



Denver Equipment Company Handbook

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Denver Equipment Company
1400 Seventeenth Street
Denver 17, Colorado

Cable Address: DECO Denver
Telephone: Denver, Colorado—CHerry 4466

DECO Engineers Handbook No. 1 is dedicated to the world-wide profession of engineers whose responsibility it is to supply essential minerals to industry and to do it with the greatest possible profit from mill operation.

Equipment and accompanying specifications has been designed to give continuous "24 Hour Service" because the age-old saying "one hour's delay means no profit today" is more important now with increased operating costs than ever before.

We have tried to supply in this handbook basic engineering facts and data on equipment as well as frequently used tables and conversion charts.

This book is designed to help you. There may be other ways that we may help you, and if so, please let us know because it is our sincere desire to be of service. All we ask is the opportunity to make you "Happier, Healthier and Wealthier" and the opportunity to work with you in supplying any or all of your equipment needs.

*"The firm that makes
its friends happier,
healthier and wealthier"*

Denver Equipment Company ...



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1400 Seventeenth Street
P.O. Box 5268

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Denver Equipment Company
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ILLINOIS, Chicago 1

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14 Avenida Juarez, Despacho 615

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220 Bay Street

CANADA, Vancouver

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ENGLAND, London, E C 2

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15-17 Christopher Street
Finsbury Square

SOUTH AFRICA, Johannesburg

Denver Equipment Co., S. A. (Pty) Ltd.
9th Ave. and Broadway, Bez. Valley

INQUIRIES

Your inquiries are solicited. Further details, specifications and bulletins on any items listed in this handbook will be supplied promptly. We will be most happy to give you our recommendation on any problem without obligation. Our primary objective is to help you by supplying sound information and proven mill equipment that will make more profit for you.

GENERAL

The dimensions and weights of machines listed in this catalog are approximately correct and are for estimating purposes only. Should the data be required for design layout or installation please write to our engineering department for latest specifications. Unless otherwise indicated, the diameter of a machine is listed first and then the length or height. For example: A 20' x 10' Thickener has a tank 20' dia. and 10' deep.

ORDERS

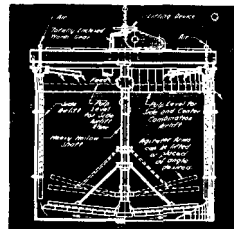
Delivery is normally an important item in selecting equipment. Delivery estimates, based on conditions existing at the time quotations are made, are subject to adjustment at the time your order is received.

Considerable time can be saved in processing an order if all necessary information is furnished. Otherwise your order may be delayed as correspondence is carried on to obtain the essential information.

Please check this list to see that your order contains the following information if applicable:

1. Customer's name and address (for mailing purposes).
2. Customer's name and address for SHIPPING purposes.
3. Name and address to which invoice and shipping papers are to be mailed.
4. Complete shipping instructions including destination and special routing if preferred.
5. Specify if this order should be consolidated with previous orders for shipment.
6. Specify the number of copies of invoice, bills of lading and packing lists you require.
7. Specify the number of sets of blueprints and operating instructions you require.
8. Specify if partial shipments are permitted. (We urge partial shipments be allowed wherever possible.)
9. Be sure to list size and description of machines ordered.
10. Describe hand of machine. (Please use sketches to indicate location of feed, discharge, source of power, etc., for each machine.)
11. Indicate type of drive; whether belt or motor drive. If it is motor drive, please specify exact electrical characteristics —phase, cycle and voltage.

AGITATOR, Denver Center and Side Air-lift



Denver Side Air-Lift Agitator

12. In case motor driven machines are ordered with the drive but without motor, the customer must furnish certified motor prints.
13. Please illustrate with sketches any special features.
14. Specify name and address of final user.
15. Give shipping date required.
16. Specify any special markings to be shown on shipment.
18. Specify final use—Uranium—Gold—Paper—Lead, etc. All export shipments require end use certificates signed by the purchaser and final user before we can apply for export licenses. If you prefer to apply for your own export license, then please let us know when placing order to avoid duplication of effort.
19. Please furnish government priority rating if available.
20. Furnish import license number if required.

Only a few of the above items may be applicable to your order but much time will be saved if an order contains all necessary information and then deliveries can be made much more promptly.

DENVER EQUIPMENT COMPANY
Box 5268, Denver 17, Colorado

THERE are three types of Denver Air-lift Agitators: Center Air-lift, Side Air-lift and a combination of the two Center-Side Air-lift.

Each type has its own advantages and application. Each type has hollow revolving center shaft so that air can be added for Center Air-lift.

A unit acquired originally for use as a Center Air-lift type, need only have the Side Air-lift pipes installed,

the angle of the rakes changed and the R.P.M. of the rakes increased, to use it as a Side Air-lift type.

The totally enclosed, running-in-oil head motion, with integral rake lifting device, is sealed against entry of dirt and is equipped with hollow center shaft so that air can be added for the Center Air-lift.

The rake lifting device is particularly advantageous when starting up after shutdown where it eliminates damage to shaft and rakes. The rakes, after having been elevated out of the settled solids can then be lowered gradually. Handwheel is conveniently located on top of mechanism.

Rake arms may be adjusted to any angle from horizontal to 45 degrees. Rakes may be changed in angle to rake toward the center or toward the periphery of the tank. Center Air-lift type operates at a normal speed of 2 to 3 R.P.M. while Side Air-lift type operates at 4 to 6 R.P.M.

Tank Size Dia. by Depth	Pulley		Side Air-lift				Center Air-lift				
	Dia. x Face	RPM	Pipe	Two Air-lifts		Weight, Bare Shaft	Rake Speed RPM	Horse Power		Weight, Bare Shaft	Rake Speed RPM
				Weight	Horse Power			Horse Power	Weight, Bare Shaft		
5'x5'	15x3	330	3"	145#	3/4-1	1060#	4-6	3/4-1	1060#	2-3	
	15x3	330	3"	165#	3/4-1	1110#		3/4-1	1110#		
7'x7'	15x3	330	3"	185#	1-1/2	1150#	4-6	3/4-1	1150#	2.3	
	15x3	330	3"	205#	1-1/2	2250#		3/4-1	2250#		
8'x8'	18x3	330	3"	225#	1-1/2	2370#	4-6	3/4-1	2370#	2-3	
	18x3	330	3"	235#	1-1/2	2500#		1-1/2	2500#		
10'x10'	18x3	360	4"	410#	2-3	3500#	4-6	1-1/2	3500#	2-3	
	18x3	360	4"	445#	2-3	3650#		1-1/2	3650#		
12'x12'	18x3	360	4"	455#	2-3	3700#	4-6	1-1/2	3700#	2-3	
	18x3	360	4"	465#	2-3	3800#		1-1/2	3800#		
14'x14'	18x3	360	5"	1155#	3-5	5865#	4-6	1 1/2-2	5865#	2-3	
	18x3	360	5"	1165#	3-5	5925#		1 1/2-2	5925#		
15'x14'	18x3	360	5"	1175#	3-5	6000#	4-6	1 1/2-2	6000#	2-3	
	18x3	360	5"	1195#	3-5	6100#		1 1/2-2	6100#		
16'x14'	18x3	360	5"	1175#	3-5	6000#					
18'x16'	18x3	360	5"	1175#	3-5	6000#					
19'x16'	18x3	360	5"	1175#	3-5	6000#					
20'x16'	18x3	360	5"	1175#	3-5	6000#					
22'x16'	24x5	360	6"	1195#	3-5	6100#					

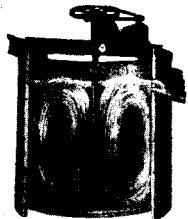
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24'x16'	24x5	360	6"	1205#	3-5	6200#		1 1/2	2	2000#		
25'x20'	30x5	360	8"	1700#	5-7 1/2	7750#	4-6	2	2	7750#	2-3	
26'x20'	30x5	360	8"	1710#	5-7 1/2	7800#		2-3	3	7800#		
28'x20'	30x5	360	8"	1730#	5-7 1/2	7900#	4-6	3-5	3-5	7900#	2-3	
30'x20'	30x5	360	8"	1750#	5-7 1/2	8000#		3-5	3-5	8000#		
35'x20'	30x5	360	8"	2150#	5-7 1/2	8750#	4-6	3-5	3-5	8750#	2-3	

Dia.	Depth	Available Tank Capacity in Cubic Feet		Additional Capacity Per Foot Depth in Cu. Feet		Air Requirements for Air lifts		
		Steel	*Wood	Steel	*Wood	C.F. M. Delivered Free Air	Compressor Piston Displacement	Pressure Lbs. Per Sq. In.
5'	5'	77	64	19.6	17.3	8	16	7.5
6'	6'	139	117	28.3	25.5	8	16	7.5
7'	7'	228	193	38.5	35.3	8	16	7.5
8'	8'	350	306	50.3	46.5	10	20	10.0
9'	9'	505	450	63.6	61.	10	20	10.0
10'	10'	682	630	78.	74.	12	24	10.0
12'	12'	1217	1133	113.	108.	14	28	12.0
14'	14'	1950	1811	154.	148.	16	32	14.0
15'	14'	2260	2200	177.	165.	18	36	14.0
16'	14'	2560	2300	201.	189.	20	40	14.0
18'	16'	3725	3430	254.	243.	25	50	16.0
19'	16'	4200	3915	284.	271.	28	56	16.0
20'	16'	4625	4280	314.	302.	30	60	16.0
22'	16'	5615	5190	380.	367.	33	66	16.0
24'	16'	6700	6230	452.	438.	35	70	16.0
25'	20'	9200	8675	491.	475.	37	74	20.0
26'	20'	9880	9280	531.	515.	38	76	20.0
28'	20'	11520	10850	616.	598.	40	80	20.0
30'	20'	13280	12550	707.	688.	50	100	20.0
35'	20'	18180	17240	962.	940.	50	100	20.0

*2" staves on all wood tanks up to and including 14'x14' and 3" staves on 15'x14' and larger wood tanks.
If 4 airlifts are required, double air requirements in above table. Pressure remains the same.

AGITATOR AND CONDITIONER, Denver (Open Type)



Denver (Open Type) Agitator and Conditioner Showing Pulp Circulation

DENVER (Open Type) Agitator and Conditioner is similar to the Denver (Patented) Super-Agitator and Conditioner except that the hood and standpipe have been eliminated. This unit can be successfully used where conditions require a moderate agitation or mixing action on light pulps. Many industrial applications where continuous mixing is required utilize this sturdy but economical agitator. Further detailed data on dimensions and capacities are available. Other valuable information can be obtained by writing any Denver Equipment Company office.

Machine Size*	Tank Capacity Cubic Feet		Overall*** Dimensions		Moto H.P.	Approx. Ship. Wt. Lbs.			
	**Wood. Steel		Dia.	Ht.		—Tank		—Mechanism	
	Wood	Steel			Wood	Steel	Belt	Motor	
3'x3'	14.4	21.2	3'4"	4'11"	1	190	190	475	500
4'x4'	38.1	50.3	4'4"	6'2"	1 1/2	330	425	680	700
5'x5'	78.8	98.1	5'5"	7'3"	2	520	670	750	800
6'x6'	141.4	169.6	6'6"	8'3"	3	760	950	950	1000
7'x7'	230.6	269.4	7'6"	9'6"	3	1030	1360	1200	1250
8'x8'	351.1	402.2	8'6"	10'9"	5	1400	1790	1350	1400
10'x10'	704.0	785.4	10'7"	12'9"	5	3300	3584	1750	1850
12'x12'	1241.0	1357.2	12'7"	16'0"	7 1/2	4700	6100	2450	2600
14'x14'	1996.0	2155.2	14'8"	18'6"	7 1/2	6500	7800	2850	3050
16'x16'	2906.0	3216.9	16'8"	20'8"	10	8570	14320	3500	3700
18'x18'	4233.0	4580.5	18'10"	22'8"	10	11243	17660	4350	4750
20'x20'	5853.0	6283.2	20'10"	25'0"	15	14245	23400	5100	5475

*Machines 14'x14' and larger built with air-lifts.
**Tanks 10'x10' and larger with 3" staves.
***For V-belt driven agitator with steel tanks.

AGITATOR, Denver Pachuca



Cross-Section of Denver Pachuca Agitator Showing Conical Bottom

DENVER Pachuca Agitators effect agitation and oxidation by means of air pressure. The tank is circular in shape, and equipped with a 60° conical false bottom and a central air tube which is approximately 1/10 of the diameter of tank.

Compressed air is introduced into the lower end of the tube by either a rubber sleeve valve, a ball cock, or a plain pipe line extending from the top of the tank to the bottom of the tube. The lower end of this pipe line is turned up to introduce the jet of air into the lift tube.

After the tank is filled with pulp, the air valve is opened. This permits the air to enter the tube under pressure, making an upward current, and overflowing at the top while fresh pulp is taken in at the bottom. A complete circulation of the pulp is produced by this action, and it can be continued until all values have passed into solution.

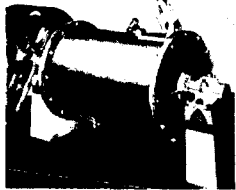
Size	Capacity Cu. Ft.	*Dimensions		Air Pressure Lbs.	Approx. Shipping Wt., Lbs.
		Diam.	Height		
10'x30'	1800	10'	30'	20-30	13000
12'x36'	3000	12'	36'	20-30	20000
15'x45'	5500	15'	45'	30-40	30000

*Special sizes can be furnished.

AGITATOR AND CONDITIONER, Denver (Patented) Super-

— See **CONDITIONER**,

AMALGAMATION BARREL, Denver



24"x36" Denver Amalgamation Barrel
Belt Drive, Showing Clean-Out Doors

DENVER Amalgamation Barrel is used for batch grinding of gold concentrates and industrial materials. Originally it was developed for the gold milling industry, where it is used to grind concentrates from mineral jigs, concentrating tables, traps and blankets. When the high grade concentrates to be treated contain elements that foul the mercury, this barrel is recommended.

Industrial materials can be batch ground, either wet or dry. Special lifter bars can be supplied for mixing purposes. Rubber liners may be furnished to reduce abrasion losses. Shell is replaceable.

Belt or motor drive can be supplied according to individual requirements. For amalgamation work a two speed motor drive is recommended, the high speed for the initial grinding operation and the low speed when the mercury is added.

The emptying and cleaning of this unit is greatly simplified by its distinctive design. Two clean-out doors are provided at opposite ends of the barrel, and an extra grate door arrangement allows the discharging of the unit while retaining the grinding medium.

More complete information can be obtained by writing any Denver Equipment Company office.

Machine Size Inches	Capacity Per Charge Lbs.	Dimensions			Motor H.P.	Approx. Shipping Wt. Lbs.	
		L	W	H		*Belt Motor	
						*Belt	Motor
18x24	50-100	48"	24"	28 1/2"	1	790	990
18x36	100-150	60"	24"	28 1/2"	1	930	1090
18x48	150-200	72"	24"	28 1/2"	1 1/2	1070	1250
24x36	300-400	69"	30"	33 1/2"	2	1780	1985
24x48	400-500	81"	30"	33 1/2"	3	2025	2300
32x48	700-800	82"	37"	43 1/2"	5	3025	3405
36x48	1200-1350	88"	45"	50"	7 1/2	5400	6000
42x48	1600-1800	88"	51"	56"	7 1/2	5865	6345

*No Pulleys are included.

†Made in Canada only.

AMALGAMATION CLEAN-UP PAN, Denver (Wheeler Type)



36" Denver Amalgamation
Clean-Up Pan

THE Clean-Up Pan has all the advantages of the arrastra and Wheeler Pans, and is designed for batch or continuous amalgamation treatment of high grade ore, flotation and table concentrates. Greater profits can be realized by removing all free metallics before a concentrate is shipped to the smelter.

In continuous operation, the slimes overflow at the weir and the heavier metallics settle to the bottom where they are wetted and absorbed by the mercury. The mineral values are ground and polished by heavy shoes which are dragged over a stationary die ring. Due to the design of this die ring the mercury is not actually ground with the pulp so there is little "flouring" and loss of mercury. The height of the shoes above the die ring is adjustable and they are easily replaced.

Machine Size	*Capacity Tons 24 Hrs.	Dimensions			Motor H. P.	Shipping Wt., Lbs.	
		L	W	H		†Belt	Motor
24"	5-7	36"	39"	43"	3	1075	1375
36"	10-15	49"	54"	78"	5	2700	3100
60"	25-35	78"	79"	109"	7 1/2	8250	8850

*Capacity depends upon size of feed, fineness of grind, and the application. When used primarily as an amalgamator, the capacity is greater than when used for grinding as well as amalgamation.

†Includes tight and loose pulleys.

Denver Ore Tests are made on an "actual cost" basis. This brings the world's finest laboratory equipment and skilled technicians to your service at a very low cost.

AMALGAMATION DRUM, Denver

WHEREVER free gold occurs in a heavy concentrate, whether from placer or milling operations, the Denver Amalgamation Drum is the ideal machine to remove the gold in the form of amalgam, leaving a mineral-free tailing.

Ordinarily a single large ball is used and this grinds and amalgamates the mineral with the least possibility of flouring the mercury. A tilting device is arranged so that the slimes

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12" Denver Amalgamation Drum Discharging Slimes while Rotating

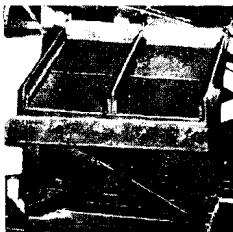
can be drained out while the drum is rotating. The concentrate is removed through a drain outlet located on the amalgam groove. This groove collects the mercury and holds the concentrate while the slimes are being discharged.

This amalgamation drum is very inexpensive and easy to operate. It should be used for the final clean up of gold concentrates from larger amalgamation operations in place of mortars and hand pans.

Machine Size	Capacity Lbs. per Chg.	Drive	Dimensions			H.P.	Shipping Wt., Lbs.	
			L	W	H		Gas	Belt Motor
12"	25-50	Without	23"	18"	17"	3/4	435	235
12"	25-50	With	52"	24"	17"	3/4	1863	460
*24"	92-125	With	86"	58"	38"	1 1/2		1805

*Available sectionalized for multiback transportation.

AMALGAMATION PLATE, Denver



Denver Amalgamation Plates Mounted on Wood Bench

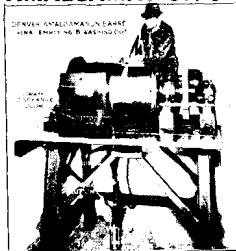
DENVER Amalgamation Plates are made from the finest cold rolled annealed copper plate, approximately 1/8" thick, with one, one and one-half or two ounces of silver plating per square foot. Heavier plating is apt to peel, and is not recommended.

Standard sizes are shown in the following table. These should be specified wherever possible as odd sizes necessitate extra cutting and a 10% increase in price.

All plates are carefully wrapped in blankets and then boxed to prevent damage in shipment. Shipping weight is approximately nine pounds per square foot.

Plate Size	Approx. Plate Thickness	Dimensions		Approx. Shipping Wt., Lbs.		
		W	L	1 oz. Ag. per Sq. Ft.	1 1/2 oz. Ag. per Sq. Ft.	2 oz. Ag. per Sq. Ft.
No. 1	1/8"	48"	48"	144	145	146
No. 2	1/8"	48"	52"	156	157	158
No. 3	1/8"	48"	54"	162	163	164
No. 4	1/8"	48"	60"	180	181	182
No. 5	1/8"	48"	96"	288	289	290
No. 6	1/8"	48"	144"	432	433	434
No. 7	1/8"	52"	96"	312	313	314
No. 8	1/8"	54"	96"	324	325	326
No. 9	1/8"	60"	96"	360	361	362
No. 10	1/8"	60"	144"	540	541	542

AMALGAMATION UNIT, Denver



Denver Amalgamation Unit

DENVER Amalgamation Unit has been developed to simplify and speed up the discharging and cleaning of concentrates after treatment in the Denver Amalgam Barrel. The Unit consists of steel supporting framework on which is mounted the amalgam barrel with trunnions and drive, splash pans and amalgam separator. The complete Unit is used to regrind and amalgamate concentrates, and the usual practice consists of:

(1) The first period, ranging from 6 to 12 hours, is for regrinding the concentrates to free the gold from the ore or sulphides, as well as to thoroughly mix the pulp with any chemicals, such as lime, soda ash, caustic soda, or nitrates. This operation, to be most efficient, is conducted at a grinding speed, and usually requires no attention. It can be conducted on the amalgamator's off-shaft.

(2) The second step, which usually lasts from one to two hours, consists of first adding the mercury needed to amalgamate the gold and then running the barrel at approximately one-half the original grinding speed. The lower speed reduces the flouring of the mercury to a minimum. It is easily obtained by use of the two-speed motor supplied as standard.

(3) A grate is placed on one of the discharge openings and as the barrel is rotated the contents are drained out, aided by wash water introduced through the swivel water connection.

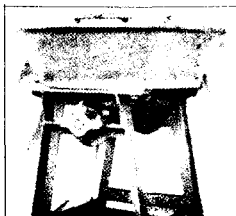
(4) In the Denver Separator, the amalgam and mercury are removed from the gangue material. This separation is accurately performed by a carefully controlled upward flowing current of water, which the operator watches through the heavy glass tube of the separator. The amalgam and mercury drop into a container or locked receptacle for subsequent retorting and reduction to a gold and silver bullion bar.

More complete information can be obtained by writing any Denver Equipment Company office.

Machine Size	Capacity Lbs. per Charge	Dimensions			H.P. Motor	Shipping Wt., Lbs.	
		L	W	H		*Belt	Motor
18"x24"	50 100	63"	54"	51"	1	1090	1155
18"x36"	100-150	63"	66"	51"	1	1330	1380
18"x48"	150-200	63"	78"	51"	1 1/2	1600	1660
24"x36"	300-400	81"	76"	108"	3	2600	2675
24"x48"	400-500	93"	76"	108"	3	3220	3390
32"x48"	700-800	93"	84"	116"	5	4210	4810
36"x48"	1200-1350	93"	105"	125"	5	6320	6745
42"x48"	1600-1800	93"	117"	135"	7 1/2	6490	6890

*Built in Canada only.

†Includes tight and loose pulleys.



Denver Arrastra

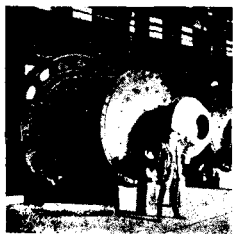
THE Arrastra is used in small gold mills to treat high grade gravity concentrates by batch amalgamation. Its capacity is 200 to 300 pounds of concentrates per day. The usual practice is to grind a small charge 5 to 7 hours, or until fine enough to add mercury, after which grinding is continued for several hours. Every day the finely ground charge is flushed out to waste and a new charge shoveled in.

Periodically the accumulated amalgam is cleaned out of the Arrastra.

The Arrastra consists of two alloy iron shoes which are dragged along the bottom of a 30" diameter circular bowl by means of a rotating arm. The bowl and bevel gear drive are mounted on cast iron legs. Power required is about 3 horsepower. Shipping weight on the belt-driven machine is approximately 750 pounds.

BALL MILL, A-C

A PULP level sufficiently high to interpose a bed of pulp, partly to cushion the impact of the balls, permits a maximum crushing effect with a minimum wear of steel. The pulp level of the Allis-Chalmers Ball Mill can be varied from discharging at the periphery to discharging at a point about half way between the trunnion and the periphery.



Allis-Chalmers Ball Mill Showing Drum Type Feeder

The mill shell is of welded plate steel with integral end flanges turned for perfect alignment, and the heads are semi-steel, with hand holes in the discharge end through which the diaphragm regulation is arranged with plugs.

The trunnion bearings are babbitted, spherical, cast iron, and of ample size to insure low bearing pressure; while the shell and saddle are machined to gauge so that the shells are interchangeable.

Various types of liners and drives are available and further information will be supplied on request.

(Continued on next page)

Size	45% Ball Load (Lbs.)	R. P. M.	Short Tons/24 Hrs.		Motor Output (HP)	Motor Size
			65%—200	85%—200		
3' x 5'	3,700	44	33	23	23	25
4' x 4'	5,600	37½	50	35	34	40
4½' x 6'	10,500	35	95	65	64	75
5' x 5'	11,000	30½	100	70	68	75
5½' x 8'	22,000	28	200	140	135	150
6' x 6'	19,500	26½	180	125	120	125
6' x 8'	26,000	26½	240	170	160	175
6½' x 6'	23,000	25	215	150	140	150
6½' x 8'	30,500	25	290	205	187	200
7' x 6'	26,500	23½	250	175	162	175
7' x 8'	35,500	23½	335	235	216	225
7' x 10'	44,000	23½	420	300	270	275
8' x 6'	35,000	21½	340	240	214	225
8' x 8'	47,000	21½	460	325	290	300
8' x 10'	58,000	21½	560	390	356	375
9' x 7'	52,000	19½	525	370	320	325
9' x 8'	60,000	19½	605	425	370	375
9' x 9'	68,000	19½	685	480	420	425
9' x 12'	90,000	19½	910	635	555	600
9½' x 8'	66,500	18½	665	460	400	400
9½' x 10'	83,000	18½	830	575	500	500
9½' x 12'	99,500	18½	1000	695	600	600
10½' x 8'	82,000	17	850	600	500	500
10½' x 10'	102,000	17	1070	755	625	650
10½' x 12'	123,000	17	1275	900	725	750

Data based on:—Wet grinding, single stage, closed circuit operation: feed—(½" one way dimension): Class III ore. All mills—free discharge, grated type, rapid pulp flow. N. B.—for overflow type mills: capacity 80%—power 83%. Dimensions:—"diameters" inside shell without liners—"lengths" working length shell between end liners.

We have often been referred to as the "Diagnosticians of the ore dressing industry." Perhaps we can help you with your mineral recovery problems. Please let us try.

BALL MILL, DENVER (Muleback Type)



Denver (Muleback Type) Ball Mill

DENVER (Muleback Type) Ball Mill is built for "muleback" transportation in 30" and 3' diameters (inside liners). A 4' Denver (Muleback Type) Ball Mill is of special design and will be carefully considered upon request. Man-kind's search for valuable minerals often leads him far away from modern transportation facilities. The potential sources of gold, silver and

strategic minerals are often found by the prospector, not close by our modern highways, but far back in the mountains and deserts all over the world. The Denver Equipment Company has realized this fact, and therefore has designed a Denver Ball Mill that can be transported to these faraway and relatively inaccessible properties, either by the age old "muleback" transportation system, or by the modern airplane. As a result these properties may now obtain a well-designed ball mill with the heaviest individual piece weighing only 350 pounds.

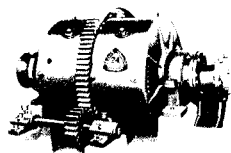
The prime factor considered in this design was to furnish equipment having a maximum strength with a minimum weight. For this reason, these mills are made of steel, giving a high tensile strength and light weight to the mills. The "muleback" design consists of the sturdy cast iron head construction on the 30" size and cast steel head construction on the larger sizes. The flanges on the heads are arranged to bolt to the rolled steel shell provided with flanged rings. When required, the total length of the shell may consist of several shell lengths flanged together to provide the desired mill length. Liners, bearings, gears and drives are similar to those standard on all Denver Ball Mills.

Submission of your problem to the Engineering Department of the Denver Equipment Company will result in prompt and accurate analysis of the conditions involved, with a recommended solution to the problem.

More complete information can be obtained by writing any Denver Equipment Company office.

Size	Capacity Tons/24 Hours	Net Weight of Heaviest Pieces—Lbs.				Motor H. P.
		Head	Trunnion	Shell Section	Gear	
30" x 18"	3-5	195	190	245	140	5
30" x 36"	7-10	195	190	245	140	7 1/2
30" x 54"	10-12	195	190	245	140	10
30" x 72"	12-15	195	190	245	210	15
3' x 2'	6-15	310	290	325	230	10
3' x 3'	9-20	310	290	325	230	15
3' x 4'	12-25	310	290	325	230	15
3' x 5'	15-30	310	290	325	315	15
3' x 6'	18-35	310	290	325	315	20
3' x 8'	21-45	310	290	325	315	25
3' x 9'	27-50	310	290	325	315	25

BALL MILL, DENVER 30"



30" x 36" Denver (Convertible)
Ball Mill

THIS Denver (Convertible) Ball Mill is unique in design and is particularly adapted to small milling plants. The shell is cast in one piece with a flange for bolting to the head. In converting the mill from a 30"x18" to a 30"x36" unit with double the capacity, it is only necessary to secure a second cast shell (a duplicate of the first) and bolt it to the original section.

Denver 30" Convertible Ball Mills are furnished with scoop feeders with replaceable lips. Standard mills are furnished with liners to avoid replacement of the shell; however, the mill can be obtained less liners. This ball mill is often driven by belts placed around the center, although gear drive units with cast gears can be furnished. A Denver Spiral Screen can be attached to the discharge.

More complete information can be obtained by writing any Denver Equipment Company office.

Machine Size	Cap. Tons 24 Hrs. Minus 40 Mesh	Ball Load Lbs.	Dimensions			Motor H.P.	**Approx. Shipping Wt. Lbs.	
			L	W	H		Belt	Motor
30"x18"	5-7	980	45"	39"	41"	5	1660	2060
30"x36"	7-10	1900	66"	39"	41"	7 1/2	2575	2975
30"x54"	10-12	2850	84"	39"	41"	10	2950	3450
30"x72"	12-15	3800	102"	39"	41"	15	3425	4025

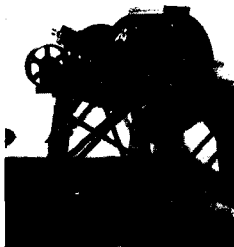
*Sectionalized construction.

**Weights are for ball mills without liners.

Sizes 30" x 36" and longer are also available in steel construction.

Denver Equipment Company publishes **DECO TREFOIL**, an exchange of helpful engineering information designed to improve milling. DECO TREFOIL is published every other month. If you are connected with mining and do not receive DECO TREFOIL please write to us.

BALL MILL, Denver Batch



Denver Batch Ball Mill

THIS mill may be used for batch or intermittent grinding, or mixing of dry or wet materials in the ore dressing industry, metallurgical, chemical, ceramic, or paint industries. The material is ground and mixed in one operation by rotating it together with balls, or pebbles in a hermetically sealed cylinder.

The cast iron shell which is bolted to the heads is made with an extra thick wall to give long wearing life. Two grate cleanout doors are provided on opposite sides of the shell by means of which the mill can be either gradually discharged and washed, while running, or easily and rapidly emptied and flushed out while shut down. Wash-water is introduced into the interior of the mill through a tapped opening in the trunnion. The mill may be lined with rubber, silex (buhstone) or wood if desired.

Drives available are as follows: (1) Motor, V-belts and spur gears; (2) Flat-belt drive through tight and loose pulleys and spur gears; (3) Flat-belt drive through tight and loose pulleys direct to trunnion shaft.

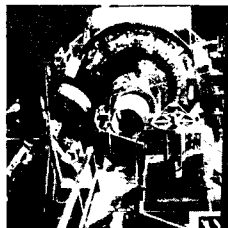
Machine Size	Capacity Lbs. Per Charge	Dimensions			Motor H.P.	Shipping Wt. Lbs.	
		L	W	H		*Belt	Motor
18"x24"	50-100	63"	54"	51"	1 1/2	1090	1155
18"x36"	100-150	63"	66"	51"	1 1/2	1330	1380
18"x48"	150-200	63"	78"	51"	2	1600	1650
24"x36"	300-400	81"	76"	108"	5	2600	2675
24"x48"	400-500	93"	76"	108"	5	3220	3390
32"x48"	700-800	93"	84"	116"	7 1/2	4210	4810
36"x48"	1200-1350	93"	105"	125"	7 1/2	6320	6745
42"x48"	1600-1800	93"	117"	135"	10	6490	6890

[†]Built in Canada only.

*Includes tight and loose pulleys.

Mill design and Flowsheet design are also services of Denver Equipment Co. Write for details how these services might help you.

BALL MILL, Hardinge Conical



Denver "Sub-A" Unit Flotation Cell Taking Conical Mill Discharge

THE Hardinge Conical Ball Mill has been widely used with outstanding success in grinding many materials in a wide variety of fields. The conical mill operates on the principle of an ordinary ball mill with a certain amount of classification within the mill itself, due to its shape.

In operations in the field one of the main advantages of this type of ball mill is the structural strength due to the conical steel ends.

Sizes of conical mills are given in diameter of the cylindrical section in feet and the length of the cylindrical section in inches. Liners can be had of hard iron, manganese steel or Belgian Silex. Forged steel balls or Danish Flint Pebbles are used for the grinding media, depending upon the material being milled.

Various types of drives can be furnished to suit the individual requirements of particular installations. Let us make recommendations for most efficiently solving your grinding problem.

APPROXIMATE CONICAL BALL MILL CAPACITIES MEDIUM HARD ORE

Size of Mill	*Capacity, Tons per 24 Hours				Floor Space Feet	R.P.M. of Mill
	2" to 10 Mesh	1" to 65 Mesh	3/4" to 80 Mesh	1/2" to 200 Mesh		
2' x 8"	5	3	2 1/2	2	3x5	42
3' x 8"	12	8	6 1/2	5 1/2	5x7	35
3' x 24"	22	13	10	9	5x8	35
3' x 36"	30	18	15	12	5x9	34
4' x 48"	50	28	23	18	7x10	30
4 1/2' x 24"	60	35	28	23	7x11	30
5' x 22"	90	50	40	33	9x10	28
5' x 36"	115	65	52	42	9x11	28
6' x 22"	160	90	72	60	10x11	26
6' x 36"	190	115	92	77	10x12	26
6' x 48"	230	140	110	90	10x13	26
7' x 22"	260	150	120	100	11x12	23
7' x 36"	300	175	140	115	11x13	23
7' x 48"	350	225	175	150	11x14	23
8' x 36"	475	275	225	185	12x14	21
8' x 48"	550	325	260	215	12x15	21
8' x 60"	650	375	300	250	12x16	20
8' x 72"	725	425	340	280	12x17	19
10' x 48"	1000	575	460	380	13x16	17
10' x 66"	1200	700	550	465	13x18	17

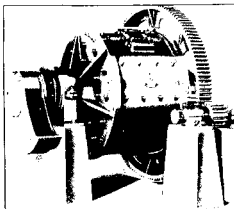
*The capacities shown in the first column are based upon the mill operating in open circuit, and those in the other three columns, in closed circuit.

CONICAL BALL MILLS
CONTINUED

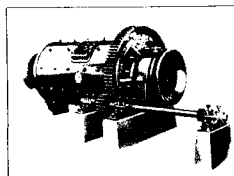
Size of Mill	H.P.		Approximate Weight, Pounds		
	To Run	Size Motor	Mill	Lining	Ball Charge
2' x 8"	1	2	900	375	500
3' x 8"	1	7 1/2	3,800	1,400	1,000
3' x 24"	5		4,300	2,200	1,800
3' x 36"	12	15	5,000	3,000	2,500
4' x 36"	18	20	7,700	4,800	4,000
4' x 24"	23	25	8,100	5,400	5,000
5' x 22"	28	30	11,000	7,800	7,500
5' x 36"	34	40	12,000	8,800	9,000
6' x 22"	45	50	15,000	10,000	12,000
6' x 36"	56	60	16,000	11,000	15,000
6' x 48"	66	75	17,000	12,000	18,000
7' x 22"	73	75	17,500	12,500	20,000
7' x 36"	90	100	18,500	13,500	24,000
7' x 48"	110	125	23,000	17,000	28,000
8' x 36"	135	150	24,000	19,000	33,000
8' x 48"	155	175	27,000	23,000	37,000
8' x 60"	175	200	30,000	26,000	42,000
8' x 72"	195	225	33,000	29,000	47,000
10' x 48"	260	300	42,000	30,000	65,000
10' x 66"	320	350	51,000	35,000	75,000

—Taken from Hardinge Catalog

BALL-ROD MILL, Denver Steel Head



6'x4' Denver Steel Head Ball Mill



1'x10' Denver Steel Head Rod Mill with Large Discharge Trunnion

THE Denver Steel Head Ball-Rod Mill gives the ore dressing engineer a wide choice in grinding design so that he can easily secure a Denver Ball-Rod Mill suited to his particular problem. The successful operation of any grinding unit is largely dependent on the method of removing the ground pulp. The Denver Ball-Rod Mill is available with five types of discharge trunnions, each type obtainable in small, medium or large diameters. The types of discharge trunnions are (1) overflow, (2) perforated overflow, (3) return spiral, (4) grate, and (5) peripheral. Thus the engineer can fit any one of fifteen methods of discharging a ball mill into grinding problem.

The superiority of the Denver Steel Head Ball-Rod Mill

is due to the all steel construction. The trunnions are an integral part of the cast steel heads and are machined with the axis of the mill. The mill heads are assured against breakage due to the high tensile strength of cast steel as compared to that of the cast iron head found on the ordinary ball mill. Denver Trunnion Bearings are made of high-grade nickel babbitt.

Denver Steel Head Ball-Rod Mills can be converted into larger capacity mills by bolting an additional shell length onto the flange of the original shell. This is possible because all Denver Steel Head Ball-Rod Mills have bearings suitable for mills with length twice the diameter.

Head and shell liners for Denver Steel Head Ball-Rod Mills are available in Decolloy (a chrome-nickel alloy), hard iron, electric steel, molychrome steel, and manganese steel. Drive gears are furnished either in cast tooth spur gear and pinion or cut tooth spur gear and pinion. The gears are furnished as standard on the discharge end of the mill, out of the way of the classifier return feed, but can be furnished at the mill feed end by request. Drives may be obtained according to the customer's specifications.

Denver Ball-Rod Mills have greater capacity than most mills because the diameters of Denver Ball-Rod Mills are measured inside the liners, while most mills measure inside the shell.

Additional data gladly furnished upon request.

Size D x L	Cap. Tons Per 24 hrs.	Size of Scoop Feeder	Dimensions		
			L	W	H
3'x2'	6 15	13' or 19'	5'-11"	6'-3"	4'-10"
3'x4'	9 20	13' or 19'	6'-11"	6'-3"	4'-10"
3'x4'	12 25	13' or 19'	11'-10"	6'-3"	4'-10"
3'x5'	15-30	13' or 19'	12'-10"	6'-3"	4'-10"
3'x6'	18-35	13' or 19'	13'-10"	6'-3"	4'-10"
3'x8'	24-45	13' or 19'	15'-10"	6'-3"	4'-10"
3'x9'	27 50	13' or 19'	16'-10"	6'-3"	4'-10"
4'x3'	22-42	30' or 36"	12'-10"	8'-0"	6'-7"
4'x4'	25-52	30' or 36"	13'-10"	8'-0"	6'-7"
4'x5'	31-63	30' or 36"	14'-10"	8'-0"	6'-7"
4'x6'	37-74	30' or 36"	15'-10"	8'-3"	6'-7"
4'x8'	50-95	30' or 36"	17'-10"	8'-3"	6'-7"
4'x10'	62-116	30' or 36"	19'-10"	8'-3"	6'-7"
5'x3'	40-77	30', 36' or 42"	14'-0"	9'-11"	7'-9"
5'x4'	45-94	30', 36' or 42"	15'-0"	9'-11"	7'-9"
5'x5'	56-112	30', 36' or 42"	16'-0"	10'-2"	7'-9"
5'x6'	67-130	30', 36' or 42"	17'-0"	10'-2"	7'-9"
5'x8'	90-170	30', 36' or 42"	19'-0"	10'-2"	7'-9"
5'x10'	113-210	30', 36' or 42"	21'-0"	10'-2"	7'-9"
5'x12'	136-250	30', 36' or 42"	23'-0"	10'-2"	7'-9"
6'x4'	82-172	36', 42' or 48"	16'-2"	12'-8"	10'-4"
6'x5'	101-210	36', 42' or 48"	17'-2"	12'-8"	10'-4"
6'x6'	124-260	36', 42' or 48"	18'-2"	12'-8"	10'-4"
6'x8'	153-325	36', 42' or 48"	20'-2"	12'-8"	10'-4"
6'x10'	185-390	36', 42' or 48"	22'-2"	12'-8"	10'-4"
6'x12'	215-465	36', 42' or 48"	24'-2"	12'-8"	10'-4"

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APPROXIMATE MARCY BALL MILL CAPACITIES
MEDIUM HARD ORE

Size D x L	Pulley Size	Horsepower		Ball Charge Pounds	Rod Charge Pounds	Approx. Ship. Wt., Lbs.	
		To Run	Motor			Belt	Motor
3'x2'	30'x5'	7 1/2	10	1600		6650	7300
3'x3'	30'x6'	10	15	2500		7100	8300
3'x4'	30'x6'	12	15	3400		7950	8950
3'x5'	30'x8'	14	15	4300	4500	8700	9700
3'x6'	30'x10'	17 1/2	20	5200	5500	9450	10500
3'x8'	30'x10'	22	25	7000	7500	10850	12300
3'x9'	30'x10'	24	25	8200	8500	11600	13100
4'x3'	36'x8'	17	20	4300		13700	14900
4'x4'	36'x10'	22	25	5900		15100	16600
4'x5'	36'x10'	28	30	7500		16750	18450
4'x6'	42'x10'	35	40	9100	9800	18600	20500
4'x8'	42'x10'	42	50	12300	13400	21650	23850
4'x10'	42'x10'	49	50	15600	16900	25750	28200
5'x3'	48'x10'	34	40	6700		17250	19350
5'x4'	48'x10'	41	50	9200		20450	22830
5'x5'	54'x12'	48	50	11700		23700	25950
5'x6'	54'x12'	57	60	14300		28100	31200
5'x8'	54'x14'	73	75	19300	20900	32400	36000
5'x10'	54'x14'	88	100	24300	26500	37350	42000
5'x12'	54'x14'	103	125	29300	32100	42500	47800
6'x4'	60'x14'	71	75	13100		38000	42200
6'x5'	60'x14'	87	100	16800		41000	46500
6'x6'	60'x14'	104	125	20500		44000	49300
6'x8'	60'x16'	130	150	28000	30000	50000	56300
6'x10'	60'x16'	150	175	35500	38000	56000	62300
6'x12'	60'x16'	175	200	43000	46000	62000	69500

BALL MILLS, Marcy

No. 75 Left-Hand Marcy Ball Mill
Showing Feed Scoop

THE MARCY Ball Mill has found wide application in wet or dry grinding of materials for industrial uses. It consists of a cylinder mounted on trunnions and lined with removable manganese steel liners. Material feeds in one end, rapidly passes through and is discharged at the other in a continuous operation. The entire discharge end is fitted with a grate or screen, back of which are radial lifters or blades which elevate and quickly remove the ground material. This material rapidly sifts through the grates; the lifters pick it up at once and discharge it out the trunnion, through which no balls or coarse pieces of material can escape.

The Marcy Mill will take material as coarse as 2 1/2 inches and deliver an 8 mesh product without the use of screens or classifiers. In conjunction with a screen or classifier it will deliver any mesh product. Mills Nos. 32, 43, and 54 can be sectionalized for muleback transportation when necessary. Information furnished upon request.

The Marcy Mill will take material as coarse as 2 1/2 inches and deliver an 8 mesh product without the use of screens or classifiers. In conjunction with a screen or classifier it will deliver any mesh product. Mills Nos. 32, 43, and 54 can be sectionalized for muleback transportation when necessary. Information furnished upon request.

Mill No.	Size of Mill		Tons 24 Hours					
	Dia.	Lgth.	1 1/2"	1 3/4"	2"	2 1/2"	3"	3 1/2"
			to 8 Mesh	to 20 Mesh	to 35 Mesh	to 48 Mesh	to 65 Mesh	to 100 Mesh
32	3' x 2'		22	17	14	12	9	5
33	3' x 3'		33	25	21	18	13	8
34	3' x 4'		44	34	28	24	18	10
43	4' x 3'		55	44	36	31	22	14
44	4' x 4'		75	59	48	41	30	20
45	4' x 5'		93	75	60	51	38	25
54	5' x 4'		138	108	96	79	55	32
56	5' x 6'		207	162	144	118	83	48
63	6' x 3'		220	173	150	122	86	52
64 1/2	6' x 4 1/2'		330	260	215	187	130	78
65	6' x 5'		367	288	240	207	146	87
66	6' x 6'		440	345	288	248	175	104
75	7' x 5'		720	560	470	405	290	170
76	7' x 6'		865	675	564	486	348	204
77	7' x 7'		1010	789	658	567	406	238
86	8' x 6'		1100	860	720	620	450	260
97	9' x 7'		1540	1200	1000	880	640	365
109	10' x 9'		2700	2080	1744	1548	1125	647

Mill No.	Size of Mill		Usual Ball Charge Wt. Lbs.	R.P.M. of Mill	H.P.		Approx. Shipping Weight Pounds Complete Without Balls
	Dia.	Lgth.			To Run	*Motor Recom- mended	
32	3' x 2'		1000	35	6-8	10	7500
33	3' x 3'		1500	35	8-11	15	8600
34	3' x 4'		2000	35	12-15	20	9800
43	4' x 3'		2500	31	15-20	20	13460
44	4' x 4'		3300	31	18-23	25	15000
45	4' x 5'		4200	31	25-30	30	18000
54	5' x 4'		5000	29	30-40	40	24000
56	5' x 6'		7500	29	40-50	60	28000
63	6' x 3'		6000	25	50-60	60	39000
64 1/2	6' x 4 1/2'		9000	25	65-90	100	42000
65	6' x 5'		10000	25	70-95	100	45000
66	6' x 6'		12000	25	90-115	125	50000
75	7' x 5'		18000	23	100-150	150	75000
76	7' x 6'		21600	23	110-160	175	79000
77	7' x 7'		25200	23	150-190	200	84000
86	8' x 6'		28000	22	150-225	250	95000
97	9' x 7'		46000	19	325-350	350	136000
109	10' x 9'		74000	17 6	550-580	600	171000

*A low current, high starting torque motor is recommended for less than 20 H.P.; above that size a wound rotor (slip ring) motor should be used.

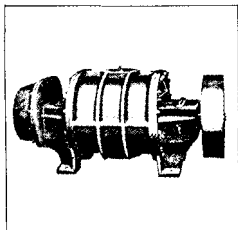
BALLS, Denver Grinding

DENVER Grinding Balls are forged from the best high-carbon manganese steel and are non-breakable. These balls are of the very highest quality that can be produced, and give long, satisfactory service. Prices on either small or cart-loads are gladly furnished upon request.

Denver Cast Alloy Steel Balls are lower in price than the forged type and where freight and haulage are not factors, they are often more desirable.

Size of Grinding Ball, Diam.	Approx. Weight Each in Pounds	No. of Balls Per Keg	Net Average Weight Per Keg
3/4"	.0626	3195	200
7/8"	.0995	2010	200
1"	.1484	1348	200
1 1/4"	.2894	680	200
1 1/2"	.5000	200	200
2"	1.1854	155	186
2 1/2"	2.1553	82	218
3"	4.0051	42	168
3 1/2"	6.3532	28	178
4"	9.4834	17	159
5"	18.5224	8	143

BLOWER, Denver Rotary



Denver Rotary Blower

DENVER Rotary Blower for pressure and vacuum service is universally used with gas or oil burners, furnaces, forges, ovens, etc.

Two interengaging impellers, rotating in opposite directions draw air into the pockets between the impellers and the case, and force this air into the discharge pipe. The amount of air displaced by these impellers at each revolution is definitely known, so that an R.P.M. may be selected to deliver any required amount of air.

Denver Rotary Blowers are simple in design, without valves, sliding vanes, springs, or other delicate parts to wear, break, or become noisy. All the parts are made of the best grade of material obtainable to carry the stresses placed on each particular piece. Low bearing and gear tooth loads, and small clearances between operating parts, enable these blowers to maintain their original efficiency for many years.

Blower Size No.	R.P.M.	1 Lb.			2 Lbs.			3 Lbs.			5 Lbs.			6 Lbs.			7 Lbs.		
		Co. Ft.	H.P.	Co. Ft.	Co. Ft.	H.P.	Co. Ft.	H.P.	Co. Ft.	H.P.	Co. Ft.	H.P.	Co. Ft.	H.P.	Co. Ft.	H.P.	Co. Ft.	H.P.	
Low Pressure Range—1 to 3 Lbs.																			
24	1 1/2	860	15	0.2	12	0.3	10	0.4	8	0.5	7	0.6	6	0.7	5	0.8	4	1.0	3.5
		1160	24	0.2	21	0.4	18	0.5	15	0.6	12	0.8	10	1.0	8	1.2	7	1.5	5	2.0
36	2 1/2	860	62	0.5	52	1.0	45	1.5	38	2.0	32	2.5	28	3.0	24	3.5	20	4.5	15
		1160	92	0.7	82	1.3	75	2.0	66	2.8	58	3.5	50	4.0	42	4.5	35	5.5	28	7.0
47	3 1/2	690	90	0.7	70	1.2	60	1.9	50	2.5	42	3.0	36	3.5	30	4.0	24	4.5	18
		900	108	0.8	90	1.5	80	2.0	70	2.5	60	3.0	50	3.5	42	4.0	35	4.5	28
59	5	690	178	1.2	160	2.3	150	3.2	140	4.2	130	5.0	120	5.5	110	6.0	100	6.5	90
		900	230	1.5	215	2.8	200	4.2	190	5.0	180	5.5	170	6.0	160	6.5	150	7.0	140
615	4	575	330	2.0	305	3.8	285	5.7	265	7.0	245	8.0	225	8.5	205	9.0	185	9.5	165
		690	405	2.3	380	4.0	365	5.5	350	6.5	340	7.0	330	7.5	320	8.0	310	8.5	300
717	5	575	570	3.2	540	6.5	515	9.7	490	12.0	470	14.0	450	15.5	430	17.0	410	18.5	390
		690	700	4.0	670	8.0	650	12.0	630	14.0	610	15.5	590	17.0	570	18.5	550	20.0	530
Medium Pressure Range—1 to 5 Lbs.																			
22	1	1160	12	0.1	10	0.2	8	0.3	7	0.4	6	0.5	5	0.6	4	0.7	3	0.8	2.5
		1750	21	0.2	18	0.3	16	0.5	14	0.6	12	0.8	10	1.0	9	1.2	8	1.5	7
33	2	1160	36	0.3	32	0.6	28	0.9	24	1.2	20	1.5	18	1.8	16	2.0	14	2.2	12
		1750	56	0.4	50	0.9	45	1.3	41	1.5	38	2.0	34	2.2	30	2.5	26	2.8	22
44	3	860	60	0.5	53	0.9	47	1.3	43	1.7	40	2.0	37	2.2	34	2.5	31	2.8	28
		1160	80	0.6	80	1.2	75	1.6	70	2.2	65	2.8	60	3.0	55	3.5	50	4.0	45
55	4	690	95	0.7	85	1.2	80	1.8	72	2.5	68	3.0	62	3.5	58	4.0	54	4.5	50
		900	122	0.8	118	1.5	107	2.3	100	3.0	96	3.9	90	4.5	84	5.0	78	5.5	72
67	5	575	165	1.0	154	2.0	145	3.0	135	4.0	130	4.9	125	5.5	120	6.0	115	6.5	110
		690	200	1.2	190	2.4	182	3.5	175	4.6	170	5.7	165	6.0	160	6.5	155	7.0	150
61	6	575	215	1.4	200	2.6	190	3.9	180	5.0	170	6.3	160	7.0	150	7.5	140	8.0	130
		690	270	1.5	255	3.1	245	4.6	235	6.1	225	7.5	215	8.0	205	8.5	195	9.0	185
610	3	575	310	1.8	300	3.0	290	4.0	280	5.0	270	6.0	260	7.0	250	8.0	240	9.0	230
		690	415	2.3	395	4.6	377	7.0	364	9.3	350	11.6	340	13.0	330	14.0	320	15.0	310
High Pressure Range—1 to 7 Lbs.																			
315	2 1/2	860	15	0.2	13	0.3	11	0.4	10	0.5	9	0.6	8	0.8	7	1.0	6	1.2	5
		1160	22	0.2	20	0.4	18	0.6	16	0.7	14	0.8	13	1.0	12	1.2	11	1.5	10
42	1 1/2	860	42	0.5	37	0.6	34	0.9	31	1.2	28	1.5	26	1.7	24	2.0	22	2.2	20
		1160	60	0.6	55	0.9	52	1.2	48	1.5	45	2.0	44	2.4	42	2.8	40	3.0	38
53	3	690	74	0.5	68	1.0	62	1.4	58	1.9	54	2.4	50	2.9	48	3.3	46	3.7	44
		860	94	0.7	90	1.3	84	2.0	80	2.5	75	3.0	74	3.7	70	4.5	68	5.0	66
61	5	690	135	0.9	125	1.6	120	2.4	115	3.2	110	4.0	105	4.8	100	5.5	95	6.0	90
		750	148	0.9	141	1.8	135	2.7	130	3.5	125	4.3	120	5.1	115	6.0	110	6.5	105
76	3	575	200	1.2	190	2.3	180	3.4	171	4.6	165	5.8	160	6.9	155	8.0	150	9.0	145
		690	245	1.4	235	2.8	225	4.2	218	5.5	211	7.0	205	8.5	200	10.0	195	11.0	190

NOTE: The ratings at the LEFT of the heavy vertical lines apply to either type. The ratings at the RIGHT of the heavy lines are for TYPE "A" BLOWERS ONLY. (With anti-friction bearings, and heat-treated steel gears.)

BLOWER, Denver Supercharger



Denver Supercharging Blower

DENVER Supercharger Blower is an ideal unit for supplying low-pressure air to the Denver "Sub-A" Flotation Machine. It is also used for supplying low-pressure air to oil and gas fired furnaces, pneumatic conveyors and for agitation of liquids and pulps.

This is a centrifugal type turbo-compressor delivering air at a uniform pressure.

Single-stage machines offered for installation where low first cost is desired, will deliver reliable air service in pressure from 4 to 16 ounces and in volumes from 110 to 2350 cubic feet per minute. Multi-stage machines are available that furnish pressures from 8 ounces to 2 pounds and in volumes up to 20,000 cubic feet per minute.

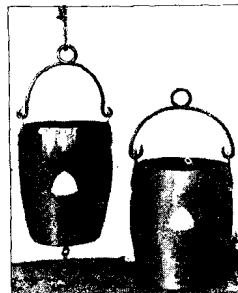
DENVER SINGLE-STAGE SUPERCHARGERS—3500 R. P. M.

Machine Size	Pressure Oz.	Volume Cu. Ft. Per Min.	Dimensions			Motor H.P.	Approx. Ship. Wt., Lbs. Motor	
			L	W	H			
025 1/4-1	4	300	19"	26 1/2"	34 3/4"	1 1/2	245	
025 3/4-1		375	20 3/4"	26 1/2"	34 3/4"	3/4	260	
0251-1		500	21"	26 1/2"	34 3/4"	1	260	
0251 1/2-1		750	22 1/2"	33 3/8"	42 3/4"	1 1/2	425	
0252-1		1000	24 1/4"	33 3/8"	42 3/4"	2	465	
0401 1/2-1	6	165	19"	26 1/2"	33 7/8"	1 1/2	245	
040 3/4-1		250	20 1/2"	26 1/2"	33 7/8"	3/4	260	
0401-1		340	21"	26 1/2"	34 3/4"	1	260	
0401 1/2-1		500	21"	26 1/2"	34 3/4"	1 1/2	300	
0402-1		675	24"	33 3/8"	40 1/2"	2	465	
0403-1	1000	24 1/4"	33 3/8"	43 1/4"	3	465		
050 1/2-1	8	110	19"	26 1/2"	33 3/8"	1 1/2	245	
050 3/4-1		160	20 1/2"	26 1/2"	33 3/8"	3/4	260	
0501-1		240	21"	26 1/2"	34 3/4"	1	260	
0501 1/2-1		350	21"	26 1/2"	34 3/4"	1 1/2	300	
0502-1		450	24"	33 3/8"	40 1/2"	2	335	
0503-1		760	24"	33 3/8"	42 3/4"	3	405	
0505-1		1265	25 1/2"	33 3/8"	43 1/4"	5	710	
0507-1		1925	30 1/2"	39 3/8"	49"	7 1/2	710	
0510-1		2600	31 1/2"	39 3/8"	49"	10	765	
060 3/4-1		10	150	22"	33 3/8"	40"	1 1/2	390
0601-1	200		22"	33 3/8"	40"	3/4	390	
0601 1/2-1	275		22"	33 3/8"	40 1/2"	1 1/2	425	
0602-1	400		23 1/2"	33 3/4"	40 1/2"	2	465	
0603-1	600		24"	33 3/8"	40 1/2"	3	465	
0605-1	1050		25 1/2"	33 3/8"	42 3/4"	5	510	
0607-1	1600		31"	39 3/8"	49"	7 1/2	710	
0610-1	2100		32"	39 3/8"	49"	10	765	
0751 1/2-1	12		225	23 1/2"	33 3/8"	40"	1 1/2	425
0752-1			325	24"	33 3/8"	40 1/2"	2	465
0753-1		500	25 1/2"	33 3/8"	40 1/2"	3	465	
0755-1		850	25 1/2"	33 3/8"	42 3/4"	5	510	
0757-1		1300	31"	39 3/8"	48 1/4"	7 1/2	710	
07510-1		1700	32"	39 3/8"	49"	10	765	
07515-1		2650	33 1/2"	39 3/8"	49"	15	845	
0902-1		14	260	28"	39 3/8"	46"	2	475
0903-1			400	28"	39 3/8"	46"	3	475
0905-1			750	29"	39 3/8"	48 1/2"	5	710
0907-1	1100		31"	39 3/8"	48 1/2"	7 1/2	710	
0910-1	1500		32 1/2"	39 3/8"	49"	10	765	
0915-1	2200		34 1/4"	39 3/8"	49"	15	845	
1005-1	16		635	29"	39 3/8"	46"	5	710
1007-1			950	31"	39 3/8"	48 1/2"	7 1/2	710
1010-1			1275	32"	39 3/8"	48 1/2"	10	765
1015-1			1900	34"	39 3/8"	49"	15	845
1020-1		2550	36 1/2"	39 3/8"	49"	20	875	

AIR REQUIREMENTS FOR DENVER "SUB-A" SUPERCHARGED FLOTATION MACHINES

Machine Size	Pressure Ozs.	Air Req'd. C. F. M. Per Cell
No. 8 (16"x16")	8	3
No. 12 (22"x22")	8	10
No. 15 (24"x24")	8	12
No. 18 (28"x28")	8	18
No. 18 Special (32"x32")	8	24
No. 21 (38"x38")	10	40
No. 24 (43"x43")	10	50
No. 30 (56"x56")	12	100

BUCKETS, Denver Ore



Denver Ore Buckets for Hoists
Left Nos. 1-3; Right Nos. 4-14

Denver Ore Buckets are built of heavy steel shaped on forms and soundly riveted. The bottoms of these buckets are concave, so that the ring to which the dumping chain is attached does not prevent their standing upright.

The superiority of these ore buckets is due to their heavy construction and careful assembly.

These buckets are designed to be large enough in diameter and short enough in height to be stable and easy to handle. The center of gravity is low enough so that the buckets do not tip over easily. Thus,

they can be conveniently used on or in conjunction with either style of Denver Ore Bucket Cars.

Many sizes are kept in Denver stock.

Size No.	Capacity		Height Inches	Diameter, Inches			Approx. Ship. Weight Lbs.
	Cubic Feet	Average Lbs. Ore		Top	Center	Bottom	
1	6 1/2	750	30	21	24	17	140
2	6 1/2	750	30	21	24	17	125
3	9	1100	32	24	27	21	195
4	15	1700	37	28	34	23	400
5	11	1300	37	24	28	22	350
6	4 1/2	550	24	20	22	16	67
6 1/2	6	725	28	20	24	16	75
7	2 1/2	300	19	17	19	14	35
10	15 1/2	1800	40	27	32	23	400
11	17 1/2	2100	48	26	31	22	425
12	14 1/2	1650	40	26	31	22	375
13	15	1700	42	26	31	22	385
14	7 1/2	900	28	22	28	19	150

We have often been referred to as the "Diagnosticians of the ore dressing industry." Perhaps we can help you with your mineral recovery problems. Please let us try.

BUCKETS, Denver Windlass

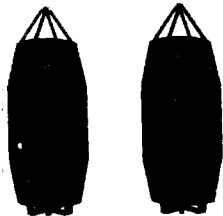


Denver Windlass Ore Buckets
Left No. 5 and Right No. 8

DENVER Windlass Buckets are of the lightest possible construction consistent with the requisite durability and stoutness for the rough handling they receive. The bails are made of the lightest and toughest steel available and will not flex under the heaviest loads inflicted in prospect hole ore hoisting operations.

Size No.	Cap. Lbs. Avg. Ore	No. Ga. Steel	Diameter, Inches		Height Inches	Approx. Ship. Weight Lbs.
			Top	Bottom		
8	200	16	16	14	16	33
9	250	16	19	15	15	35
9½	375	14	22	17	23	55

BUCKETS, Denver Water



Denver Water Buckets or Bails
Left with Strips—Right without Strips

DENVER Water Buckets are smooth on the outside to prevent their catching in the shaft. They are made of the best steel, with wrought iron bails, and in the bottoms are automatic valves which are tight, durable, and infallible.

Denver Water Buckets or Bails are made with and without strips.

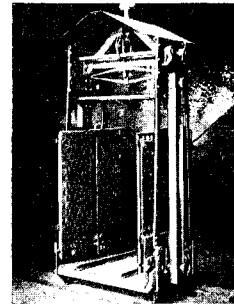
Approximately 10% is added to the price for buckets with reinforcing strips.

Size No.	Capacity Gallons	Diameter		Length	Thickness of Steel	Approx. Ship. Weight Lbs.
		Middle	Ends			
1	40	20"	16"	36"	12 Ga.	170
2	50	19"	15"	48"	12 Ga.	220
3	60	22"	18"	44"	10 Ga.	275
4	75	24"	18"	48"	10 Ga.	325
5	100	26"	21"	52"	8 Ga.	425
6	125	28"	23"	56"	8 Ga.	490
7	150	30"	24"	60"	8"	590
8	175	32"	25"	64"	8"	625
9	200	33"	26"	66"	8"	770
10	250	36"	28"	69"	8"	880
11	300	38"	30"	72"	8"	935
12	350	40"	32"	76"	8"	1000

CAGES, Denver Mine

DENVER Mine Cages are designed from experience acquired by building hundreds of cages in various sizes and types. These cages are built with highest quality material and precision workmanship.

As shaft dimensions vary, Denver Mine Cages can only be built on order. When asking for quotations or ordering cages or chairs, list the dimensions of your shaft as indicated by the diagram. For cages, give all dimensions, A-A, B-B, C-C, D-D, and E-E. For chairs, all dimensions are also necessary. Specify: load to be carried; whether or not safety doors are required in accordance with local mining laws; whether or not cages are to be equipped with Denver Automatic Landing Chairs, (see CHAIRS); whether cage is to be built with single or double deck.



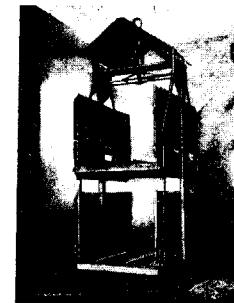
Denver Mine Cage with Safety Doors
and Landing Chairs. Equipped with
Rollers for Use in Inclined Shaft

Types of cages listed in the accompanying table are the small sizes. The difference between the three cages listed under the heading "Types" is in the weight of the material used in their construction to allow for greater weight loads.

The Standard Denver Cage may be furnished without

safety doors for use when handling ore cars and car stops are provided if specified. When safety doors are required they can be furnished of either solid or perforated steel plate. Safety catches are provided with spring operated cams.

The cage illustrated in the top photograph is equipped with rollers so that the cage may be used in an inclined shaft if desired. This unit is equipped with perforated safety doors and also with landing chairs. The lower photograph shows a two-deck Denver Mine Cage. The Standard Denver Cage is also avail-



Double Deck Denver Mine Cage
With Safety Doors

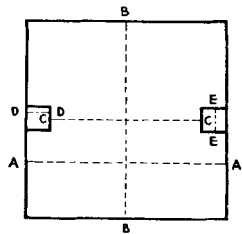
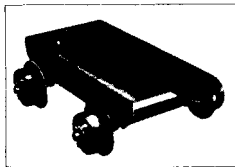


Diagram for Ordering

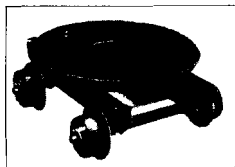
*Type	Single Deck		Double Deck	
	Capacity	Approx. Wt., Lbs.	Capacity	Approx. Wt., Lbs.
I	2000	925	4000	1600
IA	3000	1150	6000	1900
IB	6000	1375	12000	2300

*Special cages of any size can be furnished.

CAR, Denver Ore Bucket



Style 1 Denver Ore Bucket Car



Denver Ore Bucket Car with Guard

able with a self-dumping skip mounted beneath the cage.

An illustration of a Denver Mine Cage equipped with Automatic Landing Chairs and Safety Doors is shown under the item CHAIRS.

A well qualified engineering and fabricating force is at your disposal for the design of cages to fulfill the requirements of your special installation. Customer should furnish data as outlined above.

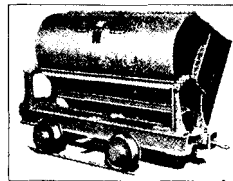
DENVER Ore Bucket Cars are built of the strongest welded steel design and are built with the expectation that continuous service will be required of them.

As shown in the accompanying illustrations, these cars are made in two styles, both of which are built as standard units for eighteen gauge track. However, these ore bucket cars can be promptly manufactured to any individual specifications desired by the customer.

Style No. 2, which is equipped with bucket guard, is approximately 20% higher in price than Style No. 1. Specifications are given in the following table.

Size No.	Style	Diam. of Wheels in Inches	Approx. Weight Lbs.	Size No.	Style	Diam. of Wheels in Inches	Approx. Weight Lbs.
1	1	6	175	1	2	6	210
2	1	8	190	2	2	8	225
3	1	10	215	3	2	10	250

CAR, ORE, Denver (Rocker Dump)



Denver Rocker Dump Ore Car

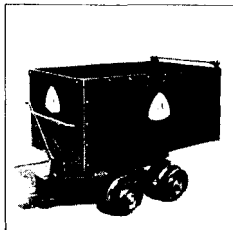
DENVER Rocker Dump Ore Cars may be dumped to either side and easily returned to an upright position. A locking mechanism, located at the center of the car bottom and at the center of the frame, automatically stops the body when it attains an upright position.

The body is carried on heavy cast steel rockers and rocker stands, which are covered by a plate to prevent spilled material lodging on the rockers.

The body is made of heavy plate, properly braced and arc welded, making a tight container with no doors or openings through which material can leak out onto the trackway.

Denver Rocker Dump Ore Cars are made on order to meet operating conditions. These cars are popular in capacities ranging from 20 to 40 cu. ft. and for from 18" to 24" gauge mine track. Write for additional information.

CAR, ORE, Denver (Standard)



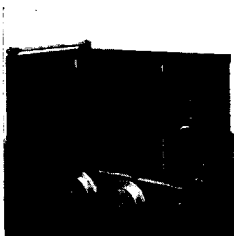
Standard Denver Ore Car

DENVER Standard Ore Car is made of the very best materials and is designed for the most severe service. Although it is regularly furnished with plain bearing wheels, roller bearings can be supplied whenever preferred. Ordinarily this car is built for standard eighteen inch gauge track although special units can be quickly manufactured to the customer's individual specifications whenever this is necessary.

The Standard Denver Ore Car can be knocked down for airplane or muleback transportation to facilitate shipping to remote localities.

Size No.	Capacity		Size of Box in Inches			Thickness of Steel	Approx. Ship. Weight Lbs.
	Cubic Feet	Ave. Ore Lbs.	L	W	H		
00	10	1250	40	22	19	No. 16	250
01	13	1500	44	24	20	No. 14	375
02	13	1500	44	24	20	No. 12	440
03	14	1625	48	24	20	No. 10	512
04	14	1625	48	24	20	"	600
05	16	1920	48	24	24	"	650
06	20	2400	48	30	24	"	700
07	23	2760	54	30	24	"	800

CAR, ORE, Denver (Standard Cage)



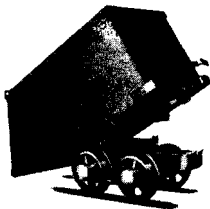
Denver (Standard Cage) Ore Car

DENVER (Standard Cage) Ore Car body is of heavy plate steel and all forgings are of the best quality iron and steel. The truck frame is made of heavy channel iron with the body securely mounted. Hooks or slots are provided for securely holding the car to the cage.

The standard gauge is 18" but other sizes can be furnished. This car can be sectionalized for airplane or muleback transportation.

Size No.	Capacity Cu. Ft.	Size of Boxes, Inches			Thickness of Steel		Approx. Weight Lbs.
		L	W	H	Sides	Bottom	
C1	14	42	24	24	No. 10	$\frac{1}{2}$ "	650
C2	14	47	24	24	$\frac{1}{2}$ "	$\frac{1}{2}$ "	750
C3	16	48	24	24	No. 10	$\frac{1}{2}$ "	800
C4	16	48	24	24	$\frac{1}{2}$ "	$\frac{1}{2}$ "	850
C5	20	48	30	24	$\frac{1}{2}$ "	$\frac{1}{2}$ "	900
C6	22	54	30	24	$\frac{1}{2}$ "	$\frac{1}{2}$ "	950
C7	28	54	30	30	$\frac{1}{2}$ "	$\frac{1}{2}$ "	1200
C8	32	60	30	30	$\frac{1}{2}$ "	$\frac{1}{2}$ "	1400

CAR, ORE, Denver (Type Z)



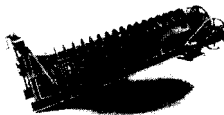
Denver (Type Z) Ore Car

DENVER (Type Z) Ore Car will meet practically all conditions where cars of this type are required. The body is well braced and riveted and two angles are used to reinforce the bottom. Cars of twenty cubic foot capacity and larger are furnished with one reinforcing strap or band in the center of the body. Bumpers, used as handles when dumping, are located at the strongest part of the body. The door is well protected by a bracing strap at the bottom where the

cars come together. The turntable is of cast iron with a grease lubricated machined groove, which takes most of the turning load off the king pin. The truck frame is in one piece without riveted corners to work loose or cause trouble. Brakes may be attached to any Denver (Type Z) Ore Car.

Car No.	Capacity Cu. Ft.	Gauge Track	Dimensions			Thickness Material		Ship. Lbs.
			L	W	H	Bottom	Sides	
Z 14	14 0	18"	47"	28"	41"	$\frac{1}{2}$ "	No. 10	660
Z 16	15 9	18"	49"	30"	41"	$\frac{1}{2}$ "	No. 10	730
Z 20	20 0	18"	53"	34"	43"	$\frac{1}{2}$ "	No. 10	1005
Z 16	15 9	24"	49"	34"	42"	$\frac{1}{4}$ "	No. 10	790
Z 20	20 0	24"	53"	34"	44"	$\frac{1}{4}$ "	No. 10	1075

CLASSIFIERS, Denver Spiral



Denver Classifier—Motor Drive

THE Denver Classifier has been successfully used for so many years that most mill operators are familiar with its principle and operation. This classifier embodies the simplest design, smallest number of wearing parts, and an absence of surge in the overflow. It separates coarse and fine solids, carried in liquids, with a high degree of accuracy and with lowest possible power and

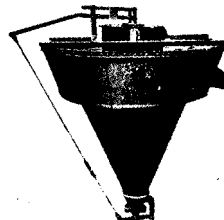
maintenance costs. Additional information on these classifiers will be sent upon request.

Machine Size	*Capacity Tons per 24 Hrs.		Dimensions			H.P.	Shipping Wt., Lbs.	
	Overflow	Sands	l.	w.	th.		Belt	Motor
30"	50	60	15' 10"	48"	35"	2	4500	4700
36"	80	95	17' 9"	54"	36"	2	6750	6925
45"	125	200	21' 6"	64"	49"	2	9000	9400
54"	200	320	26' 6"	72"	52"	3	12800	13200
60"	300	495	27' 6"	84"	62"	4	16600	17000
72"	400	930	32' 5"	105"	70"	5	28000	28500

*Sand raking capacities are in tons per 24 hours at 1 R.P.M. of spiral on 2.8 gravity of ore. Overflow capacities are approximate per 24 hours when separating at 150 mesh on 2.8 gravity ore and 25% solids in the overflow.

†Height does not include lifting device.

CLASSIFIER, Allen Cone



Allen Cone Classifier

ALLEN Sand Cones and Allen Slime Cones have application in ore-dressing, chemical and industrial processes for classification, dewatering, de-sliming, leaching and washing.

If the pulp (solids and liquid) contains more than 5% of solids larger than 48 mesh, the type 40 Allen Sand Cone is almost always used, whereas if the solids contain less than 5% coarser than 48 mesh it is generally advisable to install the type 50 Slime Cone.

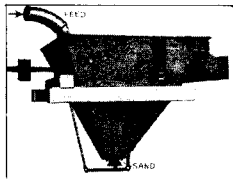
CLASSIFIER, Denver Cross-Flow

The feed enters the cone through an inner truncated cone, settled solids gradually building up in the cone to a point restricting the out-flow of the inner truncated cone. This causes the water level in the truncated cone to rise lifting a float which operates a series of levers to operate a ball valve to open a spigot in the bottom of the cone which discharges the settled material. This arrangement maintains an even depth of sand regardless of increase or decrease in the feed rate. If a foreign object should obstruct the opening retarding the flow the valve opens wider, thus allowing the passage of the obstruction.

The operation of the Allen Slime Cone follows the same general principle as described above except the float is located near the bottom of the cone and is operated by the buoyancy of the settled slime. The float operates a ball valve and spigot same as for the sand cone.

Sand Cone	Slime Cone	Diam. at Overflow Lip	Ht. Inlet to Spigot	Overall Diameter	Approx. Shipping Wt., Lbs.
40-1	50-1	3'6"	5' 2"	4'9"	675
40-0	50 0	4'6"	6' 2"	5'8"	825
40 2	50-2	6'0"	7'11"	7'2"	1050
40-3	50-3	8'0"	9'11"	9'4"	1600

CLASSIFIER, Denver Cone or Pyramid



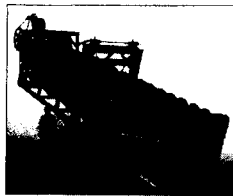
Denver Cone Classifier

CONE Classifiers are built in two types, one operating on the density of the pulp in the cone, and the other on the hydraulic or mechanical movement of the pulp. The Denver Dewatering Cone is of the former type. The weight of the pulp in the cone actuates a lever with an adjusting weight, automatically controlling the discharge valve. This method gives a constant density discharge. The unit can

be used as either a dewaterer or classifier, requires no power, and is entirely automatic.

The body of the separator can be conical or pyramidal in shape, to suit best the physical requirements of the location. The classifier can be used to advantage in dewatering and controlling feed to a regrind ball or rod mill, or material from tables, jigs, or flotation.

Machine Size	Dimensions			Approx. Shipping Weight, Lbs.
	L	W	H	
3'	81"	30"	76"	400
4'	102"	30"	90"	600
5'	120"	36"	107"	800
6'	128"	36"	121"	900
7'	137"	36"	135"	1200
8'	162"	48"	145"	1400
10'	174"	72"	148"	1600
12'	186"	96"	152"	2400



60" Denver Cross Flow Classifier

CLASSIFIERS having a helical (often improperly called "spiral") flight for removing settled coarse material have long been in successful use and most mill operators are familiar with their operation. The Denver Cross-Flow Classifier is of this general type but has many improvements which result in improved metallurgical efficiency, longer life and less repair. Among these improvements may be mentioned:

1—The lower bearing has been moved up along the conveyor shaft to a point above the pulp level, thus eliminating the wear and repair which formerly resulted from sand getting into the bearing when it was submerged.

2—The location of the main overflow weir is along the side of the classifier opposite the feed, resulting in free and uninterrupted straight line surface flow from the feed entrance to the overflow weir. The conveyor flight moves downward in front of the weir and the submerged portion of the flight moves away from the weir. Thus there is a continual separation and movement of fines toward the weir while coarse material moves away from the weir. The settled material is continually rumbled by the flight and settled fines set free. This arrangement of feed, overflow and direction of rotation of the conveyor flight results in a minimum of oversize in the overflow and a minimum of undersize in the sand discharge. This is improved metallurgical efficiency.

An auxiliary weir is provided at the end of the classifier. Both the main and auxiliary weirs are provided with weir blocks by which the depth of the pulp and pool area may be adjusted, thus controlling the size of separation.

The Denver Cross-Flow Classifier is ruggedly constructed and the tank is thoroughly reinforced. Bearings are large and all gears are enclosed. The 6", 9", and 12" sizes have replaceable hard cast iron flight sections on a square shaft. The 18", 24", and 30" have replaceable hard cast iron flight sections. The 36", 42", 48", 54", and 60" sizes have replaceable steel flights and replaceable hard iron wearing shoes. Sizes

30" and larger are provided with lifting device by which the lower end of the flight may be raised and the conveyor operated while it is slowly lowered, thus gradually removing the bed of solids which settles during a shutdown.

Additional data gladly furnished upon request.

CLASSIFIER, Denver Cross-Flow—Spiral

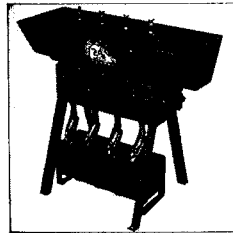
Machine Size	Tank Lengths	Conveyor R.P.M.
6" Simplex	5'-8"	14-39
9" Simplex	7'-13 $\frac{1}{2}$ "	14-39
12" Simplex	9'-6 $\frac{1}{2}$ "	14-26
18" Simplex	9'-0", 10'-6", 12'-0", 13'-6"	7-11
24" Simplex	12'-0", 13'-0", 14'-0", 15'-0"	5 $\frac{1}{2}$ -9
30" Simplex	13'-0", 14'-3", 15'-6", 16'-9"	4 $\frac{1}{2}$ -7
36" Simplex	15'-8", 17'-2", 18'-8", 20'-2"	3 $\frac{1}{2}$ -5 $\frac{1}{2}$
42" Simplex	15'-8", 17'-2", 18'-8", 20'-2"	3 $\frac{1}{2}$ -5 $\frac{1}{2}$
48" Simplex	20'-9", 22'-9", 24'-9", 26'-9"	2 $\frac{1}{2}$ -4 $\frac{1}{2}$
54" Simplex	20'-9", 22'-9", 24'-9", 26'-9"	2 $\frac{1}{2}$ -4 $\frac{1}{2}$
60" Simplex	23'-4", 25'-10", 28'-4", 30'-10"	2 $\frac{1}{2}$ -3 $\frac{1}{2}$
24" Duplex	12'-0", 13'-0", 14'-0", 15'-0", 16'-0"	5 $\frac{1}{2}$ -9
30" Duplex	13'-0", 14'-3", 15'-6", 16'-9", 18'-0"	4 $\frac{1}{2}$ -7
36" Duplex	15'-8", 17'-2", 18'-8", 20'-2", 21'-8"	3 $\frac{1}{2}$ -5 $\frac{1}{2}$
42" Duplex	15'-8", 17'-2", 18'-8", 20'-2", 21'-8"	3 $\frac{1}{2}$ -5 $\frac{1}{2}$
48" Duplex	20'-9", 22'-9", 24'-9", 26'-9", 28'-9"	2 $\frac{1}{2}$ -4 $\frac{1}{2}$
54" Duplex	20'-9", 22'-9", 24'-9", 26'-9", 28'-9"	2 $\frac{1}{2}$ -4 $\frac{1}{2}$
60" Duplex	23'-4", 25'-10", 28'-4", 30'-10", 33'-4"	2 $\frac{1}{2}$ -3 $\frac{1}{2}$

Machine Size	*Capacity		Motor H.P.	Approx. Domestic Ship. Wt., Lbs.
	Overflow	Sand		
6" Simplex	415 lbs./hr.	1670 lbs./hr.	$\frac{1}{4}$	350
9" Simplex	835 lbs./hr.	3330 lbs./hr.	$\frac{1}{4}$	520
12" Simplex	1670 lbs./hr.	5830 lbs./hr.	$\frac{1}{2}$	950
18" Simplex	46	128	3 $\frac{1}{2}$ -1	2,100-3,235
24" Simplex	65	200	1 $\frac{1}{2}$ -2	3,100-4,400
30" Simplex	94	275	2-3	4,800-6,500
36" Simplex	119	370	3-5	7,200-8,760
42" Simplex	168	470	4-6	9,600-12,000
48" Simplex	210	560	5-7 $\frac{1}{2}$	12,300-14,990
54" Simplex	274	690	6-8	14,200-16,800
60" Simplex	354	780	7 $\frac{1}{2}$ -10	16,800-21,300
24" Duplex	127	400	2-3	7,100-9,500
30" Duplex	183	550	3-5	10,000-14,000
36" Duplex	232	740	5 $\frac{1}{2}$ -7	14,000-18,000
42" Duplex	308	940	5 $\frac{1}{2}$ -7	18,100-22,100
48" Duplex	411	1120	7 $\frac{1}{2}$ -10	23,000-28,000
54" Duplex	537	1380	7 $\frac{1}{2}$ -10	28,250-31,700
60" Duplex	695	1560	10-15	32,000-38,000

*On sizes larger than 12", capacity is tons of dry solid per 24 hours, based on 65 mesh separation, specific gravity of material 2.7, with 20% solids in overflow. Sand raking capacity is in tons of dry solids per 24 hours at average conveyor speed.

All we ask is a chance to help you and the opportunity to work with you on your equipment needs.

CLASSIFIER, Denver Hydraulic



Four-Compartment 4"x4" Denver Hydraulic Classifier

DENVER Hydraulic Classifier is designed for use in gravity concentration mills for preparing a classified feed for table concentration.

The classifier compartments are provided with glass sides so that the conditions existing in each chamber can readily be observed. Only enough water is necessary to keep the solids in full teeter. As the sands accumulate in the classifier pockets the effective density of sand-water mixture increases and thumbscrews on the valve rod assemblies may be adjusted to discharge sand from each compartment as required. The finer the sand the less water is required. When the pressure regulating valves and the product valves are set, no further adjustment is necessary.

The compartments are so arranged that the perforated constriction plates for the coarser feed are nearer the feed end with each succeeding compartment arranged for a smaller mesh product.

The Denver Hydraulic Classifier is made in 2, 4, 6, and 8 compartments with two sizes of compartments, namely 4"x4" and 8"x8". The standard units are of steel construction. Capacity depends on specific gravity of the material and range of size taken from each compartment.

The 4"x4" has a capacity from 5 to 10 tons per compartment in 24 hours.

The 8"x8" has a capacity from 20 to 50 tons per compartment in 24 hours.

Additional data gladly furnished upon request.

Machine Size*	Number of Compartments	Dimensions			Approx. Shipping Wt. Lbs. Domestic Packing
		L	W	H	
4"x4"	2	1'-8"	1'-5"	2'-6"	85
	4	2'-5"	1'-5"	2'-6"	155
	8	3'-10"	1'-5"	2'-6"	295
8"x8"	2	4'-0"	3'-5"	4'-10"	510
	4	5'-5"	3'-5"	4'-10"	750
	8	6'-10"	3'-5"	4'-10"	1150

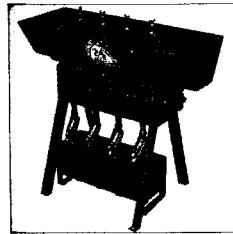
*Odd number of compartments can be supplied such as 3, 5 or 7.

Your comments and suggestions are always welcome. Please write to us.

CLASSIFIER, Denver Cross-Flow—Spiral

Machine Size	Tank Lengths	Conveyor R.P.M.
6" Simplex	5'-8"	14-39
9" Simplex	7'-13 1/2"	14-39
12" Simplex	9'-6 3/4"	14-26
18" Simplex	9'-0", 10'-6", 12'-0", 13'-6"	7-11
24" Simplex	12'-0", 13'-0", 14'-0", 15'-0"	5 1/2-9
30" Simplex	13'-0", 14'-3", 15'-6", 16'-9"	4 5/8-7
36" Simplex	15'-8", 17'-2", 18'-8", 20'-2"	3 1/2-5 1/2
42" Simplex	15'-8", 17'-2", 18'-8", 20'-2"	3 1/2-5 1/2
48" Simplex	20'-9", 22'-9", 24'-9", 26'-9"	2 1/2-4 1/2
54" Simplex	20'-9", 22'-9", 24'-9", 26'-9"	2 1/2-4 1/2
60" Simplex	23'-4", 25'-10", 28'-4", 30'-10"	2 1/4-3 1/2
24" Duplex	12'-0", 13'-0", 14'-0", 15'-0", 16'-0"	5 1/2-9
30" Duplex	13'-0", 14'-3", 15'-6", 16'-9", 18'-0"	4 1/2-7
36" Duplex	15'-8", 17'-2", 18'-8", 20'-2", 21'-8"	3 1/2-5 1/2
42" Duplex	15'-8", 17'-2", 18'-8", 20'-2", 21'-8"	3 1/2-5 1/2
48" Duplex	20'-9", 22'-9", 24'-9", 26'-9", 28'-9"	2 1/2-4 1/2
54" Duplex	20'-9", 22'-9", 24'-9", 26'-9", 28'-9"	2 1/2-4 1/2
60" Duplex	23'-4", 25'-10", 28'-4", 30'-10", 33'-4"	2 1/4-3 1/2

CLASSIFIER, Denver Hydraulic



Four-Compartment 4"x4" Denver Hydraulic Classifier

DENVER Hydraulic Classifier is designed for use in gravity concentration mills for preparing a classified feed for table concentration.

The classifier compartments are provided with glass sides so that the conditions existing in each chamber can readily be observed. Only enough water is necessary to keep the solids in full teeter. As the sands accumulate in the classifier pockets the effective density of sand-water mixture increases and thumbscrews on

the valve rod assemblies may be adjusted to discharge sand from each compartment as required. The finer the sand the less water is required. When the pressure regulating valves and the product valves are set, no further adjustment is necessary.

The compartments are so arranged that the perforated constriction plates for the coarser feed are nearer the feed end with each succeeding compartment arranged for a smaller mesh product.

The Denver Hydraulic Classifier is made in 2, 4, 6, and 8 compartments with two sizes of compartments, namely 4"x4" and 8"x8". The standard units are of steel construction. Capacity depends on specific gravity of the material and range of size taken from each compartment.

The 4"x4" has a capacity from 5 to 10 tons per compartment in 24 hours.

The 8"x8" has a capacity from 20 to 50 tons per compartment in 24 hours.

Additional data gladly furnished upon request.

Machine Size	*Capacity		Motor H.P.	Approx. Domestic Ship. Wt., Lbs.
	Overflow	Sand		
6" Simplex	415 lbs./hr.	1670 lbs./hr.	3/4	350
9" Simplex	835 lbs./hr.	3330 lbs./hr.	3/4	520
12" Simplex	1670 lbs./hr.	5830 lbs./hr.	1 1/2	950
18" Simplex	46	128	3 1/2-1	2,100-3,235
24" Simplex	65	200	5 1/2-2	3,100-4,400
30" Simplex	94	275	2-3	4,800-6,500
36" Simplex	119	370	3-5	7,200-8,760
42" Simplex	168	470	4-6	9,600-12,000
48" Simplex	210	560	5-7 1/2	12,300-14,990
54" Simplex	274	690	6-8	14,200-16,800
60" Simplex	354	780	7 1/2-10	16,800-21,300
24" Duplex	127	400	2-3	7,100-9,500
30" Duplex	183	550	3-5	10,000-14,000
36" Duplex	232	740	5 1/2-7	14,000-18,000
42" Duplex	308	940	5 1/2-7	18,100-22,100
48" Duplex	411	1120	7 1/2-10	23,000-28,000
54" Duplex	537	1380	7 1/2-10	28,250-31,700
60" Duplex	695	1560	10-15	32,000-38,000

*On sizes larger than 12", capacity is tons of dry solid per 24 hours, based on 65 mesh separation, specific gravity of material 2.7, with 20% solids in overflow. Sand raking capacity is in tons of dry solids per 24 hours at average conveyor speed.

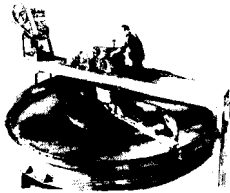
All we ask is a chance to help you and the opportunity to work with you on your equipment needs.

Machine Size*	Number of Compartments	Dimensions			Approx. Shipping Wt. Lbs. Domestic Packing
		L	W	H	
4"x4"	2	1'-8"	1'-5"	2'-6"	85
	4	2'-5"	1'-5"	2'-6"	155
	6	3'-1"	1'-5"	2'-6"	225
8"x8"	2	3'-10"	1'-5"	2'-6"	295
	4	4'-0"	3'-5"	4'-10"	510
	6	5'-5"	3'-5"	4'-10"	750
8	6	6'-10"	3'-5"	4'-10"	950
	8	8'-2"	3'-5"	4'-10"	1150

*Odd number of compartments can be supplied such as 3, 5 or 7.

Your comments and suggestions are always welcome. Please write to us.

CLASSIFIER, Denver Hydro-



Denver Hydroclassifier

THE Denver Hydroclassifier is designed to make a separation according to size in the range from 100 mesh to that of colloidal particles. It is particularly suited to the removal of slimes prior to further treatment by flotation, cyanidation, or chemical processes. The separation in this fine size range requires a large, quiet, pool area, such as is

provided by the Denver Hydroclassifier, combined with accurate control over the removal and washing of the settled material for maximum classification efficiency.

In the Denver Hydroclassifier the feed enters a feed well in the center of a large settling tank and flows without agitation into the pool. The slimes and fine material move radially to the overflow weir at the rim of the tank and overflow into the overflow launder. As the slimes move to the weir, the coarse particles settle on the sloping tank bottom, where slowly moving spiral rakes continuously move these settled solids to a central discharge cone. In the discharge cone water is added below a perforated plate while the settled solids are rabbled above the plate, thoroughly washing out slimes and fines from the coarse material, as it works through the openings in the plate. The coarse material is usually removed in the form of a sludge by means of a Denver Adjustable Stroke Diaphragm Pump.

Accurate control is maintained by:

1. Control of the wash water added to discharge cone.
2. Control of the rate of removal of settled solids by means of the diaphragm pump.

The tank is steel, thoroughly reinforced, and supported on steel columns, thoroughly braced. The mechanism driving the rakes is an alloy steel gear and bronze worm, supported on anti-friction bearings enclosed and running in oil. The vertical shaft and rakes may be raised or lowered while the mechanism is in operation. Extra heavy construction is provided throughout, resulting in long life and a minimum of repair.

Additional data gladly furnished upon request.

(Continued on next page)

Please Give Us the Opportunity to quote prices and delivery on standard equipment to meet your needs.

†Size No. (Approx. Dia. In Feet)	*Capacity Tons Solids In Overflow Per 24 Hours	R.P.M. Rate	**Motor H.P.
No. 6	11- 75	1-4	¾-1
7	16- 107	1-4	¾-1
8‡	20- 133	1-4	¾-1
9‡	30- 200	¾-3	1-1½
10	35- 230	¾-3	1-1½
12‡	46- 320	¾-3	1-1½
14	70- 465	½-2	1½-2
16‡	84- 550	½-2	1½-2
18	115- 760	½-2	2-3
20	145- 950	½-2	2-3
22‡	165-1100	¾-1½	3-5
24	208-1370	¾-1½	3-5
26‡	242-1620	¾-1½	5-7½
28	280-1850	¾-1½	5-7½
30‡	315-2100	¾-1½	5-7½
32	365-2400	¾-1	5-7½
34	410-2700	¾-1	5-7½
36	465-3100	¾-1	7½-10
38‡	515-3400	¾-1	7½-10
40	570-3800	¾-1	7½-10
45	725-4800	¾-1	7½-10
50	895-5900	¾-1	7½-10
55‡	1080-7130	¾-1	7½-10

†Size No. (Approx. Dia. In Feet)	Approximate Shipping Weight Pounds			
	Mechanism	Tank	Columns	Hand Rail
No. 6	1460	670	350	
7	1610	800	350	
8‡	1750	950	350	
9‡	1910	1350	550	
10	2010	1500	570	
12‡	2210	2200	600	
14	3735	3500	1700	
16‡	4150	4300	1750	
18	5950	6400	2800	
20	6450	7700	2900	
22‡	7350	9800	4500	
24	7750	12400	4700	
26‡	10475	16800	5700	
28	10725	18900	5950	
30‡	11200	22100	6200	370
32	14300	31500	11500	410
34	14700	36400	12000	440
36	16400	41500	16700	470
38‡	17000	45300	17300	500
40	17400	49200	17700	530
45	18200	61000	18700	600
50	24000	75000	20800	675
55‡	27000	87000	23000	705

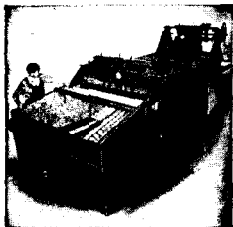
†In addition to these standard machines we can furnish larger sizes where mechanism is placed in customer's concrete tanks. Mechanism sizes 22 to 40 can be furnished for concrete tanks.

‡These sizes can be furnished in Denver Bolted Steel Tanks.

*Capacity range depending on mesh separation, specific gravity and per cent solids in products.

**Horsepower depends on the amount of solids settling and specific gravity.

CLASSIFIER, Denver Rake



Type D Duplex Denver Rake Classifier

The Denver Rake Classifier is designed for either open or closed circuit operation. It is made in two types, type "C" for light duty and type "D" for heavy duty. The mechanism and tank of both units are of sturdiest construction to meet the need for 24 hour a day service. Both type "C" and type "D" Denver Rake Classifiers have a tank made of heavy steel plate with the seams double electric welded both inside and out. Tanks are

arranged so that feed may enter from either side. Rakes are made either of heavy steel angles welded to channel supports which are carried by the actuating mechanism or channel irons split lengthwise and welded to supports, whichever type of duty the classifier will be expected to perform. Raking movement is accomplished by a cam and roller drive. Cams are mounted on an oversize shaft and driven by a semi-steel cast tooth gear and pinion on the light duty unit or heavy molychrome steel cams operated by machine cut gears are used on the heavy duty unit. Mechanism supports are of the strongest possible construction and have a large safety factor to withstand severe load conditions. Also, the babbitted pillow block drive bearings on the light duty unit and the bronze bushed drive bearings on the heavy duty unit are of ample size to handle most any overload condition.

A rake lifting device, utilizing worm gears, a hand crank, and steel cables, is provided on both units and this rake lifting device is so designed that one man can quickly and easily raise or lower the rake. Classifiers can be furnished either belt or motor driven. On the belt driven type a right angle drive can be supplied if desired. The standard motor drive is V to flat with 3-phase, 60 and 50 cycle, 220, 440 or 550 volt motor.

The standard length of "C" type simplex classifier is 14'8", with widths of 1'6", 2'0", 2'3", 3'0". Type "C" duplex standard lengths are 12'0", 14'8", 16'4" and 18'0", with widths of 4'0", 4'6", 5'0" and 6'0". Model "D" simplex has tank lengths of 18'4", 20'0", 21'8", 23'4", 25'0", or 26'8", with width of 3'0" and 4'0". Heavy duty model "D" duplex comes with tank lengths the same as model "D" simplex, and widths of 5'0", 6'0", 7'0" and 8'0".

(Continued on next page)

**Complete Milling Equipment From
Testing . . . To Feeder . . . To Dryer.**

Light Duty "C"	Cap. in Tons per 24 Hrs. at 100 Mesh. Dilution 4:1 to 6:1, stroke 16-20		Length	H. P. Motor	Approx. Ship. Wt. Lbs.			
	Width	Design			Overflow	Raking	Belt Motor	*
1'6"	Simplex	25-40	175	14'8"	1-1½	2200	2500	45
2'0"	Simplex	35-50	225	14'8"	1½-2	2450	2920	65
2'3"	Simplex	50-75	250	14'8"	1½-2	2550	3020	70
3'0"	Simplex	65-100	325	14'8"	2-3	2750	3270	85
4'0"	Duplex	90-135	450	14'8"	3	3500	4020	100
4'6"	Duplex	100-150	500	14'8"	3-5	3700	4250	110
5'0"	Duplex	110-170	550	14'8"	5	3900	4450	115
6'0"	Duplex	130-200	650	14'8"	5	4400	4950	130
Medium and Heavy Duty "D"								
3'0"	Simplex	100-150	400	18'4"	3	6150	6500	135
4'0"	Simplex	130-200	530	18'4"	3-5	7140	7550	180
5'0"	Duplex	160-250	660	21'8"	5	11300	12000	230
6'0"	Duplex	200-300	800	21'8"	5-7½	12900	12600	270
7'0"	Duplex	230-350	930	21'8"	7½	12700	13500	310
8'0"	Duplex	260-400	1050	21'8"	7½-10	13400	14200	350

*Add or subtract for each 12" difference in length.

What can we do to help you?



All we ask is a chance to help you and the opportunity to work with you on your equipment needs.

CONCENTRATOR, Denver-Buckman Tilting

crank case breather. The drive is by V-belts from an electric motor or a gasoline engine. Either base-plate or receiver-mounted units can be obtained. Automatic start-and-stop control is included on motor-driven compressors.

The Type 40 Ingersoll-Rand Compressor is a stationary, vertical, single-acting, two-stage machine with air-cooled cylinders and intercooler. Construction is with tapered roller bearings on the main shaft, "constant-level" oiling system which insures uniform lubrication regardless of the crankcase oil level, stainless steel valve channels and springs, replaceable intercooler sections, propeller type fan mounted on crankshaft, automatic unloader, and combined air-intake filter and silencer. Any type of motor, gasoline engine, or diesel engine can be used to drive the compressor at rated speed by means of V-belts employing the proper pulley ratio. Compressors can be obtained with the motor direct-connected to the compressor by a flexible coupling. The most compact drive is the "Motorcompressor" in which the motor rotor is mounted directly on the compressor crankshaft, and the motor frame is bolted to the compressor crankcase, eliminating a flexible coupling and a common sub-base under the motor and compressor. When air is needed only at intervals, or an entirely automatic unit is desired, automatic "start-and-stop" control is recommended. The table below lists the various sizes of Type 40 Compressors with motor-V-belt drives.

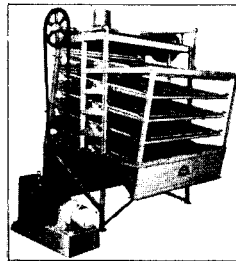
INGERSOLL-RAND TYPE 30 AIR-COOLED COMPRESSORS

Machine Size	Piston Displacement Cu. Ft. Per Min.	Max. Discharge Pressure Lbs.	*Motor H. P.	Dimensions Inches			Approx. Ship. Wt., Lbs. Motor
				L	W	H	
3" x 2 3/4"	6.0	40	3/4	42	19	16	250
3" x 2 3/4"	8.1	40	1	42	19	16	260
3" & 3" x 2 3/4"	13.5	40	1 1/2	42	19	17	330
3" & 3" x 2 3/4"	18	40	2	42	19	17	360
4" & 4" x 2 3/4"	24	40	3	46	22	22	490
5" & 5" x 3 1/2"	40	40	5	49	26	22	570
6" & 6" x 3 1/2"	62	40	7 1/2	58	29	31	1180
6" & 6" x 5"	83	40	10	58	29	31	1260
3" & 1 3/4" x 2"	5.3	100	1	42	19	16	290
3" & 1 3/4" x 2 3/4"	7.8	100	1 1/2	42	19	17	310
3" & 1 3/4" x 2 3/4"	10.8	100	2	42	19	17	340
4" & 2 1/2" x 2 3/4"	15.8	100	3	46	22	19	470
5" & 3" x 3 1/2"	24.0	100	5	49	26	22	540
6" & 3 1/2" x 4 1/2"	41.0	100	7 1/2	56	30	31	905
6" & 3 1/2" x 5"	52	100	10	56	30	31	980
5" & 5" & 4" x 4"	54	100	10	58	27	34	1200

INGERSOLL-RAND TYPE 40 AIR-COOLED COMPRESSORS

Model	Piston Displacement Cu. Ft. Per Min.	Max. Discharge Pressure Lbs.	*Motor H. P.	Dimensions Inches			Approx. Ship. Wt., Lbs. Motor
				L	W	H	
15-B	79	100	15	90	51	76	1805
25-B	142	100	25	62	28 1/2	52	2565
40-B	194	100	40	66	34	58 1/2	3310
50-B	284	100	50	76 3/4	39	59	4130
75-B	387	100	75	79	45	58	5650
75-BH	445	100	75	87	47 1/2	67 1/2	5700
90-B	515	100	100	87	48	69 1/2	6000

*Sea-level ratings.



Denver-Buckman Tilting Concentrator

DENVER-BUCKMAN Tilting Concentrator was developed by a large mining company in Western Canada for concentrating very fine high-specific gravity minerals. It is used for cassiterite, wolframite, scheelite, and free milling gold ores in the 150-1000 mesh range.

Denver - Buckman Tilting Concentrator is a continuous feed distribution system synchronized in operation with one or more concentrator units. A mechanically controlled cycle of operations for each unit develops a continuous

performance in the concentrator. Automatically the feed to each unit is cut off, the unit tilted, washed by high pressure water sprays, and then returned to its original position. Five to ten units can be operated from one distributor. Cleaner circuits may be operated in unison with rougher circuits.

The Denver-Buckman Tilting Concentrator fills a definite need for a unit to increase efficiency of slime sections of gravity plants. An extremely small operating crew, combined with low maintenance costs and high ratio of concentration have been reported by many enthusiastic users.

Additional data gladly furnished upon request.

No. Decks	Size of Decks	Capacity Tons/24 Hrs.	Dimensions			H. P. Per Circuit	Approx. Ship. Wt., Lbs.		Cubic Dimensions Export Cu. Ft.
			L	W	H		Dom.	Export	
5	6'x6'	50 to 120	89'	80'	125'	1	5000	5600	314

CONDITIONER AND AGITATOR, Denver (Open Type)

— See AGITATORS

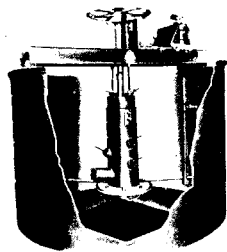
Reliable Denver Ore Tests insure your mining investment.

CONDITIONER AND SUPER-AGITATOR, Denver (Patented)

DENVER (Patented) Conditioner and Super-Agitator is especially designed for intense agitation and aeration. It has a wide application as a conditioner, an agitator, a mixer, or an aerator. It will handle any pulp or slurry, or liquid-solid combination that will flow through a ten mesh screen.

The Denver (Patented) Conditioner and Super-Agitator is a heavy duty machine. The mechanism is supported on a beam type superstructure which may be mounted on an open or closed tank of wood, steel, concrete, or other suitable material. The enclosed antifriction bearing assembly carries the heavy duty shaft and ship type three blade propeller, which may be furnished of cast iron, rubber, or special alloys as required. Recirculation of pulp is controlled by an adjustable collar on the standpipe, and by recirculation holes in the standpipe itself. In large tanks auxiliary airlift pipes are supplied to increase circulation and aid aeration.

The Denver (Patented) Conditioner and Super-Agitator can be easily started after a shutdown, and accordingly is valuable for batch work. Short circuiting of pulp when used continuously is prevented by the positive feed to the propeller. More complete information can be obtained by writing any Denver Equipment Company office.



Denver (Patented) Conditioner and Super-Agitator

A Denver Mineral Jig or Denver "Sub-A" Unit Flotation Cell In Your Grinding Circuit Will Recover Mineral As Soon As Free.

Recover Your Mineral As Soon And As Coarse As Possible.

CONVEYOR, Denver Belt Ore



Denver Belt Ore Conveyor

BELT conveyors are used to transport various materials over relatively short distances both horizontally and on an incline where the angle of the latter does not exceed 21° to 23° in exceptional cases. The material can be of almost any size and either dry or wet, but in the latter case the moisture content must be known and taken into consideration when figuring such installations. Us-

ually the belt is supported at regular intervals by troughing rollers on the carrying side, while a number of flat rollers are needed for the return side.

Conveyor belting for the particular service is usually rubber covered, the upper or wearing side in many instances being further reinforced by an extra thickness of "tread" rubber which may or may not extend to the outside edge of the belt, while the under or pulley side has only a thin coat to protect the duck. Duck for conveyor belting ordinarily weighs 28 to 42 ounces and the plys from 3 to 8 depending on the factors of length of conveyor, width of belt, size of head and tail pulleys and the weight and character of material to be handled.

Supports for conveyors are usually wood or steel longitudinal members properly supported on bents and braced laterally to properly keep in alignment both the troughing rollers and the return idlers.

Conveyors are a cheap, quick and continuous method of transporting the material and when properly designed give long service.

Additional data gladly furnished upon request.

Machine Size*	Tank Capacity Cubic Feet		Overall*** Dimensions		Motor H. P.	Approx. Ship. Wt., Lbs.			
	**Wood	Steel	Dia.	Ht.		-Tank-		-Mechanism-	
						Wood	Steel	Belt	Motor
3'x3'	14.4	21.2	3'4"	4'11"	1½	190	190	500	550
4'x4'	38.1	50.3	4'4"	6'2"	2	330	425	800	850
5'x5'	78.8	98.1	5'5"	7'3"	3	520	670	1050	1100
6'x6'	141.4	169.6	6'6"	8'3"	3	760	950	1200	1250
7'x7'	230.6	269.4	7'6"	9'6"	5	1030	1360	1400	1450
8'x8'	351.1	402.2	8'6"	10'9"	5	1400	1790	1450	1700
10'x10'	704.0	785.4	10'7"	12'9"	7½	3300	3584	2450	2650
12'x12'	1241.0	1357.2	12'7"	16'0"	10	4700	6100	3600	3800
14'x14'	1996.0	2155.2	14'8"	18'6"	15	6500	7800	4200	4400
16'x16'	2906.0	3216.9	16'8"	20'8"	20	8570	14320	5400	5800
18'x18'	4233.0	4580.5	18'10"	22'8"	20	11243	17660	6200	6600
20'x20'	5853.0	6283.2	20'10"	25'0"	25	14245	23400	6600	7300

*Machines 14'x14' and larger built with air-lifts.

**Tanks 10'x10' and larger with 3" staves.

***For V-belt driven agitator with steel tanks.

CAPACITIES FIGURED AT 100 FEET PER MINUTE BELT SPEED

Width of Belt	Average Ply	Material Sizes		Cross Section of Lead in Sq. Ft.	Cu. Ft. per Hr.	Tons per Hour Weight of Material In Lbs. per Cu. Ft. @ 100 Ft. / Minute					Recommended Power per Minute	H.P. at 300 Ft. per Minute
		Average Size Range	*Maximum Size Allowable			50	75	100	125	150		
12"	3	1 1/2" - 1 3/4"	2"	.07	475	12	18	23	30	37	225	142
14"	4	1 1/2" - 2"	3"	.11	685	17	26	34	43	52	225	158
16"	4	2" - 2 1/2"	4"	.15	895	22	34	45	56	67	225	174
18"	4	2 1/2" - 3"	5"	.19	1135	28	43	57	71	85	250	183
20"	5	3" - 3 1/2"	6"	.23	1400	35	53	70	88	105	250	189
24"	5	3 1/2" - 4 1/2"	8"	.34	2015	50	76	101	127	151	300	204
30"	6	4" - 6"	11"	.53	3150	79	118	158	197	237	340	219
36"	6	6" - 7 1/2"	14"	.76	4535	113	170	227	284	340	375	246
42"	7	7 1/2" - 9"	17"	1.03	6175	154	232	309	386	463	400	270
48"	8	9" - 10 1/2"	20"	1.34	8065	202	302	403	504	605	450	303

*Maximum size material not to exceed 10% of load.

†For horsepower on inclined conveyors add 1 H. P. for each 10 feet of elevation of discharge end.

NOTE:—On inclined conveyors the maximum angle should never exceed 23° or a rise of 39 feet in 100 feet of conveyor length and it is advisable to keep the angle under 21°.

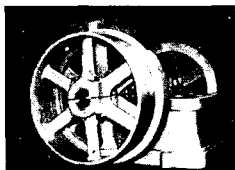
The pitman is made of cast steel and water jacketed. Under the water jacket, a cap is so arranged that a small amount of water flowing through the chamber will effectually dissipate excess heat generated by the bearing. The swing jaw is made of open hearth annealed steel and it is heavily ribbed in the back, also is provided with a recess for the toggle seat. Crusher jaws are of standard manganese steel 5" thick and accurately ground on the back and sides. Crusher is fitted with hard iron false plates. The cheek plates are of manganese steel 1 1/4" thick. The two toggle plates are made of gray cast iron and fit in toggle seats made of manganese steel. The tension rod is made of forged round iron connected to the swing jaws by means of an eye bolt.

*Machine Size, Jaw Openings	Capacity Tons Per Hour		Dimensions			H.P.	Approx. Domestic Shipping Wt., Lbs.
	To 3 Inch	To 2 1/2 Inch	L	W	H		
	Belt						
18"x30"	45	40	9'7 3/4"	9'2 3/4"	5'6"	50	40,000
18"x36"	80	60	9'8"	9'4 3/4"	5'9"	50-75	59,000

*Size of feed opening when jaw is open 2 inches at discharge opening.

We have often been referred to as the "Diagnosticians of the ore dressing industry." Perhaps we can help you with your mineral recovery problems. Please let us try.

CRUSHER, Denver (Blake Type) Jaw



Denver (Blake Type) Jaw Crusher

DENVER (Blake Type) Jaw Crusher is an exceedingly strong, serviceable machine, widely used in milling operations, also for general crushing work. It is especially adapted to handling blocky ore requiring large jaw openings 3", 4", or 5" in size.

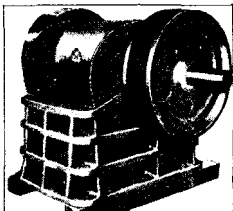
The massive proportion of the frame, cast in one piece of highest quality cast iron, absorbs the severest strains incident to crushing. The babbitted bearings for the pitman shaft are cast integral with the frame and are water cooled. Swing jaw shaft bearings also cast integral with frame.

CRUSHERS, Denver (Forced Feed Type) Jaw

THE Denver (Forced Feed Type) Jaw Crusher is ideal for small properties. A high ratio of reduction is obtained by the forced feed method of operation. The pitman moves on an eccentric shaft and rotates so that the material is constantly forced downward through the opening. An outstanding feature of this type of crusher, is that the jaws can be set at a certain opening and maintain this setting assuring a uniform product size. This is accomplished by the single toggle bottom pivot adjustment, which will not slip, but may be adjusted with ease when desired.

For limited tonnages these crushers will give a product fine enough for ball or rod mill feed, eliminating the need for secondary crushing. This forced feed crusher is made in three different types as described in detail in the information on each type, which follows. The capacities of all types are the same and are shown in the table on the following page.

Denver Forced Feed Jaw Crusher

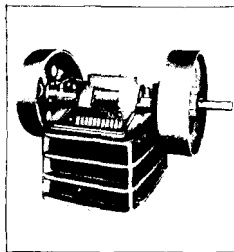


Type H—Cast Steel Frame, Anti-friction Bumper Bearings, Bronze Side Bearings.

THIS crusher is ideal for small properties and is of the high capacity forced feed design. The main frame and bumper are cast of special alloy iron and the initial cost is low. The frame is ribbed both vertically and horizontally to give maximum strength

with minimum weight. The bumper is ruggedly constructed to withstand tremendous shock loads. Steel bumper can be furnished if desired. The side bearings are bronze; the bumper bearings are of the anti-friction type. This bearing arrangement adds both strength and ease of movement. The jaw plates and cheek plates are reversible and are of the best grade manganese steel. The jaw opening is controlled by the position of an adjustable wedge block. The crusher is usually driven by a V-to-V belt drive, but it can be arranged for either V-to-flat or flat belt drive. The 8"x10" size utilizes a split frame and may be packed for muleback transportation. Cast steel frames can be furnished to obtain maximum durability.

Denver Forced Feed Jaw Crusher



Bronze Bearing Cast Steel Frame and Bumper, Bronze Side and Eccentric Bearings.

THIS type of crusher is similar in design to the Type H listed above except for having a frame and bumper made of cast steel. This steel construction makes the unit lighter per unit of size, and adds considerable strength. The bearings are all of special design; they are bronze and will stand continuous service

without any danger of failure. The jaw and cheek plates are manganese steel; and are completely reversible, thus adding to their wearing life. The jaw opening is controlled by the position of an adjustable wedge block. The crushers are usually driven by V-to-V but can be arranged for V-to-flat and belt drive. The 5"x6" size and the 8"x10" size can be made with sectionalized frame for muleback transportation. This crusher is ideal for strenuous conditions.

Bronze Bearing—Cast Steel Frame and Bumper, Bronze Side and Eccentric Bearings

Crusher Size	H. P. Required	R.P.M.	Flywheel Dia. & Face	Dimensions			Approx. Ship. Wt. Lbs.
				W	L	H	
5"x6"	3-5	350	18"x3 1/2"	27	27	26	650
7"x10"	7 1/2-10	325	24"x5 1/2"	38	38 3/4	32 1/2	1725
8"x10"	10-12	325	28"x5 1/2"	41 1/2	44	39 1/2	2180
9"x12"	15-20	300	28"x7"	47	45 1/2	39 1/2	3400
9"x14"	20-25	300	28"x7"	49	45 1/2	39 1/2	3700
10"x16"	20-25	275	28"x7"	55	45 1/2	40 1/2	4200
10"x16"	25-30	275	30"x8 1/2"	59	52	43	4700
10"x18"	30-35	275	30"x8 1/2"	61	52	43	5600
10"x20"	30-40	275	32"x8 1/2"	66 1/2	52	44	6500
10"x24"	35-45	250	36"x10 1/2"	78 1/2	57 1/2	46 1/2	8400
10"x30"	50-55	250	36"x10 1/2"	84 1/2	57 1/2	46 1/2	10600
10"x36"	50-60	250	36"x12 1/2"	95 1/2	64 1/2	46 1/2	11900
15"x24"	45-60	250	42"x10 1/2"	82 1/2	72 1/2	65	14000
15"x36"	60-75	200	50"x13"	98	78	70	19000

TYPE "H"—Anti-Friction Bumper Bearings—Bronze Side Bearings

SPECIFICATIONS

Crusher Size	H.P. Required	H.P. Motor	R.P.M.	Flywheel Face & Dia.	Approx. Ship. Wt., Lbs.	Dimensions, In.		
						L	W	H
2 1/4 x 3 1/2	1/2	1	350-450	15 x 2 1/4	150	15	17	14
3 1/4 x 4 1/2	1	2	350-425	13 3/8 x 2 1/2	313	18 3/4	18 3/4	17
5x6	3	5	325-375	18x4 1/2	630	28	27	25
8x10	5-7 1/2	10	250-325	28x5 1/2	2660	45	42	39
10x16	20-25	30	250-300	30x8 3/4	6050	56	61	44
10x20	25-30	30	225-275	30x9	6200	55	66	50
11x30**	35-40	40	225-275	36x11 1/2	10600	67	72	48

CAPACITIES* (Tons per hour)

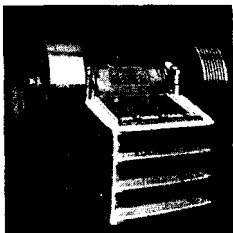
Crusher Size	Ring Size (Inches)				
	1/4	1/2	1	1 1/2	2 1/2
2 1/4 x 3 1/2	50-150 lbs.				
3 1/4 x 4 1/2	500 lbs.				
5x6	75	1.5	5	2.5	5
8x10	1.3	4	7	10	12
10x16	3	9	17	33	40
10x20	6	16	28	44	52
11x30**	8	20	36	64	80

*Laboratory size crusher; alloy iron frame

**11"x30" size has anti-friction side bearings as well as anti-friction bumper bearings.

Denver Ore Tests are made on an "actual cost" basis. This brings the world's finest laboratory equipment and skilled technicians to your service at a very low cost.

Denver Forced Feed Jaw Crusher



Type J—Cast Steel Frame and Bumper — Antifriction Side and Eccentric Bearings. THIS type of crusher is ideal for very heavy crushing. It is similar to the Types H and also has the additional feature of antifriction bearings. These bearings are special and are designed to take any load that can be imposed. The heavily ribbed cast steel frame makes this a unit of exceptional strength. It is ideal for hard

crushing problems where continuity and ease of motion are essential. The jaw and cheek plates are manganese steel, and are easily replaceable. The unit is adjustable by means of a wedge and screw adjustment. This unit is generally arranged for V-to-V drive, but V-to-flat and belt drive are used with equal success.

TYPE "J"—Anti-Friction Side and Bumper Bearings**

SPECIFICATIONS

Crusher Size	H.P. Required	H.P. Motor	R.P.M.	Flywheel Face & Dia.	Appr. Ship Wt., Lbs.	Dimensions, In.		
						L	W	H
10x24	25-35	40	225-275	36x10½	9300	47	72½	50¼
10x36	40-50	50	225-275	36x11½	13000	48¾	88½	51
15x24	40-50	50	225-275	42x11½	14300	59	72½	71
18x24	40-45	50	225-275	42x11½	14300	59	72½	71
15x36	50-60	60	200-250	50x13½	20200	60	89½	75
18x36	50-60	60	200-250	50x13½	20200	60	89½	75
21x36	60-75	75	200-225	50x13½	24950	66	89½	86½
25x40	70-80	100	200-225	56x13½	36500	82	94½	102
32x40	80-90	100	200-225	56x13½	47000	84	96½	113½

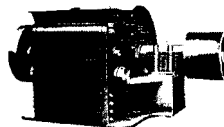
CAPACITIES* (Tons per hour)

Crusher Size	Ring Sizes (Inches)					
	¼	1	1½	2½	3	4
10x24	7	18	33	52	68	
10x36	8	22	40	74	88	
15x24	7	18	33	52	68	
18x24			33	52	68	
15x36				74	88	120
18x36				74	88	120
21x36				80	92	128
25x40					92	128
32x40					92	128

*Capacities are based on material weighing 100 lbs. per cubic foot of average stone with jaws set to produce 15-20% oversize above ring size.

**All anti-friction bearing crushers have steel plate, electric welded frame.

CRUSHER, Dixie (Standard Mogul) Hammermill



Dixie Hammermill Crusher

THE Dixie (Standard Mogul) Hammermill is very similar to the Mogul Non-Clog in construction, but is equipped with a stationary breaker plate.

Simply but sturdily constructed throughout, to withstand severe use and heavy loads, the Dixie Standard Mogul is without question the

most practical hammermill in general use today.

This hammermill can be operated either as a primary or secondary crusher, and with its great tonnage per horsepower reduces materials of large proportion to any given size in a single operation.

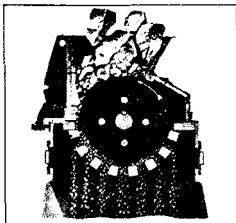
Size Mill	Hopper Opening	*Capacity Tons Per Hour	Horsepower
2012	12"x6"	2 to 6	10-15
2018	18"x6" or 18"x10"	3 to 8	20-25
2024	24"x6" or 24"x10"	4 to 10	25-30
5024	40"x24" or 40"	25 to 125	75-125
5030	30"x24" or 40"	35 to 175	125-175
5040	40"x24" or 40"	45 to 225	150-250
5050	50"x24" or 40"	55 to 275	175-300
5060	60"x24" or 40"	65 to 325	200-350
6040	40"x40"	75 to 350	200-300
6060	60"x40"	85 to 400	300-400
7260	60"x48"	150 to 500	500-600
9672	72"x70"	200 to 1000	600-800

Size Mill	Speed R. P. M.	Overall Dimensions			Approx. Shipping Weight, Lbs.
		W	L	H	
2012	1800	4'6"	3'6"	3'	3,200
2018	1800	5'	3'6"	3'	4,200
2024	1800	5'6"	3'6"	3'	5,200
5024	600-900	10'4"	8'8"	5'8"	30,000
5030	600-900	11'1"	8'8"	5'8"	33,000
5040	600-900	12'	8'8"	5'8"	40,000
5050	600-900	12'11"	8'8"	5'8"	43,000
5060	600-900	13'9"	8'8"	5'8"	48,000
6040	600-720	15'6"	13'3"	8'8"	68,000
6060	600-720	17'2"	13'3"	8'8"	80,000
7260	500-720	15'	14'	10'	105,000
9672	400-500	21'5"	19'8"	13'11"	180,000

*Capacity depends on kind of material to be reduced, ratio of reduction, moisture content, and fineness.

Your comments and suggestions are always welcome. Please write to us.

CRUSHER, Jeffrey Miracle Hammer



Jeffrey Miracle Hammer Crusher

THE Jeffrey Miracle Hammer Crusher is designed for the reduction of large pieces and large capacities of limestone, shale, slag, and cement rock. The larger sizes are built to take steam shovel size limestone, crushing it into pieces 1", 2", 3", or 4" and under, in one operation, the one unit doing the work ordinarily done by two or more of other types of crushers. This enables large reduction of limestone and other materials to a uni-

form size with minimum initial and production costs. All parts are extra heavy to withstand heavy, continuous service. The Miracle Hammer Crushers are supplied with either heavy cast iron frames or with armorplate steel frames with manganese steel liners. These crushers are provided with a hinged breaker plate easily adjustable to compensate for wear, as well as giving easy access to working parts. The large, heavy duty crushers are frequently used in such industries as carbide, chemical and cement as a primary machine where large capacities and cubical products are desired.

The Jeffrey Heavy Duty Reversible Hammer Crusher is designed especially for reducing bituminous coal down to a product of 85% minus $\frac{1}{8}$ ", at large capacities, for coking purposes. These machines are also adaptable to the reduction of abrasive materials since they are symmetrical about the vertical center line and when one corner of the hammers become worn, it is only necessary to reverse the direction of the rotor in order to use the opposite unused faces of the hammers. The frame is made of heavy welded plate steel equipped with removable manganese liners and provided with vertical hinged breaker plates to compensate for the wear on breaker plate liners.

MIRACLE HAMMER CRUSHERS

Size of Crusher Inches	Approx. H.P.	Speed R.P.M.	Feed Opening Inches	Approx. Ship. Wt., Lbs.
36x24	60 to 75	700 to 900	18x24	9600
36x36	75 to 100	700 to 900	18x36	11800
36x48	100 to 125	700 to 900	18x48	14600
42x24	75 to 100	600 to 800	24x24	13000
42x36	100 to 125	600 to 800	24x36	17200
42x48	150 to 175	600 to 800	24x48	25500
42x66	200 to 250	600 to 800	24x66	36000
54x30	100 to 200	500 to 700	30x41½	37500
54x48	200 to 350	500 to 700	48x48	48000
54x70	300 to 400	500 to 700	48x70	66000

(Continued on next page)

MIRACLE HAMMER CRUSHERS (Continued)

Size of Crusher Inches	Maximum Size of Feed	Approximate Capacity Tons per hour	
		1" and under	4" and under
36x24	14" sq. x 8" thick	35 to 40	50 to 70
36x36	14" sq. x 8" thick	50 to 60	70 to 90
36x48	14" sq. x 8" thick	70 to 75	90 to 120
42x24	16" sq. x 10" thick	50 to 60	80 to 100
42x36	16" sq. x 10" thick	70 to 90	110 to 130
42x48	16" sq. x 10" thick	100 to 120	150 to 180
42x66	16" sq. x 10" thick	140 to 175	210 to 260
54x30	20" Cubes	100 to 150	150 to 225
54x48	Steam Shovel	150 to 225	225 to 275
54x70	Steam Shovel	200 to 300	325 to 400

HEAVY DUTY REVERSIBLE CRUSHERS

Size of Crusher Inches	Approx. H.P.	Speed R.P.M.	Feed Opening Inches	Approx. Ship. Wt., Lbs.
42"x82"	300 to 350	720 to 900	18"x82"	41000

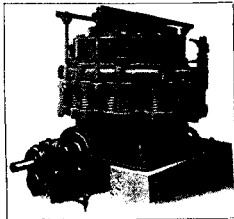
Size of Crusher Inches	Maximum Size of Feed	Approximate Capacity
		85% -- $\frac{1}{8}$ " Product
42"x82"	12" to 16"	300 T. P. H. Bituminous Coal

DECO Equipment is Designed for "24 Hour Service." This is important because "one hour's delay means no profit today" and with today's high operating costs continuous service is more important than ever before.



Please Give Us the Opportunity to quote prices and delivery on standard equipment to meet your needs.

CRUSHER, Symons Cone



Symons Cone Crusher

SYMONS Cone Crushers have been used extensively for secondary crushing in metallic, non-metallic, rock products and industrial operations. The Symons Cone was developed to give large capacity, fine crushing. The combination of high speed and wide travel of the cone results in a series of rapid, hammer-like blows on the material as it passes through the crushing cavity and permits free flow of material through the cavity.

Reduction in size of any particle, with each impact of the head, is regulated by the opening between the head and bowl at that point. A threaded arrangement of the bowl affords a quick and easy method for changing the size of product or to compensate for wear. This adjustment can be made while crusher is operating. A parallel zone between the lower portion of the crushing members assures uniform sizing.

Frame, adjustment ring and cone are made of cast steel; gears are made of special treated steel and have cut teeth; all bearings are bronze; mantle and bowl liners are manganese steel. The head and shaft can be removed as a unit, and other parts such as the eccentric and thrust bearings can easily be lifted out after the head is removed. The counter shaft assembly can also be removed as a complete unit.

The circle of heavy coil springs, which holds the bowl and adjustment ring down firmly onto the frame, provides automatic protection against damage due to tramp iron. These springs compress, allowing the bowl to rise the full movement of the head until non-crushable material passes through. The springs then automatically return to their normal position.

Symons Cone Crushers are made in Standard and Short Head types. They are of the same general construction but differ in shape of the crushing cavity. The Standard cone is used for intermediate crushing. The Short Head cone is used for finer crushing. It has a steeper angle of the head, a shorter crushing cavity and greater movement of the head at the top of the crushing cavity.

(Continued on next page)

Use Denver Equipment—Standard the World Over. "No Yearly Models But Constant Improvement."

STANDARD CONE CRUSHERS

Size	Dimensions			H. P.	Full Load R.P.M.	Approx. Ship. Wt., Lbs.
	L	W	H			
20 In.	5'9 $\frac{1}{2}$ "	4'2 $\frac{1}{2}$ "	4'10 $\frac{1}{4}$ "	20 to 25	650	7,700
2 Ft.	7'2 $\frac{3}{4}$ "	4'5 $\frac{3}{4}$ "	5'5 $\frac{3}{4}$ "	25 to 30	575	10,000
3 Ft.	9'1 $\frac{3}{4}$ "	6'2 $\frac{1}{2}$ "	6'6 $\frac{1}{2}$ "	50 to 60	580	21,000
4 Ft.	10'4 $\frac{3}{4}$ "	7'6 $\frac{1}{4}$ "	8'3 $\frac{3}{4}$ "	75 to 100	485	35,000
4 $\frac{1}{4}$ Ft.	10'6"	7'6 $\frac{1}{2}$ "	9'7 $\frac{1}{2}$ "	125 to 150	485	45,000
5 $\frac{1}{2}$ Ft.	12'6"	8'10 $\frac{1}{2}$ "	11'5 $\frac{1}{4}$ "	150 to 200	485	83,000
7 Ft.	13'10 $\frac{3}{8}$ "	10'5 $\frac{3}{8}$ "	13'1 $\frac{3}{8}$ "	250 to 300	435	140,000
7 Ft.	13'10 $\frac{3}{8}$ "	10'5 $\frac{3}{8}$ "	13'3"	250 to 300	435	145,000

SHORT HEAD CONE CRUSHERS

Size	Dimensions			H. P.	Full Load R.P.M.	Approx. Ship. Wt., Lbs.
	L	W	H			
2 Ft.	7'2 $\frac{3}{4}$ "	4'5 $\frac{3}{4}$ "	5'5 $\frac{3}{4}$ "	25 to 30	575	10,300
3 Ft.	9'1 $\frac{3}{4}$ "	6'2 $\frac{1}{2}$ "	6'6 $\frac{1}{2}$ "	50 to 75	580	21,500
4 Ft.	10'6"	7'6 $\frac{1}{2}$ "	8'5 $\frac{3}{4}$ "	100 to 150	485	44,000
5 $\frac{1}{4}$ Ft.	12'6 $\frac{3}{4}$ "	8'10 $\frac{1}{2}$ "	11'5 $\frac{1}{4}$ "	150 to 200	485	86,000
7 Ft.	13'10 $\frac{3}{8}$ "	10'5 $\frac{3}{8}$ "	12'10"	250 to 300	435	150,000

STANDARD CONES

Size of Crusher	Type of Bowl	Recommended Minimum Discharge Setting A	Feed Opening B
20 Inch	Fine	$\frac{1}{4}$ "	1 $\frac{1}{2}$ "
	Coarse	$\frac{3}{8}$ "	2 $\frac{5}{8}$ "
2 Ft.	Fine	$\frac{1}{4}$ "	2 $\frac{1}{4}$ "
	Coarse	$\frac{3}{8}$ "	3 $\frac{1}{4}$ "
3 Ft.	Fine	$\frac{3}{8}$ "	3 $\frac{3}{8}$ "
	Coarse	$\frac{1}{2}$ "	5 $\frac{1}{8}$ "
4 Ft.	Fine	$\frac{3}{8}$ "	5"
	Coarse	$\frac{3}{4}$ "	7 $\frac{3}{8}$ "
4 $\frac{1}{4}$ Ft.	Fine	$\frac{1}{2}$ "	4 $\frac{1}{2}$ "
	Medium	$\frac{3}{8}$ "	7 $\frac{3}{8}$ "
	Coarse	$\frac{3}{4}$ "	9 $\frac{1}{4}$ "
5 $\frac{1}{2}$ Ft.	Fine	$\frac{3}{8}$ "	7 $\frac{1}{8}$ "
	Medium	$\frac{1}{2}$ "	8 $\frac{5}{8}$ "
	Coarse	1"	9 $\frac{3}{8}$ "
7 Ft.	Fine	$\frac{3}{4}$ "	10"
	Medium	1"	11 $\frac{1}{2}$ "
	Coarse	1 $\frac{1}{4}$ "	13 $\frac{1}{2}$ "

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Use Denver Ore Tests to verify or improve your present flowsheet.

**CAPACITIES,
STANDARD CONE CRUSHERS**

Size of Crusher	*Capacities in Tons (2000 Lbs.) Per Hour at Indicated Discharge Setting A with Material Weighing 100 Pounds Per Cubic Foot												
	½"	¾"	1"	1 ¼"	1 ½"	1 ¾"	2"	2 ¼"	2 ½"	3"	3 ½"	4"	4 ½"
20 Inch	8	10	15	20	25	30	35	40	.....	.....	.....	.....	.....
2 Ft.	15	20	25	30	35	40	45	50	60	.....	.....	.....	.....
	20	25	30	35	40	45	50	60	.....	.....	.....	.....	.....
3 Ft.	35	40	55	70	75	80	85	90	95	.....	.....	.....	.....
	40	55	70	75	80	85	90	95	.....	.....	.....	.....	.....
4 Ft.	60	80	100	120	135	150	170	177	185	.....	.....	.....	.....
	120	135	150	160	175	185	190	.....	.....	.....	.....	.....	.....
4 ½ Ft.	100	125	140	150	160	175	185	190	.....	.....	.....	.....	.....
	125	140	150	160	175	185	190	.....	.....	.....	.....	.....	.....
5 ½ Ft.	160	200	235	275	300	340	375	450	.....	.....	.....	.....	.....
	275	300	340	375	450	.....	.....	.....	.....	.....	.....	.....	.....
7 Ft.	330	390	450	560	600	600	800	900	.....	.....	.....	.....	.....
	450	560	600	800	900	.....	.....	.....	.....	.....	.....	.....	.....

*Capacities given are neither minimum nor maximum, but are a conservative estimate based on results secured in actual practice.

SHORT HEAD CONES

Size of Crusher	Bowl	Recommended Minimum Discharge Setting C	Feed Opening D	
			Minimum	Maximum
2 Ft.	Fine	¾"	¾"	1 ¾"
	Coarse	1 ½"	1 ½"	2"
3 Ft.	Fine	¾"	¾"	1 ½"
	Medium	1 ½"	1"	2"
4 Ft.	Coarse	¾"	2"	3"
	Fine	¾"	1 ½"	2 ½"
5 ½ Ft.	Medium	¾"	1 ½"	2 ½"
	Coarse	¾"	2 ¾"	4"
7 Ft.	Fine	¾"	1 ½"	2 ¾"
	Medium	¾"	2"	3 ¾"
7 Ft.	Coarse	¾"	3 ¾"	5 ¼"
	Fine	¾"	2"	3 ¾"
7 Ft.	Medium	¾"	3 ¾"	5 ¾"
	Coarse	¾"	5"	7"

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What can we do to help you?

Denver Ore Tests are made on an "actual cost" basis. This brings the world's finest laboratory equipment and skilled technicians to your service at a very low cost.

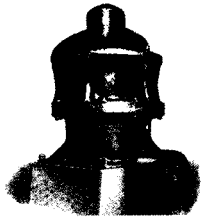
**CAPACITIES,
SHORT HEAD CONE CRUSHERS**

Size of Crusher	*Capacities in Tons (2000 Lbs.) Per Hour at Indicated Discharge Setting C with Material Weighing 100 Pounds Per Cubic Foot						
	¾"	1"	1 ¼"	1 ½"	1 ¾"	2"	2 ¼"
2 Ft.	6	8	10	14	20	.....	.....
	8	10	14	20	.....	.....	.....
3 Ft.	15	20	30	40	50	.....	.....
	15	20	30	40	50	.....	.....
4 Ft.	20	35	50	75	100	.....	.....
	20	35	50	75	100	.....	.....
5 ½ Ft.	50	75	100	125	.....	.....	.....
	50	75	100	125	.....	.....	.....
7 Ft.	120	150	240	300	360	420	.....
	120	150	240	300	360	420	.....

*Capacities given are neither minimum nor maximum, but are a conservative estimate based on results secured in actual practice.

Mill design and Flowsheet design are also services of Denver Equipment Co. Write for details how these services might help you.

CRUSHER, Traylor (Type TY) Reduction



Traylor (Type TY) Reduction Crusher

TRAYLOR (Type TY) Reduction Crusher is compact and of simple design, which provides maximum strength and high efficiency. It occupies minimum floor space, requires little head room and is easily and economically maintained. It is a machine of many exclusive features, among which may be mentioned: an all cast steel frame, with upper shells and spider made in one piece; a ball and socket type spring suspension; non-chokable, self-tightening bell head and curved concave, made of manganese steel; a patented dust seal, an efficient device for excluding dust and grit from the gyratory crusher lubrication chamber; a positive automatic forced feed lubrication system with water cooled oil reservoir; machined cut steel gearing; a self contained counter shaft fitted with roller bearings and automatically lubricated; an all-around bottom discharge, without diaphragm.

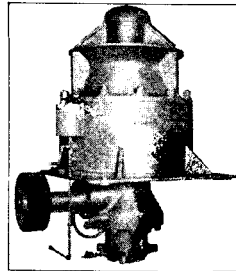
For individual requirements and recommendations you should specify the kind of rock to be crushed, the size of the feed, size of the largest rock in the feed, size of product required, the largest and smallest product for which adjustment is to be provided, whether the material is hard, medium or soft, brittle, tough or spongy, dry, damp, sticky or wet, and capacity desired in tons per hour.

Additional data gladly furnished upon request.

Size Dia. of Head	*Approximate Capacities		H. P. Required	Max. R. P. M. Counter Shaft	Recommended Pulleys	Approx. Shipping Weight Lbs.
	Reduction	Tons Per Hour				
1'-3"	3" to 3/4"	8	15-20	1050	13x7	3500
1'-8"	4 1/2" to 3/4"	15	20-40	865	20x8	8000
	5 1/2" to 1/2"	53	50-75	865	20x12	15000
2'-4"	9" to 3/4"	55				
	7" to 5/8"	81	75-125	695	26x16	28500
3'-0"	12" to 1"	79				
	10" to 7/8"	150	100-200	575	32x18	61000
4'-0"	16" to 1 1/4"	141				

*These capacities are average for 100 lbs. per cubic foot rock, medium hard. Different settings for feed and discharge can be made for each size head and concave. On crushers larger than the 1'3" diameter, several different sizes of head and concaves are available to obtain maximum capacity range.

CRUSHER, Allis-Chalmers (Type R) Reduction



Allis-Chalmers (Type R) Reduction Crusher

THE Allis-Chalmers (Type R) Reduction Crusher is of the gyratory type, designed for large capacity, fine crushing and incorporates many improvements over other gyratory type crushers previously manufactured by this company. The most distinctive feature of the Type R Crusher is the built-in, oil filled hydraulic jack used for fast, positive change of crusher setting while crusher is operating. The hydraulic step support also provides a convenient means of unloading the crushing chamber in case of power failure or other emergency. Protection against damage from tramp iron is automatically provided by a relief valve which opens under a predetermined pressure, lowering the crushing head and allowing foreign material to pass through without stopping the machine. The crusher discharge opening can then be promptly restored by cutting the feed, to clear the crushing chamber, and raising the head by means of the hydraulic jack. The pressure at which the automatic release operates can be regulated by a convenient valve.

A flexible support between the crusher and its foundation eliminates destructive vibration, facilitates feeding by the gyratory motion at top of crusher, and eliminates need of a massive foundation. Positive lubrication is assured, oil being pumped from a fully enclosed combination storage, cooling and screening tank by means of an electric motor driven unit.

The Type R Crusher is built with cast steel main frame and top shell; heavy forged steel main shaft; extra large bearings; steel gears with machine cut teeth; effective dust seals; and its wearing parts are of heat-treated manganese steel. It has a large self-feeding hopper type three-arm spider; one-piece ground-to-fit head mantle; self-tightening and self-locking concave ring. Top shell and spider are cast integral and readily removed to replace the one-piece concave ring. Lower flange is taper turned to accurately fit the main frame and to facilitate removal for replacement of wearing parts.

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Recover Your Mineral As Soon And As Coarse As Possible.

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*CAPACITIES IN TONS PER HOUR

Close Side Setting and Ecc. Throw										
	3"	¼"	½"	¾"	1"	1½"	2"	3"	4"	5"
No. 322	9.75	14	16	22	36					
No. 530		20.5	27.5	35	51	66				
No. 636			36.5	44	64	83	108	124		
No. 848				58.5	82.5	105	135	168	192	237

*Capacities given above are based on a feed of graded material with a one-way dimension not to exceed 66 per cent of the feed opening. The table is in net tons of 2000 lbs. per hour of material weighing 100 lbs. per cubic foot. Ores weighing more or less than 100 lbs. will correspondingly increase or decrease the capacity. All the above capacities are based on crushing fairly dry, clean stone or ore with fines removed.

Crusher Size	*Dimensions			H. P.	Approx. Total Wt., Lbs.
	L	W	H		
No. 322	4'8"	3'4"	8'13 1/2"	25-30	6,000
No. 530	7'2"	4'10"	10'8 3/4"	30-40	12,000
No. 636	8'7"	5'9 1/2"	12'11 1/4"	60-75	20,500
No. 848	11'6"	7'0"	17'0 3/8"	75-125	48,000

*Dimensions are for preliminary use only. H is overall height plus minimum headroom for removing eccentric.

The roll spacing mechanism may be easily and quickly changed while rolls are in operation, the size of the product changing correspondingly, to permit positive control of product size at all times.

The roll cores are so designed as to provide a continuous bearing surface, accurately tapered on the outside for mounting roll shells, assuring a positive grip that will not slip when shells are worn thin.

Roll shells are made of manganese or chrome alloy steel, depending upon the type of material to be crushed. The outside faces are ground or machined true and smooth for fine grinding and rough ground for coarse grinding. The inside surfaces are accurately tapered to fit the draw-type cores.

Proper lubrication facilities are provided and rolls are furnished with heavy steel plate housing with hopper plates attached, and doors are provided for inspection. The housing can be readily removed.

All types of drives are available: flat belt, "V to V", or others, depending upon the crushing plant requirements.

Size Machine	*Capacity: Tons per Hr.			Dimensions		
	Size Feed	Size Product	Tons	L	W	H
10"x6"	0.37"	0.10"	2	3 1/2"	2'0"	1'5"
16"x10"	0.75"	0.18"	6	4'0"	2'5"	2'5"
20"x12"	0.94"	0.23"	16	4 1/2"	2'11"	2'6 3/4"
27"x14"	1.28"	0.32"	29	6'2 1/2"	3'5"	3'0"
30"x14"	1.44"	0.36"	35	6'2 1/2"	3'5"	3'0"
36"x16"	1.69"	0.42"	42	7 3/4"	3'9"	4' 1/4"

Size Machine	R. P. M.	H. P.	Approx. Shipping Wt. Lbs.	
			Domestic	Export
10"x6"	225	5	1000	1100
16"x10"	200	6	3500	3850
20"x12"	170	12	7000	7700
27"x14"	150	18	10000	11000
30"x14"	140	20	15000	16500
36"x16"	105	30	20000	22000

*Due to variable characteristics of ores, size of feed, size of opening between rolls, and speed, the above capacities given are approximations only. Maximum reduction, at 4-1.

CRUSHING ROLLS, Denver (Spaced Type)

DENVER (Spaced Type) Crushing Rolls have been tried and proven over a long period of years by extensive use in the mining industry. Their advantages as a secondary crushing unit are definitely known.

The main frame is constructed of structural steel H beams welded together. Large diameter shafts of heat treated alloy steel prevent failure under severe service and the stationary and movable shafts are interchangeable. Bearings of interchangeable sleeve type have certain self-aligning features that assure equal distribution of bearing load and all bearings are sealed to exclude dust and to retain lubricant.

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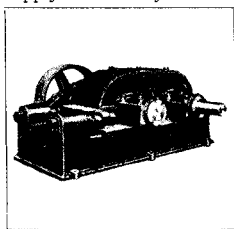
CRUSHING ROLLS, Denver (Sample)

DENVER (Sample) Crushing Rolls usually follow a primary crusher in the crushing section of an ore concentrating mill, and the primary crusher should be operated in closed circuit with a vibrating screen or other sizing mechanism to supply a correctly sized feed for the crushing rolls.

The action of the rolls in crushing is continuous and the rate at which they will crush depends upon the reduction ratio, speed of rolls and uniformity and type of feed. The crushing roll is ideally suitable for crushing brittle or friable material and produces a minimum of fines on any type ore.

Denver (Sample) Crushing Rolls embody the latest improvements on the ideas of experienced mill men, and at the same time retain simplicity and rugged durability. The main frame and stationary roll journals are cast in one piece, the movable roll is mounted on a heavy sliding saddle and fitted with heavy coil compression springs to provide adjustable crushing pressure between the roll shells.

(Continued on next page)



Denver (Sample) Crushing Rolls

Recover Your Mineral As Soon As Free.



Denver (Spaced Type) Crushing Rolls

Cores and shells are positively gripped together and the shells will not slip or break when worn through.

Spring tension provides an adjustable crushing pressure from 4,000 to 10,000 pounds per inch of shell face, and the spring pressure is so applied that none is transmitted to the bearings. Tension rods keep the rolls properly spaced for the setting required and the strain on the rods is all tension.

The spacing of the roll shells is accomplished simply by means of a special sleeve nut and spacing may be changed quickly and easily while rolls are in operation. The size of product changes accordingly with change of roll spacing. Absolute control of product size at all times is permitted and this is essential for producing specification material.

Where installations permit, the rolls are furnished with heavy steel plate housings with hopper plates attached, and doors are provided for inspection. The housing can be readily removed when necessary. All types of drives are available; flat belt, V-to-V, or others, depending upon plant requirements.

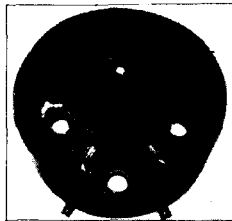
*Machine Size	**Capacity in Tons Per Hour			Max. R.P.M.	Max. Hp.
	Feed Size	Product Size	Tons		
24"x14"	1.15"	0.29"	25	160	25
30"x14"	1.44"	0.36"	35	140	30
36"x16"	1.69"	0.25"	42	105	40
42"x16"	2.0"	0.50"	50	90	45
48"x24"	2.25"	0.56"	85	80	60
54"x24"	2.56"	0.64"	102	75	65
62"x24"	2.94"	0.74"	134	70	75
68"x24"	3.19"	0.80"	138	65	80
72"x24"	3.44"	0.85"	140	60	100

*Machine Size	Dimensions			Approx. Shipping Weight, Lbs.	
	L	W	H	Domestic Export	
24"x14"	6'8"	6'1"	3'1"	8500	10000
30"x14"	8'8 1/2"	6'1 1/2"	3'5 3/8"	14000	15400
36"x16"	9'4"	7'10"	3'9"	18800	20680
42"x16"	12'0"	7'9"	4'6 1/4"	30000	38000
48"x24"	13'0"	8'10"	4'9"	50000	55000
54"x24"	14'5"	9'0 1/2"	5'2"	65000	71500
62"x24"	15'9 1/2"	9'6"	6'4 3/4"	86000	96800
68"x24"	16'9"	9'10"	7'0 3/4"	95000	104500
72"x24"	17'6"	10'2"	7'4 3/4"	112000	123200

*Intermediate sizes available.

**Due to variable characteristics of ores, size of feed, size of opening between rolls, and speed, the above tables are approximations only. Maximum ratio of reduction: 4 to 1.

DISTRIBUTOR, PULP, Denver (Self-Rotating Type)



Denver (Self-Rotating Type) Pulp Distributor

THE Denver Pulp Distributor is a simple, accurate and positive unit for distributing pulp in a concentrator wherever it is necessary to split a pulp stream and send equal quantities of material with identical characteristics to several points or circuits for treatment. It is self-rotating and requires no driving mechanism.

Every operator realizes the importance of eliminating surges and controlling pulp to flotation machines, concentrating tables, etc. By eliminating these surges without frequent operating adjustments, higher efficiency can be obtained as well as increased recovery.

Denver Pulp Distributor is made in two types, the only difference being the bearing mounting of the distributor head. A wide range of standard units makes it possible to select the correct type and size for your installation: from two foot size, built with two to eight compartments and handling 10 to 50 tons; up to the six foot size, built with two to twenty compartments handling 2000 tons or more. Send us a description of your problem and let us recommend the correct pulp distributor. Sizes up to 12' diameter.

DENVER (SINGLE BEARING TYPE) PULP DISTRIBUTOR

Size	Number of Compartments	Capacity, Cu. Ft. of Pulp per 24 hrs.	Approx. Shipping Wt., Lbs.
2'	2 to 8	12,000	360
	2 to 10	40,000	510

DENVER (TWO-BEARING TYPE) PULP DISTRIBUTOR*

Size	Number of Compartments	Capacity, Cu. Ft. of Pulp per 24 hrs.	Approx. Shipping Wt., Lbs.
2'	2 to 8	12,000	600
3'	2 to 10	40,000	740
4'	2 to 12	82,000	900
5'	2 to 14	175,000	1150
6'	2 to 16	330,000	1750

*Motor or positive drive can be supplied—also sizes up to 12' in diameter to handle up to 2,000,000 cu. ft. pulp per 24 hrs. are available.

Our desire is to make you "Happier, Healthier and Wealthier."

May We Please Work With You On All Your Equipment Needs?

DRIVES, Transmission



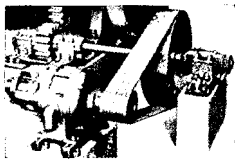
Multiple V-Belt Drive

transmission drives because they are smooth-starting, absorb shock loads, easy on bearings, compact, operate on short center distances, silent, clean and economical. They are used on speed ratios up to 7 to 1 and slightly over, permitting the use of lower cost higher speed motors. Five different cross section V-belts and various diameters of sheaves for transmitting up to 250 horsepower are stocked in Denver for immediate shipment. The sheaves have removable bushings to fit the most common shaft diameters.

More complete information can be obtained by writing any Denver Equipment Company office.

V-BELT, Step-Cone Pulley Drives are used for transmitting fractional power to Denver Laboratory Machines. It is possible to obtain three or four different speeds with the use of step-cone pulleys having grooves machined with several diameters.

V-TO-FLAT Belt Drives transmit power from grooved driver sheaves to flat-face pulleys or to flywheels. This

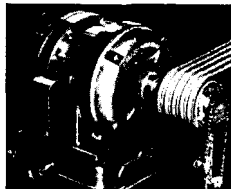


V-Flat Drive: also Shows Spur Gear Drive Arrangement

MULTIPLE V-Belt Drives are used for transmitting from fractional to 6000 horsepower constant speed, and to 300 horsepower adjustable speed. The V-belt design utilizes angled sides to transmit power through a V-grooved pulley by wedge contact between the angled sides of the belt and the angled sides of the groove. The multiple V-belt drive has supplanted the flat belt drive on many it is capable of pulling loads over very small grooved pulleys or sheaves without slip; they are smooth-starting, absorb shock loads, easy on bearings, compact, operate on short center distances, silent, clean and economical. They are used on speed ratios up to 7 to 1 and slightly over, permitting the use of lower cost higher speed motors. Five different cross section V-belts and various diameters of sheaves for transmitting up to 250 horsepower are stocked in Denver for immediate shipment. The sheaves have removable bushings to fit the most common shaft diameters.

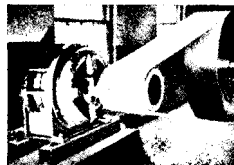
This adaptation of the V-belt drive is commonly found in plants making a gradual change-over from flat belts to the multiple V-belt drives. The chief advantage of the V-to-flat belt drive is low initial cost. However, they are limited to drives where the speed ratio is over 3 to 1 and where center distance is less than diameter of large sheave.

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Adjustable In-motion Control Type Vari-pitch Drive with Adjustable Motor Base

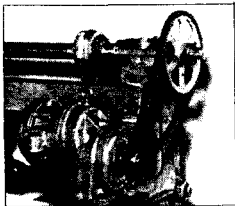
up to 4 horsepower. On 1- to 300-horsepower drives, vari-pitch sheaves can be obtained in two types: adjustable in motion or stationary; they require "companion" sheaves grooved to match vari-pitch groove spacing, and it is possible to obtain 9% to 28% speed variations. The adjustable In-Motion Control Vari-Pitch Sheave is used when speed changes are frequent and when adjustment is to be made while the sheave is in motion. A special motor base which moves on ball-bearings provides and maintains uniform belt tension throughout the speed adjustment range. A handwheel located in the motor base increases or decreases the pitch diameter of the vari-pitch sheave, thereby varying the speed and simultaneously maintaining the proper belt tension by compensating for change in center distance. The Stationary Control Type Vari-Pitch Sheave is used when speed changes are infrequent and may only be made while the drive is stationary. By merely stopping the motor, releasing the belt tension, adjusting the pitch diameter, and restoring tension, the change is completed.



Flat Belt Drive

FLAT-BELT Drives may be used for transmitting power where the center distances of the pulleys are of considerable length. This type of drive receives considerable favor for group drives; that is, where a number of machines located adjacent to one another are so arranged that the group can be driven from one line-shaft and therefore from one source of power. The driving power is produced by a diesel or gasoline engine, waterwheel, steam engine turbine or electric motor. Due to the diversity of loads, the combined horsepower required to drive a group of machines is usually one-half to two-thirds of that required if each of the machines are individually driven. Rubber belts made of cotton duck and special compound of rubber are best used where the atmospheric conditions are damp or dusty.

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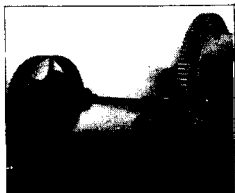
Roller Chain Drive

ROLLER Chain Drives are especially applicable when the distance between the driving and driven shafts is too short for belting and too long for gearing. The roller chain drive is positive, compact, and without the initial tension required for a V-belt or flat-belt drive. The initial cost is somewhat higher than the belt drive, but this is offset by greater efficiency, non-slip, and obtaining a uniform turning movement. They have

particular application on slow-speed drives, especially when motorized speed reducers are used.

More complete information can be obtained by writing any Denver Equipment Company office.

SILENT Chain Drives are used for high speed power transmission up to 2000 horsepower. They have been used successfully on thousands of installations, and many of them have operated efficiently for 10, 20, and even 30 years. Due to positive tooth-to-tooth action they transmit full speed and power of the prime mover. There is no slippage as with belts. Their long wearing life with low upkeep expense make them desirable for many drive installations.

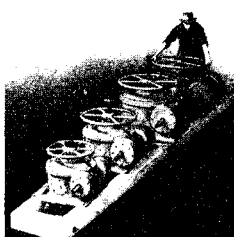


Arrangement of Spur Gear and Clutch Pulley Drive

GEAR Drives are important elements of machines for transmitting power positively from one shaft to another shaft with the minimum of shaft centers. Spur, helical, and herringbone gears operate with parallel shafts; miter, bevel, worm and helical gears operate with their shafts at right angles to each other; and bevel and spiral gears may operate with their axis at an angle other than 90°. For transmitting moderate

loads with low-rim velocities cast-tooth gears are satisfactory; however, with high loads to be transmitted and high rim velocities, cut-tooth gears are recommended. Helical, spiral, and herringbone gears are always made with cut teeth. Spur gears are usually cut with 14½° pressure angle. Gears with teeth cut with 20° pressure angle are stronger and are used especially where pinions with a small number of teeth are required. The usual speed ratios range from 1:1 to approximately the following for various types of gears: Spur, 10:1; helical, 10:1; herringbone, 10:1; miter, 1:1; bevel, 6:1; worm 160:1. Where noise is objectionable, it is advisable to use rawhide, bakelite, or some approved type of non-metallic gear in conjunction with mating gear made of metal.

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Gear Drives

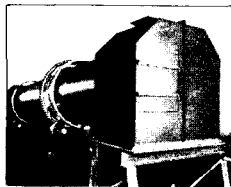
SPEED Reducers employ all the various types of gear drives described in the preceding paragraph. The gears are enclosed in a metal case which excludes water and dirt from the gears and which also provides an oil reservoir for supplying the gears with a continuous bath of lubricant. Speed reducers are used on many Denver Equipment Company products such as side and center air-lift agitators, repulpers and scrubbers.

More complete information can be obtained by writing any Denver Equipment Company office.

INFORMATION Required: Our Engineering Department will gladly assist you. Send in the following information:

1. Horsepower and type of motor, or other power source.
2. What is the name of machinery driven?
3. Running H.P., starting H.P., peak H.P.
4. Describe load conditions; uniformity, shock, reversal.
5. Service conditions: temporary, intermittent, continuous.
6. Atmosphere: dampness, water, acid, oil, dust, temperature.
7. Shaft speeds and diameters.
8. Direction of rotation of shafts.
9. Which shaft is the driver?
10. Horizontal distance between shafts.
11. Vertical distance of shafts above floor.
12. Distance to walls, ceilings, bearings, etc., which limit pulley, sheave, sprocket, or gear diameters, or belt widths.
13. Pulley diameter and width of face on equipment in use.
14. Is belt to be endless or to have fasteners?
15. Desired pulley, sheave, sprocket or gear centers.

DRYER, Denver Rotary



Denver Rotary Dryer

DENVER Rotary Dryer is a simple, inexpensive unit for reducing the moisture content of flotation concentrates, as well as chemical and industrial products. Frequently the saving of shipping weight so effected will pay for the dryer in a few months. Difficulties from freezing while in transit are also eliminated. Many industrial projects are now using Denver Dryers for control and

production purposes on many materials.

(Continued from preceding page)

Three main types of Denver Dryers can be supplied. The direct heat unit is used when it is permissible for the drying gases to come in direct contact with the material being dried. Partition plates increase the heating surface. Drying may be by hot air or exhaust gases from other operations. If this drying gas has a deleterious effect on the product, then an indirect type of dryer can be supplied. A further derivation is the Denver-Tedrow Steam Dryer.

Additional data gladly furnished upon request.

DENVER STANDARD DIRECT HEAT TYPE IN TONS PER 24 HOURS WET FEED

Size of Dryer	Cylinder RPM	With Moisture in Feed Based on Net Weight					
		5%	10%	15%	20%	30%	40%
24"x15'	7.6	30	18	12	9	6	4
36"x20'	7.3	90	54	38	28	17	12
36"x30'	7.3	135	82	57	42	26	17
48"x30'	5.1	203	122	85	63	39	26
48"x40'	5.1	269	162	113	84	52	34
54"x30'	5.1	257	155	108	80	49	33
60"x40'	4.6	372	226	156	115	72	48

Heat required in BTU's per ton of Wet Feed*
 322,000 582,000 872,000 1,198,000 1,992,000 3,052,000

*Heat required in BTU's for drying at 50% thermal efficiency per ton of wet feed, based on final moisture of dried product of 1%, feed temperature 60 degrees F., discharge temperature at 212 degrees F. and specific heat of material 0.21.

AVERAGE CALORIFIC VALUE OF FUELS IN B.T.U.S. MOISTURE FREE BASIS

Fuel	Calorific Value
Anthracite Coal.....	10,600-14,000 per pound
Semi-Anthracite Coal.....	13,700 per pound
Semi-Bituminous Coal.....	13,000-14,700 per pound
Bituminous Coal.....	11,000-14,300 per pound
Sub-Bituminous Coal.....	9,200-10,600 per pound
Lignite.....	5,800-13,000 per pound
Peat.....	8,700-10,300 per pound
Coke.....	14,000 per pound
Wood.....	8,509-9,200 per pound
Fuel Oil.....	18,800-20,000 per gallon
Fuel Oil.....	152,000-134,000 per gallon
Gasoline or Kerosene.....	20,000 per gallon
Gasoline or Kerosene.....	133,000 per gallon
Natural Gas.....	750-1,100 per cubic foot
Coke Oven Gas.....	400-550 per cubic foot
Producer Gas.....	160-170 per cubic foot
Coal Gas.....	500 per cubic foot
Water Gas.....	350 per cubic foot

Recover Your Mineral As Soon And As Coarse As Possible.

ELEVATOR, Denver Belt Bucket



Denver Belt Bucket Elevator Installed in Denver Mill

DENVER BELT Bucket Elevators are of standard design and are well suited to handle practically all types of loose materials. The frame housing of the elevator can be made of either wood or steel. The type and size depends upon the operating conditions as well as the material to be handled. The selection of an elevator of standard dimensions (as listed below) saves special design and engineering cost. Our engineering department will gladly cooperate with you in solving your elevator problems.

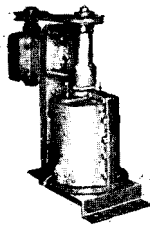
Size of Buckets	Capacity of Buckets Cu. Ins.	Dry Ore Buckets 1/2 Full	Dry Ore Buckets 1/2 Full	Wet Ore Buckets 1/2 Full Tons per Hour		Horsepower Required Buckets Full	
		Tons per Hr.	Tons per Hr.	Water 3 Ore 1	Water 5 Ore 1	Up to 35' Centers	35' to 60' Centers
6"	55	6.4	9.6	2.4	1.6	1.0	2.0
8"	115	13.4	20.1	5.0	3.3	2.0	3.5
10"	204	23.7	35.5	8.9	5.9	3.5	6.5
12"	332	38.5	57.7	14.4	9.6	6.0	10.0
14"	391	45.3	67.9	16.9	11.3	7.5	12.5
16"	467	54.1	81.1	20.2	13.5	8.5	15.0

NOTE: Above data based on belt speed of 300 feet per minute and crushed ore at 20 cubic feet equal to 1 ton.

Rated Size	Bucket Width	Belt Width	Pulley Width	Housing Width Inside	Bucket Spacing C.L. to C.L.	Width Discharge Opening	Hd. Diam. Pulley	Tail Pulley Diam.
6"	6"x4"	8"	9"	13"	10"	18"	30"	20"
8"	8"x5"	10"	11"	15"	12"	22"	30"	20"
10"	10"x6"	12"	13"	19"	15"	24"	36"	24"
12"	12"x6"	14"	15"	21"	16"	26"	36"	24"
14"	14"x7"	16"	17"	24"	18"	30"	42"	28"
16"	16"x8"	18"	19"	28"	20"	32"	48"	30"

Rated Size Inches	Minimum Weight of Elevator Belt	R P.M. of Head Pulley to Give Belt Speed of		
		300 Ft./Min.	350 Ft./Min.	400 Ft./Min.
6"	8"- 5 Ply	38.2	44.5	51.0
8"	10"- 6 Ply	38.2	44.5	51.0
10"	12"- 6 Ply	31.9	37.2	42.6
12"	14"- 7 Ply	31.9	37.2	42.6
14"	16"- 8 Ply	27.2	31.8	38.6
16"	18"-10 Ply	23.7	27.7	31.6

EMULSIFIER, Denver (Disc Type)



Denver (Disc Type) Emulsifier

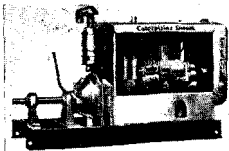
THE Denver (Disc Type) Re-agent Emulsifier is used to emulsify flotation reagents with water before introducing them into the cells. By using this unit greater efficiency is attained from reagents, decreasing the amount necessary to produce the best flotation results.

The unit consists of a sturdily constructed tank and impeller, together with the driving motor, on a strong mounting bracket. The impeller shaft has a series of disc shaped vanes which rotate between stationary beaters welded to the sides of the emulsifier tank. The violent stirring action thus produced completely emulsifies the reagents before discharging them.

Machine *Size	Motor H.P.	R.P.M.	Approx. Dimensions			Approx. Ship. Wt., Lbs.	
			L	W	H	Belt	Motor
No. 1	1½	1800	22½"	13½"	23"	100	195

*Emulsifiers for various conditions available.

ENGINE, DIESEL, Caterpillar



Caterpillar Diesel Engine

CATERPILLAR Diesel Engine brings to the users of small power units all of the advantages of the larger diesel engines.

The units are available in sizes from 48 horsepower to 450 horsepower and are all of rugged design with compactness and accessibility of parts built into all units.

These units are available in 4, 6, 8, and 12 cylinders. The 8 and 12 cylinder units are 60° V-type engines. Full load speeds range from 650 to 2000 RPM. The units are complete with either totally enclosed or open clutches or without clutch.

Each unit is equipped with an independent starting system consisting of a gasoline engine on, the smaller horsepower units and either an electric motor or an air motor on the larger horsepower units, an air cleaner and a built-in, flyball, spring balanced type governor which acts through the entire range of speed.

Caterpillar Diesel Electric Sets make it possible to use the efficiency of electrically powered equipment in areas where electric power is otherwise not available. These diesel electric sets are self-regulated and externally-regulated. The generators are direct connected to the diesel engines and are 3-phase alternating current generators.

Additional data on the diesel engines and the diesel electric sets will be gladly furnished upon request.

*Rated RPM is the RPM at which the maximum load in BHP that the engine is capable of carrying for a period of 12 hours from each cold start.

Set Number	3 Phase, 60 Cycle				3 Phase, 50 Cycle			
	Continuous output		12 hr. output		Continuous output		12 hr. output	
	KW	PF	KW	PF	KW	PF	KW	PF
D311	19	.8	20	.8	20	.75	23	.8
D315	39	.8	40	.8	30	.75	34	.8
D318	58	.8	60	.8	40	.75	45	.8
D364	138	.75	156	.8	118	.75	133	.8
D375	174	.75	197	.8	150	.75	163	.8
D386	299	.75	236	.8	179	.75	204	.8
D397	261	.75	296	.8	228	.75	259	.8
D8800	50	.75	55	.8	50	.75	55	.8
D13000	75	.75	83	.8	75	.75	83	.8
D17000	96	.8			105	.8	110	.8

Engine Number	Number of Cylinders	Brake HP at Rated RPM*	Rated RPM	Approximate Dimensions In Inches			Full Load Speed Range RPM	Approx. Ship. Wt. Lbs.
				L	W	H		
D311	4	1800	48	56	28	42	1000-2000	1,840
D315	4	1800	69	61	29	43	1000-1800	2,450
D318	6	1600	94	77	31	57	1000-1800	3,100
D326	6	1600	125	72	35	48	1000-2000	3,650
D337	6	1600	180	72	37	57	1000-2000	3,850
D364	V-8	1200	238	89	53	72	800-1200	8,370
D375	V-8	1200	300	88	53	78	800-1200	8,150
D386	V-12	1200	360	109	53	71	800-1200	10,770
D397	V-12	1200	450	113	48	71	800-1200	11,865
D8800	4	1000	92	70	40	67	650-1000	4,600
D13000	6	1000	133	88	43	67	650-1000	5,610
D17000	V-8	1000	181	85	50	67	650-1000	9,000

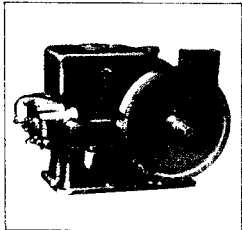
*Rated RPM is the RPM at which the maximum load in BHP that the engine is capable of carrying for a period of 12 hours from each cold start.

Denver Equipment Company
 Denver Chicago El Paso New York
 Toronto Vancouver Mexico, D. F.
 London Johannesburg

Mailing address:

Denver Equipment Company
 1400 Seventeenth Street
 P. O. Box 5268
 Denver 17, Colorado

ENGINE, GASOLINE, Denver (Water Cooled)



4 H. P. Denver (Water Cooled) Gasoline Engine

DENVER Gasoline Engine (Water Cooled) is constructed to give continuous, economical operation. It is easy to start and operates with a minimum of vibration.

The 2, 3, and 4 H.P. engines are of the horizontal single cylinder type with over-size Timken roller main bearings, a high tension magneto, noned cylinder, and a hopper cooler. Cylinder, hopper and crankcase are all cast in one piece. Operates economically on gasoline and

special equipment is available for adapting engines to use tractor fuel, kerosene, distillate or natural gas.

The 4 and 5-6 H.P. single cylinder vertical engines are self oiling and water cooled from either tank or radiator. These engines are precisely controlled by a sensitive governor and equipped with a high tension magneto and friction clutch pulley. Bearings and gears are fully enclosed in a dust and moisture proof crankcase and are readily accessible when side plate is removed.

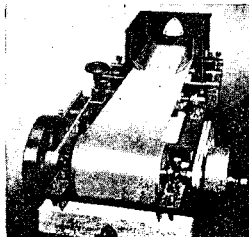
In higher horsepower the 8, 10, 10-12, 15, and 20 H.P. engines are vertical double cylinder type with combination pump and splash oiling, high tension magnetos, taper roller main bearings and automobile type carburetion controlled by a throttling governor. These engines can be equipped with flat or V-belt pulleys or chain sprockets and with or without outboard bearing for heavy belt work. Friction clutch or pulley and long or short base optional. Equalized bearing load gives long bearing life. Water cooled from either tank or radiator.

Engine Size	*Cap. Fuel Gals.	Ignition	*Dimensions			Speed Range R.P.M.	**H.P.	*Approx. Ship. Wt. Lbs.
			L	W	H			
2-H	1	Mag.	25"	24"	15"	400-900	1½-2½	235
3-H	1¼	Mag.	25"	22"	17"	400-900	2½-3½	270
4-H	1¼	Mag.	25"	23"	22"	400-900	3½-4½	290
4-V	2	Mag. or Bat.	24"	19"	31"	400-950	4	265
5-6-V	2	Mag.	24"	19"	31"	400-1400	5-6	270
8-V	4½	Dual	35"	23"	35"	500-950	8	400
10-V	9	Mag.	60"	38"	30"	400-1100	10	615
10-12-V	6	Mag.	70"	47"	42"	500-1400	5-12	455
15-V	11	Dual	70"	48"	42"	400-800	15	1000
20-V	18	Dual	75"	40"	51"	400-700	20	1550

*Fuel capacity, dimensions, and shipping weights (less clutch) depend on whether tank or radiator cooled. Figures are for radiator cooled unit without clutch on engines where either tank or radiator are available—for tank cooled add approximately 90 lbs.—for clutch add approximately 75 lbs.

**Deduct 3% for each 1000 feet in altitude for intermittent load. Deduct 3% for each 1000 feet in altitude over 3000 feet for continuous load.

FEEDER, ORE, Denver Adjustable-Stroke Belt



16"x60" Denver Adjustable-Stroke Belt Ore Feeder

THE Denver Adjustable-Stroke Belt Ore Feeder is preferred for feeding the grinding mill because of its smoothness of operation, uniformity of discharge, and regulation of feed. It is so arranged that it can be installed to draw the feed from the bottom or the front of the ore bin. Various lengths are available to fit the various requirements.

The tonnage of feed can be regulated by a wide range of belt speeds or by regulating a sliding gate fitted on the front of the feed hopper, or if necessary, an adjustable opening is built into the ore bin to give further control.

The frame is made of structural steel and supports a steel hopper, head and tail shafts and the necessary closely spaced flat belt idlers which are located under the feed hopper to support the ore in the bin. A heavy rubber belt ensures long life. Variable belt speeds ranging from 0" to 15' per minute are accomplished by the use of an adjustable feed control which is regulated by a handwheel conveniently placed on the frame away from belt.

Additional data gladly furnished upon request.

Belt Width	Length	Width	Height	Capacity in Tons per Hour	Approximate Shipping Wt. Lbs. with	
					Minimum Belt	Center Motor
12"	48¾	42½	26	.85	650	800
12"	87	41½	22½	.85	955	1125
16"	48¾	46½	26	1.75	910	1070
16"	88	48	26	1.75	1340	1500
20"	88	59	27	6.0	1500	1675
24"	88	64½	27	9.0	1365	1740
30"	90	65½	29	15.0	1650	1825
36"	90	71	29	32.0	1750	1950
48"	116	81	30	60.0	2600	2800

FEEDER, ORE, Denver Apron (Type A)



Denver Apron Ore Feeder

THE Denver Apron Ore Feeder is especially suited for feeding a uniform flow of lumpy and abrasive ores which would ordinarily damage less durable equipment. It is built to resist damage resulting from sudden impact and from sharp edges of large lumps, and to withstand severe loading conditions. It is an ideal unit for installing under a coarse ore bin to feed a jaw crusher or a gyratory crusher, and due to its slow speed it may be used as a picking belt for removing tramp iron and drill bits before the ore is fed to the crushing unit.

The Denver Apron Ore Feeder is constructed with a steel frame, two strands of roller chain which support double beaded steel pans, sprockets and chain take-ups. Pans can be furnished $\frac{3}{8}$ " or $\frac{1}{2}$ " thick with or without 2" high sides. Steel skirt boards can be furnished if desired. Two types of feeders can be supplied: with or without roller-supported chain. Usual drive consists of a gear motor, sprockets and roller chain. Variable feeds are obtained by using a Reeves drive. Minimum center is 47" and can be increased in increments of 18" to a maximum of 91" center.

Additional data gladly furnished upon request.

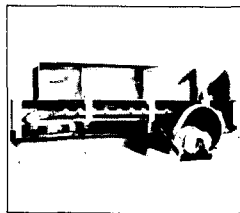
Machine Size	*Capacity in Tons Per Hour	Dimensions			H. P.	Approx. Shipping Weight Pounds	
		**L	W	H		Belt	Motor
24"	3-40	76"	44"	22"	1 1/2	2320	2620
30"	4-50	76"	50"	22"	1 1/2	2525	2825
36"	11-62	76"	56"	22"	1 1/2	2725	3025
42"	15-72	76"	62"	22"	2	2930	3350
48"	20-84	76"	68"	22"	2	3135	3580

*Minimum capacities based on apron speed of 10 feet per minute, ore weighing 100 pounds per cubic foot, without skirt boards. Maximum capacities based on feeder with skirt boards fed with depth of 12".

**Length shown is minimum.

Use Denver Ore Tests to verify or improve your present flowsheet.

FEEDER, ORE, Denver Apron (Type J)



Denver Apron Ore Feeder

THE Denver Type "J" Apron Ore Feeder is especially suited for feeding a uniform flow of lumpy and abrasive ores which would ordinarily damage less durable equipment. It is built to resist damage resulting from sudden impact and from sharp edges of large lumps, and to withstand severe loading conditions. It is an ideal unit for installing under a coarse ore bin to feed a jaw crusher or a gyratory crusher, and due

to its slow speed it may be used as a picking belt for removing tramp iron and drill bits before the ore is fed to the crushing unit.

The Denver Type "J" Apron Ore Feeder is constructed with a heavy welded "I" beam frame, steel bar links connecting the flight roller shafts forming a continuous chain type linkage, bronze bushed chilled face cast iron flight rollers running on two parallel steel rails for rigid support, and specially constructed one piece heavy ribbed (underside) cast steel flights (pans) bound together with a roller shaft which runs entirely through the flight assembly with outside connecting links on each side of the rollers. Drive assembly consists of 4 cast steel sprockets mounted on oversize head and foot shafts, takeupus, countershaft with babitted bearings, and spur gear reduction between the countershaft and the headshaft. Usual motor drives consist of gearmotor and sprocket and chain drive. Variable speed drives with 2 to 1 variation in apron speeds also available. Minimum pulley centers is 6 ft. and may be increased in one foot increments.

Machine Size	Dimensions			H. P.**	Approximate Shipping Wt.	Dist. Between Skirt Boards	Capacity*** Tons/Hour	
	L*	W	H				Speed 10'/min.	20'/min.
18"	111"	59 3/4"	32"	2	5870	12"	5-40	10-80
24"	111"	65 3/4"	32"	2	6700	18"	7-75	15-150
30"	111"	71 3/4"	32"	2	7600	24"	10-120	20-240
36"	111"	77 3/4"	32"	2	8600	30"	12-182	25-375
42"	111"	83 3/4"	32"	2	9380	36"	15-270	30-540
48"	111"	89 3/4"	32"	2	10360	42"	17-367	35-735

*Minimum length, actually 8' on pans or 6' pulley centers.

**Minimum horsepower without skirt boards.

***Capacity based on material weighing 100#/ft.; minimum without skirt boards.

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FEEDER, ORE, Denver Challenge



Denver Challenge Ore Feeder

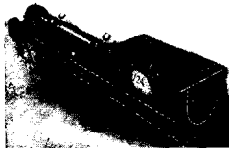
THE Denver Challenge Ore Feeder is built for low and moderately sized tonnages. Positive feeding of the ore is assured, as there are no gears or levers in the mechanism which account for lost motion and resulting irregular feed. The clutch mechanism is on the same shaft as the feed disk, and the hopper and disk are made of heavy steel plate. Specify correct hand when ordering. Drive is to a tight and loose pulley from the cus-

tomner's line shaft, or for a motor driven feeder a gear-motor can be mounted on a bracket in front of the ore bin.

Machine Size	Capacity Tons per Hour	Disk Diam.	Dimensions			H.P. Motor	Ship. Wt., Lbs.	
			L	W	H		*Belt	Motor
33"	1-2	33"	45"	41"	29"	1/2	450	525

*Includes tight and loose pulleys.

FEEDER, ORE, Denver Middling



Denver Middling Ore Feeder

THE Denver Middling Type Ore Feeder is an economical, simple unit for such operations as returning jig tailings or classifier sands to ball mill.

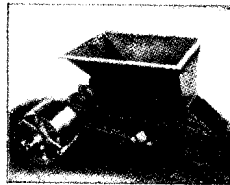
The unit consists of a trough in which a helix turns, forcing the ore out the end of the feed trough. Simple construction, minimum floor space, and

ease of cleaning make the Denver Ore Feeder an ideal unit for a great number of feeding problems. The rate of feed can be varied by simply changing either the motor or the reducer sheave. The length of the trough can be arranged to feed even dilute pulps or middling products. The helix is so constructed as to allow very rapid replacement, it being only necessary to remove two small bolts.

Machine Size Screw Diam.	Dimensions			R.P.M.	H.P. Motor	Ship. Wt., Lbs.	
	L	W	H			Belt	Motor
6"	59"	13"	20"	5-10	1	225	345
9"	72"	16"	24"	4-8	1	400	560
12"	96"	20"	28"	3-6	1 1/2	800	980

Reliable Denver Ore Tests insure your mining investment.

FEEDER, ORE, Denver Plunger



5'x9" Denver Plunger Ore Feeder

THE Denver Plunger Ore Feeder includes a strong cast iron frame supporting a small welded steel hopper, and the plunger bearing. The unit is built so that a feed chute can be easily attached to the discharge opening. The stroke is adjustable and can be regulated easily. These ore feeders are low priced and recommended for small tonnage.

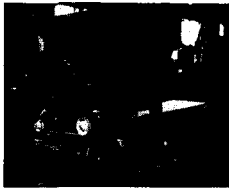
Machine Size	Capacity Tons per Hr.	Dimensions			R.P.M.	H.P.	Ship. Wt., Lbs.	
		L	W	H			*Belt	Motor
3"x6"	75-1	34"	36"	12"	75	1/4	215	270
5"x9"	4-6	42"	36"	12"	40	1/2	385	525
6"x12"	8-10	62"	45"	24"	30	1 1/2	750	890

*Includes light and loose pulleys. The ideal drive is by means of a motor speed reducer with a belt drive to the eccentric shaft pulley.

Complete Milling Equipment From Testing . . . To Feeder . . . To Dryer.

Please Give Us the Opportunity to quote prices and delivery on standard equipment to meet your needs.

FEEDER, ORE, Denver Variable Speed Belt



Denver Variable Speed Belt
Ore Feeder

WHEN higher rates of feed than those supplied by the Denver Adjustable-Stroke Belt Ore Feeder are required, or where the belt speeds range from 10 to 50 feet per minute the Denver Variable Speed Ore Feeder has application.

The feeder is constructed the same as the Adjustable-Stroke Belt Ore Feeder except that a standard variable speed mechanism with reduction gears and constant-speed motor are used to drive the head shaft of the feeder. Any belt speed can be obtained within a 2 to 1 speed variation by turning a handwheel mounted on the side of the variable speed transmission.

The photo shows a constant-speed belt ore feeder employing a constant-speed motor, direct coupled to a worm gear speed reducer which in turn drives the head shaft through a sprocket and roller chain drive. This type of feeder may also be used as a picking belt. Dimensions and shipping weight are the same as for the Denver Adjustable Stroke Belt Ore Feeder.

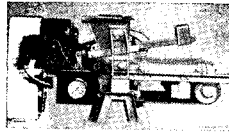
Additional data gladly furnished upon request.

**Complete Milling Equipment From
Testing . . . To Feeder . . . To Dryer.**

**Please Give Us the Opportunity to
quote prices and delivery on standard
equipment to meet your needs.**



FEEDER, ORE, Hardinge "Feedometer"



Hardinge "Feedometer"

THE Hardinge Recording Feeder feeds and weighs the material from a bin or surge hopper, and consists of a traveling belt on a pivoted frame suspended from the hopper. Any variation in weight on the belt will tilt the frame, thereby moving the feed gate through appropriate linkage.

As the feed on the belt increases, the frame tilts down slightly and the feed gate opening is decreased. If the weight on the belt becomes less, the frame tends to rise and the gate opens wider. A constant weight is thus maintained regardless of conditions. A variable speed drive for the belt, is used to vary the rate of feed. Once set this feeder will maintain a constant rate of discharge by weight, irrespective of changes in character of the material being fed.

One or all of the following features may be incorporated:

1. A visual feed rate indicating meter that reads direct in pounds, tons, kilograms per hour or other units.
2. A totalizer that records cumulative weight fed and a reset recorder that totalizes batch or partial runs.
3. A printing attachment that prints on a card the cumulative weight delivered in numerals, also a reset device for recording the batch weight and corresponding transaction or serial number. The card or paper slip on which the weights are recorded is locked in position during the run.
4. A recording chart for the control room located at a distance from the feeder. This chart indicates the rate of feed and changes in rate fed. Each chart roll will make a record covering a month's operation and is divided into hours and fractions thereof.
5. Remote control of the feed rate and direct tonnage indicator of the feed rate in an infinite number of steps, through push button control and dial indicator
6. Interlocking system for two or more feeders when used as proportioning devices to maintain a constant ratio of feed rates, with means to incorporate feed rate records of two or more feeders on the same chart.
7. No-load cut-off attachment and signal to stop the feeder and prevent a false record being made when the feed bin becomes empty or the feed bridges over in the bin. When material again enters the feed hopper the feeder will start up automatically.

(Continued on next page)

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Feeder	Length	Width	Height
Size "B"	4'5"	2'1"	19 3/4"
Size "C"	4'11"	3'1"	20 3/4"
Size "D"	9'4"	4'0"	2'2"

Feeder Size	Maximum Capacity 85 Lbs. per Cu. Ft. (see Note)	H.P. Motors Required	Method of Regulation of Capacity
B	12 tons per hour	Up to 1/4 H. P.	By variable speed belt drive only Above, combined with 2 speed motor
C	150 tons per hour	Up to 1/2 H. P.	By variable speed belt drive only Above, combined with 2 speed motor
D	500 tons per hour	1/2 H. P. below 15 Tons per hour and 1 H. P. to 100 Tons per hour 2 H. P. above 100 Tons per hour	By variable speed belt drive only Above, combined with 2 speed motor

Feeder Size	Max. Feed Size	Capac. Variation Range (see Note)	Size Feed Hopper	Approximate Shipping Weight Pounds
B	2" 2"	3:1 6:1	.6 x .6 .6 x .6	500 500
C	4" 4"	3:1 6:1	18" x 12" 18" x 12"	700 700
D	12" 12"	3:1 6:1	30" x 24" 30" x 24"	3000 3000

NOTE: The minimum capacity may be as low as desired (1 pound per hour if necessary) but the maximum will then be only the multiple of the minimum indicated in the "Capacity Variation Range" column. For a capacity range greater than shown, consult our engineering department.

Denver Equipment Company publishes **DECO TREFOIL**, an exchange of helpful engineering information designed to improve milling. DECO TREFOIL is published every other month. If you are connected with mining and do not receive DECO TREFOIL please write to us.

FEEDER, ORE AND REAGENT, Syntron Electric Vibrating



Syntron Electric Vibrating Ore and Reagent Feeder Installed

THE Syntron Electric Vibrating Feeder is built on the same simple and strong principles as the Syntron Electric Vibrator. The vibrating trough is carried on two leaf springs and vibrated through the pulsating current of an electro-magnet. The speed of this magnet is controlled by a separate electric controller, which is furnished with each feeder. This controller is a totally enclosed unit arranged for mounting on a wall, either close to or quite a distance from the feeder. A manually operated dial rheostat controls the speed of the pulsating magnet and the flow of the feed.

By a simple turn of the rheostat in the controller the feed can be changed from a thick, fast flow to a slow, minute one.

These feeders can handle practically every kind of dry feed, give accurate reagent control; even feed to a screen, crusher or conveyor. They can be supplied for suspension-mounting in the larger sizes, as well as the standard floor-mounting on a heavy base. Due to construction there is no wearing of mechanical parts, or abrasion of trough.

A variety of different sizes is available from the small reagent feeders, up to the "Heavy Tonnage" model, which will handle up to 1200 tons per hour of heavy ore and rock.

These are also available as special "Heat Resistant" furnace feeders, or equipped with a grizzly discharge, especially suited to separate fines from the flow of coarse material feeding into a crusher or other machine.

Specifications	Machine Size	Max. Capacity Based on Sand Trough Flowing Horizontally	Dimensions with Std. Size Trough (Other size Troughs are Available)			Approx. Ship. Wt. Lbs.	Power Consumption
			L	W	H		
Without Base For Suspension Mounting	F-0	1 ton per hr.	18"	3'	9"	60	20 watts
	F-1	4 ton per hr.	24"	4'	14 1/2"	120	65 watts
	F-210	10 ton per hr.	36"	8'	23"	320	300 watts
	F-225	25 ton per hr.	47"	21'	20"	500	350 watts
	F-350	50 ton per hr.	63"	28'	24"	1400	750 watts
	F-4100	100 ton per hr.	72"	33'	31"	2650	1000 wts.
	F-5500	500 ton per hr.	102"	65'	43"	5800	2600 wts.

F-0 and F-1 available for 110 or 220 Volt AC.

F-210, F-225, F-350 available for 110 or 220 or 440 Volt AC.

F-4100 and F-5500 available for 220 or 440 Volt AC.

FEEDER, REAGENT, DRY, Denver (Belt Type)



Denver (Belt Type) Dry Reagent Feeder

DENVER (Belt Type) Dry Reagent Feeder is particularly well suited to feeding reagents, such as lime or soda ash, which become lumpy or sticky and tend to clog hopper type feeders in any but a very dry climate. Also, any dry reagents used in very small quantities, such as zinc

dust in cyanide precipitation, are most conveniently and accurately fed by this belt type feeder.

Continuous test laboratories require ore fed at the rate of 100 to 200 lbs. per hour while reagents must be fed in very small quantities. This unit is ideal for both operations, providing accuracy essential for uniform results in laboratory test work.

A step-cone pulley drive controlling speed of belt, skirt boards adjustable from center to edge of belt to control width of feed, and depth of reagent on belt, provide three adjustments for accurately controlling quantity of material fed. Drives for higher belt speeds can be provided to increase capacity. Pressed-steel head and tail pulleys, and habbitted bearings ensure reliable, continuous operation. On motor driven feeder the fractional horsepower sleeve-bearing motor and speed reducer may be mounted on the top, side or bottom of the unit.

Machine Size	Range of Belt Speeds with Standard Drive Ft. per Hour	*Capacity Lbs./hour Soda Ash	Dimensions			H.P.	Approximate Shipping Weight Pounds	
			L	W	H		*Belt	Motor
6" x 6"	2 1/2 - 5 7/8	8-23	7'6"	1'10"	1'7"	1/4	340	480
9" x 9"	3 1/8 - 8 6/8	19-54	10'9"	2'1"	1'9"	1/4	570	615
12" x 12"	3 2/8 - 8 9/8	28-76	13'8"	2'4"	1'11"	1/2	950	980
15" x 15"	3 4/8 - 9 5/8	38-103	16'5"	2'5"	2'3"	1/2	1150	1250
18" x 18"	4 3/8 - 11 9/8	58-160	21'7"	2'8"	3'11"	1/2	1300	1400

*Capacity feeding 2" deep with skirt boards at maximum width.

**Belt driven unit furnished with speed reducer but without drive pulley.

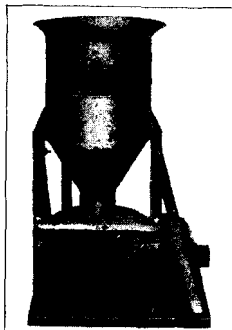
NOTE: Data required to determine size and type feeder includes: mill tonnage per 24 hours, name of reagent, reagent feed in lbs. per ton mill feed or solution, and type of drive with electrical characteristics

FEEDER, REAGENT, DRY, Denver (Cone Type)

DENVER (Cone Type) Dry Reagent Feeder is the most commonly used feeder for dry reagents except for those that absorb moisture readily and tend to become lumpy or sticky. This feeder is lower in cost than the belt type and is compact and easy to install ahead of ball mill, over a conditioner or in any other part of the circuit.

(Continued on next page)

Three adjustments are provided for varying rate of feed-- a step-cone pulley drive permits adjustment by speed change, an adjustable collar on the hopper bottom allows for full range of feed rate at each drive speed, and the scraper may be set to cut any desired width of reagent from the rotating disk. This allows very accurate feeding through a wide range of feed rates as all adjustments are positive.



Denver (Cone Type) Dry Reagent Feeder

A coarse screen across the top of the hopper prevents lumps entering when filling, and a stirring rod attached to the rotating disk insures a smooth gravity flow onto the disk. A rib or scraper on the underside of the rotating disk moves the reagent falling into the pan under the disk into the spout for discharge.

The Denver (Cone Type) Dry Reagent Feeder is of all metal construction rigidly mounted on a steel base. Rotating disk is mounted on a totally enclosed vertical speed reducer which is driven by a motor and step-cone pulley drive. Standard motor driven unit is equipped with a 3/4 H.P.

single phase, 60 cycle, 110 or 120 volt, 1800 r.p.m. sleeve bearing motor. This durable construction assures dependable, trouble free operation with a minimum of attention by the operator.

Machine No.	Size	Hopper Capacity		Maximum Feed Lbs. per Hour	Dimensions			H.P.	Shipping Wt., Lbs.	
		Cu. Ft.	Pounds Soda Ash		L	W	H		*Belt	Motor
1	6"	0 8	46	14 2	18"	22"	29"	1/4	95	130
2	12"	1 7	97	23 9	20"	17"	43"	1/4	140	175
3	18"	3 3	188	49 0	26"	23"	53"	1/4	300	350
4	24"	6 7	382	85 5	26"	37"	60"	1/4	600	675
5	36"	18 0	1000	200 0	38"	48"	72"	1/2	1400	1600

*Belt driven unit furnished with speed reducer but without drive pulley. NOTE: Data required to determine size and type feeder includes: mill tonnage per 24 hours, name of reagent, reagent feed in lbs. per ton mill feed or solution, and type of drive with electrical characteristics.

A Denver Mineral Jig or Denver "Sub-A" Unit Flotation Cell In Your Grinding Circuit Will Recover Mineral As Soon As Free.

FEEDER, REAGENT, DRY, Denver (Zeigler Type)



Denver (Zeigler Type) Dry Reagent Feeder

DENVER (Zeigler Type) Dry Reagent Feeder is a cam-actuated shaker feeder which consists of a pyramid-shaped welded steel hopper supported on a welded steel framework. The cam-actuated shaking pan stroke can be varied by means of a screw. Motor and speed reducer on the motor driven type are mounted on a welded steel base that is bolted to the feeder frame. This unit is easily regulated for accurately feeding dry reagents and is a simple, inexpensive feeder.

Machine Size	Capacity Hopper Cubic Feet	Dimensions			H.P.	Ship. Wt., Lbs.	
		L	W	H		*Belt	Motor
No. 1	2 5	29"	27"	35"	¼	225 lbs.	260 lbs.

*Belt driven unit furnished with speed reducer but without drive pulley
NOTE: Data required to determine size and type feeder includes: mill tonnage per 24 hours, name of reagent, reagent feed in lbs. per ton mill feed or solution, and type of drive with electrical characteristics

Mill design and Flowsheet design are also services of Denver Equipment Co. Write for details how these services might help you.



Use Denver Ore Tests to verify or improve your present flowsheet.

FEEDER, REAGENT, WET, Denver



12" Simplex Denver Wet Reagent Feeder with Cover Removed

TODAY mill men are continually experimenting with new reagents, not only to secure higher grade concentrates and lower tailings, but also to reduce reagent costs per ton. Denver Wet Reagent Feeder is a compact, self-contained unit mounted on a wood base. It occupies minimum floor space and may be conveniently placed near the grinding or flotation circuit as required. The Denver Wet Reagent Feeder is equipped with a revolving disc, carrying a variable number of cups around its outer rim. Micrometer adjustment is easily and quickly made with a convenient handwheel which moves the drip trough in or out to increase or decrease the amount of reagent caught in the trough, giving accurate control of reagent feed. The speed of the disc may be varied if desired and a float valve is provided to maintain constant level of reagent in the tank. Adjustments have been reduced to a minimum to simplify control. A tank cover is furnished on the No. 12 size to keep reagent clean.



12" Duplex Denver Wet Reagent Feeder with Covers Removed

The Denver Duplex Wet Reagent Feeder combines two standard simplex wet reagent feeders on a single base and driven by a motor through a speed reducer. Belt drive may be furnished if desired. Advantages of two simplex feeders are thus secured at only a slight increase in cost.

The No. 12 Denver Wet Reagent Feeder is ideal for use in laboratory continuous test plants and mills up to 150 tons and larger, depending on reagent feed rate required.

Machine Size	Maximum capacity in c.c. per minute (Each compartment) at different peripheral speeds of disc				Tank Capacity Gallons	CUPS			Disc Dia. Inches
	*7.5 f.p.m.		17.1 f.p.m.			34.2 f.p.m.		**No. Per Disc	
	c.c. Each	**No. Disc	c.c. Each	**No. Disc		c.c. Each	**No. Disc		
No. 12	190	285	428	855	2	10.5	10	11 ¾	
No. 24	640	959	1440	2880	20	57.6	12	24	
No. 36	1485	2230	3350	6700	48	155.0	16	36	

*All feeders are furnished as standard for operation at this speed unless otherwise specified.

**Number of cups furnished as standard.

No. 12 Simplex, Denver Wet Reagent Feeders can be furnished for feeding up to 2000 c.c. per minute. Acid feeders are also available.

Complete Milling Equipment From Testing . . . To Feeder . . . To Dryer.

Machine Size	No. of Compartments	Overall Dimensions			H. P.	Approximate Shipping Weight Lbs.	
		L	W	H		Belt	Motor
No. 12	Simplex	18"	16"	16"	1/20	110	130
	Duplex	18"	24"	16"	1/20	205	225
No. 24	Simplex	42"	34"	33"	1/4	570	600
	Duplex	48"	46"	33"	1/4	1070	1100
No. 36	Simplex	58"	49"	45"	1/4	490	740
	Duplex	110"	40"	45"	3/2	1160	1210

NOTE: Data required to determine size and type feeder includes: mill tonnage per 24 hours, name of reagent, reagent feed in lbs. per ton mill feed or solution, and type of drive with electrical characteristics.

FEEDER, REAGENT, WET, Denver Multi-Comp'tm't



12" Denver Multi-Compartment Wet Reagent Feeder with Positive Sprocket and Chain Drive

DENVER Multi-Compartment Wet Reagent Feeder is used where a central point of reagent distribution is desired. This feeder, in the No. 12 and No. 24 sizes, is furnished in three, four, five, and six compartment units combined in one compact assembly. This

allows the feeding of a large number of reagents simultaneously. Four compartments are maximum on the No. 36 feeder. The revolving disc, tank, and micrometer control of every compartment are the same as those on the Standard Denver Simplex Wet Reagent Feeder. The discs are rotated from a common drive by a motor through a speed reducer. Belt drive may be furnished if desired. The drive is positive and insures constant disc speed under all conditions.

Special compartments for feeding aerofloat, cyanide, or acids substituted without altering driving mechanism or base.

Machine Size	Maximum capacity in c.c. per minute (Each compartment) at different peripheral speeds of disc				Tank Capacity Gallons	CUPS			Disc Dia Inches
	7.5 f.p.m.	11.2 f.p.m.	17.1 f.p.m.	34.2 f.p.m.		c.c. Vol. Each	**No. Per Disc	**No. Per Disc	
No. 12	190	285	428	855	2	10.5	10	1134	
No. 24	640	959	1440	2880	20	57.6	12	24	
No. 36	1485	2230	3350	6700	48	155.0	16	36	

*All feeders are furnished, as standard, for operation at this speed unless otherwise specified.

**Number of cups furnished as standard.

***Up to 2000 c.c. capacity also available.

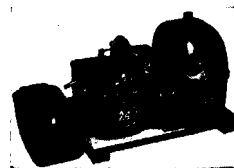
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Use Denver Ore Tests to verify or improve your present flowsheet.

Machine Size	No. of Compartments	Overall Dimensions			H. P.	Approx. Shipping Wt., Lbs.	
		L	W	H		Belt	Motor
No. 12	3	62"	20"	16"	1/4	390	320
	4	82"	20"	16"	1/4	395	415
	5	96"	20"	16"	1/4	480	510
	6	110"	20"	16"	1/4	575	605
No. 24	3	149"	40"	33"	1/2	2175	2250
	4	188"	40"	33"	1/2	2675	2750
	5	227"	40"	33"	3/4	3175	3250
	6	267"	40"	33"	3/4	3675	3750
No. 36	3	164"	41"	45"	1	1630	1680
	4	218"	41"	45"	3/4	2075	2150

NOTE: Data required to determine size and type feeder includes: mill tonnage per 24 hours, name of reagent, reagent feed in lbs. per ton mill feed or solution, and type of drive with electrical characteristics.

FEEDER, REAGENT, WET, Denver Special



Duplex Denver Special Wet Reagent Feeder with Heating Element

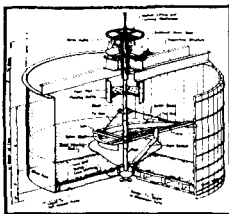
DENVER Special Wet Reagent Feeder is designed for handling reagents of a corrosive nature such as aerofloat, cyanide, and the various acids normally used in flotation. This special feeder can be used as an individual unit or as special compartments in Denver Multi-Compartment Wet Reagent Feeders.

In the Denver Aerofloat Feeder, all parts coming in contact with the liquid are non-corrosive. A light bulb under the tank cover keeps the liquid warm and easy flowing. The copper sulphate feeder consists of a standard feeder and a heavy lead cylindrical tank in which is placed copper sulphate crystals. Water is introduced in this tank from the feeder and the resulting saturated copper sulphate solution overflowing the tank then is introduced into the conditioner or flotation circuit by gravity. Feeders for cyanide solution are available and materials readily attacked by cyanide such as copper and brass, are eliminated.

Denver Special Wet Reagent Feeder is available in the No. 12 and No. 24 sizes in simplex, duplex, and multi-compartment units with capacities, etc., as listed under the Denver Wet Reagent and Denver Multi-Compartment Wet Reagent Feeders. Submit your special wet reagent feeding problems to us for recommendation.

FILTER, Denver Clarifying

THE Denver Clarifying Filter is used to remove turbidity from practically any liquid. It can be used to remove either suspended solids or colloidal and dissolved solids, with the



Denver Clarifying Filter
With Sand Bed

aid of an adsorbing agent. In certain cases a filter bed of porous material is used having decolorizing properties.

In the majority of cases in metallurgical plants the filter bed is composed of a sand which is one of the intermediate milling products, i.e., classifier return sands in the grinding circuit.

The clarifying filter is of simple construction, consisting of a tank of suitable material of relatively shallow depth

equipped with suitable superstructure supporting a central shaft and spiral scraper to scrape the film of removed solids from the surface of the filter bed. This scraper can be lowered a fraction of an inch at a time by an adjustable handwheel lifting device.

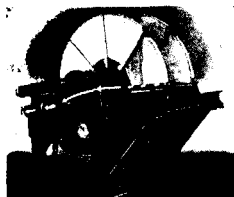
The liquid is removed by a wet vacuum pump connected to the area below the filter bed.

In special cases a supporting crushed rock bottom may be used to carry the filter medium where acid solutions are being handled and the entire mechanism is made acid proof.

The mechanism and superstructure can be adapted to any suitable sized tank. In certain instances tanks have been employed using static head instead of a vacuum pump. Additional data gladly furnished upon request.

Tank Size	Average Filter Area Sq. Ft.	Effective Depth of Sand Bed	H. P. Mechanism
8' x 6'	40	1 1/2"	1/2
10' x 8'	63	1 3/4"	1/2
12' x 10'	93	1 7/8"	3/2
16' x 12'	175	2 7/8"	3/4
20' x 14'	262	3 5/8"	3/4
26' x 16'	455	4 1/2"	1
30' x 16'	612	4 9/8"	1
40' x 16'	1025	4 6/8"	1 1/2

FILTER, Denver Disc



Two Disc 4' Denver Disc Filter

DENVER Disc Filter is an alternate to the Denver Rotary Drum Filter and has the advantage of being able to filter two or more products simultaneously with one unit.

It consists of a predetermined number of discs rotating in a tank, on a common shaft. The discs are divided into segments and covered with a suitable filter medium and are connected through an

appropriate valve assembly to a vacuum system, causing the proper segments to be under suction at the right time. The exclusive gravity drainage feature of this filter gives the driest possible product. All filtrate drains by gravity down the grooves in the disc segment to the drainage pipe and out the valve, before discharge of the filter cake.

The capacity of a filter depends largely on the nature of the material to be filtered, particularly the amount of fine material and slimes and the percent solids. The following capacities are average:

Copper flotation concentrates:

150 to 300 lbs. per sq. ft. per 24 hrs.

Lead and zinc flotation concentrates:

300 to 630 lbs. per sq. ft. per 24 hrs.

Cyanide tails:

500 to 600 lbs. per sq. ft. per 24 hrs.

Coal flotation concentrates:

1500 lbs. per sq. ft. per 24 hrs.

Barite:

3000 lbs. per sq. ft. per 24 hrs.

The foregoing figures indicate the large variation in filter capacity, depending upon the material. Laboratory leaf tests should always be made to determine the filtering rate of a particular material, the size filter required for a given tonnage, the optimum speed, amount of moisture to be expected in cake, and the size vacuum equipment required.

Additional data gladly furnished upon request.

DENVER DISC FILTERS

Machine *Size Discs	†Capacity Tons Per 24 Hrs.	Filter Area Sq. Ft.	Dimensions			H. P. Without Vac. Equip.	Approx. Ship. Wt. Lbs.	Motor
			L	W	H			
4" 1	3-4	22	4 1/2"	5 3/8"	4 1/2"	3/4	1300	1500
4" 2	6-8	44	5 1/2"	5 3/8"	4 1/2"	3/4	1750	1950
4" 3	9-12	66	6 4/8"	5 3/8"	4 1/2"	3/4	2200	2400
4" 4	12-16	88	7 6/8"	5 3/8"	4 1/2"	3/4	2600	2800
4" 5	15-20	110	8 8/8"	5 3/8"	4 1/2"	1	3000	3200
6" 1	7-8	50	4 9/8"	5 3/8"	6 1/2"	3/4	3750	4000
6" 2	14-18	100	5 11/8"	7 4/8"	6 1/2"	1	4250	4500
6" 3	21-28	150	7 3/8"	7 4/8"	6 1/2"	1	4750	5000
6" 4	28-38	200	8 7/8"	7 4/8"	6 1/2"	1 1/2	5250	5500
6" 5	35-48	250	9 11/8"	7 4/8"	6 1/2"	1 1/2	5750	6000
6" 6	42-60	300	10 1 1/8"	7 4/8"	6 1/2"	2	6250	6500
6" 7	49-66	350	12 7/8"	7 4/8"	6 1/2"	2	8450	8750
6" 8	56-76	400	13 1 1/8"	7 4/8"	6 1/2"	3	9250	9530
6" 9	68-86	450	15 3/8"	7 4/8"	6 1/2"	3	9950	10280
6" 10	70-96	500	16 7/8"	7 4/8"	6 1/2"	3	10700	11030

*Filters of 8 foot diameter are available.

†Based on operation without thickeners and for filtering 300 lbs. per square foot in 24 hours. For pyritic gold, pyrite, or zinc concentrates assume 400 lbs. per square foot. With a thickener, capacities of 50-100% greater can be obtained.

Use Denver Equipment—Standard the World Over. "No Yearly Models But Constant Improvement."

FILTER, Denver Drum



Denver Drum Filter with Oscillating Agitator

DENVER Drum Filter will successfully dewater finely ground materials such as flotation concentrates and cyanide tailings, so as to secure the best washing and drying of the filter cake. The capacity, moisture content, and the nature of the cake depend upon the physical characteristics of the material handled. These factors can be determined by laboratory testing.

Denver Drum Filter is of all metal construction with cast iron filter segments bolted to heavy steel ends so that the leakage and warping, so common in wooden types, is eliminated. The segments have the drains so sloped that the filtrate flows rapidly to the pipe connections at the end. An oscillating agitator in the bottom of the tank keeps the pulp in suspension, and a repulper can be furnished for the discharged cake.

The valve can be arranged for drawing off two solutions and is provided with a port for a short, quick blast of air to loosen the cake before scraping, and also a port for a hard blast of air after scraping to open the pores and clean the cloth or other filter medium used.

Pipe connections to the valve and segments are exposed on the outside of the drum and are readily accessible. Simplified all metal construction permits economical transportation, quick installation, and low operating cost. For granular types of feed high capacities can be obtained by use of a fine wire screen as the filter medium—using oversize piping and valve ports and increased vacuum capacity. For industrial or special uses acid resisting metals can be furnished.

Special emphasis has been given to all operating features and to simplicity of operation. At the same time unnecessary refinements have been eliminated without sacrificing mechanical efficiency or metallurgical performance.

More complete information can be obtained by writing any Denver Equipment Company office.

FILTER, Denver Drum (Fluorspar Type)

DENVER Drum Type Filter has been modified by the addition of a special agitating mechanism to aid in filtering fluorspar concentrates. Details on the Denver Fluorspar Filter will be promptly supplied on request.

DENVER DRUM FILTERS

FILTER (Continued from previous page)

*Machine Size	†Cap. Tons Per 24 Hours	Filter Area Sq. Ft.	Dimensions			H.P. Without Vac. Equip.	Approx. Shipping Wt. Lbs.
			L	W	H		
3' 1'	1-1½	9	4'3"	4'9"	3'10"	¼	1700 1900
3' 2'	2-3	18	5'3"	4'9"	3'10"	¾	2350 2600
4' 1½"	2-3	18	4'5"	6'0"	4'10"	¾	2650 2800
4' 2'	3-5	25	4'11"	6'0"	4'10"	1	2800 3000
4' 3'	5-6	37½	5'11"	6'0"	4'10"	1	3500 3700
4' 4'	7-8	50	6'11"	6'0"	4'10"	1½	4300 4600
4' 5'	8-11	62½	7'11"	6'0"	4'10"	1½	5100 5400
4' 6'	10-13	75	8'11"	6'0"	4'10"	1½	5900 6200
6' 4'	10-13	75	8'4½"	8'9"	6'10"	2	9000 9300
6' 5'	15-22	95	9'6½"	8'9"	6'10"	3	9700 10100
6' 6'	20-30	113	10'8½"	8'9"	6'10"	3	10300 10700

*Filters of 8', 10', 12', and 14' diameters are available.

†Based on 300 lbs. per sq. ft. of filter area. Capacity may be increased 75-100% when thickening is used ahead of filter.

FILTER, Denver Pan



3'x3' Duplex Denver Pan Filter

THE Denver Pan Filter has been designed primarily for application to filtering problems requiring capacities between those of laboratory filters and standard commercial drum filters.

The machine is used in batch operation. The pan is filled with the material to be filtered, the vacuum is applied, and the cake is left in the

bottom of the pan, from where it is easily removed by revolving the pan on its trunnions.

There is a definite need for this unit in all plants . . . for small tonnages of concentrates, either table or flotation; for cyanide clarification; and especially for experimental work. Because of the gravity method of filtration, a larger tonnage per square foot can be treated than by the straight vacuum filter where the material is not brought into contact with the filter medium by the force of gravity.

The duplex machine is preferred where more than one product is handled simultaneously or where simulating continuous filtration of a single product, as one pan can be filled while the second pan is finishing filtration and discharging the filtered material.

Chemical works, test plants, pilot plants and cyanide mills all can use this simple, inexpensive, dependable filter. Let us make recommendations for the type and size unit best suited to your needs.

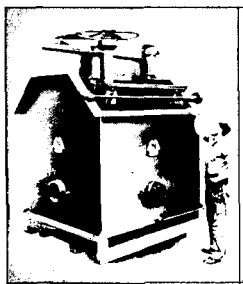
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Recover Your Mineral As Soon As Free.

Filter Size	Filter Capacity Tons per 24 Hours			
	Table Concentrates	Flotation Concentrates	Cyanide Sands	Cyanide Slimes
	2'x2' Simplex	3/4-1	1/2-1	3/4-1	1/2-1
3'x3' Simplex	1 1/2-2 1/2	1-2	1 1/2-2 1/2	1-2
4'x4' Simplex	2 1/2-4 1/2	1 3/4-3 1/2	2 1/2-4 1/2	1 3/4-3 1/2
5'x5' Simplex	4 1/2-7	2 3/4-5 1/2	4 1/2-7	2 3/4-5 1/2
2'x2' Duplex	1 1/4-2	1-2	1 1/4-2	1-2
3'x3' Duplex	3-5	2-4	3-5	2-4
4'x4' Duplex	5-9	3 1/2-7	5-9	3 1/2-7
5'x5' Duplex	8 1/2-14	5 1/2-11	8 1/2-14	5 1/2-11

Filter Size	Filter Area Sq. Ft.	Receiver Capacity Gallons	Dimensions			Motor H.P.	Approx. Shipment Wt., Lbs.	
			L	W	H		Belt	Motor
2'x2' Simplex	4	47	35"	34"	32"	3/4	410	520
3'x3' Simplex	9	60	47"	45"	41"	1	530	660
4'x4' Simplex	16	75	59"	59"	41"	1 1/2	675	815
5'x5' Simplex	25	100	71"	71"	41"	2	1160	1345
2'x2' Duplex	8	60	66"	34"	32"	1	810	1010
3'x3' Duplex	18	75	93"	45"	41"	2	1060	1245
4'x4' Duplex	32	100	116"	59"	41"	3	1650	1820
5'x5' Duplex	50	155	140"	71"	41"	5	2680	2950

FLOTATION CELL, Denver "Sub-A" Unit



Denver "Sub-A" Unit Flotation Cell

THE Denver "Sub-A" Unit Flotation Cell, when installed in the grinding circuit between the ball mill and classifier, makes possible the quick recovery of coarse free mineral, which is a vital factor in economic mill operation. Slime losses from overgrinding are reduced to a minimum with the use of the Denver "Sub-A" Unit Flotation Cell, resulting in increased metallurgical efficiency. Mill costs are lowered due to the fact that this machine provides an efficient means of reducing the load on the mill circuit. When

mill heads are a variable factor, as they usually are, this unit provides for a satisfactory method of ironing out these variations, resulting in better mill control. This machine is adaptable to practically any mill circuit and is universally used in the treatment of such ores as copper, lead, zinc, iron, gold, and silver.

(Continued on next page)

The Denver "Sub-A" Unit Flotation Cell is built in varying sizes to accommodate a large range of tonnage and can be readily fitted to most existing mill circuits. The machine embodies all of the principles of the Denver "Sub-A" Flotation Machine cell, with the addition of the coarse mineral zone on the bottom of the tank, where extremely coarse mineral particles and tramp iron are removed from the mill circuit. The Denver "Sub-A" Unit Flotation Cell is designed so that all parts are interchangeable with the parts of the Denver "Sub-A" Flotation Machine cell of equivalent size. The distinctive gravity flow feature, together with easy and positive adjustment and the use of long-life molded rubber wearing parts, make the unit cell ideal for operation in the grinding circuit, as very coarse material is readily handled. However, there are many other points in circuits where this unit is of great value, such as in scavenger operation.

Additional data gladly furnished upon request.

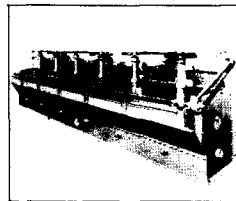
Machine Size No.	*Capacity Tons per 24 Hrs.	Cell Size	Cell Volume Cubic Feet	Motor H.P.
25	5-15	16"x16"	2.75	1
50	10-35	22"x22"	10	1 1/2
100	25-60	24"x24"	12	2
250	50-125	32"x32"	24	5
500	100-250	38"x38"	40	7 1/2
750	200-500	43"x43"	50	10
1500	450-1200	56"x56"	100	15

Machine Size No.	Dimensions				Approx. Shipping Wt., Lbs.			
	L	W		H	Domestic		Export	
		Motor	†Belt		Motor	†Belt	Motor	†Belt
25	1'9"	2'1"	1'8"	3'0"	725	645	825	750
50	2'6"	2'7"	2'2"	4'8"	1050	925	1175	1050
100	3'0"	2'10"	2'5"	4'8"	1425	1275	1575	1425
250	3'6"	3'6"	3'0"	5'5"	1900	1700	2100	1900
500	4'0"	3'11"	3'6"	6'6"	2875	2600	3200	2925
750	4'5"	4'3"	.....	5'6"	3650	.....	4050	.....
1500	5'8"	5'6"	.....	7'7"	8200	.....	9000	.....

*Initial feed to grinding circuit.

†No. 750 and No. 1500 sizes not available for belt drive.

FLOTATION MACHINE, Denver "Sub-A"



Denver "Sub-A" Flotation Machine

THE reliability of the Denver "Sub-A" Flotation Machine is proven by its world wide acceptance and application since 1927. During the intervening years improvements in design have been incorporated to better metallurgical results and, at the same time, structural and wearing qualities have been improved. These changes can be applied to earlier machines at low cost, without difficulty.

(Continued from preceding page)

The design of the Denver "Sub-A" Flotation Machine incorporates all of the basic principles and requirements of flotation. With its distinctive design, the Denver "Sub-A" Flotation Machine is the only machine that will successfully handle all types of flotation problems. Its wide acceptance in all branches of metallic, non-metallic and industrial flotation is evidence of its basically sound qualities.

Denver "Sub-A" Flotation Cell has many distinctive features which make it the universal flotation unit. These distinctive features are:

1. **Handles Coarse Material**—The patented gravity flow principle assures positive circulation of all pulp fractions. There is no bedding or sanding.
2. **Aeration Can Be Controlled**—For sluggish pulps the supercharging principle can be adapted to any Denver "Sub-A" Flotation Machine to increase the degree of intensity of aeration. Likewise, with this feature the amount of aeration can be decreased when required. With standard operation air is drawn down the stand-pipe and partition.
3. **No Short Circuiting**—Machine design allows pulp to pass through each and every impeller or a portion to bypass through partition openings. This flexibility gives the operator a unit cell machine, or the "open tank" machine, by a quick adjustment while in operation.
4. **Middling Return by Gravity**—The exclusive Denver "Sub-A" design allows rougher, cleaner, and recleaner products to be returned from one cell to another by gravity, hence no pumps or elevators are required.
5. **Positive Cell Control**—A minimum of operating attention is required as the quick pulp level adjustment keeps the machine in balance for any feed variation. The stationary hood and air standpipe with wearing plate, protect the impeller from sanding and eliminate the necessity for draining machine after shutdown.
6. **Selectivity**—Selective flotation is a noted feature of the Denver "Sub-A" Flotation Machine and is a result of the combination of machine features. The high selectivity, coupled with flotation of coarse as well as fine particles, assures maximum flotation efficiency. Results are a high ratio of concentration, high recovery, low volume of circulating load and improved final product, acceptable for dewatering and subsequent smelting.

Standard Denver "Sub-A" Flotation Machines are built with heavy steel tanks and rigid superstructures. The superstructure supports the heavy duty shaft assemblies in their individual, totally enclosed, bearing housings. The cells are protected against wear by cast iron side liners and rubber bonded to steel bottom liners. The wearing parts can be either alloy iron or pressure molded rubber. The pressure molded rubber wearing parts are a distinct feature of Denver "Sub-A" Flotation Machines. This type of construction has been applied to Denver "Sub-A" Flotation Machines since 1932 and is used for impellers, wearing plates, and replaceable sand relief bushings. The impeller shafts are protected by means of rubber shaft sleeves.

Pulp level control is by means of conveniently located extra-wide weirs which are adjustable with either hand-wheel gate, gear gate, or wood weir blocks. These easily adjusted weirs control the pulp level, and froth removal is facilitated by froth paddles.

Denver "Sub-A" Flotation Machines are furnished with either V to V heavy duty drives from vertically mounted ball bearing motors, or with the belt drive type in the smaller size machines. Standard belt drives are quarter twist V belt to grooved pulley lineshaft for multi-cell installations.

Recent improvements can be adapted to the earlier Denver "Sub-A" Flotation Machines and, if required, the hand of the machine can be reversed in the field.

Denver "Sub-A" Flotation Machines are moderately priced, due to standardization and quantity production. Specifications are varied to suit particular conditions and special features are added to the machine at slight additional cost. Every machine is factory assembled and carefully labeled, to facilitate quick and accurate re-assembly in the field. Assembly details are furnished with every order.

Additional data gladly furnished upon request.

Machine Size	Cell Size in Inches	Cell Volume Cu. Ft.	H. P. Per Cell		Approx. Weight Lbs. Per Cell		Export Volume Cu. Ft. Per Cell
			*Belt	Motor	*Belt	Motor	
No. 8	16"x16"	2.75	0.75	0.50	537	456	10
No. 12	22"x22"	10	1.0	1.0	940	920	45
No. 15	24"x24"	12	1.3	1.2	1080	1050	60
No. 18	28"x28"	18	2.3	1.4	1550	1360	75
No. 18 Sp.	32"x32"	24	2.5	2.2	1770	1770	95
No. 21	38"x38"	40	....	3.2	....	2660	160
No. 21 D	38"x38"	50	....	3.8	....	2750	....
No. 24	43"x43"	50	....	4.5	....	3200	185
No. 30	56"x56"	100	....	9.2	....	6700	300

*Belt drive not furnished on size No. 21 machine or larger.

Machine Size	*Tons/24-hrs. 4-Cell		*Tons/24-hrs. 6-Cell		*Tons/24-hrs. 8-Cell		*Tons/24-hrs. 10-Cell	
	Slow Float.	Med. Float.	Slow Float.	Med. Float.	Slow Float.	Med. Float.	Slow Float.	Med. Float.
No. 8	7.4	14.8	11	22	15	30	18	36
No. 12	25	45	35	70	45	95	60	115
No. 15	35	65	50	95	65	125	85	160
No. 18	45	95	70	140	95	185	115	235
No. 18 Sp.	60	120	90	180	120	240	150	300
No. 21	105	215	160	420	215	425	265	535
No. 21 D	125	250	190	380	250	500	315	630
No. 24	125	250	190	380	250	500	315	630
No 30	270	535	400	800	535	1070	670	1335

*Capacity figures in dry tons of ore per 24 hours, based on 25% solids for both slow (20 minute treatment time) and medium (10 minute treatment time) floating ores. Specific gravity of dry solids 2.8.

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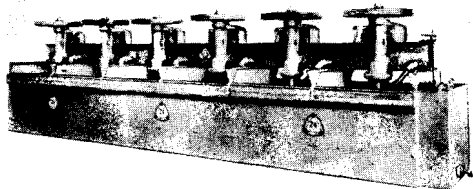
Machine Size	Length—Belt or Motor		Width		Height
	2-Cell	4-Cell	*Belt	Motor	
No. 8	3'8"	6'11"	4'7 $\frac{3}{4}$ "	3'1 $\frac{1}{2}$ "	2'11 $\frac{1}{4}$ "
No. 12	5'4"	9'10"	5'8 $\frac{1}{2}$ "	4'1 $\frac{3}{4}$ "	4'7 $\frac{3}{4}$ "
No. 15	5'10"	10'10"	5'10"	4'5 $\frac{7}{8}$ "	4'7 $\frac{3}{4}$ "
No. 18	6'4"	11'10"	6'5"	4'11 $\frac{1}{8}$ "	5'1 $\frac{1}{2}$ "
No. 18 Sp.	7'1 $\frac{3}{4}$ "	13'4 $\frac{1}{2}$ "	6"	5'0 $\frac{1}{2}$ "	5'7 $\frac{3}{4}$ "
No. 21	8'4 $\frac{3}{4}$ "	15'9"	.....	5'5 $\frac{1}{2}$ "	6'8 $\frac{1}{4}$ "
No. 21D	8'4 $\frac{3}{4}$ "	17'8 $\frac{1}{2}$"	.....	5'5 $\frac{1}{2}$ "	7'8 $\frac{1}{4}$ "
No. 24	9'4"	17'8"	.....	5'9 $\frac{3}{4}$ "	6'11 $\frac{3}{4}$ "
No. 30	11'11 $\frac{1}{2}$ "	22'9"	.....	7'7 $\frac{1}{4}$ "	7'11 $\frac{3}{4}$ "

Machine Size	Length or Motor		Width		Height
	Belt	8-cell	*Belt	Motor	
No. 8	10 2	13'5"	4'7 $\frac{3}{4}$ "	3'1 $\frac{1}{2}$ "	2'11 $\frac{1}{4}$ "
No. 12	14'4"	18'10"	5'8 $\frac{1}{2}$ "	4'1 $\frac{3}{4}$ "	4'7 $\frac{3}{4}$ "
No. 15	15'10"	20'10"	5'10"	4'3'4"	4'7 $\frac{3}{4}$ "
No. 18	17'8"	22'11"	6'5"	4'11 $\frac{1}{8}$ "	5'1 $\frac{1}{2}$ "
No. 18 Sp.	19'7 $\frac{1}{2}$ "	25'10"	6'7"	5'0 $\frac{1}{2}$ "	5'7 $\frac{3}{4}$ "
No. 21	23'2 $\frac{1}{4}$	30'7"	.....	5'5 $\frac{1}{2}$ "	6'8 $\frac{1}{4}$ "
No. 21D	26'0"	30'7"	.....	5'5 $\frac{1}{2}$ "	7'8 $\frac{1}{4}$ "
No. 24	26'0"	34'4"	.....	5'9 $\frac{3}{4}$ "	6'11 $\frac{3}{4}$ "
No. 30	33'6 $\frac{1}{2}$ "	44'4"	.....	7'7 $\frac{1}{4}$ "	7'11 $\frac{3}{4}$ "

Machine Size	Length Belt or Motor		Width		Height
	10-Cell	12-Cell	*Belt	Motor	
No. 8	16' 8"	19' 11"	4' 7 $\frac{3}{4}$ "	3' 1 $\frac{1}{2}$ "	2' 11 $\frac{1}{4}$ "
No. 12	23' 4"	27' 10"	5' 8 $\frac{1}{2}$ "	4' 1 $\frac{3}{4}$ "	4' 7 $\frac{3}{4}$ "
No. 15	25' 10"	30' 10"	5' 10"	4' 5 $\frac{7}{8}$ "	4' 7 $\frac{3}{4}$ "
No. 18	28' 4"	33' 10"	6' 5"	4' 11 $\frac{1}{8}$ "	5' 1 $\frac{1}{2}$ "
No. 18Sp.	32' 0 $\frac{3}{4}$ "	38' 3'4"	6' 7"	5' 0 $\frac{1}{2}$ "	5' 7 $\frac{3}{4}$ "
No. 21	37' 11 $\frac{3}{4}$ "	45' 4'3"	.....	5' 5 $\frac{1}{2}$ "	6' 8 $\frac{1}{4}$ "
No. 21D	37' 11 $\frac{3}{4}$ "	45' 4'3"	.....	5' 5 $\frac{1}{2}$ "	7' 8 $\frac{1}{4}$ "
No. 24	42' 8"	51' 0"	.....	5' 9 $\frac{3}{4}$ "	6' 11 $\frac{3}{4}$ "
No. 30	55' 1 $\frac{1}{2}$ "	65' 11"	.....	7' 7 $\frac{1}{4}$ "	7' 11 $\frac{3}{4}$ "

*Belt drive not furnished on size No. 21 or larger.

Denver "Sub-A" Super Rougher Flotation Machine



Denver "Sub-A" Super Rougher Flotation Machine

Large tonnage rougher-flotation installations use the Denver "Sub-A" Super Rougher Flotation Machine. This machine, specially designed for coarse flotation and large capacities, uses the standard Denver "Sub-A" impeller

mechanism in a free-flow, straight side, double overflow tank with adjustable froth discharge height.

Parts for the Super Rougher are interchangeable with those of the standard Denver "Sub-A."

Except for tank design, froth paddles and weir assemblies, the details of the Denver "Sub-A" Super Rougher Flotation Machine are identical to those of the standard Denver "Sub-A." One adjustable weir partition is furnished on the end cell and one is normally furnished for each four cells in the machine. Weir assemblies are interchangeable with those of the standard Denver "Sub-A." Multibladed impellers and diffusers are standard for this machine.

The Denver "Sub-A" Super Scavenger

This special machine, built to order, has a double impeller mechanism. The mechanisms can be supplied with or without tank. The tank is an adjustable double overflow, straight side tank without weir assemblies except on the last cell.

This double-impeller assembly is designed for maximum aeration and agitation. Frequently it is advisable to install these scavenger mechanisms in the last two cells of a rougher circuit to obtain maximum recovery.

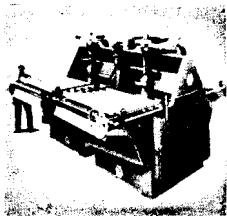
These mechanisms use standard wearing parts and the parts and assembly are interchangeable with the standard Denver "Sub-A" Mechanism.

DIMENSIONS AND SPECIFICATIONS Denver "Sub-A" Super Rougher and Denver "Sub-A" Super Scavenger Flotation Machines

Machine Size	Cu. Ft. Volume per cell	Motors for 2 cells	Motor H.P.		Approximate Dimensions				
			Super Rougher	Super Scavenger	Width	Height	Machine Length		
			2-Cell	4-Cell			6-Cell		
No. 18 Sp R (32x32)	18.6	1-1800	5	7 $\frac{1}{2}$	2'-8"	4'-10"	6'-1"	11'-6"	16'-11"
No. 21-R (38x38)	30.0	1-1800	7 $\frac{1}{2}$	10	3'-2"	5'-11"	7'-0"	13'-4"	19'-9"
No. 24-R (43x43)	38.4	1-1800	10	15	3'-7"	5'-11"	7'-10"	15'-1"	22'-3"
No. 30-R (56x56)	93.0	2-1200	10	15	4'-8"	7'-1"	10'-3"	19'-8"	29'-0"

Approximate Shipping Weights per 2-cell machines, with motors:
 No. 18 Sp-R (32x32) 2900 lbs., domestic ship., 3300 lbs., export ship.
 No. 21-R (38x38) 3850 lbs., domestic ship., 4400 lbs., export ship.
 No. 24-R (43x43) 4900 lbs., domestic ship., 5600 lbs., export ship.
 No. 30-R (56x56) 11400 lbs., domestic ship., 12600 lbs., export ship.

FLOTATION, Coal, Denver "Sub-A" (Lasseter Type)



Denver "Sub-A" (Lasseter Type)
Coal Flotation Machine

THE Denver "Sub-A" principle of flotation, when applied to the cleaning of coal fines, effectively separates clean coal particles from high ash materials. In many applications the standard Denver "Sub-A" Flotation Machine is adequate. However, in certain cases the physical characteristics of the coal froth is such that special provisions must be made for removing the heavy mat of coal from the surface of the machine.

This has been accomplished by the Lasseter type of froth removal rakes specially designed for coarse coal flotation.

Denver "Sub-A" (Lasseter Type) Coal Flotation Cells have stainless steel punched plate rakes attached to chain drags. These rakes pull the heavy mat of coarse coal from the surface of the machine to special spitzkasten overflow. Drainage through the punched plate rakes permits a lower moisture in the clean coal fines. Denver "Sub-A" (Lasseter Type) Coal Flotation Machines are constructed as 2-cell units only. Each cell has its own motor drive. Any number of 2-cell units may be bolted together to meet flotation objectives.

Denver Equipment Company has pioneered in the flotation recovery of coal fines and we have many publications on recovery of coal fines by flotation. Please let us know your interest so we may send these helpful engineering bulletins to you.

Mechanisms of Lasseter Flotation Machines are standard Denver "Sub-A" Flotation Machine mechanisms. Neoprene wearing parts are standard to withstand coal flotation reagents.

Laboratory tests can quickly determine the economic advantage of recovering coal fines. Complete information will be sent on request.

Denver "Sub-A" (Lasseter Type) Coal Flotation Machine				
Machine Size	Construction	Motor HP Per Cell*	Approximate Cell Volume	
No. 30 (56x56)	2-cell units	7½	100 cu. ft.	
Shipping Weight Per 2-Cell Unit		L	W	H
12,200 lbs. (Domestic)		11'6"	11'0"	7'11"
13,400 lbs. (Export)				

*In addition, one only ½ HP motor per cell is used to power froth removal rakes.

Standard Denver "Sub-A" Flotation Machines with double overflow are recommended for -28 mesh coal fines.

If the coal feed contains an appreciable percentage of coal +28 mesh up to ¼" in size, the Denver "Sub-A" (Lasseter Type) Flotation Machine is recommended.

Denver "Sub-A" Flotation is standard in practically all commercial coal flotation plants throughout the world.

FLOTATION, Denver Supercharger



DENVER Supercharger Blower is an ideal unit for supplying low-pressure air to the Denver "Sub-A" Flotation Machine. It is also used for supplying low-pressure air to oil and gas fired furnaces, pneumatic conveyors and for agitation of liquids and pulps.

This is a centrifugal type turbo-compressor delivering air at a uniform pressure.

Single-stage machines offered for installation where low first cost is desired, will deliver reliable air service in pressure from 4 to 16 ounces and in volumes from 110 to 2350 cubic feet per minute. Multi-stage machines are available that furnish pressures from 8 ounces to 2 pounds and in volumes up to 20,000 cubic feet per minute.

AIR REQUIREMENTS FOR DENVER "SUB-A" SUPERCHARGED FLOTATION MACHINES (Continued from previous page)

Machine Size	Pressure Ozs.	Air Req. C. F. M. Per Cell
No. 8 (16"x16")	8	3
No. 12 (22"x22")	8	10
No. 15 (24"x24")	8	12
No. 18 (28"x28")	8	18
No. 18 Special (32"x32")	8	24
No. 21 (38"x38")	10	40
No. 24 (43"x43")	10	50
No. 30 (56"x56")	12	100

Reliable Denver Ore Tests insure your mining investment.

Use Denver Ore Tests to verify or improve your present flowsheet.

FRAMER, Denver Timber

DENVER Timber Framer is a necessary piece of equipment for any mine using considerable mine timbers.

The Denver Timber Framer consists of a head frame comprised of a rigid horizontal cross arm at the top of a vertical extra heavy steel column mounted on a heavy cast iron base. The rigid horizontal cross arm at the top of the column supports the driving motor and shaft for the rip saws for horizontal cuts. Two separate cast iron arms on the column support the individual driving motors and the cross cut saws which make the vertical cuts. Arms are adjustable vertically by means of handwheels. A structural steel guage stand and a timber carriage with a steel ball supported turntable mounted on a truck running on rails is also supplied.

The machine is equipped with saws, belts, countershaft, etc. The Denver Timber Framer will handle logs as large as 30 inches in diameter and 10 feet long. The unit requires a space 12 feet long by 12 feet wide and 10 feet high. The shipping weight is 7,000 pounds and total required horsepower is 30.

Additional data gladly furnished upon request.

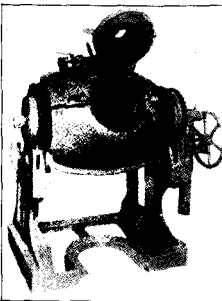
Use Denver Equipment—Standard the World Over. "No Yearly Models But Constant Improvement."



FURNACE, Denver Melting

DENVER Melting Furnaces efficiently melt brass, bronze, copper, aluminum, gray iron, ferromanganese, gold and silver precipitates, and can also be used for smelting and refining grindings, borings, wash metals, and various ores. No crucibles are used. These furnaces are similar in construction, having chambers split longitudinally and hinged on one side so that they may be easily opened to replace linings. Charging and pouring openings have hinged lids and vents. A low pressure burner is provided for each unit or at opposing ends on each chamber of the double chamber type. Either gas or oil burners can be supplied and fuel can be oil, natural gas, city gas, or producer gas. Air pressure and volume required will vary according to the duty of the furnace. These units are of durable construction and simple to operate. Initial installation and operating expense is comparatively low and a range of capacities are available to meet the need of practically every size plant.

Additional data gladly furnished upon request.



Single Chamber Melting Furnace

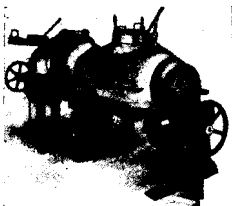
THE Single Chamber Melting Furnace is so constructed that the metal is melted directly on the lining. The shape of the furnace lends itself particularly to the refining of precious metals as there are no corners in the lining in which the metal can collect. This low capacity furnace, up to 250 lbs. per heat, is ideal for small cyanide or other plants where a larger furnace is not needed.

This unit consists of an egg shaped, lined, metal shell or chamber mounted horizontally on two undercut stands which set on a cast iron base as a unit. The chamber revolves freely on rollers actuated by a worm gear and handwheel. A 5-inch thick lining of Carbofrax No. 3 (Silica) is supplied as standard. The diameter of the chamber is 17 inches and the diameter of the charging opening is 9 inches.

THE Double Chamber Melting Furnace is really two of the Standard Single Chamber Furnaces in one. It is two chambers with each chamber consisting of an egg shaped, lined, metal shell. The chambers are mounted horizontally in line on a structural steel base as a unit. Each chamber

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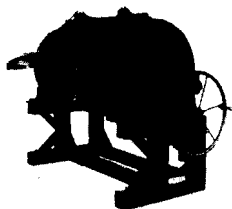


Double Chamber Melting Furnace

is revolved independently by means of a worm gear and handwheel.

In operation, a chamber is pre-heated, charge is introduced, and the burners are then fully opened to complete the melting and refining operation. The waste heat and gases pass through the second chamber. This action pre-heats the second chamber and, a charge can be placed in the second chamber for melting while the refining pro-

ceeds in the first chamber. Thus, operating procedures can be alternated, providing additional use of the hot gases in pre-heating and alternate charges. The economy of this method is self-evident as melting is practically continuous. As this unit consists of two Single Chamber Furnaces incorporated into a single unit, general specifications are the same as for the Single Chamber Melting Furnace.



Simplex Melting Furnace

THE Simplex Melting Furnace ranges in capacity from 500 lbs. to 6,000 lbs. This capacity makes it suitable for the larger cyanide or precious metal recovery plants. The melting process in this furnace is accomplished by radiated heat with no flame striking the metal directly.

The Simplex Melting Furnace is made of steel plate with cast iron heads and with a cast steel collar around the pouring opening. It is equipped with a lined cast iron

door which clamps down tight on the steel collar when the furnace is in operation, and is easily manipulated by means of a lever located at the rear of the furnace. The chamber rests on undercut cast iron stands which are bolted to a heavy bed plate. The furnace revolves easily on steel rollers, actuated by means of a handwheel driven worm and gear.

A Carbofrax No. 3 (Silica) lining, varying in thickness according to the size and capacity of furnace, is furnished as standard. Other lining materials may be used, however, and lining the furnace is a very simple operation. If desired, a lining of fire clay tile can be used. Full instructions for lining are furnished with each furnace.

If manual oscillation is impractical, such as on the larger capacity furnaces, a motor driven oscillating device may be furnished. Also, furnaces are available with power drive controlled by push button or automatic controls.

SINGLE CHAMBER MELTING FURNACE

Capacity Pounds	*Fuel Oil Consumption Gallons	*Air Required		Dimensions			Shipping Wt., Lbs.		Export Volume Cu. Ft.
		Cu. Ft. Per Min.	Pressure Oz.	L	W	H	Do-estic port	Ex- port	
250	1½ - 2	150	12	5'3¼"	3'6"	6'6"	2350	2700	80

*Data shown on fuel oil consumption and air required is based on melting 100 pounds of ordinary brass mixture.

DOUBLE CHAMBER MELTING FURNACE

Capacity Pounds Per Chamber	*Fuel Oil Consumption Gallons	*Air Required		Dimensions			Shipping Wt., Lbs.		Export Volume Cu. Ft.
		Cu. Ft. Per Min.	Pressure Oz.	L	W	H	Do-estic port	Ex- port	
250	1½ - 2	150	12	10'¾"	36"	6'6"	5100	5900	150

*Data shown on fuel oil consumption and air required is based on melting 100 pounds of ordinary brass mixture.

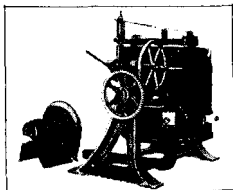
Furnace No.	Capacity Pounds	*Fuel Oil Consumption Gallons	Charging Opening Dia. Inches	Lining Thickness Inches	Dimensions		
					L	W	H
92	500	1½ - 2	11"	5"	5'	3'6"	6'10"
93	1000	1½ - 2	12"	6"	6'	4'	8'4"
94	2000	1½ - 2	13½"	7"	7'	4'	10'5"
95	4000	1½ - 2	16"	8"	8'	4'6"	11'2"
96	6000	1½ - 2	16"	9"	9'	5'	13'8"

*Data on fuel consumption is on the basis of oil fuel required to melt 100 lbs. of brass mixture: oil to be supplied at 2.5 lbs. pressure, using air at a pressure of 12 ounces provided by a blower at a rate to maintain uniform pressure.

Furnace No.	Floor Space Required Sq. Ft.	Net Weight Lbs.	Approx. Shipping Wt., Lbs.		Shipping Space Cu. Ft.
			Domestic	Export	
92	17½	4600	4800	5500	120
93	24	6900	7300	8400	200
94	28	9700	10500	12300	290
95	36	14500	15200	17500	400
96	45	16000	17000	20000	614

All we ask is a chance to help you and the opportunity to work with you on your equipment needs.

FURNACE, Denver (Tilting Type, Oil) Melting



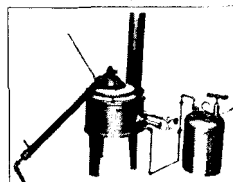
Denver (Tilting Type, Oil) Melting Furnace—Blower Shown at Left

DENVER Melting Furnaces have been designed for melting gold and silver bullion, cyanide precipitates, brass, copper, and other non-ferrous metals. The patented linings are made of the most refractory fire clay, give maximum support to the crucible in all positions, and insure uniform distribution of heat. These furnaces are equipped with drop bottoms, a great convenience in cases of spillage.

The standard furnace is supplied with a Denver low pressure oil burner and motor blower, but it can be furnished with a high pressure burner or a gas burner. If no electricity is available, a belt driven blower can be supplied. The complete furnace includes a low pressure burner, a black lead crucible, a 30 gallon oil tank, air and oil pipes, and fittings.

Model No.	For Crucible No.	Capacity Crucible Gallons	Motor Blower		Floor Space		Approx. Ship Wt., Lbs.
			Type	H.P.	L	W	
341	40	2	10	1	36"	36"	2000
342	60	3	10	1	40"	36"	2300
344	150	6 1/2	20	2	52"	40"	2700
345	275	10 1/2	20	2	54"	40"	2950

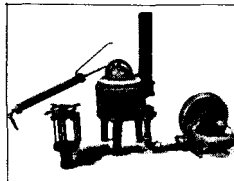
FURNACE, Denver (Gasoline, Oil) Retort or Melting



Denver Retort or Melting Furnace for Gasoline with Retort and Condenser in Operating Position

DENVER Retort or Melting Furnace is made in two standard sizes and can be supplied for burning gasoline or fuel oil. The retort furnace includes all furnace parts shown in the illustrations except retort, condenser, and an amalgam press. The oil-fired furnace includes a burner, motor blower, oil tank, pipe fittings, and one length of clay-lined stack. The gasoline furnace includes a burner, blow-pipe

tank, pipe fitting, and one length of clay-lined stack. These Denver Retort or Melting Furnaces are also furnished as either oil or gasoline fueled melting furnaces.



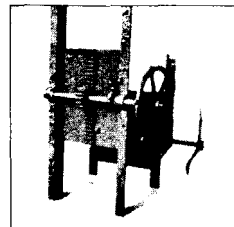
Denver Retort or Melting Furnace for Dil. with Blower, Retort, Retort Condenser and Denver Amalgam Press

THE Denver Retort Condenser is made of iron with a water jacket. The inner tube is threaded to the retort outlet. This unit is very useful in mercury retorting and minimizes the danger of mercury poisoning. Tube diameters are 1 1/4", 1 1/2", 2", and 2 1/2"; weights 10 lbs., 11 1/4 lbs., 13 lbs., and 16 lbs. respectively.

The Denver Amalgam Press, shown in the illustration, is used for pressing excess mercury out of amalgam. Details on this accessory are given under, "Amalgam Press, Denver."

Model No.	Capacity Iron Retort Pints	Type Fuel	Size Gas. Tank Gallons	Motor Blower		Approx. Shipping Wt., Lbs.
				Type	H.P.	
3162	6	Gasoline	10	5	3 1/2	250
3163	10	Gasoline	10	5	3 1/2	450
3162-O	6	Oil	10	5	3 1/2	375
3163-O	10	Oil	10	5	3 1/2	575

GATE, Denver (Rack and Pinion) Bin



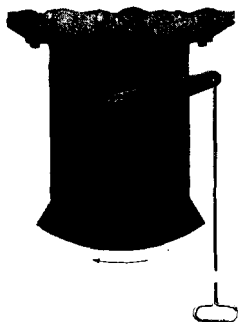
Denver (Rack and Pinion) Bin Gate

DENVER (Rack and Pinion) Bin Gate consists of a steel plate door, steel shaft, cast iron guides, hand wheel, pawl, rack, and pinion. These parts are all built of the best materials, carefully machined and assembled. This type of gate meets the need for a simple means of control of flow of dry materials from a bin. Rugged construction of rack and pinion assures long operating life.

Size No.	Dimensions		Shipping Weight, Lbs.	
	W	H	1 Rod and Pinion	2 Rods and Pinions
1	18"	24"	160	180
2	20"	24"	170	190
3	20"	30"	190	220
4	24"	30"	220	250
5	24"	36"	230	270
6	30"	36"	250	300

Our desire is to make you "Happier, Healthier and Wealthier."

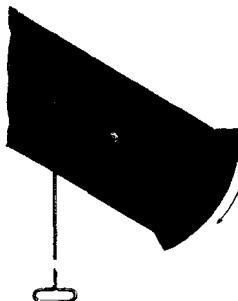
GATE, Denver (Radial, Duplex and Undercut) Bin



Type "A" Denver Radial Bin Gate



Type "B" Denver Duplex Bin Gate



Type "D" Denver Undercut Bin Gate

TYPE "A" Radial Bin Gate is designed for attaching to the horizontal bottoms of bins. The quadrant swings freely and is self-closing. The quadrant cuts through the stream of material to stop the flow with no chance for large lumps to foul the closing action of the gate. The throat is a heavy casting and lever may be furnished cast integral with the side plates or as a separate sweet bar on most sizes.

Type "B" Duplex Gate is opened by a downward movement of the lever and closed by gravity when released. The two gate plates are opened in unison by the gear segments attached to the throat casing. Most sizes of this type gate above the 12"x12" size may be furnished with either a circular cross section for conical shaped bottom bins or a square cross section for flat bottom bins. When provided with a circular cross section, the collar is cast at a 45 degree angle as standard. The large sizes of this type gate are furnished with steel gate plates. Distance between mounting collar and pivot point of gate plates may be varied to meet specific requirements.

Type "D" Undercut Gate has its chute attached to a vertical surface (the front or side of bin). This type gate opens with a downward rotary motion and is closed by a downward pull on the actuating arm. This causes the gate to cut under the stream from below so that lumps cannot interfere with closing. The 30"x24" size gate plate is of steel with cast iron gate sides and, in addition to the 24" by 24" size, can be made any width from a 24" minimum to a 42" maximum.

(Continued on next page)

TYPE "A" DENVER RADIAL BIN GATES

Throat Opening	Flange Dimensions	Approx. Shipping Wt. Pounds
8' x 8'	13' x 13'	115
10' x 10'	16' x 16'	140
12' x 12'	18' x 18'	175
14' x 14'	20½' x 20½'	275
16' x 16'	22' x 22'	260
16' x 20'	22' x 26'	330

TYPE "B" DENVER DUPLEX BIN GATES

Throat Opening	Flange Dimensions	Approx. Shipping Wt. Pounds
12' x 12'	17½' x 17½'	165
16' x 16'	23' x 23'	250
18' Diam.	23½' Diam.	310
26' Diam.	31½' Diam.	705

NOTE: Other sizes are available.

TYPE "D" DENVER UNDERCUT BIN GATES

Throat Opening	Flange Dimensions	Approx. Shipping Wt. Pounds
13' x 14'	16' x 25'	210
14' x 10'	20½' x 21'	200
24' x 24'	24¼' x 30'	500
30' x 24'	30' x 29½'	640

Use Denver Equipment—Standard the World Over. "No Yearly Models But Constant Improvement."

Complete Milling Equipment From Testing . . . To Feeder . . . To Dryer.

GRIZZLY, Denver Shaking

DENVER Shaking Grizzly has been developed as a distinct improvement over the fixed grizzly now in such wide use.

It combines the functions of screening and feeding the ore to the primary crusher, and, by eliminating the undersize product in the ore feed to the crusher, materially increases the crusher capacity.

In addition, due to the pulsating action of the unit, the ore is fed positively to the crusher, at a controlled rate and the manual labor usually required is eliminated.

The unit consists of a strong, frame mounted, standard grizzly which receives a positive eccentric motion in a lateral plane through connecting links attached to the head motion of the jaw crusher. Due to this positive action the angle of slope of the grizzly may be much less than that required in fixed type grizzlies; and head room or fall may be reduced.

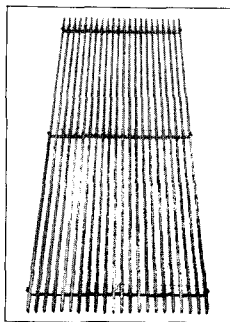
The Denver Shaking Grizzly is constructed in several sizes to fit standard Denver Jaw Crushers.

Denver Shaking Grizzlies can be supplied on three standard sizes of Denver (Forced Feed Type) Jaw Crushers.	Crusher Size Inches	Shaking Grizzly Dimensions Inches	
		W	L
	5" x 6"	12" x 36"	
	8" x 10"	18" x 48"	
	9" x 16"	24" x 60"	

A Denver Mineral Jig or Denver "Sub-A" Unit Flotation Cell In Your Grinding Circuit Will Recover Mineral As Soon As Free.



GRIZZLY BARS, Denver



Denver Grizzly Bars

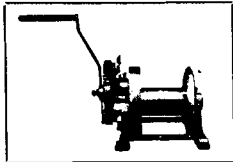
GRIZZLY Bars are a widely used means of reducing the work of primary or secondary crushers. As the ore is fed to the crusher, it passes over the grizzly bars, and the finer pieces drop through into the mill ore bin. The grizzly is made of wear resisting wedge shaped bars easily replaced if necessary.

Denver Grizzly Bars are punched and held in place by steel rods passing through the holes. Cast iron spacers, of the proper shape and width, are placed between the bars. Various types of bars and spacers can be supplied, depending upon the application.

Member Sections	Bar Spacings (Weight Lbs. per Sq. Ft.)									
	1/2"	3/4"	1"	1 1/4"	1 1/2"	1 3/4"	2"	2 1/2"	3"	
Bar: 1/4" x 1/2" x 1 3/4" Rod Diam.: 1/2"	30	26	22	19	17	16	15	14	13	
Bar: 3/8" x 3/8" x 1 3/4" Rod Diam.: 1/2"	31	27	23	20	18	17	16	15	14	
Bar: 3/8" x 1/2" x 2" Rod Diam.: 3/8"	40	36	29	27	24	22	18	16	14	
Bar: 1/2" x 3/4" x 3" Rod Diam.: 3/8"	63	55	49	43	40	...	36	...	...

Denver Equipment Company publishes DECO TREFOIL, an exchange of helpful engineering information designed to improve milling. DECO TREFOIL is published every other month. If you are connected with mining and do not receive DECO TREFOIL please write to us.

HOIST, Beebe Hand

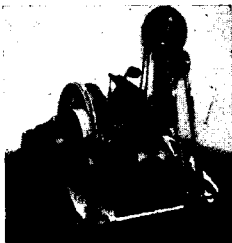


Beebe Hand Hoist

THIS unit easily handles a multitude of hoisting problems. It is easily portable and the large gear reduction makes minimum effort required to lift large loads. An ideal unit for trucks, hand derricks, gin poles, jib cranes and similar applications. Power may be applied to any size unit when desired.

Hoist Size	DRUM CAPACITY Feet of flexible steel cable							Drum Size Inches	
	¼"	⅜"	½"	⅝"	¾"	7/8"	1"	Dia.	Width
Two Ton	300	200	150	100	75			4	6
Five Ton		445	325	250	160			5	8
5 Ton Spec.		890	650	500	320			5	16
5 Ton Spec.			1335	975	750	480		5	24
15 Ton Spec.					1200	800	525	10	12½

HOIST, Denver Mine



Denver Single Drum Mine Hoist

ONE of the main problems in the operation of a mine is the hoisting of ores speedily and without excessive labor costs. Denver Mine Hoists are of rugged construction and time proven design and successfully solve this problem. They keep tonnage moving, without shutdowns or delays which reduces overall operating expense. Frames are sectionalized and of heavy steel construction. Drums and gears are of Meehanite and pinions of forged steel. Heavy duty

ball bearings, removable and adjustable, are used on the sizes shown. Post brakes are constructed of heavy cast steel and designed with a large safety factor.

Larger sizes of hoists than those listed can be furnished, as well as hoists with different specifications such as drum friction clutches, band brakes, or double drum.

Additional data gladly furnished upon request.

(Continued on next page)

GASOLINE OR ELECTRIC MOTOR DRIVEN

Type Hoist	Rope Pull Lbs.	Motor H.P. and Rope Speed Ft. Per Min.		*Rope Capacity	Drum Dimensions Dia. *Face	Hoist Dimensions L W		Approx. Ship. Weight Pounds
		H.P.	R.S.	Size Inches		Drum Cap. Feet		
17P	2000	10	140	½" 900'	14" 18"	6'4"	3'8"	2100
21½P	3000	15	210	¾" 1400'	21" 24"	7'8"	4'9"	2900
		20	280					
		25	235					
22P	4000	20	190	¾" 1800'	24" 24"	8'4"	4'9"	4100
		30	210					
		40	280					
23P	5000	50	350	¾" 2000'	28" 27"	9'2"	5'8"	6400
		40	225					
		50	280					
		60	335					

*Specifications based on 6 layers of rope

ELECTRIC MOTOR DRIVEN

No. 11½	1750 R.P.M. — 3 H.P.		1150 R.P.M. — 3 H.P.		1750 R.P.M. — 5 H.P.		Drum Capacity Feet of ¾" Rope
	Rope Layer	Rope Pull Lbs.	Rope Speed Ft. Per Min.	Rope Pull Lbs.	Rope Speed Ft. Per Min.	Rope Pull Lbs.		Rope Speed Ft. Per Min.
1st	1100	90	1700	60	1800	90	75
4th	850	120	1300	75	1400	120	350
8th	650	150	1050	100	1100	150	800
12th	530	190	800	125	900	190	1400

NOTE: Dimensions of No. 11½ size—38" Length by 29" Width.

GASOLINE ENGINE DRIVEN HOIST

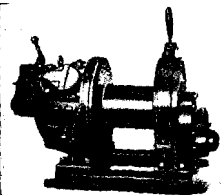
No. 11½	2200 R.P.M.		2800 R.P.M.		Drum Capacity Feet of ¾" Rope
	Rope Pull Lbs.	Rope Speed Ft. Per Min.	Rope Pull Lbs.	Rope Speed Ft. Per Min.	
1st	2100	40	2000	50	75
4th	1500	54	1400	67	350
8th	1200	70	1175	85	800

NOTE: Dimensions of No. 11½ size—38" Length by 29" Width.

Data on larger hoists are available.

May We Please Work With You On All Your Equipment Needs?

HOIST, Utility and Tugger



Air Motor Driven Single Drum "Utility" Hoist



Double Drum Electric Hoist

THE hoists illustrated are two of a large variety available for underground duties. The single drum air hoist is extremely useful for such purposes as operating a skip in a winze or for pulling cars on an incline. This hoist can be equipped with column mounting and can be readily installed for the service required. It operates under 30 lbs. per square inch air pressure. THE double drum electric hoist is most suitable, where power is available, for use in connection with scraper mucking and loading, or "slushing" operations. It is also furnished in single and triple drum types and can be driven with electric motor, air motor, gasoline engine or oil engine drive. Capacities range from 750 lbs. to 10,000 lbs. with rope speeds varying from 75 feet to 450 feet per minute on various sizes available.

SINGLE-DRUM "UTILITY" AIR HOISTS

Size	*Rated Capacity Lbs. 80 Lbs. Air Pressure	Average Ft. Per Min. Lift at Rated Load 80 Lbs. Air Pressure	Maximum Amount of Cable, Ft.		
			1 3/4" Dia.	1 1/2" Dia.	5/8" Dia.
K4U	3500	95	.....	625'	400'
K4UL	3500	95	.....	1250'	800'

Size	Dimensions Inches			Net Wt., Lbs.	Size Pipe Connection Inches	Hose Recommended Inches
	L	W	H			
K4U	21	39	27 3/4	850	1 1/4	1 3/8
K4UL	21	49	27 3/4	940	1 1/4	1 1/2

Capacity can be increased many times by the use of sheave or block and tackle.

(Continued on next page)

Your comments and suggestions are always welcome. Please write to us.

DOUBLE DRUM "TUGGER" ELECTRIC HOIST

Size	60 Cycles and D.C.		Cycles 25-50		Weight Lbs		Length
	Rated Capacity Cable Pull Lbs.	Average Cable Speed Ft. Per Min.	Rated Capacity Cable Pull Lbs.	Average Cable Speed Ft. Per Min.	*With A.C. Motor	With D.C. Motor	
235	4200	275	5040	230	3475	3640	74 3/4

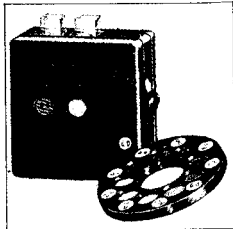
Size	Width, Inches		Height, Inches		Size opening will pass through without Cable Guide, Inches	Cable Capacity of each Drum, Ft.		
	With Cable Guide	Without Cable Guide	With Cable Guide	Without Cable Guide or Eye Bolts		1 1/2" Cable	5/8" Cable	7/8" Cable
	235	40 3/8	34 1/2	36 1/4	33 3/8	35x34	1000	650	450

*With intermittent rated A.C. Motor.

Denver Ore Tests are made on an "actual cost" basis. This brings the world's finest laboratory equipment and skilled technicians to your service at a very low cost.

We have often been referred to as the "Diagnosticians of the ore dressing industry." Perhaps we can help you with your mineral recovery problems. Please let us try.

INDICATOR, pH, Denver



No. 605-H Denver pH Indicator
Showing Color Wheel

THE control of pH is recognized as an important factor in successful and profitable flotation milling treatment.

Colorimetric pH control is widely used because of its simplicity which allows its use without technical training. The only requirement is that the operator be able to match colors, making it possible for the average worker to obtain accurate results.

The No. 605-H pH Indicator is enclosed in a durable, corrosion-resistant housing.

Compartments for all parts: color disc, two square tubes, a pipette, and a bottle of indicator reagent, are provided. Glass color plates are standard and are non-fading.



Block-L Denver pH Indicator

The Block-L, Utility-L, and Roulette-L pH Indicators are simple, compact units for a wide range of standard pH readings. The Roulette-L Indicator is equipped with artificial daylight reading for day or night operation.

For recommendations as to equipment for a specific problem, give range of pH values to be determined and nature and characteristics of material. Let us recommend the unit best suited to your particular problem.

Compartments for all parts: color disc, two square tubes, a pipette, and a bottle of indicator reagent, are provided. Glass color plates are standard and are non-fading.

Model L	Range No. of Stds.	pH Range	Accuracy	Light Source	Dimensions		
					L	W	H
Block-L	20	0.2-13.6	0.20pH	Daylight	8"	2"	5 1/2"
Roulette-L	20	0.2-13.6	0.10pH	Inc. Mazda	26"	26"	16"
Utility-L	20	0.2-13.6	0.25pH	Inc. Mazda	13"	13"	8"

Model H No.	Range No. of Stds.	pH Range	Light Source	Overall Dimensions Inches		
				L	W	H
605-H	21	0.2-13.6	Daylight	3 3/4"	1 1/2"	3 3/4"
607-H	21	0.2-13.6	Inc. Mazda	3 3/4"	4 3/4"	3 3/4"

Recover Your Mineral As Soon And As Coarse As Possible.

INDICATOR, pH, Denver Alkacid

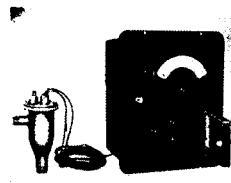


Denver Alkacid Indicator

DENVER Alkacid Indicator provides a quick, simple method of measuring pH of liquids within a range of pH 2 to pH 10 with an accuracy of ± 1 pH. The indicator consists of a spool of 1/4 inch test paper enclosed in a transparent plastic cover 2 1/2 inches in diameter. Mounted on the cover is a color chart showing the five distinct color changes

that the paper undergoes at the various pH ranges. The unit is supplied, filled with one 15 ft. roll of test paper.

INDICATOR, pH, Denver Electric



Model R Electric pH Indicator

THE Electric (Hydrogen Ion) pH Indicator with glass electrodes, provides a quick and accurate method of determining and controlling acidity or alkalinity. Accurate pH determination can be made with ease on practically all substances, regardless of color, suspended solids, colloids, oxidizing or reducing agents.

The pH readings by these units are positive and extremely accurate due to their being true readings of the hydrogen ion content of the solutions being tested. Readings are more accurate than by color comparison. Units are equipped with reference electrodes of the saturated potassium chloride-calomel type, and rugged factory sealed glass electrodes. The accuracy of these indicators is unaffected by vibration or electro-static disturbances and a built-in temperature compensator automatically adjusts for a wide range of temperature variations. Indicators consist of the electrode system and a compact case which houses the registering devices and instruments.

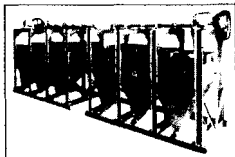


Model G Electric pH Indicator

Definite recommendations can be made as to the equipment required for your specific problem of circuit alkalinity control. Not only is it possible to make pH measurements on laboratory samples, but models are also available for continuous pH measurement and recording.

Model	Use	pH Range	Accuracy	Dimensions			Approx. Shipping Wt., Lbs.
				L	W	H	
G	Laboratory	0-13	.01 pH	9'	11 1/4"	11'	31
M	Industrial	0-14	.05 pH	9 1/4"	13 1/4"	9'	37
R	Continuous	0-7 3-10 6-13	.10 pH	12'	13'	16 1/2"	85

JIG, Denver (Improved Harz Type)



Denver (Improved Harz Type) Jig

THE Denver (Improved Harz Type) Jig is essentially a coarse - mineral concentrator embodying improvements on the Harz Jig and the Ellis Jig. It will handle successfully all types of ores which can be treated by gravity concentration with feed size ranging from 1/4" to 1 1/2".

These jigs are made in three sizes and with one to six compartments sub-divided by a shallow partition into a screen compartment and a plunger compartment. Reciprocation of the plunger causes flow of water through the screen. The coarse and heaviest particles settle onto the screen and are removed by a side drawoff. The heavy fine particles pass through openings in screen into hopper-shaped hutch, from which they are discharged intermittently or continuously. The light particles pass into next compartment where currents are of lower velocity.

Standard construction is welded steel tanks and frames with laminated wood plungers. Iron work consists of necessary tie rods, eccentrics, plunger rods, screens, concentrate drawoffs, shafting and bearings.

Jigs may have belt or motor drive. Wood construction is available if desired.

Additional data gladly furnished upon request.

Size Inches	*Dimensions of 1 and 2 Compartment Units					
	Steel Construction			Wood Construction		
	L	W	H	L	W	H
18"x32"	3'8 1/2"	3'3 1/4"	6'0"	3'4 1/2"	5'6"	8'4"
	6'9"	3'3 1/4"	6'2"	6'4 1/2"	5'6"	8'4"
24"x36"	4'7 1/2"	4'6"	6'9"	3'8 1/2"	6'6"	8'10"
	8'2 1/2"	4'6"	6'11"	6'11 1/2"	6'6"	8'10"
30"x36"	4'7 1/2"	5'9 3/4"	7'8"	3'8 1/2"	7'6"	9'6"
	8'2 1/2"	5'9 3/4"	7'10"	6'11 1/4"	7'6"	9'6"

*Dimensions for 1 to 6 compartment units will be gladly furnished on request.

NOTE: Water requirements vary from approximately 3 to 10 tons per ton ore treated. Stroke variation is from 0"-1" on the 18"x32" size to 0"-1 1/4" on the 24"x36" and 30"x36" sizes.

Size	No. of Compartments	*Av. Capac. in Tons per 24 Hours	Screen Area in Sq. Ft.	Motor H.P.	Approx. Ship. Wts., Lbs. Wood or Steel Motor Driven	
					Domestic	Export
18"x32"	1	40	4	1	1450	1750
	2	80	8	1 1/2	2550	3050
	3	120	12	2	3575	4300
	4	160	16	3	4500	5325
	5	200	20	3	5550	6650
	6	240	24	5	6600	7900
24"x36"	1	60	6	1 1/2	2125	2550
	2	120	12	2	3825	4600
	3	180	18	3	5450	6350
	4	240	24	5	6950	8350
	5	300	30	5	8400	10000
	6	360	36	7 1/2	9800	11800
30"x36"	1	75	7 1/2	1 1/2	2850	3400
	2	150	15	3	5225	6200
	3	225	22 1/2	5	7650	9200
	4	300	30	5	9600	11500
	5	375	37 1/2	7 1/2	11600	13900
	6	450	45	7 1/2	13600	16300

*Average capacity is based on 10 tons of ore per square foot of screen surface per 24 hours.

JIG, Denver (Selective) Mineral



24"x36" Duplex Denver (Selective) Mineral Jig (Low Dilution Type)

DENVER Mineral Jig is not just another jig. It is a highly efficient selective pulsator and concentrating machine, which has the ability to treat an unclassified feed . . . separating solids having only a slight differential in settling rates, with only a minimum addition of water. It is successfully used on practically every type of ore. Gold, lead, zinc, copper, native copper, nickel, iron, manganese, tungsten, chromite, and fluor spar are a few of the ores which can be concentrated in this jig.

The Denver Mineral Jig is usually installed in the grinding circuit between the ball mill and classifier, or at any other point in the circuit where free mineral is present. It is ideal for use in cyanide, flotation, and gravity-concentration mills; base-metal and non-metallic mills; tungsten-gold mills; and placer operation; to save minerals as coarse and as soon as possible, thus reducing grinding cost.

(Continued on next page)

(Continued from preceding page)

This jig is simple to regulate and control, requiring only periodic discharging of concentrates from the hutch, which can be locked to prevent theft of high-grade mineral, or can be arranged for continuous discharge by using a Denver-Dowsett Density Control Valve. The Denver Mineral Jig requires a minimum of attendance; dilution is easily controlled, as it is always necessary to add water to the jig tailing for subsequent classification. It requires minimum floor space—being less than that for any other concentration unit; and has a low initial cost. No pumps or elevators are needed in the ball-classifier circuit, as the jig acts as a launder. It treats an unscreened, unclassified feed—yielding a clean, high-grade concentrate. The distinctive upper trash screen prevents foreign tramp matter from interfering with normal jig operation, and the lower wedge-bar screen minimizes the blinding so common in other jigs.

The rugged design of the jig with its few wearing parts insures continuous "24 Hour Service."

Additional data gladly furnished upon request.

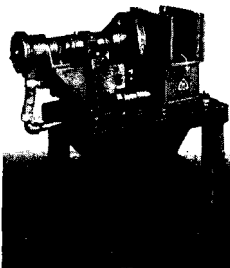
Machine Size	Capacity With Circulating Load Tons Per 24 Hrs.	Dimensions			Motor H.P.	Approximate Shipping Weight Pounds		
		L	W	H†		Gas	Belt	Motor
4"x 6" Simplex	2-6	12½"	23"	207½"	¼		195	236
8"x12" Simplex	7-35	24"	34"	43"	¼	535	430	590
8"x12" Duplex	15-45	35"	36"	53"	¼	850	700	900
12"x18" Simplex	25-75	26"	42"	66"	¾	1165	1015	1130
12"x18" Duplex	50-150	48"	42"	66"	1	1650	1375	1800
16"x24" Simplex	75-200	32"	51"	66"	1	1500	1225	1450
16"x24" Duplex	150-400	60"	51"	66"	1½	2000	1790	2280
24"x36" Simplex	200-400	44"	69"	67"	2	2900	2500	2750
24"x36" Duplex	400-800	86"	69"	67"	2	3975	3575	3910
36"x48" Simplex	400-800	53¼"	74½"	73½"	3	3900	3400	3800

*Capacity should be decreased 50% when jiggling non-metallics.

**H. P. of gasoline engine is 1.34 up to and including 16"x24" Simplex, 2 H. P. for 16"x24" Duplex and 3 H. P. for 24"x36" Simplex and Duplex.

†Height without motor.

JIG, Denver (Selective) Mineral 4"x6"



4"x6" Simplex Denver (Selective) Mineral Jig (Low Dilution)

DENVER Mineral Jig, size 4" x 6", is a unit which fills the needs between the 8"x12" Simplex Denver Mineral Jig and the No. 1-M Denver Laboratory Jig, due to its applicability to both commercial and test work.

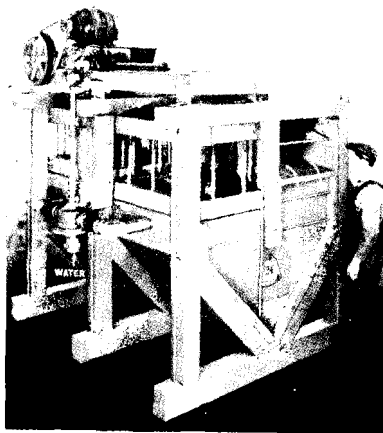
Although the 4" x 6" Denver Mineral Jig is ideal for many uses in commercial work, it also has considerable merit as a unit for use in pilot mill operation and in large batch laboratory tests. It is suited for non-metallic or open-circuit work in the laboratory especially where a large quantity of concentrate must be

obtained. This size jig is most desirable for trial installation in large tonnage mills to determine the desirability of a jig in the circuit, as it can operate on small quantities of material of the same size as that handled by the larger size jigs.

The 4"x6" jig has a single hutch compartment and a reversible screen compartment constructed of cast iron so that cyanide solutions can be fed to the unit instead of water if desired. The rotating water valve is timed to admit water only on the plunger up-stroke and is located on the end of the eccentric shaft. The eccentric shaft is mounted in a ball-bearing double-pillow-block type bearing. An adjustable eccentric is used for varying the movement of the rubber diaphragm. The upper trash screen consists of a four mesh woven-wire cloth. Two lower wedge-bar screens are furnished with each jig; one with 2-millimeter openings and the other with 5-millimeter openings.

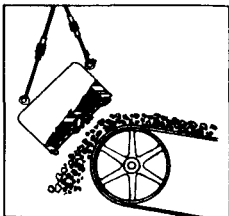
When the jig is used on continuous tests, a steel stand is recommended for mounting the jig. The steel stand is arranged with a shelf for holding a glass jar which accumulates the jig concentrate as it discharges from the hutch and which facilitates the inspection of the type of jig product while the test is being conducted.

Machine Size	Capacity Pounds Per Hr.	Steel Stand	Dimensions			Motor H.P.	Shipping Wt. Lbs.	
			L	W	H		Belt	Motor
4"x6"	150-500	With	18"	26"	46"	1/4	290	315
4"x6"	150-500	Without	18"	23"	24"	1/4	175	200



24" x 36" DENVER DUPLEX ACID-RESISTING MINERAL JIG

MAGNET, (Suspended Type)



(Suspended Type) Magnet Removing Foreign Magnetic Material

SOME type of magnetic unit is always advisable and should be a standard piece of equipment in every mill. When one (Suspended Type) Magnet is located just ahead of the primary jaw crusher, and another is placed before the intermediate crusher, all danger of damage to the crushers from tramp iron is eliminated. The tramp iron usually consists of stray bits from drills, hammerheads, and other tools which can seriously damage crushing equipment.

The suspended type of magnet has its place where space is not the deciding factor. The suspension of the magnet above the ore conveyor preceding the jaw crusher allows it to be swung aside when replacing conveyor belt or working on the conveyor pulley; and also for periodical removal of adhering tramp iron to maintain maximum efficiency. The suspension principle makes this a low cost unit.

Care should be used in the selection of this type of magnet as the width of the conveyor belt, the proper depth of the ore being conveyed, and the average percentage of foreign material to be eliminated, determine the size of magnet used. The magnets are made in circular or rectangular types and may be suspended on either a trolley or crane, or on the stationary suspension principle.

Let us make recommendations for the correct size and type of this low cost magnet best suited to your needs.

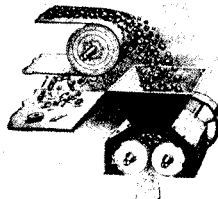
MAGNET. Denver Alnico Horseshoe

THE Denver Alnico Horseshoe Magnet is a small, extremely powerful, hand magnet. It is an alloy of aluminum, nickel, and cobalt, very high in retentivity, and many times stronger than the ordinary horseshoe magnet. It is extremely resistant to demagnetization and is affected only slightly by shock or temperatures as high as 1200° F. This magnet provides an invaluable tool for the assayer, mineralogist, and plant operator. Minerals that are even moderately magnetic may be separated from non-magnetic material with this magnet and it is small and light enough to carry about in your pocket.



Denver Alnico Horseshoe Magnet

MAGNETIC PULLEY



High Intensity Magnetic Pulley Showing Method of Separating Foreign Magnetic Materials from Feed to Crushing Rolls

THE high intensity Magnetic Pulley is one of the most satisfactory and economical magnets in use today. It is a sure way of getting a practically iron-free product. The low cost of current consumption, positive operation, low maintenance, and moderate initial cost, all have a definite place in planning or improving every efficient milling, processing, or industrial plant.

The greatest asset of the Magnetic Pulley is the ability of this compact, efficient unit to attract and hold the tramp

material to the surface of the drum until it is away from the material being conveyed. The weight of the iron brings it to the bottom of the conveyed material and it is thus in an ideal position to be attracted to the Magnetic Pulley more quickly. The tramp material is then disposed of when the revolving drum or cylinder reaches the "demagnetized field or dead spot" on the under side of the drum and the iron is allowed to drop into a bin provided for this purpose.

No one type of Magnetic Pulley will be adaptable to every need, although there is a Magnetic Pulley for every specific application. The design used for collecting tramp iron is entirely different from that used for purification or concentration purposes. The construction of the Magnetic Pulley is such as to allow the maximum flux density to be obtained. Each section is a separate magnet (having a separate casting) with its own coil, core, and north and south poles. The Magnetic Pulley is cool operating which prolongs the life of the pulley and is necessary in order that the unit maintain its most efficient operation.

The Magnetic Pulley is used as a head pulley of a conveyor and very often the shaft of the Magnetic Pulley can be made to correspond with the shaft of the original pulley. It is necessary then only to place the Magnetic Pulley shaft into the existing bearings.

The collector ring housing is attached to any suitable bracket. The contact rings are in place on the shaft. The switch cabinet is completely wired, and the connection between it and the contact brushes is accomplished quickly.

Magnetic Pulleys operate on direct current only. They are wound for either 110 or 220 volts, although higher voltage can be used when specified. Alternating current is not suitable, and when direct current is not available, a generator, motor-generator set, or a rectifier is installed to convert the alternating current to direct current. However, these generator sets are of small size because of the nominal current requirements of the pulley.

A large range of sizes, both in diameter and width, is available and there is a capacity to suit every individual requirement. Pulley width required is determined by the width of the conveyor belt used and the diameter of a Mag-

Size	Dimensions			Approximate Shipping Weight Pounds
	Height	Width	Thickness	
Small	1 3/8"	1 1/2"	3/4"	1/2
Large	2 1/4"	1 3/4"	1/2"	3/4

netic Pulley determines its strength; the larger the diameter the greater the strength. Data necessary for recommendations is kind of material to be treated, size of material, amount to be handled per hour, whether wet or dry, purpose of separation, and characteristics of available current supply.

*Pulley Diam. Inches	Belt Width Inches	Capacity Cu. Ft. Per Hour	Overall Shaft Length Inches	Watts—Direct Current	Approx. Shipping Weight Pounds
12	12	790	41 1/4	400	370
12	14	925	43 1/4	400	415
12	16	1050	45 1/4	480	460
12	18	1190	47 1/4	480	525
12	20	1320	48 3/4	500	560
12	24	1580	54 1/4	750	665
12	30	1980	62 3/4	950	850
12	36	2380	69 1/4	1000	1020
12	42	2780	76 3/4	1250	1280
12	48	3080	83 1/4	1500	1500
15	12	1230	41 1/4	600	525
15	14	1440	43 1/4	600	620
15	16	1650	46 1/4	670	800
15	18	1850	49 1/4	670	860
15	20	2070	52 3/4	700	910
15	24	2470	60 1/4	1000	1250
15	30	3000	65 3/4	1350	1500
15	36	3700	72 1/4	1400	1650
15	42	4330	82 1/2	1750	1950
15	48	4950	89	2000	2400
18	12	1610	43 1/4	850	800
18	14	1880	45 1/4	850	850
18	16	2150	49 1/4	900	1000
18	18	2300	51 1/4	950	1070
18	20	2680	54 1/4	950	1130
18	24	3220	60 1/4	1000	1350
18	30	4030	66 3/4	1400	1640
18	36	4820	76 1/2	1750	2000
18	42	5630	82 1/2	2000	2360
18	48	6450	92	2500	2870

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*Pulley Diam. Inches	Belt Width Inches	Capacity Cu. Ft. Per Hour	Overall Shaft Length Inches	Watts—Direct Current	Approx. Shipping Weight Pounds
20	16	2480	50 3/4	1100	1150
20	18	2660	52 3/4	1150	1350
20	20	3100	56 1/4	1150	1500
20	24	3720	63	1200	1690
20	30	4650	70 1/2	1700	2210
20	36	5560	78 1/2	2100	2420
20	42	6520	86	2400	2990
20	48	7450	94 1/2	2750	3470

*The Magnetic Pulley may also be obtained in diameter sizes of 24", 30", and 48" with a belt width varying from 18" up to and including 60" in width. We suggest that our engineers be consulted with regard to the larger sizes.

MAGNETIC SEPARATOR, Dings-Crockett (Wet Type)

THE Dings-Crockett High Intensity (Wet Type) Submerged Belt Magnetic Separator is designed for wet separations. It has found wide application in the concentration of magnetite, ilmenite, and other materials of similar magnetic susceptibility where it gives an amazingly clean-cut separation of tailings, middlings, and concentrates. Its magnetic efficiency is well above 99%.



Dings-Crockett High Intensity (Wet Type) Magnetic Separator

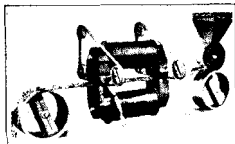
The separator will efficiently handle large capacities of unsized ore from minus 1/4" down to the finest dust. Control of the separator is simple, steady, and not critical. Feed rates may be varied over a wide range and practically the same results obtained.

The unit consists of a stationary curved bank of twenty magnets, partly submerged in water, under which passes a thin conveyor belt. Magnet pole pieces are therefore kept in close contact with belt.

Magnet Width	Belt Width	*Capacity Tons Ore Per Hour	Water Req'd G.P.M.	Dimensions			Watts D.C.	Motor H.P.
				L	W	H		
12"	18"	4 to 18	15 to 45	166"	53"	104"	1200	2 & 3
24"	30"	9 to 38	30 to 75	166"	65"	104"	2400	3
36"	42"	14 to 55	45 to 110	166"	77"	104"	3600	5
48"	54"	20 to 80	60 to 150	166"	89"	104"	4800	5 & 7 1/2

*Capacity figures vary greatly with size of material being handled and concentration ratio.

MAGNETIC SEPARATOR, Dings Rowand-Wetherill (Cross Belt Type)



Dings Rowand-Wetherill (Cross Belt Type) Magnetic Separator

THE Dings Rowand-Wetherill Magnetic Separator handles many materials which cannot be handled satisfactorily by any other type of magnetic separator. Even the finest material can be readily separated with highest efficiency.

The material to be treated (which must be absolutely dry) flows from the hopper onto the feed roller which

spreads it in a thin, uniform layer over the whole width of the conveyor belt as it travels toward the poles of the magnet system. As the material passes between the poles of the first magnet the magnetic particles are strongly attracted toward the upper pole and jump toward it. They are intercepted by the cross belt which removes them quickly from the influence of the magnets and allows them to drop into a receptacle provided at one side. The use of a series of magnets of different strengths permits the separation from one another of materials having different magnetic permeabilities, as well as the separation of magnetic materials. The separate removal of the strongest as well as the weakest magnetic mineral is possible.

The capacity of any magnetic separator depends on so many variables that it is impossible to estimate the exact tonnage until a test has been made and all necessary data received. Let us engineer your proposed installation.

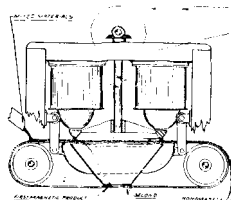
Machine Size No.	Number Poles	Width Belt	Ampere Turns Per Magnet			
			First Magnet	Second Magnet	Third Magnet	Fourth Magnet
E No. 1X	2	6"	30,000			
E No. 1E	2	12"	20,000			
E No. 1F	2	12"	40,000			
E No. 1G	2	12"	75,000			
E No. 2E	4	12"	20,000	40,000		
E No. 2F	4	12"	20,000	75,000		
E No. 2G	4	12"	40,000	75,000		
E No. 3A	6	12"	20,000	40,000	75,000	
E No. 1A	2	18"	30,000			
E No. 1B	2	18"	60,000			
E No. 1C	2	18"	100,000			
E No. 2A	4	18"	30,000	60,000		
E No. 2B	4	18"	30,000	100,000		
E No. 2C	4	18"	6,000	100,000		
E No. 3C	6	18"	30,000	60,000	100,000	
E No. 4C	8	18"	20,000	30,000	60,000	100,000

(Continued on next page)

MAGNETIC SEPARATOR (Continued from previous page)

Machine Size No.	Total Watts	Approximate Dimensions			Motor H.P.	Approx. Shipping Wt., Lbs.
		L	W	H		
E No. 1X	550	73"	2'8"	5'6"	¼	3,500
E No. 1E	800	10'4"	4'0"	5'6"	1	10,000
E No. 1F	1300	10'6"	4'0"	5'6"	1	11,000
E No. 1G	1900	11'3"	4'0"	5'6"	1	12,000
E No. 2E	2100	15'6"	4'0"	5'6"	1½	18,000
E No. 2F	2700	16'3"	4'0"	5'6"	1½	19,000
E No. 2G	3200	16'6"	4'0"	5'6"	1½	20,000
E No. 3A	4000	15'6"	4'0"	5'6"	2	24,000
E No. 1A	1200	10'6"	4'6"	5'6"	1½	14,000
E No. 1B	1600	11'3"	4'6"	5'6"	1½	15,000
E No. 1C	3200	12'0"	4'6"	5'6"	1½	16,000
E No. 2A	2800	16'0"	4'6"	5'6"	2	25,000
E No. 2B	4400	16'9"	4'6"	5'6"	2	26,000
E No. 2C	4800	17'6"	4'6"	5'6"	2	27,000
E No. 3C	6000	22'2"	4'6"	5'6"	3	33,000
E No. 4C	7000	26'8"	4'6"	5'6"	3	35,000

MAGNETIC SEPARATOR, Stearns (Ring Type)



Operation of Stearns (Ring Type) Magnetic Separator

THE Stearns (Ring Type) Magnetic Separator differs materially from the cross belt type machine. A steel take-off ring is employed in place of a cross belt to intercept and carry the magnetic material beyond the conveyor belt to final delivery. It has been found in certain applications that the steel take-off ring actually improves the separation. The ring has a broad flat surface adjacent to the magnetic pole to receive and

carry the flux built up by the magnet. The sides are shaped to form a parabolic curve ending in a defined peak where the concentrated field is produced. The magnetic material is attracted from the feed belt to the inductively magnetized moving ring, which forms a part of the magnet pole, while in the field. In moving away from the field the ring carries the magnetic particles beyond the conveyor belt, effecting an automatic discharge as it approaches the zero point between the plus and minus poles.

The magnetic gap on this unit can be opened or closed within fixed limits by a simple and very convenient adjustment. Adjustments are usually made while the machine is operating. This applies not only to the magnetic air gap, but also to the flux density of the magnetic field, as the power or attractive force of the magnet is regulated by a rheostat which controls the amount of current used. Such adjustments will accommodate a wide range of sizings and variable magnetic permeability of materials.

Capacities of magnetic separator units vary widely as their most efficient operation depends upon a large number of factors. It is therefore impossible to estimate the exact tonnage that can be handled without complete data and preliminary tests. Let us engineer your installation.

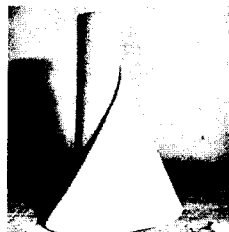
Machine Size No.	Number Poles	Width Belt	Ampere Turns Per Magnet			
			First Magnet	Second Magnet	Third Magnet	Fourth Magnet
D No. 0	2	2 1/2"	28,000			
D No. 1B	2	5"	58,000			
D No. 1AB	4	6"	30,000	58,000		
D No. 2B	2	12"	40,000			
D No. 2D	2	12"	92,000			
D No. 2AB	4	12"	24,000	40,000		
D No. 2AD	4	12"	24,000	92,000		
D No. 2BD	4	12"	40,000	92,000		
D No. 2ABC	6	12"	24,000	40,000	76,000	
D No. 2ABCD	8	12"	24,000	40,000	76,000	92,000
D No. 3B	2	18"	68,000			
D No. 3D	2	18"	14,000			
D No. 3AC	4	18"	30,000	116,000		
D No. 3BC	4	18"	68,000	116,000		
D No. 3ABC	6	18"	30,000	68,000	116,000	
D No. 3ABCD	8	18"	30,000	68,000	116,000	140,000

Machine Size No.	Total Watts	Approximate Dimensions			Approx. Shipping Wt., Lbs.
		L	W	H	
D No. 0	440	2'9"	1'5"	2'6"	450
D No. 1B	1540	7'4"	3'0"	5'6"	2100
D No. 1AB	1980	11'10"	3'0"	5'6"	3800
D No. 2B	1210	8'10"	3'6"	7'4"	7100
D No. 2D	2640	8'10"	3'6"	7'4"	8850
D No. 2AB	1950	14'0"	3'6"	7'4"	11800
D No. 2AD	3300	14'0"	3'6"	7'4"	13800
D No. 2BD	3850	14'0"	3'6"	7'4"	14700
D No. 2ABC	3850	19'2"	3'6"	7'4"	19600
D No. 2ABCD	6480	24'4"	3'6"	7'4"	26500
D No. 3B	1870	10'8"	4'0"	7'10"	12600
D No. 3D	4400	10'8"	4'0"	7'10"	14300
D No. 3AC	4510	16'5"	4'0"	7'10"	23500
D No. 3BC	5390	16'5"	4'0"	7'10"	24400
D No. 3ABC	6380	22'2"	4'0"	7'10"	33600
D No. 3ABCD	10780	27'11"	4'0"	7'10"	46500

A Denver Mineral Jig or Denver "Sub-A" Unit Flotation Cell In Your Grinding Circuit Will Recover Mineral As Soon As Free.

Complete Milling Equipment From Testing . . . To Feeder . . . To Dryer.

MATTING, Denver Rubber and Corduroy



Denver Rubber Matting

DENVER Rubber Matting, as shown in illustration at left, is used in placer and mill operations, replacing blankets for recovering coarse and fine gold. The innumerable small recesses catch and retain the values, particularly in the fine sizes. Denver Rubber Matting is very easily washed, a fact which simplifies its clean-up. It is so tough that its life is many times that of ordinary blankets. Full rolls are 24 inches wide by 50 feet long; weight of full rolls is only 100

lbs., for ease in handling, but any length is available. This Denver Rubber Matting can be furnished on a continuous belt concentrator similar to a vanner, with water sprays for the removal of the concentrates. This unit is built two feet wide and can be furnished in any length required to meet specifications for a particular operation.

DENVER Corduroy Matting is made up of strongly ribbed fabric material. It is widely used by the mining industry for gold recovery in sluices, launders, and on tables. Both a wide rib, best suited for placer under-currents, and a narrow rib, designed for ground ore treatment, can be obtained in a width of 36" and in any lengths desired. The weight is approximately one pound per yard of length.

Denver Ore Tests are made on an "actual cost" basis. This brings the world's finest laboratory equipment and skilled technicians to your service at a very low cost.

Your comments and suggestions are always welcome. Please write to us.

We have often been referred to as the "Diagnosticians of the ore dressing industry." Perhaps we can help you with your mineral recovery problems. Please let us try.



Denver Mercury Flasks

MERCURY for use with amalgam plates and barrels, ball mills, clean-up pans, etc., can be furnished at the prevailing market price. Specially designed metal containers can be supplied in a number of convenient sizes. These metal containers avoid spillage and breakage and can be easily transported. Large flasks contain 75 pounds and smaller sizes, 5, 10, or 25 pounds of mercury.

MILLS, Denver Amalgamation and Concentration

FREE milling gold and silver ores are efficiently and economically treated in Denver Amalgamation Mills. These mills are often used in the early stages of development of free milling gold properties to recover the main portion of the gold with a simple, inexpensive flowsheet. Later a more comprehensive installation can recover the remaining mineral. These mills are also used to bulk sample ore bodies



Denver Amalgamation and Gravity Concentration Mill

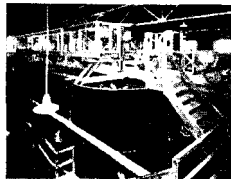
having erratic mineral occurrences and exploit properties with limited ore reserves at greatest possible profit and with a minimum of risk.

The basic machine in Denver Amalgamation and Concentration Mills is the Denver Selective Mineral Jig, used in conjunction with the Denver Amalgamation Unit. The balance of the equipment includes a jaw crusher, ball mill, rotary classifier, and corduroy

blankets or a concentrating table. Mills can be operated by diesel-electric generator sets using individually driven units, giving greatest possible flexibility, or transmission equipment can be supplied for driving from a single source of power.

More complete information can be obtained by writing any Denver Equipment Company office.

Mill design and Flowsheet design are also services of Denver Equipment Co. Write for details how these services might help you.



Denver Cyanide Mill Installation

DENVER Cyanide Mills are designed to treat a particular ore deposit to give the highest economic return; due consideration being given to location, tonnage involved, and capital available. Each ore body to be treated presents an individual problem due to these various factors.

Various combinations of treatment methods are utilized to best advantage. Flotation

and amalgamation provide valuable auxiliary treatment. Frequently flotation is used to provide a small high-grade concentrate that is cyanided in a compact concentrate treatment plant.

Denver Equipment Company is well known for its ability to furnish the right machine for the job, irrespective of the flowsheet. Our testing laboratory will be glad to cooperate with you either on your present mill problems or on your proposed new mill.

More complete information can be obtained by writing any Denver Equipment Company office.

MILLS, Denver Engineering Service



Successfully Operating Large Tungsten Mill Engineered and Built by Denver Equipment Company

DENVER Equipment Company's complete engineering service begins with an accurate and comprehensive ore test, a report of which is sent to you with estimate of profits you may expect from treatment of the ore. After proper method of handling your ore has been determined, our engineers design a mill adapted to your problem, giving complete detailed plans and general

arrangement to enable construction of the mill economically and in the shortest possible time. We also can furnish a competent construction superintendent and a crew skilled in mill building. Their familiarity with our equipment and methods insures speed in installation and lowest costs.

Many factors enter into the arrangements for designing and building a mill; and close, cooperative effort is essential to obtain the maximum value at lowest cost. In addition to information obtained by complete ore tests, certain other basic facts must be known before we can carry out an orderly procedure or plan of design and construction.

More complete information can be obtained by writing any Denver Equipment Company office.

MILLS, Denver Flotation



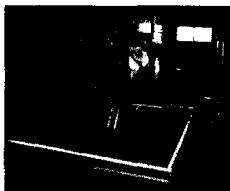
Typical Installation of Denver "Sub-A" Flotation Machines

DENVER Flotation Mills have been designed to meet the present demand for standardized and economical concentrating mills of the highest quality. They are not only designed for the flotation of gold and silver ores, but also can be used to treat many other minerals of economic importance. The Denver Selective Mineral Jig and a Denver Amalgamation Unit can easily be added and are often advisable for maximum recoveries and lowest costs.

The machines used in the general arrangement of these flotation mills include a jaw crusher, ore feeder, ball mill with spiral screen, classifier, unit flotation cell, conditioner, flotation machine, wet and dry reagent feeders, concentrating table, sand pump, and concentrate filter with vacuum equipment.

More complete information can be obtained by writing any Denver Equipment Company office.

MILLS, Denver Portable



Steel Work—Denver Portable Mill

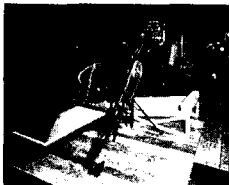


Denver Portable Mill—Motor Drive

A Denver Portable Mill is a complete plant, including motor or belt driven units and complete steel framework for mounting the machines. It is inexpensive because it can be assembled quickly at small labor cost; the mill having been completely erected and the parts labeled before shipment. Standardized design and mass production of these milling plants make them very economical . . . this is particularly true of plants up to 50 tons per day capacity.

Many Denver Portable Mills are being used as pilot plants as they can be quickly erected and if the ore body does not warrant a large tonnage plant the mill can be easily dismantled and moved to another location. Standard flowsheets for flotation, amalgamation and

(Continued on next page)



Denver Portable Mill—Belt Drive

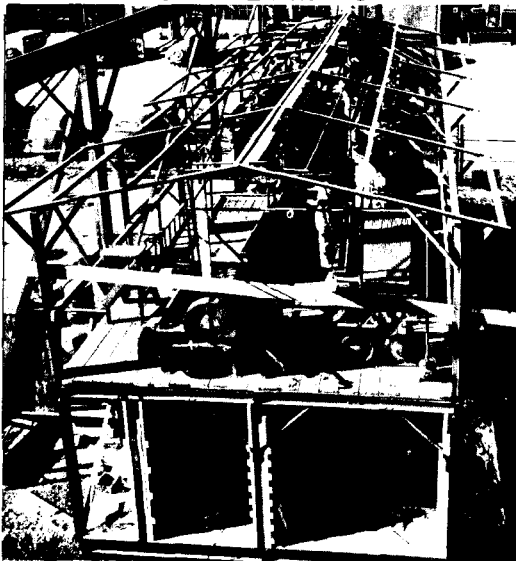
gravity concentration can be supplied without the expense of engineering design. When a larger tonnage plant is warranted, the equipment of these smaller mills can be used in the flowsheet.

Only machines which have proved successful in plant operation have been included in these mills. They are built in sizes ranging from 5 to 100 tons per day and can be supplied

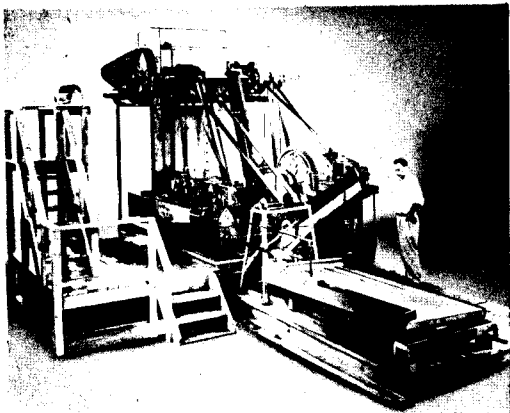
without steel framework if desired.

More complete information can be obtained by writing any Denver Equipment Company office.

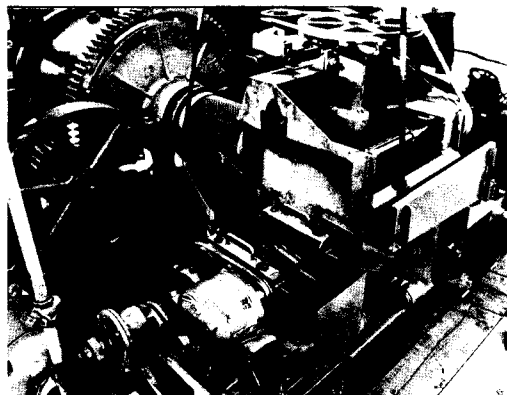
A FEW EXAMPLES OF DENVER PORTABLE MILLS



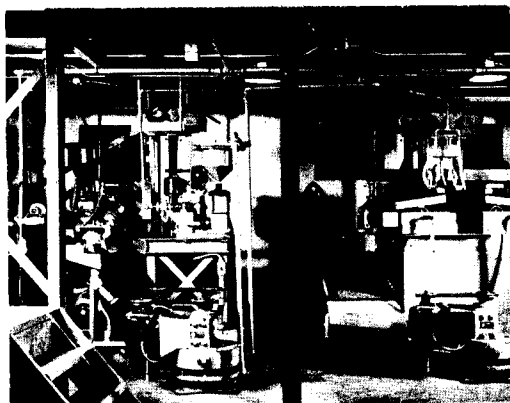
Denver Portable Mill is completely assembled prior to shipment from factory. Pieces are match-marked to simplify erection of mill at destination. This mill was supplied complete with structural steel members, flooring, roofing, electrical wiring; piping, motors, drives and equipment. One source of supply eliminated endless delays at destination.



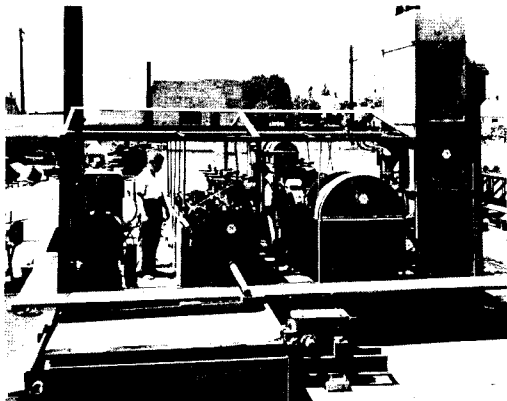
Small Denver Portable Flotation and Gravity Mill. Mills similar to these Denver Portable Mills can be supplied with or without structural steel framework.



Grinding circuit of Denver Portable Mill. Denver Unit Flotation Cell and Denver Mineral Jig are in closed circuit with Denver Ball Mill and Denver Classifier. This compact unit is mounted on steel frame work, can be dis-assembled and shipped to other locations thus giving greater value to equipment investment.



Portable Denver Laboratory and Continuous Pilot Test Plant. This completely equipped laboratory was installed in trailer-type building. Portable mills and laboratories can be designed to your specifications.



Small Denver Portable Mill is assembled and tested at factory. Power plant is at left, ore bin, crusher and ball mill are at right. Compact unit is ideal for exploration or for working limited deposits.

MILLS, Denver Portable Truck

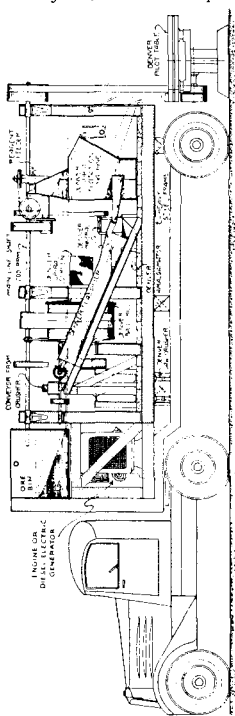
THE Denver Portable Truck Mill has a capacity of approximately five to nine tons per day, and consists of the following

Denver Machines: plunger ore feeder, jaw crusher, belt conveyor, ball mill, spiral screen, selective mineral jig, amalgamation clean-up pan with riffled launder, flotation cells, pilot table, and middling return pump. A diesel-electric generator unit for individually driven machines or necessary transmission equipment and engine for lineshaft drive is also provided.

The Denver Portable Truck Mill is ideal for concentrating gold and many other ores. Any part of the flowsheet can be used or omitted, according to the treatment desired, due to the machines being arranged on the truck to give maximum flexibility. The use of only standard equipment in the flowsheet allows the operator to try a number of different methods to obtain the best results. These units can be added to if increased tonnage is desired.

The entire unit is self-contained with all machines assembled on a heavy steel frame. Due to being mounted on a trailer or semi-trailer truck, as illustrated at the left, this portable mill can be moved quickly from one location to another. The mill can also be removed from the trailer or truck and mounted on a fixed foundation.

Additional data gladly furnished upon request.



Denver Portable Truck Mill Mounted on Semi-Trailer Truck Showing General Arrangement of Units—Various Arrangements are used According to Treatment Methods to be Incorporated

Use Denver Ore Tests to verify or improve your present flowsheet.

What can we do to help you?

MINERALIGHT



Three Models of Mineralight Lamps



Model V-42 Mineralight Lamp

MINERALIGHT was developed to fill the need for a simple method of identifying those substances which respond or "fluoresce" when subjected to ultraviolet light. In the field of mineralogy, some 200 minerals are known to have this property of fluorescence. Early day prospectors, while searching for gold, discarded valuable minerals, such as scheelite; being unable to recognize them by ordinary field methods. The modern prospector does not pass by these opportunities, since he uses the easily portable, compact Mineralight.

Besides the application in mining, this lamp is also used extensively in ore dressing and mineralogical laboratories; ore sorting; the "fluorochemistry" field; investigating various petroleum, organic, and inorganic chemical products; biological materials; the dye industry; and in criminological work.

The Mineralight is available in nineteen different models.

(Continued on next page)

Recover Your Mineral As Soon As Free.

Recover Your Mineral As Soon And As Coarse As Possible.

Denver Equipment Company publishes **DECO TREFOIL**, an exchange of helpful engineering information designed to improve milling. DECO TREFOIL is published every other month. If you are connected with mining and do not receive DECO TREFOIL please write to us.



Model M-13 Mineralsight is Light and Compact—Ideal for Close Examination of Known Deposits and Prospecting

It is equipped for 110 volt alternating current, 60 volt battery operation, or a combination of both. The intensity of the lamp depends on the amount of quartz tubing placed in the lamp. The standard lamp is furnished with a set of identified fluorescent minerals and operating instructions. Auxiliary equipment such as will-merite screens for mercury detection, standardized scheelite battery, etc., is also available.

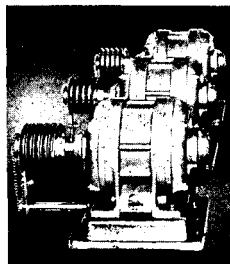
analyzer card, carrying case, Please consult us for further information and recommendations.

Model No.	Quartz Tube Type	89 8 ⁰⁰ / ₁₆ Angstrom Units	*Voltage A. C. Power Source	Lamp Extension Cord Length	Approx. Shipping Wt., Lbs.
V-41	6-Bar	2540	110	52'	5
Q-31	4-Bar	2540	110	52'	3 $\frac{1}{4}$
M-11	2-Bar	2540	110	Combined Unit	2 $\frac{1}{4}$
T-21	2-Bar	2540	110	52'	3 $\frac{1}{4}$
R-51	6-Bar	2540	110	48'	8
**S-61	9-Ft. Tubing	2540	110	As Ordered	21

*Other models of units shown available for 6 to 12 volt wet cell or dry cell battery operation—also transformers supplied so unit may use either 110 volt alternating current or battery power.

**Industrial unit ideal for ore sorting on picking belt.

MOTORS, Fractional H.P. and General Purpose



Motors with Vari-Pitch Sheaves

IN the modern electric motor installation the individual motor drive has practically replaced all other types. It is comparatively easy to obtain the required speed through the use of motors directly connected to the driven machine, through speed reducers, or the now more economical geared motors, or even through V-belt or chain or sprocket drive. The use of drivers of this type has resulted in greater efficiency, lower operating and maintenance costs, and easier accessibility than was the case with the formerly

widely used lineshaft drive and its associated inconvenience.

Motors have continued to be reduced in size and overall dimensions, while horsepower output has increased over the past few years until the individual electric motor drive has practically replaced all flat belt drives in new installations. Its use has proved of great value to mill operators due to the flexibility of circuits using machines that are self-contained units.

The individual motor drive has also found rapid acceptance due to its adaptability to almost every type of driving problem. Electric motors have been developed to withstand the most severe operating conditions and meet exacting requirements. Let us make recommendations for motor type, size, and drive for most economical and efficient service and best suited to your particular problem.

FRACTIONAL HORSEPOWER MOTORS A.C. OR D.C.

H.P. 40°C Rise	Speed Full Load R.P.M.	A. C. Split Phase		A. C. Capacitor		Direct Current		1 A. C. 3 Phase	
		Frame	Wt.	Frame	Wt.	Frame	Wt.	Frame	Wt.
1/20	1725	23	10	—	—	260	11	—	—
1/6	1725	45	24	45	24	42	24	43	22
1/6	1200	47*	28	47	28	44	28	45	24
1/4	1725	45	24	47	28	44	28	43	22
1/2	1725	—	—	63	46	66	50	63	46
3/4	1725	—	—	73	58	74	66	73	58

*On 50 cycle frame becomes No. 49 and weight is 35 lbs.
†All A.C. motor speeds in R.P.M. under full load are for 60 cycle. These motors are not for use on 50 cycle without modification.
‡These motors are dual 60/50 cycle and 50 cycle speeds become 5/6 of those shown.

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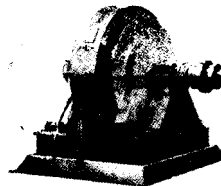
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Our desire is to make you "Happier, Healthier and Wealthier."

What can we do to help you?

GENERAL PURPOSE MOTORS
Constant Speed—Two and Three Phase 60 Cycle
(Squirrel Cage Rotors)

MOTORS, Synchronous



Splash-Proof Synchronous Motor

SYNCHRONOUS Electric Motors are available in many sizes from 20 horsepower to several thousand horsepower and in speeds from 80 R.P.M. to 3600 R.P.M.

The characteristics are usually built into them as required for the specific application and can be constant, synchronous, starting, pull-in, and pull-out torques.

The applications usually consist of: power factor correction, or improving power factor, and for constant-speed as well as low-speed direct drives on heavy equipment such as ball mills, large crushers, and similar machines requiring high horsepower and low R.P.M.

They should be carefully applied to the load when used as prime movers as difficult starting may result if not specifically designed to start under heavy loads. Let us make recommendations for your proposed installation.

Frame No.	*H.P. 40° C Rise	R.P.M. Sync.	R.P.M. Full Load	Volts	Pulley Diameter & Face Inches	Approx. Shipping Weight Pounds
203	¾	1200	1140	110-208-220-440-550	3x3	67
224	¾	900	850	"	4x3½	92
225	¾	720	685	"	4x3½	105
203	1	1800	1720	"	3x3	67
204	1	1200	1145	"	3x3	74
225	1	900	850	"	4x3½	105
254	1	720	685	"	4½x4½	141
204	1½	1800	1730	"	3x3	74
224	1½	1200	1135	"	4x3½	92
224	1½	900	860	"	4x3½	92
254	1½	720	685	"	4½x4½	141
224	2	1800	1735	"	4x3½	92
225	2	1400	1140	"	4x3½	105
254	2	900	860	"	4½x4½	141
284	2	720	685	"	5x4½	192
225	3	1800	1725	"	4x3½	105
254	3	1200	1145	"	4½x4½	141
284	3	900	860	"	5x4½	192
324	3	720	685	"	6x5½	256
254	5	1800	1735	"	4½x4½	141
284	5	1200	1150	"	5x4½	192
324	5	900	865	"	6x5½	256
326	5	720	685	"	8x6½	288
284	7½	1800	1735	"	5x4½	192
324	7½	1200	1160	"	6x5½	256
326	7½	900	865	"	8x6½	288
364	7½	720	700	208-220-440-550	9x7¾	435
324	10	1800	1740	110 208-200-440-550	6x5½	256
326	10	1200	1160	"	8x6¾	288
364	10	900	875	208-220-440-550	9x7¾	435
365	10	720	700	"	9x7¾	450
326	15	1800	1745	110-208-220-440-550	8x6¾	288
364	15	1200	1165	208-220-440-550	9x7¾	435
365	15	900	875	"	9x7¾	450
404	15	720	700	"	10x7¾	575
364	20	1800	1760	208-220 440 550	9x7¾	435
365	20	1200	1170	"	9x7¾	450
404	20	900	875	"	10x7¾	575
405	20	720	700	"	10x7¾	640
404	25	1200	1170	"	10x7¾	575
405	25	900	875	"	11x9¾	640
444	25	720	700	"	11x9¾	765
445	25	600	580	"	11x9¾	860
405	30	1200	1170	"	10x7¾	640
444	30	900	875	"	11x9¾	765
445	30	720	700	"	11x9¾	860
504U	30	600	580	"	15x13	1285
444	40	1200	1175	208-220-440-550	11x9¾	765
445	40	900	875	"	11x9¾	860
504U	40	720	700	"	15x13	1285
505	40	600	580	"	14x13	1235
445	50	1200	1175	"	11x9¾	860
504U	50	900	875	"	15x13	1285
505	50	720	700	"	14x13	1235

Two and Three Phase—60 Cycle

Frame No.	H.P. Cont. 40° C Rise	R.P.M.		Volts	Pulley Diameter and Face	Approx. Shipping Wt., Lbs.
		Sync.	Full Load			
404	20	1200	1160	208-220-440-550	10"x8¾"	863
405	20	900	855	208-220-440-550	10"x8¾"	906
445	20	720	690	208-220-440-550	12"x11"	1299
504U	20	600	570	208-220-440-550	15"x13"	1622
405	25	1200	1170	208-220-440-550	10"x8¾"	906
444	25	900	870	208-220-440-550	12"x11"	1165
504U	25	720	685	208-220-440-550	15"x13"	1622
505	25	600	575	208-220-440-550	15"x13"	1766
444	30	1200	1170	208-220-440-550	12"x11"	1165
445	30	900	870	208-220-440-550	12"x11"	1299
505	30	720	690	208-220-440-550	15"x13"	1766
6323	30	600	575	208-220-440-550	18"x17"	1850
445	40	1200	1170	208-220-440-550	12"x11"	1299
504U	40	900	865	208-220-440-550	15"x13"	1622
6323	40	720	680	208-220-440-550	18"x17"	1850
6323	40	600	575	208-220-440-550	18"x17"	1850
504U	50	1200	1160	208-220-440-550	15"x13"	1622
505	50	900	865	208-220-440-550	15"x13"	1766
6323	50	720	685	208-220-440-550	18"x17"	1850
6324	50	600	575	208-220-440-550	18"x17"	2105
505	60	1200	1170	208-220-440-550	15"x13"	1766

*All open type 40° C. general purpose polyphase motors may be operated on 50 cycles at listed voltages, although they will not necessarily meet the standards established for 60 cycle operation, and the temperature rise will not exceed 50° C.

†Synchronous speeds on 50 cycles are 5/6 of those at 60 cycles.

(Continued on next page)

6323	60	900	865	208-220-440-550 2300	18"x17"	1850
6324	60	720	685	208-220-440-550	18"x17"	2105
6333	60	600	575	208-220-440-550 580 2300	18"x17"	3000
6323	75	1200	1165	208-220-440-550 2300	18"x17"	1850
6324	75	900	870	208-220-440-550 2300	18"x17"	2105
6325	75	720	695	208-220-440-550 2300	18"x17"	2360
6333	75	600	575	208-220-440-550 2300	18"x17"	3000
6324	100	1200	1170	208-220-440-550 2300	18"x17"	2105
6325	100	900	875	208-220-440-550	18"x17"	2360
6333	100	720	695	208-220-440-550 2300	18"x17"	3000
6334	100	600	575	208-220-440-550 2300	20"x19"	3110
6335	100	514	495	208-220-440-550 2300	22"x21"	3615
6325S	125	1200	1170	208-220-440-550 2300	18"x17"	2360
6333	125	900	870	208-220-440-550 2300	18"x17"	3000
6334	125	720	700	208-220-440-550 2300	20"x19"	3110
6335	125	600	575	208-220-440-550 2300	22"x21"	3615
564	125	514	500	208-220-440-550 2300	26"x25½"	4560
6333S	150	1200	1170	208-220-440-550 2300	18"x17"	3000
6334	150	900	875	208-220-440-550 2300	20"x19"	3110
6335	150	720	695	208-220-440-550 2300	22"x21"	3615
564	150	600	580	208-220-440-550 2300	26"x25½"	4560
566	150	514	500	208-220-440-550 2300	26"x25½"	5220
6334S	200	1200	1170	208-220-440-550 2300	20"x19"	3110
6335	200	900	880	208-220-440-550 2300	22"x21"	3615
564	200	720	700	208-220-440-550 2300	26"x25½"	4560
566	200	720	705	208-220-440-550 2300	25"x25½"	5220
566	200	600	585	208-220-440-550 2300	26"x25½"	5220
566	200	514	500	208-220-440-550 2300	26"x25½"	6000

PAN, Denver Batea Hand Gold



Denver Batea Hand Gold Pan

THE Denver Batea Hand Gold Pan, patterned after the Latin America Batea, is so simple to operate that anyone can easily use it to recover gold without previous experience.

The Denver Batea Gold Pan is both a gravel washing and concentrating device. It is shallow, disk shaped, and has a turned up rim which catches and holds the gold and black sands, making it very difficult to lose the values while washing. The small depression in the center is useful in finally separating the gold and black sands, and gold concentrates can be easily removed through the hole in the rim. Operating instructions are furnished with each Denver Batea Hand Gold Pan. The diameter of this pan is 19½", weight 4 lbs.

PAN, Denver Hand Gold



Standard Denver Hand Gold Pan

THE Denver Hand Gold Pan is used in testing gold deposits and can be furnished in either the all steel Standard Denver Hand Gold Pan or the Copper-Bottomed Denver Hand Gold Pan. The latter is made of steel with a copper bottom and, whenever such use is desirable, forms an excellent amalgamating unit when properly coated with mercury.

These pans are made in a standard diameter of 16" and weigh 2 pounds. However, various diameters can be supplied on special orders.

PAN, Denver Mechanical Concentrating



Denver Mechanical Concentrating Pan Showing Sizing and Concentrating Stages

DENVER Mechanical Concentrating Pan, although primarily developed for the recovery of placer gold, is proving equally successful for treating mine dumps, old mill tailings, and values from low grade sluice operations. The Denver Mechanical Concentrating Pan has also proved valuable as an amalgamator in free milling gold plants.

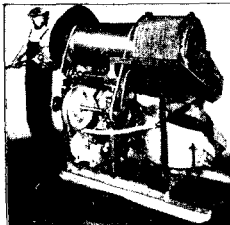
The phenomenal success of this unit is based upon the fact that it duplicates the hand

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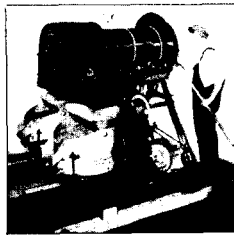


Simplex Denver Mechanical Concentrating Pan

the feed is again sized, until only the fine material and the water pass to the concentrating stages below. There are usually three concentrating pans placed one on top of the other. The top pan contains a plate of heavy copper coated with mercury to amalgamate free gold. From this first pan the overflow enters the second concentrating pan, which is made of steel, with Denver Rubber Matting in the bottom, over which is placed a 1" screen to hold the matting in



Simplex Denver Mechanical Concentrating Pan with Trommel Screen



Duplex Denver Mechanical Concentrating Pan with Trommel Screen

panning motion in a smooth but positive oscillation which settles the free mineral. The amalgam plate and rubber matting catch and hold both the fine and coarse values.

Denver Mechanical Concentrating Pan duplicates panning motion by using a steel yoke and saddle connected to an enclosed, rotating, ball bearing eccentric. Material is fed into the hopper on the upper screen (a punched steel plate) which allows 1/4" material to pass through. On the second screen only the fine material and the place. This screen also acts as a riffle to whirl the material and settle the gold.

The third or bottom pan is assembled the same as the second and is used to ensure complete recovery of the remaining values or any floured mercury. All pans are constructed so that either the copper amalgam plate or rubber matting can be installed to suit conditions. The Denver Mechanical Concentrating Pan is a self-contained machine, being equipped with a gasoline engine, V-belt drive, water pump and suction hose with a foot valve. All units are mounted on a welded, structural steel base and provided with skids for mobility.

This unit, as a duplex machine, consists of two separate Denver Mechanical Concentrating Pans driven by the same power unit. The distinct advantage of the duplex unit is that one set of pans can be cleaned up while the other set is still in operation. This is a valuable feature when using the unit as an amalgamator in circuit with a stamp battery.

Experience has proved that the Denver Mechanical Concentrating Pan operates successfully under most conditions. However, operators have requested a machine with a trommel washing screen for gravels containing clay and sticky material. Trommel screen attachments can be supplied for both simplex and duplex units.

An outstanding recommendation for the Denver Mechanical Concentrating Pan is that this unit has more than six hundred users all over the world. Many of these installations are repeat orders.

More complete information can be obtained by writing any Denver Equipment Company office.

Machine Size	Capacity Bank Run Yards Per Hour	Dimensions			H.P. Gas. Engine	Approx. Shipping Wt., Lbs.
		L	W	H		
24 Simplex	1 1/2-2	53"	32"	31"	3/4	675
24 Simplex	1 1/2-2	53"	35"	31"	*1 1/2	715
24 Duplex	3-4	53"	64"	31"	1 1/2	1100
24 Duplex	3-4	53"	64"	31"	*3	1230
24 Simplex Trommel	2-3	65"	42"	60"	3-*6	1500
24 Duplex Trommel	4-6	65"	64"	60"	4-*8	2200

*Above 7,200 feet altitude, this higher horsepower engine should be used.
NOTE: Denver Mechanical Concentrating Pans equipped with electric motor drives available for use wherever applicable.

PAN, Denver Vanning Plaque



Denver Vanning Plaque Pan

THE Denver Vanning Plaque Pan was originally designed by Professor Richards and has found wide acceptance throughout the mining industry for panning small amounts of fine material. The surface is white, with baked enamel finish. This pan is an extremely useful item to have about your mill for studying the various mill products in

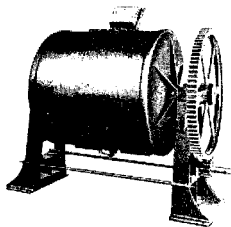
order to observe mesh at which minerals are freed, amount of sliming, efficiency of operation of various units, and other factors which may be approximately determined by visual examination. Shipping weight is one pound.

ORDERS

Delivery is normally an important item in selecting equipment. Delivery estimates, based on conditions existing at the time quotations are made, are subject to adjustment at the time your order is received.

(Continued on next page)

PEBBLE MILL, Abbe



Abbe Pebble Mill, Style GPS

THE Abbe Pebble Mill is particularly adapted to pulverizing or mixing either dry or wet materials.

This unit is of the batch or intermittent type. The cylinder is approximately half filled with flint pebbles, porcelain balls, or metal balls; the material is put into the cylinder; a tight cover is fastened securely, to seal the mill hermetically; and the cylinder is then revolved until the fineness required is obtained. After that

the tight cover is replaced by a grate discharge cover and the cylinder is revolved until the material is discharged, the grate retaining the pebbles or balls. For dry grinding it is customary to enclose the cylinder to prevent the spread of undesirable dust and also to preserve all of sample to insure accuracy of testing procedures.

In wet grinding, the same directions are followed except there is no casing required; and instead of replacing the tight cover with a grate cover, a special wet discharge cover, or the Abbe patented discharge valve, is used for emptying the mill.

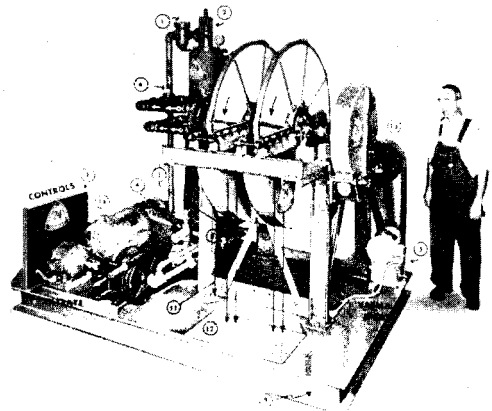
In requesting recommendations for jar or pebble mills, please state: (1) Material to be reduced. (2) Size at which it will be fed to the mill. (3) To what mesh it is desired to grind to produce the finished product. (4) Capacity (lbs. or gals.) desired per hour. (5) Whether material is to be ground wet or dry.

*Mill Size	Cylinder Inside Diam.	Grinding Charge		Cyl. Vol. Without Pebbles Gals.	Pebbles Required Lbs.	Speed R.P.M.
		Sand Lbs	Gallons Net			
0	7'6"	9200	1680	2800	17000	10-16
1C	6'0"	5800	1065	1775	11000	12-18
1B	6'0"	4650	846	1410	8300	12-18
1A	6'0"	3400	621	1035	6100	12-18
1	6'0"	2800	510	850	5000	12-18
2B	5'0"	2300	420	700	4200	16-24
2	5'0"	1500	272	453	2600	16-24
3C	4'6"	1525	275	457	2700	22-26
3A	4'6"	1200	216	360	2100	22-26
4A	3'9"	800	144	240	1400	26-30
5A	3'0"	500	95	152	850	30-34
6A	2'6"	275	50	82	470	35-40
7	2'6"	175	31	52	260	35-40
8 1/2 B	2'0"	150	24	40	230	38-42
8	1'6"	60	10	17	100	40-48

(Continued on next page)

*Mill Size	Overall Dimensions			Pulley Size		Motor H. P.		Approx. Shipping Weight Lbs.
	L	W	H	Diam. Face	Dry	Wet		
0	21'	8'6"	10'6"	48" 12"	40	20	40000	
1C	18'	7'6"	9'6"	40" 12"	30	15	31000	
1B	16'	7'	9'6"	36" 12"	20	10	27000	
1A	14'	7'	9'6"	30" 10"	16	8	23000	
1	13'	7'	9'6"	30" 10"	14	7	21000	
2B	12'6"	6'	7'6"	28" 10"	12	6	17500	
2	10'6"	6'	7'6"	28" 8"	8	4	14600	
3C	11'	5'6"	6'9"	24" 8"	9	4 1/2	10000	
3A	10'	5'6"	6'9"	24" 6"	7	3 1/2	9000	
4A	8'	4'9"	6'2"	45" 6"	6	3	6285	
5A	7'6"	3'10"	5'0"	36" 6"	4	2	4800	
6A	5'9"	3'4"	4'9"	24" 4"	2	1	2290	
7	4'9"	3'4"	4'9"	24" 4"	1 1/2	3/4	1925	
8 1/2 B	3'9"	2'9"	3'6"	22" 3"	1	1/2	1400	
8	3'6"	2'3"	3'3"	18" 3"	1/2	3/4	850	

*Sizes No. 0 to No. 3, inclusive, have gear reduction. Sizes No. 4 to No. 9, inclusive, have pulleys mounted on cylinder shafts, but we supply gear drive if desired. These mills are also built motor driven.



Denver "Packaged" Filter Unit
Uses Wet Vacuum Pump

PLACER UNIT, Denver Portable

WELL-KNOWN throughout the world for finest mill equipment, Denver Equipment Company nevertheless is very active in the development and construction of placer machines of various types and sizes to meet every need.

(Continued on next page)



Denver Portable Placer Unit Mounted On Pneumatic Tires

A prime essential for making money in a placer is high yardage, and equipment to handle it must be put to work as soon as preliminary testing indicates that the extent and value of the ground warrants such an investment.

Innumerable local conditions will govern the design of the plant, and therefore the placer operator will find the facilities and experience of Denver Equipment Company of the greatest benefit in the interpretation of these conditions and the solution of particular

operating problems with which he is confronted. With the rapidly increasing use of the Denver (Selective) Mineral Jig comes a new era in the design of these plants. Due to the proved, efficient action of this machine, a much greater capacity can be obtained from the same size plant (and investment) and the plant can get in more productive operating time because the jig provides an entirely continuous operation without stops for cleanups. Furthermore, the jig makes a higher recovery by saving fine material which previously was not recoverable.

Illustrated above is such a plant mounted on pneumatic tires for dry land operation, although flanged wheels for rail transport or steel drums for timber runways can be used instead where this may be desirable. The operation is as follows:

Gravel or sand excavated by tractor shovel, drag-line or scraper bucket from the placer deposit is discharged to the top of the grizzly. Oversize rocks and pebbles roll off the grizzly to the ground.

Undersize material, 2, 3, or 4 inch diameter, falls through the grizzly to a hopper under the grizzly. Under the hopper is a feeder equipped with a heavy rubber belt and having an adjustable stroke which delivers the gravel to the revolving scrubber-screen.

Wash water is delivered to the feed end of the revolving scrubber-screen and also to outside of revolving screen.

Oversize material from the revolving screen falls to a portable rubber belt conveyor stacker which elevates it to the tops of the tailing piles.

The undersized gravel, falling through the openings of the revolving screen, flows to the Denver (Selective) Mineral Jig which recovers coarse and fine gold particles, together with the black sand particles, in the hutches in the form of a clean, high grade concentrate.

The tailing from the jig flows to a riffled sluice which serves to recover any gold which may have escaped because of surges or irregularity in the feed to the Denver (Selective) Mineral Jig.

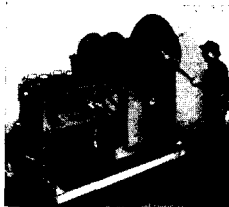
Since the grizzly, feeder, revolving scrubber-screen, Denver (Selective) Mineral Jig, gasoline engine, and transmission equipment are supported on a structural steel frame; the portable plant may be moved forward to be within reach of the excavator digging bucket as the excavator proceeds.

However, since the unit illustrated was designed for one particular set of conditions, it may not be the answer to your problem. Let Denver Equipment Company design and build your placer plant to suit your specific requirements and thus ensure highest economic return.

More complete information can be obtained by writing any Denver Equipment Company office.

PLACER UNIT, Denver Trommel-Jig

DENVER Trommel-Jig Placer Unit is driven by a gasoline engine or electric motor which also drives a centrifugal water pump, furnishing water for washing in the trommel as well as for use in the operation of the Denver (Selective) Mineral Jig. A rubber suction hose, reinforced with steel wire coils which are imbedded in the walls of the hose, and a foot valve, are furnished.



Denver Trommel-Jig Placer Unit With Duplex Denver (Selective) Mineral Jig

The entire unit is mounted on a steel base with steel sides for easy transportation from place to place, and the trommel and jig are supported on a structural steel frame which carries necessary shafting and belting, making the unit completely self-contained.

In operations where the Denver Trommel-Jig Placer Unit is used for the recovery of gold from gravels, the black sand values which are concentrated in the jig hutch can often be reground and amal-

gamated with minimum effort and at lowest cost by means of the Denver Amalgamation Unit. This unit, when followed by the Denver Amalgam Separator, makes possible the efficient production of an amalgam ready for retorting to bullion.

In many placer deposits the values are associated with clay or cementing materials and with masses of black sand. In order to secure concentration of the mineral particles, both coarse and fine, it is necessary to thoroughly disintegrate and wash the gravel. The material to be treated is shoveled or dumped into the large feed hopper and then is fed regularly into the washing and disintegration section of the rotating trommel. This disintegrating chamber is equipped with spiral lifting blades which elevate and mix the gravel several times during a revolution. Water is added at the feed end of the machine and the action secured by the lifting blades breaks up the lumps of cemented or clayey materials so that the desired minerals are freed and separated.

(Continued on next page)

The material then passes on to the screened section of the trommel for the removal of the washed large particles from the undersize. This screening section includes an inner screen made of steel plate having rectangular openings. Surrounding this heavy perforated plate is an outer replaceable screen of 3, 4, or 6 mesh steel wire screen, depending upon the character of the material being treated. The washing action is continued in this screening section so that the oversize material is discarded at the end, thoroughly washed and free from any adhering valuable particles. This is particularly important in placer operation.

The material which goes through the screen is caught in a hopper and passes to the Denver (Selective) Mineral Jig which effects a selective gravity concentration, separating the heavy particles from the light gangue. The Denver (Selective) Mineral Jig is a complete self-contained unit that can be operated with minimum water, requiring only one-half as much water as other types of jigs.

More complete information can be obtained by writing any Denver Equipment Company office.

Size	*Capacity Cu. Yds. Per Hour	Dimensions			Denver Selective Mineral Jig	
		Length	Width	Height	Size	Type
No. 2	1—2	6' 5"	5' 9"	6' 2 1/2"	8"x12"	Simplex
No. 3	2—3	7' 6 1/2"	5' 9"	6' 2 1/2"	8"x12"	Duplex
No. 6	4—6	8' 7 1/2"	5' 9"	7' 5 1/2"	12"x18"	Duplex

*Gravel or sand, bank run.

Size	Water Pump Size	Gasoline Engine H. P.	Approximate Shipping Weight Pounds	
			Domestic	Export.
No. 2	1"	3	2000	2300
No. 3	1"	3	2325	2900
No. 6	1 1/4"	4	2900	3500

Recover Your Mineral As Soon And As Coarse As Possible.

PLANTS, Denver Cyanide Concentrate Treatment

THE notably successful application of flotation to many cyanide ores, and the development of a plant to treat the flotation concentrates by cyanidation, makes it possible for small plants to increase their recovery greatly and to make

(Continued on next page)



Installation of Denver (Patented) Super-Agitator And Conditioners in Canadian Concentrate Treatment Plant

a much wider margin of profit. These concentrate treatment plants do not require large outlays of money and they are low in operating cost. The elimination of handling, freight, miscellaneous shipping charges, and smelter treatment charges, is possible through reducing the gold to bullion at the mill. This assures the operator maximum return.

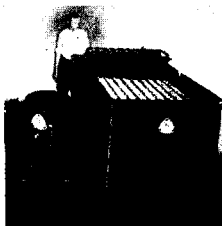
These plants have been made possible through the development of the Denver (Patented) Super-Agitator

And Conditioner which successfully breaks down the froth formed by the reagents in the flotation concentrates. These agitators also speed up extraction time and are most efficient in aerating pulps. The flowsheet is simple, utilizing a ball mill-classifier circuit for regrinding concentrates, a series of Denver (Patented) Super-Agitator And Conditioners, a clarifier, zinc dust feeder, a precipitation agitator, a precipitation tank, a storage bin, and a furnace. The number and size of units will, of course, depend upon capacity desired.

There are three standard plants available: 2 to 3 tons, 5 to 7 tons, and 7 to 10 tons per day, although equipment for any size plant can be supplied. Upon receipt of the necessary information, an estimate can be furnished on a treatment plant which will meet your requirements. Some ores require roasting in the Denver (Edwards Type) Roaster and others may be treated in combination with amalgamation most economically.

More complete information can be obtained by writing any Denver Equipment Company office.

PRECIPITATION EQUIPMENT, Denver Cyanide



Denver Zinc Dust Mixing Cone With Pump for Circulation of Solution—Denver Clarifier Shown at Right

DENVER Cyanide Precipitation Equipment is designed to meet the demands of cyanide plants for a low cost, efficient method of precipitating gold and silver from a cyanide solution. Metallurgical results obtained with this equipment have proved highly satisfactory and usually compare favorably with results obtained with more complicated processes although the machines are simple and inexpensive.

Equipment includes a pregnant solution tank, clarifier,

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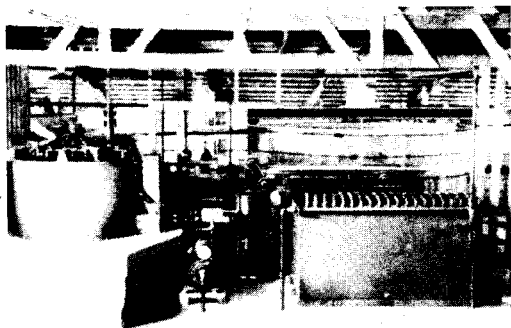
Denver Precipitation Unit Showing Precipitate Filtering Bags

solution pump, zinc dust feeder and mixing cone, a precipitation agitator where required, a second solution pump, precipitation unit, (including precipitate filtering bags), and a barren solution storage tank. Highest quality materials are used in the fabrication of each unit which assures continuous, trouble-free, and lowest cost operation of any size plant.

Denver Cyanide Precipitation Equipment will provide plants to handle from 25 to 600 tons of solution per day. Complete plants for precipitating larger quantities of solution

can be worked out according to the value and type of ore to be cyanided and the tonnage to be handled. Laboratory testing is the most accurate and reliable method of determining these factors before the necessary investment is made and a commercial plant installed.

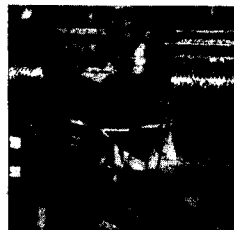
Let our engineers make recommendations as to the type and size of equipment you need for your plant, or design and install a plant suited to your individual requirements.



DENVER CYANIDE PRECIPITATION PLANT WITH DENVER SIDE BULK AGITATORS IN THE BACKGROUND

Use Denver Equipment—Standard the World Over. "No Yearly Models But Constant Improvement."

PRESS, Denver Precipitation



Typical Installation of Denver Precipitation Presses

THE Denver Precipitation Press is available in various sizes; the number of plates and frames used depending upon the amount of precipitate to be filtered and the characteristics of the solution.

In the operation of this unit the pulp suspension is mixed with the precipitant and then pumped into the inlet of the filter press. The solution then flows into the triangular frames which are alternated with the plates. Plates have sides covered with a filter media and may be either recessed or flush, with either pyramid, corrugated, or other surface giving optimum drainage of barren solution and providing proper amount of support for filter media. Frames and plates are held tightly together by a heavy power screw and, with filter media between, a gasket-like joint is formed which prevents leakage. Precipitation takes place and pressure forces the solution through the filter cloth, the precipitate being left inside the frames. The barren solution emerges from the filter press through drain cocks or outlets in the plates. Periodically, plates and frames are removed from the filter press, cleaned, and precipitates refined for marketing as bullion.

*Size of Press	Width	Height	No. Frames	2' Cake			3' Cake		
				Length	Tons Solution 24 Hrs.	Approx. Ship. Wt., Lbs.	Length	Tons Solution 24 Hrs.	Approx. Ship. Wt., Lbs.
36"	4' 0"	4' 0"	10	9' 6"	200	4720	11' 8"	150	5100
			15	10' 10"	300	5910	12' 4"	225	6550
			20	12' 2"	400	7100	14' 0"	300	7950
			25	13' 6"	500	8950	15' 8"	375	9450
			30	14' 10"	600	9580	17' 4"	450	10900
52"	5' 6"	5' 4"	10	11' 2"	400	6110	11' 10"	300	6640
			15	12' 5"	600	9160	13' 7"	450	9950
			20	13' 8"	800	12210	15' 4"	600	13250
			25	14' 11"	1000	15250	17' 1"	750	16560
			30	16' 2"	1200	18320	18' 10"	900	19890

*For other sizes interpolate by adding or subtracting width of 2 frames.

Please Give Us the Opportunity to quote prices and delivery on standard equipment to meet your needs.

PUMP, DIAPHRAGM, Denver Adjustable Stroke 2", 3" and 4"

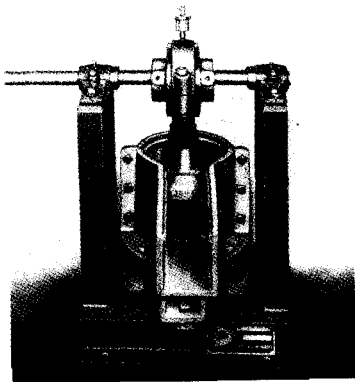


Denver Adjustable Stroke
Diaphragm Pump

SIMPLICITY and ease of discharge regulation—while in operation—is one of the many distinctive features of the Denver Adjustable Stroke Diaphragm Pump. This is accomplished by means of a conveniently located hand-wheel which operates a heavy rod, moving the pivot end of the connecting rod closer to the fulcrum point of the walking beam, or farther away, to increase or decrease the stroke. Maximum diaphragm life is assured by the vertical motion of the rod operating the diaphragm, resulting in the elimination of excessive flexing and wear. Also, the diaphragm is always wet on both sides;

preventing drying and resultant cracking. Valves are rubber faced and valve seats are rubber covered. The discharge bowl may be set at any one of four quadrants. Single or double discharge bowls are available as desired. All valve parts can be replaced without dismantling the pump.

(Continued on next page)



Denver Diaphragm Pump Acid-Proof Construction

Denver Adjustable Stroke Diaphragm Pump is designed for convenient mounting on thickeners and hydroclassifiers, and when mounted on a Denver Thickener may be driven from the thickener mechanism. Arrangement of mounting is such as to place all parts so that an abrasive material cannot attack wearing surfaces. This insures longest possible life of wearing parts.

The Denver Adjustable Stroke Diaphragm Pump is available in 2", 3", and 4" sizes and in simplex, duplex, triplex and quadruplex types to give a wide range of capacities for the pumping of dense pulps, dewatered concentrates, tailings, cyanide pulps, and all sludges and slurries. As a filtrate pump, it ensures positive, trouble-free removal of solution from filtrate receivers at lowest cost per unit of capacity in filtering operations.

Cast steel, cast iron, and structural steel members make up the rugged mechanism and rigid framework, while bronze bearings are used at the critical points.

More complete information can be obtained by writing any Denver Equipment Company office.

Pump Size	Type	*Capacity—Tons Solids/24 Hours (Specific Gravity Solids 1.4)			*Capacity—Tons Solids/24 Hours (Specific Gravity Solids 2.7)			*Capacity—Tons Solids/24 Hours (Specific Gravity Solids 4.2)		
		Solids in Pulp			Solids in Pulp			Solids in Pulp		
		33%	50%	60%	33%	50%	60%	33%	50%	60%
2"	Simplex	38	53	54	45	65	69	48	72	80
2"	Duplex	76	106	108	90	130	138	96	144	160
2"	Triplex	114	159	162	135	195	197	144	216	240
2"	Quadruplex	142	212	216	170	260	276	192	288	320
3"	Simplex	74	102	106	87	125	137	94	139	159
3"	Duplex	148	204	212	174	250	274	188	278	318
3"	Triplex	222	306	318	261	375	411	282	417	477
3"	Quadruplex	296	408	424	348	500	548	376	556	636
4"	Simplex	94	124	133	111	153	172	120	169	199
4"	Duplex	188	248	266	222	306	344	240	338	398
4"	Triplex	282	372	399	333	459	516	360	507	597
4"	Quadruplex	376	496	532	444	612	688	480	576	796
Cu. Ft. Pulp Per Ton Dry Solids.		91.0	54.0	43.5	77.5	43.8	33.6	71.5	39.4	29.0
Pulp Specific Gravity		99.0	27.4	26.4	25.4	22.0	20.0	23.8	19.8	17.4
Pulp		1.1	1.17	1.21	1.26	1.46	1.60	1.34	1.62	1.84

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Denver Ore Tests are made on an "actual cost" basis. This brings the world's finest laboratory equipment and skilled technicians to your service at a very low cost.

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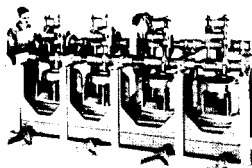
Pump Size	Type	Normal Speed R.P.M.	Normal Range Stroke	*Capacity—Cubic Feet Per Minute—Maximum Stroke —Normal Speed			
				Water	Solids in Pulp		
					33%	50%	60%
2"	Simplex	40	1½" to 1½"	2.34	2.40	1.98	1.62
2"	Duplex	40	1½" to 1½"	4.68	4.80	3.96	3.24
2"	Triplex	40	1½" to 1½"	7.03	7.20	5.94	4.92
2"	Quadruplex	40	1½" to 1½"	9.37	9.60	7.92	6.48
3"	Simplex	40	3/8" to 2 3/8"	4.52	4.66	3.82	3.20
3"	Duplex	40	3/8" to 2 3/8"	9.04	9.32	7.64	6.40
3"	Triplex	40	3/8" to 2 3/8"	13.56	13.98	11.46	9.60
3"	Quadruplex	40	3/8" to 2 3/8"	16.78	18.64	14.28	12.80
4"	Simplex	40	5/8" to 2 3/8"	5.48	5.96	4.64	4.01
4"	Duplex	40	5/8" to 2 3/8"	10.85	11.92	9.28	8.02
4"	Triplex	40	5/8" to 2 3/8"	16.48	16.88	13.92	12.03
4"	Quadruplex	40	5/8" to 2 3/8"	21.62	21.84	18.56	16.04

*Specific gravity of fluid in pulp is taken as 1.00 and 40 R.P.M. is speed used. However, pump may be operated from 25 to 60 R.P.M.

Pump Size	Type	Dimensions			Motor H. P.	Approx. Ship. Wt. Lbs.	
		L	W	H		Belt	Motor
2"	Duplex	4'10"	2'2"	4'4"	1-2	1210	1480
2"	Triplex	5'9"	2'2"	4'5"	2-3	1700	1970
2"	Quadruplex	8'8"	2'2"	4'5"	3-5	2200	2530
3" or 4"	Simplex	3'7"	2'10"	5'4"	1½-2	1215	1465
3" or 4"	Duplex	5'4"	2'10"	5'4"	2-3	1700	1970
3" or 4"	Triplex	6'9"	2'11"	5'6"	3-5	2150	2480
3" or 4"	Quadruplex	8'8"	3'3"	5'9"	5-7½	3020	3500

PUMP, DIAPHRAGM, Denver Adjustable Stroke 5" and 6"

THE 5" and 6" Denver Adjustable Stroke Diaphragm Pump has the same distinctive features as the 2", 3" and 4" sizes, plus exceptionally high capacity. One 6" Denver Adjustable Stroke Diaphragm Pump has a capacity equal to that of four 4" pumps. Pump capacity can be varied one hundred percent while the pump is running by means of a conveniently located handwheel.



6" Triplex Denver Adjustable Stroke Diaphragm Pump

Mechanical advantages are: (1) Valve can be removed without stopping the pump; (2) Bowl can be set to discharge in any of four quadrants; (3) Vertical diaphragm motion prolongs life of diaphragm; (4) Bronze bushed

hinge points and heavy main bearings; (5) Drive through cut tooth gears to the eccentric shaft; (6) Frame of heavy welded steel construction; (7) Alemite fittings for pressure lubrication insure minimum repair and operating costs.

Pump is available in 5" and 6" sizes and in simplex, duplex, triplex, and quadruplex types to give capacities ranging from 400 to over 3,000 tons of solids per 24 hours.

Pump Size	Type	**Capacity—Tons Solids Per 24 Hours (Specific Gravity Solids 1.4)		
		Solids in Pulp		
		33%	50%	60%
5"	Simplex	300	406	418
5"	Duplex	600	812	836
5"	Triplex	900	1218	1254
5"	Quadruplex	1200	1624	1672
6"	Simplex	386	518	525
6"	Duplex	772	1036	1050
6"	Triplex	1158	1554	1575
6"	Quadruplex	1544	2072	2100
Cu. Ft. Pulp Per Ton Dry Solids		91.0	54.0	43.5
Cu. Ft. Per Ton Pulp		29.0	27.4	26.4
Specific Gravity Pulp		1.10	1.17	1.21

Pump Size	Type	**Capacity—Tons Solids Per 24 Hours (Sp. Gravity Solids 2.7)			**Capacity—Tons Solids Per 24 Hours (Sp. Gravity Solids 4.2)		
		Solids in Pulp			Solids in Pulp		
		33%	50%	60%	33%	50%	60%
5"	Simplex	354	500	540	383	551	625
5"	Duplex	708	1000	1080	766	1102	1250
5"	Triplex	1062	1500	1620	1149	1653	1875
5"	Quadruplex	1416	2000	2160	1532	2204	2500
6"	Simplex	453	636	675	492	710	785
6"	Duplex	906	1272	1350	984	1420	1570
6"	Triplex	1359	1908	2025	1476	2130	2355
6"	Quadruplex	1812	2544	2700	1968	2840	3140
Cu. Ft. Pulp Per Ton Dry Solids		77.5	43.8	33.6	71.5	39.4	29.0
Cu. Ft. Per Ton Pulp		25.4	22.0	20.0	23.8	19.8	17.4
Specific Gravity Pulp		1.3	1.5	1.6	1.3	1.6	1.8

Pump Size	Type	Normal *Speed R.P.M.	Normal Range Stroke	**Capacity—Cubic Feet Per Minute—Maximum Stroke —Normal Speed			
				Water	Solids in Pulp		
					33%	50%	60%
5"	Simplex	40	1½"-3"	18.0	19.0	15.2	12.6
5"	Duplex	40	1½"-3"	36.0	38.0	30.4	25.2
5"	Triplex	40	1½"-3"	54.0	57.0	45.6	37.8
5"	Quadruplex	40	1½"-3"	72.0	76.0	60.8	50.4
6"	Simplex	40	2" - 4"	23.0	24.4	19.4	15.8
6"	Duplex	40	2" - 4"	46.0	48.8	38.8	31.6
6"	Triplex	40	2" - 4"	69.0	73.2	58.2	47.4
6"	Quadruplex	40	2" - 4"	92.0	97.6	77.6	63.2

*Minimum speed 20 R.P.M., normal speed 40 R.P.M., and maximum speed 50 R.P.M.

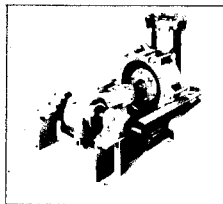
**For computing capacities shown, specific gravity of liquid in pulp was taken as 1.00 and normal operating speed of 40 R.P.M. was used.

(Continued on next page)

DIAPHRAGM PUMP (Continued from previous page)

Pump Size	Type	Dimensions			Motor H. P.	Approx. Ship. Wt., Lbs.	
		L	W	H		Belt	Motor
5"	Simplex	3'6"	4'2"	5'4"	2	2400	2580
5"	Duplex	5'5"	4'2"	5'4"	5	4030	4260
5"	Triplex	8'3"	4'2"	5'4"	7 1/2	5775	6240
5"	Quadruplex	10'9"	4'2"	5'4"	10	7520	8035
6"	Simplex	3'6"	4'2"	5'4"	3	2400	2630
6"	Duplex	5'5"	4'2"	5'4"	7 1/2	4195	4460
6"	Triplex	8'3"	4'2"	5'4"	10	5775	6290
6"	Quadruplex	10'9"	4'2"	5'4"	15	7520	8250

PUMP, DIAPHRAGM, Denver Suction-Pressure



4" Denver Suction-Pressure Diaphragm Pump

DENVER Suction - Pressure Diaphragm Pump is the solution to pumping problems which involve the handling of all types of pulps and slurries, particularly where elevating material to a point higher than is possible with an open discharge diaphragm pump.

Pumping against a discharge head up to 20 feet is possible with this unit. It is also an ideal filtrate pump for discharging the solution from a filtrate receiver in the vacuum circuit of a filter system where the vacuum is not greater

than 15 inches of mercury. The fine solids that are often present in filtrates will seriously damage an ordinary centrifugal solution pump, but are handled without trouble by the Denver Suction-Pressure Diaphragm Pump due to its outstanding design features and adaptability.

Carefully engineered throughout, this pump is simple in design and operation. The 3/4" size has a single heavy rubber diaphragm and is available in the simplex type only. The 1 1/4", 2", and 4" sizes have two heavy, molded rubber diaphragms, and are available in simplex, duplex, triplex, and quadruplex types. Thus, almost any range of capacities desired can be obtained by varying size and type.

The vertical flow pulp through the pump and the vertical position of the diaphragms make it impossible for air, which would decrease the pump's efficiency, to collect in pockets. Also, when a diaphragm wears out or breaks, there is no spray or splash of pulp outside the pump as in ordinary suction-pressure pumps. This is important in preventing injury to operators when pumping caustic pulps.

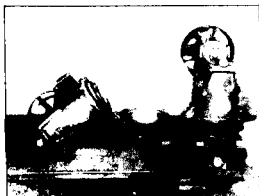
Variation in stroke on all sizes is made possible by means of an adjustable eccentric, and on the 1 1/4", 2", and 4" sizes the capacity may be further regulated by admitting air during the suction stroke—through a small needle valve—this having the effect of varying the suction and therefore allowing finer capacity adjustments.

Both belt driven and motor driven units are available. All sizes are equipped with replaceable rubber valve seats. Valves and valve seats are readily accessible from the side opposite the diaphragm, without disturbing the diaphragm, by simply unbolting the pump's removable side plate. Ball valves are standard on the 3/4" size and tapered valves with replaceable rubber wearing faces are standard on the larger sizes.

More complete information can be obtained by writing any Denver Equipment Company office.

(Continued on next page)

PUMP, DIAPHRAGM, Denver Lowhead



Two Denver Lowhead Diaphragm Pumps—Pump at Left is in Open Position and Other Pump is Ready for Operation

DENVER Lowhead Diaphragm Pump is an inexpensive, reliable unit for pumping thick pulps, concentrates, sludges, and slurries; it is ideal for pumping thickener underflow.

The lowhead design requires a minimum of headroom and construction is so that replacement of diaphragm and inspection of parts is simple. The entire upper casting, as shown in the illustration, hinges backward, bringing the diaphragm and rubber faced

valves into easy accessibility. The pumping stroke may be quickly adjusted from 1/2" to 2 1/2" by revolving the eccentric. Available in simplex and duplex types.

More complete information can be obtained by writing any Denver Equipment Company office.

*Pump Size	**Capacity Tons Per 24 Hours	Speed R.P.M.	Dimensions			Motor H.P.	Approx. Ship Wt., Lbs.	
			L	W	H		Belt	Motor
1" Simplex	59	50-60	32"	25"	28"	3/4	300	525
1" Duplex	118	50-60	32"	43"	28"	1 1/2	690	860
3" Simplex	146	50-60	38"	30 1/2"	35"	1 1/2	430	710
3" Duplex	292	50-60	38"	53"	35"	3	975	1115

*Simplex and duplex pumps with 2" and 4" intake pipes also available—data on 1" pump identical to 2" size and data on 3" identical to 4" size.

**Capacity is with pump operating at 50 R.P.M. and full stroke on a pulp of specific gravity 2.6 and ratio of dilution 1:1.

(Continued from preceding page)

Pump Size	Type	Speed Range R.P.M.	Range Stroke	*Capacity—Maximum Stroke—40 R.P.M.	
				Cu. Ft. Per Min.	Gallons Per Min.
3/4"	Simplex	40-60	0" to 1"	0.31	2.3
1 1/4"	Simplex	40-60	0" to 1 1/2"	0.67	5.0
1 1/4"	Duplex	40-60	0" to 1 1/2"	1.34	10.0
1 1/4"	Triplex	40-60	0" to 1 1/2"	2.10	15.0
1 1/4"	Quadruplex	40-60	0" to 1 1/2"	2.70	20.0
2"	Simplex	40-60	0" to 1 3/4"	2.40	18.0
2"	Duplex	40-60	0" to 1 3/4"	4.80	36.0
2"	Triplex	40-60	0" to 1 3/4"	7.20	54.0
2"	Quadruplex	40-60	0" to 1 3/4"	9.60	72.0
4"	Simplex	40-60	0" to 2 1/2"	5.90	44.0
4"	Duplex	40-60	0" to 2 1/2"	11.80	88.0
4"	Triplex	40-60	0" to 2 1/2"	17.70	132.0
4"	Quadruplex	40-60	0" to 2 1/2"	23.60	176.0

Pump Size	*Capacity Tons Solids Per 24 Hours (40 R.P.M.)								
	Solids In Pulp (Specific Gravity Solids 1.4)			Solids In Pulp (Specific Gravity Solids 2.7)			Solids In Pulp (Specific Gravity Solids 4.2)		
	33%	50%	60%	33%	50%	60%	33%	50%	60%
3/4"S	4.5	8.0	10.0	5.2	10.0	13.0	5.4	11.0	15.0
1 1/4"S	11	17	19	16	22	24	18	24	28
1 1/4"D	22	34	38	32	44	48	36	48	56
1 1/4"T	33	51	57	48	66	72	56	72	84
1 1/4"Q	44	68	76	64	88	96	72	96	112
2"S	34	44	47	38	55	64	45	64	72
2"D	68	88	94	76	110	128	90	128	144
2"T	102	132	141	114	165	192	135	192	216
2"Q	136	176	188	152	220	256	180	256	288
4"S	91	123	130	108	149	164	118	161	184
4"D	182	246	260	216	298	328	236	322	368
4"T	273	369	390	324	447	492	354	483	552
4"Q	364	492	520	432	596	656	472	644	736
Cubic Feet Pulp Per Ton Dry Solids									
	91	54.9	44.3	77.5	43.9	33.3	71.5	39.6	29.1
Cubic Feet Per Ton Pulp									
	29	27.4	26.4	25.4	22.0	20.0	23.8	19.8	17.4
Specific Gravity Pulp									
	1.10	1.17	1.21	1.26	1.46	1.61	1.34	1.62	1.84

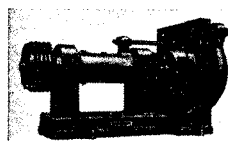
*Capacities shown are for one foot suction head and one foot pressure head. Increase in total dynamic head will decrease capacities shown.

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Your comments and suggestions are always welcome. Please write to us.

Pump Size	Type	Dimensions			Motor H.P.	Approximate Shipping Wt., Lbs.		
		L	W	H		Belt Net	Motor Net	Boxed Net
3/4"	Simplex	1' 1/2"	0' 8 3/4"	0' 10 3/8"	1/4-1/2	45	60	115
1 1/4"	Simplex	1' 8"	1' 6 3/4"	1' 3 3/8"	1/2-1	180	280	355
1 1/4"	Duplex	1' 8"	3' 1 1/4"	1' 3 3/8"	1-2	350	480	600
1 1/4"	Triplex	1' 8"	4' 8 1/2"	1' 3 3/8"	2-3	520	685	860
1 1/4"	Quadruplex	1' 8"	6' 3"	1' 3 3/8"	3-5	690	885	1330
2"	Simplex	2' 4 1/2"	1' 10"	1' 6"	1-1 1/2	360	455	590
2"	Duplex	2' 4 1/2"	3' 2"	1' 6"	2-3	710	860	1050
2"	Triplex	2' 4 1/2"	4' 6"	1' 6"	3-5	1050	1250	1690
2"	Quadruplex	2' 4 1/2"	5' 10"	1' 6"	5-7 1/2	1390	1685	2140
4"	Simplex	2' 10"	2' 3"	2' 1 1/2"	1 1/2-2	800	950	1110
4"	Duplex	2' 10"	3' 11"	2' 1 1/2"	3-5	1580	1770	2270
4"	Triplex	2' 10"	5' 7"	2' 1 1/2"	5-7 1/2	2350	2610	3000
4"	Quadruplex	2' 10"	7' 3"	2' 1 1/2"	7 1/2-10	3150	3410	4000
6"	Simplex	4' 0"	3' 5 1/2"	3' 1"	5-7 1/2	2600	2930	3350
6"	Duplex	4' 0"	6' 4 1/2"	3' 1"	7 1/2-10	5180	5470	6030
6"	Triplex	4' 0"	9' 2 1/2"	3' 1"	10-15	7950	8360	9035
6"	Quadruplex	4' 0"	12' 1 1/2"	3' 1"	15-20	10480	10945	11680

PUMP, SAND, Denver Nor-Sand Centrifugal



Denver Nor-Sand Centrifugal Sand Pump

THE Denver Nor-Sand Centrifugal Sand Pump is an evolution in pump design which overcomes the many difficulties encountered in handling abrasive materials.

An unimpeded flow of pulp to the impeller is assured, as provision has been made to prevent coarse material from settling out by providing the pump with a central inlet on the shaft side of the casing. An extension on the gland projects into the zone of centrifuge within the impeller, thus eliminating back pressure on the packing gland. A very small amount of gland water is required to keep the gland free from grit (as low as 1/2 of 1% of the total volume pumped). As a packing gland is effectively used, the pump develops suction which not only ensures a steady flow of feed but obviates placing the pump at any great depth below its feed pump.

While normally the Denver Nor-Sand Centrifugal Sand Pump will give satisfactory results with an all metal inlet, impeller, and casing; there have been developed a rubber lined inlet and casing which give excellent service under extremely severe conditions. The rubber liner for the casing is so installed that there is no possibility of sand or solution entering between the housing and the liner.

The bearings are protected from liquid or grit by a "mud slinger" mounted on the rotating shaft, and also by a felt oil seal incorporated in the bearing cap. Hand can be changed in field and horizontal, vertical, or direct-connected motor mountings are available.

Additional data gladly furnished upon request.

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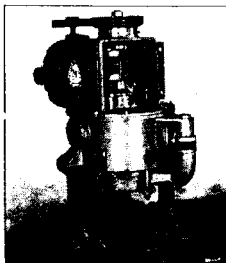
Pump Size	*Cap. Gals. Per Min.	20 Foot Head 30% Solids Pulp (Specific Gravity Solids 2.8)		40 Foot Head 30% Solids Pulp (Specific Gravity Solids 2.8)		60 Foot Head 30% Solids Pulp (Specific Gravity Solids 2.8)	
		Speed R.P.M.	Motor H.P.	Speed R.P.M.	Motor H.P.	Speed R.P.M.	Motor H.P.
		2"x3"	50 150 300	730 970 1470	¾ 5 15	1200 1360	5
3"x3"	50 200 350	640 970 1370	1½ 5 15	1035 1275	5 10.....	...............	...............
3"x4"	100 250 450	600 840 1170	3 5 15	935 1100	7½ 15	1220	15
4"x6"	150 375 750	545 600 775	5 7½ 20	760 810 950	10 15 30	970 1010 1130	20 40 25

*For each 646.8 gallons of pulp pumped (solution having 30% solids by weight, and solids having a specific gravity of 2.8) 1 ton (2000 lbs.) of dry rock will be handled.

Pump Size	Inlet Dia.	Outlet Dia.	Dimensions			Approx. Ship. Wt., Lbs.	
			L	W	H	Belt	*Motor
			2"x3"	3"	2"	42"	25"	24"	815	1455
3"x3"	3"	3"	42"	25"	24"	875	1515
3"x4"	4"	3"	42"	25"	24"	975	1725
4"x6"	6"	4"	56"	28"	30"	1870	2620

*Based on motor suitable for use on pump working against a 20 foot head and handling average capacity of medium density pulp.

PUMP, SAND, Denver Vertical Centrifugal



Denver Vertical Centrifugal Sand Pump

Denver Vertical Centrifugal Sand Pump is designed to handle frothy concentrates or any material that will flow by gravity into the pump bowl.

The distinctive design feature of this pump is that the feed falls into the large pump bowl. Frothy material is broken down. The pulp or solution then falls by gravity into the horizontally rotating impeller. Fluctuations in feed are taken care of by the pump bowl. No feed box is required.

A totally enclosed vertical shaft assembly contains the anti-friction bearings that carry the vertical shaft. The

impeller is securely fastened by one nut, which facilitates quick replacement when necessary. No stuffing box or packing gland is used. Floor space requirement is low, due to

the vertical design, with motor off the floor. Smaller sizes are portable for pilot plant or unit operation. Wearing parts can be easily cleaned when used in processing plants. Alloy parts can be furnished for special conditions. Drive can be by belt or motor and motor drive V-belt or direct connected.

The Denver Vertical Centrifugal Sand Pump is a simple, flexible, pumping unit that has solved many extremely difficult pumping problems. Let us consider your pumping problem and make recommendations for the type, size, and number of pumps to most effectively and economically satisfy your pumping requirements.

Additional data gladly furnished upon request.

Pump Size	Discharge Head—Vertical Lift Plus Friction Head									
	20 Foot		30 Foot		40 Foot		50 Foot		60 Foot	
	Speed RPM	Mtr. H.P.	Speed RPM	Mtr. H.P.	Speed RPM	Mtr. H.P.	Speed RPM	Mtr. H.P.	Speed RPM	Mtr. H.P.
¾"	1975	1½	2385	1	1624	2	.....	.....	.....	.....
1"	1150	¾	1450	1½	1410	3	1570	5	1710	7½
1½"	1015	2	1230	3	1370	7½	1520	7½	1660	10
2"	1000	3	1200	5	1300	10	1150	10	1250	15
3"	825	7½	925	7½	1035	10	930	20	1015	20
4"	690	10	775	15	855	15	.....	.....	.....	.....

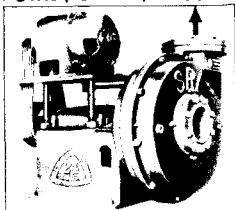
Pump Size	Disch. Line Dia.	In- take Dia.	Capacity Based on 25% Solids By Weight		Dimensions			Approximate Shipping Weight Lbs.		
			Gal. Per Min.	Dry Tons Per 24Hr.	L	W	H	Height Intake Above Base	* Belt Drive	† Mtr. Drive
			¾"	¾"	1½"	15	27	23"	12¾"	22¼"	7½"	220	315
1"	1"	1½"	30	54	27¾"	14¾"	23"	8½"	328	490
1½"	1½"	3"	75	135	35½"	26½"	47½"	13¾"	785	1060
2"	2"	3"	150	270	42"	26½"	47½"	23¾"	870	1235
3"	3"	6"	225	400	65¼"	42"	63¼"	30½"	.....	2300
4"	4"	6"	450	800	69"	42"	63¼"	30½"	.....	2800

*Furnished with vertical flanged pulleys for flat belt—mule drive attachment for round rubber belt or mule-stand for V-belt drive.

†Shipping weights are for largest motor recommended with highest discharge head given in table.

Use Denver Equipment—Standard the World Over. "No Yearly Models But Constant Improvement."

PUMP, SAND, Rubber Lined (Type SRL)



Rubber Lined (Type SRL) Horizontal Sand Pump With Overhead Motor Mounting

THE Rubber Lined (Type SRL) Sand Pump is recognized as standard equipment for handling abrasive pulps in the mining industry. Reports from mill operators emphasize its efficiency, dependability, durability, and economy. Need for standby units has been eliminated. In most cases the power required for the operation of this pump is one-half that required for operation of equivalent all-metal pump and this is an important factor.

The saving in power alone pays for the cost of this pump in from four to twelve months. At the same time the efficiency of this pump is 1½ to 3 times that of other types of sand pumps. Rubber parts give a service life of four to ten times that of the best alloy metal parts obtainable. Many Rubber Lined (Type SRL) Sand Pumps handling mill tailings have not replaced wearing parts in three years. An average life of wearing parts of from one to two years is common and instances of extremely long life of wearing parts are not uncommon.

The rubber covered parts consist of a heavy pressure molded rubber covered impeller and a casing liner. The rubber impeller is an open style for the sizes covered on page 167. The type "C" pumps on pages 168 and 169 have closed type molded rubber impellers.

The rubber covered casing liner is in two pieces, the rubber being molded to metal reinforcing plates which bolt to the pump case.

Antifriction ball bearings are used to carry both the radial and thrust load on the impeller. A water seal bushing is between the stuffing box packing and the pump impeller. The amount of sealing water required is usually less than 1% of pump capacity and is only sufficient to keep the pulp from contacting the exposed surface. A shaft sleeve and mud slinger also provide a maximum of protection for the shaft and bearings.

The pump can be arranged for overhead motor drive using a super-imposed motor base on all sizes, or for a horizontal drive where the motor is mounted on a separate base on all sizes.

More complete information can be obtained by writing any Denver Equipment Company office.

CAPACITIES OF DENVER S.R.L. PUMPS

These capacities are based on water. Multiply listed horsepower ratings by specific gravity of pulp to obtain actual brake horsepower. Increase calculated total dynamic head by 10% to allow for maximum wear of rubber parts.

Pump Size	Capacity U.S. G.P.M.	*Motor H.P. and Pump Speed	HEADS					
			20 Foot	30 Foot	40 Foot	50 Foot	60 Foot	80 Foot
2" x 2"	10	R.P.M. .50 H.P. 800	.70 910	1.0 1050	1.3 1180	1.7 1280	2.2 1490	
	20	R.P.M. .51 H.P. 815	.80 920	1.1 1065	1.5 1190	1.8 1290	2.5 1600	
	30	R.P.M. .53 H.P. 823	.90 930	1.2 1070	1.6 1200	2.0 1300	2.8 1510	
	40	R.P.M. .60 H.P. 830	1.0 910	1.3 1080	1.8 1210	2.2 1310	3.0 1518	
	50	R.P.M. .60 H.P. 838	1.1 950	1.5 1090	2.0 1218	2.3 1320	3.2 1525	
	60	R.P.M. .70 H.P. 845	1.2 965	1.6 1100	2.2 1225	2.5 1330	3.4 1534	
3" x 3"	80	R.P.M. .95 H.P. 745	1.3 908	1.7 1042	2.0 1172	2.9 1350	3.9 1553	
	100	R.P.M. 1.1 H.P. 760	1.5 917	1.9 1053	2.2 1184	3.4 1303	4.3 1453	
	125	R.P.M. 1.3 H.P. 780	1.7 929	2.2 1067	2.5 1200	3.8 1315	4.7 1459	
	150	R.P.M. 1.5 H.P. 800	1.9 943	2.4 1083	2.9 1218	4.2 1331	5.2 1467	
	175	R.P.M. 1.7 H.P. 578	2.1 667	2.7 1100	3.4 1234	4.7 1350	5.7 1475	
	200	R.P.M. 1.8 H.P. 580	3.2 670	3.9 777	5.1 868	6.4 940	6.4 1485	
5" x 5"	225	R.P.M. 1.9 H.P. 582	3.3 675	4.2 782	5.5 873	6.9 944	9.7 1075	
	250	R.P.M. 2.1 H.P. 585	3.4 680	4.5 788	5.9 878	7.4 948	10.3 1079	
	275	R.P.M. 2.2 H.P. 587	3.6 685	4.8 794	6.3 883	7.8 952	10.9 1184	
	300	R.P.M. 2.4 H.P. 590	3.8 690	5.1 800	6.7 889	8.3 956	11.5 1087	
	350	R.P.M. 2.6 H.P. 595	4.2 700	5.7 811	7.4 900	9.2 964	12.7 1095	
	400	R.P.M. 2.8 H.P. 572	4.7 710	6.4 820	8.3 909	10.2 973	14.0 1104	
6" x 6"	450	R.P.M. 3.0 H.P. 577	5.2 726	7.0 822	9.1 918	11.1 982	15.3 1112	
	500	R.P.M. 3.3 H.P. 585	5.9 689	7.8 846	9.9 927	12.1 990	16.6 1122	
	600	R.P.M. 4.1 H.P. 600	6.8 707	9.4 791	12.2 871	14.0 1007	19.2 1142	
	700	R.P.M. 4.9 H.P. 620	7.7 723	10.5 806	13.4 887	16.9 957	23.5 1080	
	800	R.P.M. 5.8 H.P. 644	8.7 740	11.7 821	14.8 903	18.6 971	25.5 1093	
	900	R.P.M. 6.85 H.P. 672	9.8 760	13.0 840	16.5 919	20.5 988	27.5 1107	
1000	R.P.M. H.P.	11.0 782	14.4 862	18.3 937	22.6 1005	30.0 1122		
	R.P.M. H.P.	15.9 886	20.4 957	24.9 1023	32.8 1138			
1200	R.P.M.			22.6 978	27.4 1042	35.6 1156		

*To convert to Imperial gallons, multiply by 0.833.

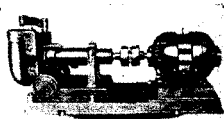
DENVER SRL-C CAPACITIES

These capacities are based on water. Multiply listed horsepower ratings by specific gravity of pulp to obtain actual brake horsepower.

Pump Size	20 Ft. Head		30 Ft. Head		40 Ft. Head		50 Ft. Head		60 Ft. Head		70 Ft. Head		80 Ft. Head		90 Ft. Head		100 Ft. Head		
	RPM	Hp.	R.P.M.	Hp.	R.P.M.	Hp.	R.P.M.	Hp.	R.P.M.	Hp.	R.P.M.	Hp.	R.P.M.	Hp.	R.P.M.	Hp.	R.P.M.	Hp.	
3"	10	730	0.8	860	0.9	1040	1.6	1165	2.2	1270	2.8	1340	3.7	1465	4.3	1545	5.1	5625	5.9
	20	745	0.8	900	0.9	1060	1.7	1175	2.4	1280	3.0	1360	3.9	1470	4.5	1555	5.4	1685	6.2
	30	765	0.8	915	1.0	1065	1.8	1185	2.5	1290	3.2	1375	4.0	1475	4.7	1560	5.6	1640	6.4
	40	760	0.8	925	1.0	1070	1.9	1195	2.6	1300	3.3	1385	4.1	1485	4.9	1570	5.8	1650	6.6
	50	770	0.8	930	1.1	1075	2.0	1200	2.7	1310	3.4	1395	4.3	1485	5.1	1375	6.0	1660	6.8
x	60	780	0.9	940	1.1	1085	2.1	1210	2.8	1315	3.5	1410	4.5	1435	5.3	1585	6.2	1670	7.0
	70	700	0.9	950	1.2	1045	2.2	1215	3.0	1320	3.6	1445	4.6	1500	5.4	1545	6.4	1675	7.2
	80	705	0.9	960	1.4	1100	2.4	1225	3.2	1325	3.8	1420	4.9	1520	5.6	1600	6.6	1685	7.5
	90	810	1.0	970	1.8	1110	2.6	1230	3.4	1330	4.1	1430	5.0	1520	5.7	1610	6.8	1695	7.8
	100	820	1.1	980	2.1	1115	2.8	1235	3.6	1340	4.4	1440	5.4	1530	5.9	1615	6.9	1700	8.0
5"	125	845	1.3	1010	2.2	1130	3.1	1255	4.0	1360	4.8	1460	5.9	1550	6.6	1640	7.6	1720	8.7
	150	870	1.5	1030	2.3	1145	3.2	1275	4.2	1385	5.3	1485	6.4	1580	7.3	1670	8.3	1745	9.6
	175	600	1.7	710	2.8	810	3.3	900	4.4	985	5.4	1055	6.5	1130	7.7	1195	8.9	1258	10.2
	200	605	1.9	715	3.0	815	3.6	905	4.7	990	5.8	1065	6.9	1134	8.1	1200	9.5	1261	10.8
	225	610	2.0	720	3.2	820	3.8	910	5.0	994	6.2	1065	7.3	1137	8.5	1204	10.1	1264	11.3
250	620	2.2	725	3.3	825	4.0	915	5.4	997	6.6	1070	7.8	1140	9.1	1207	10.6	1267	12.0	

4"	275	625	2.4	730	3.4	830	4.4	920	5.7	1000	6.9	1075	8.3	1145	9.7	1212	11.2	1270	12.6
	300	635	2.6	740	3.5	835	4.6	925	6.0	1005	7.3	1080	8.8	1150	10.2	1215	11.8	1275	13.3
	350	655	2.9	755	4.0	850	5.4	940	7.0	1020	8.3	1090	9.8	1160	11.4	1225	12.9	1280	14.0
	400	450	3.4	775	4.7	870	6.1	955	7.7	1035	9.4	1100	10.9	1170	12.5	1235	14.3	1295	16.0
	450	455	3.6	815	5.4	890	6.9	975	8.7	1045	10.1	1120	12.0	1185	13.8	1250	15.6	1310	17.4
x	500	460	3.8	550	5.7	625	8.2	695	9.9	1060	11.2	1135	13.1	1200	15.0	1261	17.1	1320	19.1
	600	470	4.3	565	6.6	635	9.1	700	11.0	765	13.6	820	16.4	870	18.0	920	20.5	970	23.8
	706	485	4.7	575	7.6	645	10.3	710	12.2	770	15.1	825	17.2	880	20.0	930	23.1	975	26.6
	800	500	5.7	585	8.4	655	11.6	720	14.0	780	16.8	835	19.2	890	22.3	935	25.5	980	28.0
	900	400	6.7	475	10.5	670	12.7	735	15.5	790	18.7	845	21.4	900	24.9	945	28.0	985	31.2
10"	1000	405	7.1	480	11.2	545	15.9	605	20.7	805	20.5	855	23.5	910	27.1	955	30.6	995	34.2
	1100	410	7.7	485	12.1	550	16.9	610	22.0	660	27.3	710	32.8	765	30.0	970	33.7	1010	37.3
	1200	415	8.5	490	13.0	555	17.9	615	23.3	665	29.3	715	34.6	770	40.1	785	46.5	825	54.0
	1300	420	9.4	495	14.0	560	19.0	620	24.6	670	30.3	720	36.4	770	42.3	790	48.7	828	56.5
	1400	430	10.0	500	14.8	565	20.0	625	25.7	675	31.8	725	37.8	775	44.5	795	51.0	832	58.5
x	1500	435	10.7	510	15.8	570	21.4	630	27.2	680	33.3	730	39.2	780	46.8	797	53.1	835	60.4
	1600	445	11.2	515	16.6	580	22.5	635	28.5	685	34.8	735	41.0	785	48.5	800	55.5	838	62.5
	1700	455	11.9	520	17.4	585	23.8	640	30.2	690	36.4	740	43.0	790	50.6	804	57.0	840	64.7
	1800	465	12.6	530	18.5	590	24.8	650	31.8	700	38.6	745	45.0	794	52.2	807	59.5	845	66.8
	1900	475	13.4	540	19.8	600	26.4	655	32.5	705	40.2	750	47.0	797	55.0	810	61.8	857	69.8
2000	485	14.0	550	20.9	610	27.8	660	34.4	710	41.2	760	49.1	797	56.3	815	63.8	855	71.5	
2200	570	23.2	625	30.5	675	37.2	725	45.0	770	52.7	802	60.4	825	69.0	860	78.0	870	81.5	
2400					695	41.0	740	49.0	785	57.2	805	65.0	835	73.6	865	81.5			

PUMP, SAND, Wilfley Centrifugal



Direct-Connected Motor Driven
Wilfley Centrifugal Sand Pump

THE Wilfley Centrifugal Sand Pump is used by the mining and other industries throughout the world. Difficult material handling requirements have been satisfactorily met for years by this outstanding centrifugal sand pump.

There are many distinctive features incorporated into this unit such as the well-known centrifugal seal which eliminates the need for the customary stuffing box; slippage seal adjustment; extra heavy wearing parts of rubber or metal, changeable in a few minutes time; and unit construction ball bearing shaft assembly.

Drives can be arranged as either direct-connected, or for flat or V-belt. Motor mountings for V-belt can be made either vertical or horizontal, whichever is most suitable. Overhead motor and V-belt drive is available on all sizes up to and including the 4" size.

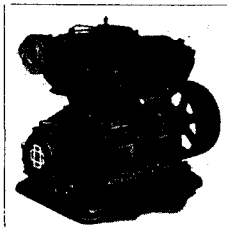
More complete information can be obtained by writing any Denver Equipment Company office.

Pump Size	Recommended Sump Height	Max. Size Particle Handled With Standard Runner	Average Capacity			
			Percent Solids By Weight			
			5%	25%	50%	65%
			G. P. M.	G. P. M.	G. P. M.	G. P. M.
1"	4 1/2"	1 1/4"	35	30	25	20
2"	4 3/8"	1 1/2"	175	140	110	100
3"	4 3/8"	1 1/2"	250	225	190	175
4"	6"	3 1/4"	500	450	350	300
6"	5 3/8"	1"	1000	850	700	600
8"	5 3/8"	1"	2200	1800	1650	1500

Pump Size	Pipe Connections		*Overall Dimensions			Pump Complete With Standard Pulley For Belt Drive	Mounted On Subbase With Coupling For Direct Connection To Electric Motor
	Discharge Diameter	Intake Diameter					
	L	W	H	Approximate Shipping Weight Lbs.	Approximate Shipping Weight Lbs.		
1"	1"	2"	41 1/4"	16 1/2"	19 1/4"	475	690
2"	2"	4"	48"	19 3/4"	22 3/4"	475	1090
3"	3"	5"	48 3/8"	22 3/4"	27 3/4"	950	1350
4"	4"	6"	57 1/4"	25 3/4"	34"	1730	2275
6"	6"	8"	71"	30"	41"	2650	3450
8"	8"	10"	83 3/4"	30"	48"	3950	5650

*Approximate overall dimensions for standard belt driven units. Length includes minimum clearance for removing wearing parts.

PUMP, VACUUM, Gardner-Denver



Four-Cylinder Vacuum Pump
or Compressor

THE Gardner-Denver "AA" Vacuum Pump is well known throughout the world as one of the most widely distributed and most completely satisfactory single stage, vertical, vacuum pumps ever built.

The force feed lubrication system, generous bearing areas, simplicity, accessibility, and smooth running qualities, place the Gardner-Denver Vacuum Pump far ahead of many similar competitive compressors. These pumps can be used as compressors if desired.

Let us make recommendations for the type and size vacuum pump or compressor best suited to meet your particular requirements.

SINGLE CYLINDER

Size Cylinder Inches	Displacement Cubic Feet Per Minute	Dimensions, Inches			Maximum H.P. Recommended	Approximate Shipping Wt., Lbs.	
		L	W	H		Belt	Motor
4 1/2"x4	11 0-32.0 11 0-42.6	17 17	16 14	28 28	3	365 285	365 285

DUPLEX

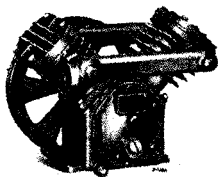
Size Cylinder Inches	Displacement Cubic Feet Per Minute	Dimensions, Inches			Maximum H.P. Recommended	Approximate Shipping Wt., Lbs.	
		L	W	H		Belt	Motor
4 1/2"x4	22 0-64.0	31 1/2	17	30	5	650	650
5" x4	27 0-79.0	31 1/2	17	30	5	685	685
5 3/8"x5	41 0-130.0	36	20	36	7 1/2	1130	1130
6 1/2"x5 1/2	63 0-184.0	43	20	39	10	1495	1495

V-TYPE FOUR-CYLINDER

Size Cylinder Inches	Displacement Cubic Feet Per Minute	Dimensions, Inches			Maximum H.P. Recommended	Approximate Shipping Wt., Lbs.	
		L	W	H		Belt	Motor
5 3/4"x5	90 0-261.0	49	31	36		2105	2105
6 1/2"x5 1/2	126 0-367.0	55	35	38		2760	2760

All we ask is a chance to help you and the opportunity to work with you on your equipment needs.

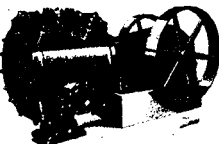
PUMP, VACUUM, Ingersoll-Rand



Type 30 Dry Vacuum Pump With Air-Cooled Cylinders and Heads—Note Compact Construction



Sectional Views of Type 15 Dry Vacuum Pump Showing Piston Action and Strong Internal Construction



Class ES Dry Vacuum Pump Equipped for Flat Belt Drive—Note Sturdy Horizontal Construction

ous service. Unit is available in single or two-stage construction. Single-stage units are double-acting. Two-stage units are single-acting with opposite ends of the single cylinder arranged in series. The Class ES units are adaptable to any type of drive: V-belt, short belt, long belt, or direct-connected synchronous motor drive on the larger units. The tables following give general data on vacuum pumps for displacements of from 9 to 2,832 cubic feet per minute.

(Continued on next page)

THE Ingersoll-Rand Vacuum Pump can be furnished to meet all requirements for Denver Rotary Drum Filters and Denver Disc Filters. Also, other problems requiring a reliable and constant source of vacuum are effectively solved by these pumps.

For the smaller installations, the Type 30 dry vacuum pump is recommended. The general data on this vacuum pump is given in tables under pumps for displacements of from 9 to 100 cubic feet per minute.

For medium sized installations, the Type 15 vertical, double-acting, dry vacuum pump is preferred. The Type 15 dry vacuum pump is a vertical, water-cooled, double-acting, single cylinder unit with a trunk-type piston. It can be arranged as a single-stage, double-acting, or a two-stage, single-acting unit. It is available for flat or V-belt drive, with or without a common subbase with the motor. The general data on these vacuum pumps are given in table under pumps for displacements of from 91 to 250 cubic feet per minute.

For larger sizes the Class ES vacuum pump is recommended. This is of the straight-line, single cylinder, horizontal cross-head type, designed to operate at moderate speeds and built for heavy, continuous

TYPE 30

Pump No.	Each Cylinder			Speed R.P.M.	Single Stage Piston Displ. C.F.M.	Two Stage Piston Displ. C.F.M.	Motor H.P. Single Stage	Motor H.P. Two Stage
	Baseplate Mounted	Bare Unit	Stroke Inches					
V-23AX7	V-23A	3	2 3/4	800	9	—	3/4	—
V-235X1	V-235	3	2 3/4	800	18	9	1	1
V-244X2	V-244	4	2 3/4	800	32	16	2	2
V-255X3	V-255	5	3 1/2	750	60	30	3-5*	3
V-67X5	V-67	6	5	610	100	50	5	5

*For continuous operation below 22 inches Hg. vacuum, a 5 H.P. motor should be used.

TYPE 30

*Pump No.	Overall Dimensions—Inches						Shipping Data			
	Bare Unit			Compl. Elec. Driven Unit			Bare Unit		Compl. Elec. Driven Unit	
	L	W	H	L	W	H	Approx. Ship. Wt. Lbs.		Approx. Ship. Wt. Lbs.	
							Domestic	Export	Domestic	Export
V-23AX7	12	16	15	42	19	16	125	150	250	300
V-235X1	17	14	17	42	19	17	130	155	320	370
V-244X2	21	17	21	46	22	19	230	275	450	500
V-255X3	25	20	23	49	26	22	330	380	500	570
V-67X5	38	27	30	58	29	31	655	700	980	1080

*For number of pump as bare unit, see table above.

TYPE 15

Each Cyl.	Diameter	Stroke	Speed R.P.M.	Single Stage Piston Displ. C.F.M.	Two Stage Piston Displ. C.F.M.	Motor H.P. Single Stage	Motor H.P. Two Stage	Overall Dimensions—Inches					
								Bare Unit			Compl. Elec. Driven Unit		
								L	W	H	L	W	H
10'	5"	400	167	91	7 1/2	5	21	23	44	45	23	46	
12"	6"	350	250	137	*10	10	25	26	50	53	29	52	

*If 12"x6" size is sold for operation at or near peak load continuously, a 15 H.P. motor should be used.

(Continued on next page)

Each Cylinder		Shipping Data					
Diameter	Stroke	Bare Unit			Complete Electric Driven Unit		
		Approximate Shipping Wt. Pounds		Boxed for Export Cu. Ft.	Approximate Shipping Wt. Pounds		Boxed for Export Cu. Ft.
		Do-mestic	Export		Do-mestic	Export	
10"	5"	740	800	22	1400	1450	58
12"	6"	1075	1190	31	1775	1950	72

CLASSES ER, ES, AND FS

Cylinder Diameter Inches			Vacuum Inch. Hg.	Stroke Inches	Single Stage Piston Displ. C.F.M.	Two Stage Piston Displ. C.F.M.	Speed R.P.M.	Boxed for Export Cu. Ft.
Steam								
90-125 Lbs.	125-180 Lbs.	180-250 Lbs.						
			*10	5	180	91	400	25
			*14	5	354	178	400	46
7	6	5	14	7	434	218	350	59
7	6	5	18	7	720	361	350	71
9	8	6½	22	9	1184	594	300	111
12	10	8¼	24	11	1633	822	285	212
12	10	8¼	26	11	1918	963	285	203
14	12	10	31	13	2832	1400	250	403

*These sizes (Class ER) have babitted sleeve bearings instead of Timken bearings; sight-feed cylinder lubrications; and frame construction. They are not built for steam drive or synchronous-motor drive.

CLASSES ER, ES AND FS

Overall Dimensions (Bare Unit) Feet—Inches						Approx. Ship. Wt. Lbs.			
Length		Width		Above Floor		Domestic		Export	
FS	ES (Less Motor)	FS	ES (Less Motor)	FS	ES (Less Motor)	FS	ES (Less Motor)	FS	ES (Less Motor)
	4-6		1-6		2-6		1150		1400
	5-9½		1-9½		3-0		2100		2450
8-4	6-5½	2-4	2-3½	3-11	4-0	4200	2680	4750	2800
8-8	7-1	2-4	2-4½	3-11	4-3	4810	3600	5360	3820
10-0	8-2½	2-9	2-10½	4-5	4-6	7400	5300	8050	5700
12-2	9-5	3-6	3-4½	5-6	5-8	11200	8150	11900	8650
12-5	9-10	3-6	3-4½	5-6	5-8	11600	8200	12500	8700
14-3	11-4	4-8	4-4	6-1	6-6	14600	11180	17400	12450

PUMP, WATER, Fairbanks-Morse Centrifugal



1" Centrifugal Water Pump

THE Fairbanks-Morse Centrifugal Water Pump is a sturdy, inexpensive, side-suction, ball-bearing pump of up-to-date design and construction and is ideal for many applications. It is particularly easy to dismantle as all parts are readily accessible. The pump is built of highest quality materials and is highly efficient due to design resulting from long experience.

Various sizes and models are available to suit most pumping requirements. Units are built in sizes ranging from ¾" to 8" outlets, for capacities from 5 to 3,000 gallons per minute, and for operating against heads up to 160 feet.

These pumps are designed and built for both general service and heavy duty and may be driven by electric motor, diesel engine, or gasoline engine. Drive may be by flat belt, V-belt, or pump may be direct-connected. Parts are interchangeable and, when necessary due to the nature of the liquid being pumped, may be replaced at moderate cost.

Additional data gladly furnished upon request.

FIGURE 5520P

Pump Size (Discharge)	Suction Size	*Capacity 1750 R.P.M. 15 Ft. Head G.P.M.	Motor H.P.	**Dimensions		
				L	W	H
¾"	1"	5	1/6	12"	6½"	7¾"
1"	1½"	10-40	¾-½	15¾"	10"	10"
1½"	1½"	50-60	¾	15¼"	10"	9¾"
1½"	2"	75	¾	16"	10¼"	10¼"
2"	2½"	100-125	¾	16¼"	10½"	11"

*Figure 5520 pumps for capacities up to 175 G.P.M. or against heads up to 70 feet available.

**Dimensions are for bare pump without base.

(Continued on next page)

Mill design and Flowsheet design are also services of Denver Equipment Co. Write for details how these services might help you.

(Continued from preceding page)

FIGURE 5510

*Pump Size (Discharge)	Suction Size	**Capacity 40 Ft. Head G.P.M.	Speed R.P.M.	Motor H.P.	†Dimensions		
					L	W	H
1"	1½"	25-75	2000-2540	1-3	15¾"	9¾"	10"
1½"	2"	100-150	1550-1800	3-5	17¾"	13¾"	14"
2"	3"	175-300	1200-1530	3-7½	25¾"	13½"	17½"
3"	4"	350-600	1240-1600	7½-15	26¾"	15¾"	18½"
4"	5"	700	1380	15	30¼"	17¾"	20½"
5"	6"	800-1300	1310-1740	15-30	31"	19"	20½"
6"	8"	1500	1335	30	37¼"	21¾"	25"
8"	8"	1800-2000	1340-1440	40-50	37¼"	23½"	26½"

*Sizes 1", 1½", and 2" have suction and discharge connections tapped in volute.

**Figure 5510 pumps for capacities up to 2,200 G.P.M. or against heads up to 125 feet available.

†Dimensions are for bare pump without base.

FIGURE 5530-31-32-33

*Pump Size (Discharge)	Frame No.	**Capacity 1750 R.P.M. 40 Ft. Head G.P.M.	Motor H.P.	†Dimensions		
				L	W	H
1"	0	25-75	1-1½	18¾"	13¾"	14¾"
1"	1	25-75	1-1½	21¾"	13¾"	14¾"
1¼"	0	100	2	18½"	13¾"	15"
1½"	0	125-175	3-5	18"	13½"	15½"
1½"	1	125-175	3-5	22¼"	14"	14¾"
2"	1	200-250	3-5	23¼"	15½"	15"
3"	2	300-500	7½-10	29½"	17¾"	20¾"
4"	2	600-700	10	30"	18¾"	21½"
5"	2	800-1200	15-25	30¾"	21¾"	20¾"
6"	3	1400-1600	25-30	37¼"	23"	24¾"
8"	3	1800-2000	30-40	38¾"	24¾"	26¾"

*Sizes 1", 1¼", and 1½" have tapped suction and discharge connections.

**Pumps for capacities up to 3,000 G.P.M. or against heads up to 160 feet available.

†Dimensions are for bare pump without base.

Please Give Us the Opportunity to quote prices and delivery on standard equipment to meet your needs.

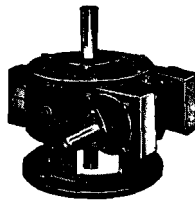
REAGENTS, DRY AND WET, Denver Flotation

QUANTITY warehouse stocks of common flotation reagents are carried in Denver. As new reagents are developed they are added to our list of stock items which include: Aerofloat (15, 25, and 31) Barrett Oil No. 4, Barrett Oil No. 634, Caustic Soda, Copper Sulphate, Creosote (Cleveland Cliffs No. 1 Hardwood), Cresylic Acid, Lime, Metso, Oleic Acid, Yarmor F Pine Oil, Quebracho, Reagents Nos. 208, 301, 404, Soda Ash, Sodium Aerofloat, Sodium Cyanide (eggs and granular), Sodium Silicate, Sodium Sulphite, (Santosite), Thiocarbamide, Potassium Ethyl Xanthate Z-3, Sodium Ethyl Xanthate Z-4, Potassium Amyl Xanthate Z-8, Potassium Isopropyl Xanthate Z-9, Potassium Hexyl Xanthate Z-10, and Zinc Sulphate.

Information on the reagents in which you are interested will be sent on request.

Write for our Reagent Bulletin No. R1-B2 listing over 200 reagents used in flotation of metallics and non-metallics and also many industrial uses.

REDUCERS, SPEED, Denver



Denver Vertical Drive Type "V" Speed Reducer

THE Denver Speed Reducer eliminates unnecessary transmission equipment, thus providing compact drives, and assures positive performance. It is made with speed reduction ratios up to 4,000 to 1 and with right angle, (vertical or horizontal), or parallel shafts for either light or heavy duty.

RETORT, Denver



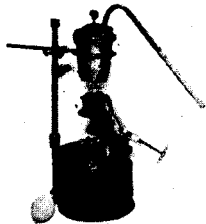
Pint Denver Retort—Note Heavy Construction Providing Maximum Safety

THE Denver Retort is a low cost, extremely durable, iron unit for distilling mercury from amalgam. The cover is carefully turned and ground for a tight fit and the outlet pipe is securely screwed into the cover.

These Denver Retorts are heavily built and fit into Denver Retort Burners. However, homemade stands or tripods can be used for heating retorts over a fire or stove. Information concerning larger sizes than those listed will be sent upon request.

Retort Size	Capacity Pints	Diameter Inches	Approximate Shipping Wt. Lbs.
No. 1	3/4	2 3/4	4 1/2
No. 2	1	3 1/2	6
No. 3	2	4 1/2	11
No. 4	4	5 1/2	20
No. 5	8	7 1/2	28
No. 6	16	9 3/4	45

RETORT BURNER, Denver



Denver Retort Burner Shown With Denver Retort in Supporting Stand

THE Denver Retort Burner gives a very intense heat for retorting amalgam, and it is easily and quickly regulated. The larger size is equipped with a two gallon capacity tank, pressure tested at 100 pounds per square inch, and a powerful, quick-acting brass pump of the check valve type. The burner, which is cast of heat resisting bronze, is fully protected from wind and weather by a sliding wind-shield. Unit is especially designed to fit the Denver Retort.

Burner Size	Fuel Capacity Pints	Dimensions			Approx. Ship. Wt., Lbs.
		L	W	H	
No. 1187	1-2	10"	8"	16"	14
No. 120	8-16	13"	12"	21"	35

ROASTER, Denver (Edwards Type)



Interior View of Denver (Edwards Type) Roaster Showing Rabbles

THE Denver (Edwards Type) Mechanical Roaster was first developed in Australia for the roasting of gold and silver ores and concentrates. It can be built in units to handle from 20 to 200 tons per 24 hours. The overall height of this type of unit is low, an important advantage in installation. Dusting is eliminated because

(Continued on next page)



Exterior View of Denver (Edwards Type) Roaster--Note Size of Men on Unit Left of Center in Background

the material being treated is not dropped from one hearth to another. Instead, material being roasted passes continuously on the one hearth from the feed end to the discharge.

Temperature can be closely regulated and heat properly applied. Ordinarily two fire boxes are used on each side; however, this is governed by the character of the material being roasted. Arrangements

can be made for using pulverized fuel or oil, or other fuels may be used which require hand firing methods.

Rabbling arms and shafts can be arranged for the circulation of cooling water where materials being treated require temperatures high enough to warrant such an arrangement.

For a sweet roast approximately 200 to 225 pounds of 10,000 BTU coal is used per ton of ore roasted. The horsepower per spindle is from 0.2 to 0.3. Width of the simplex unit is 6.6 ft. and the duplex unit has a width of 13 ft. The length of each panel is approximately 4 ft. The costs of materials and construction will vary widely with location and local prices but the following is approximate cost of a 54

Dryer Size	Number Spindles	Number Panels	Hearth Area Sq. Ft.	Approximate Capacity Tons Per 24 Hours							
				45% S to 5% S	45% S to Sweet	20% S to 5% S	20% S to Sweet	10% S to Sweet	5% S to Sweet		
Simplex	10	8	265	8	5	10	7	10	13		
Simplex	15	12	400	12	8	16	11	16	20		
Duplex	24	12	600	18	14	25	20	27	33		
Duplex	32	15	800	27	21	38	30	40	50		
Duplex	40	20	1000	38	30	54	44	57	70		
Duplex	48	24	1200	44	40	66	50	75	100		
Duplex	56	28	1350	50	45	85	70	90	120		
Duplex	60	30	1500	60	50	95	77	100	135		
Duplex	80	40	2000	80	65	125	100	130	175		

More complete information can be obtained by writing any Denver Equipment Company office.



**SOUND PLANNING CALLS FOR
RELIABLE ORE TESTING!
WRITE TODAY!**

ROD MILL, Denver Steel Head



6'x10' Denver Steel Head Rod Mill with Large Discharge Trunnion

THE Denver Steel Head Rod Mill gives the ore dressing engineer a very wide choice in grinding design. He can easily secure a standard Denver Steel Head Rod Mill suited to his particular problem. The successful operation of any grinding unit is largely dependent on the method of removing the ground pulp. The Denver Steel Head Rod Mill is available

with five types of discharge trunnions and each type trunnion is available in small, medium, or large diameter. The types of discharge trunnions are (1) overflow, (2) perforated overflow, (3) return spiral, (4) grate, and (5) peripheral. Thus the engineer can fit any one of fifteen variations of sizes and type of discharging a rod mill, into the problem on which he is working.

The superiority of the Denver Steel Head Rod Mill is due to the all-steel construction. The trunnions are an integral part of the cast steel heads and are machined with the axis of the mill. The mill heads are insured against breakage due to the high tensile strength of cast steel as compared to that of the cast iron head found on the ordinary rod mill. Denver Trunnion Bearings are made of high-grade nickel babbitt, dovetailed into the casting. Ball and socket bearings can be furnished if desired.

Head and shell liners for Denver Steel Head Rod Mills are available in Decolloy (a chrome-nickel alloy), hard iron, electric steel, molychrom steel, and manganese steel. The heads have a conical shaped head liner construction, both on the feed and discharge ends, so that there is ample room for the feed from the trunnion helical conveyor discharge to enter the mill between the rods and head liners on the feed end of the mill. Drive gears are furnished either in cast tooth spur gear and pinion or cut tooth spur gear and pinion. The gears are furnished as standard on the discharge end of the mill, out of the way of the classifier return feed, but can be furnished at the mill feed end by request. Drives may be obtained according to the customer's specifications.

The following table clearly illustrates why Denver Steel Head Rod Mills have greater capacity than other mills. This is due to the fact that the diameters are measured inside the liners, while other mills measure their diameter inside the shell. Desired information and recommendations will be gladly furnished upon writing to any Denver Equipment Company office.

(Continued on next page)

Use Denver Ore Tests to verify or improve your present flowsheet.

Size DxD	Approx. Cap. Tons Per 24 Hrs.	Scoop Feeder Size	Dimensions		
			L	W	H
3'x5'	15-30	13" or 19"	12'10"	6'3"	4'10"
3'x6'	18-25	13" or 19"	13'10"	6'3"	4'10"
3'x8'	24-45	13" or 19"	15'10"	6'3"	4'10"
3'x9'	27-50	13" or 19"	16'10"	6'3"	4'10"
4'x6'	37-74	30" or 36"	15'10"	8'3"	6'7"
4'x8'	50-95	30" or 36"	17'10"	8'3"	6'7"
4'x10'	62-116	30" or 36"	19'10"	8'3"	6'7"
5'x8'	90-170	30", 36" or 42"	19'0"	10'2"	7'9"
5'x10'	113-210	30", 36" or 42"	21'0"	10'2"	7'9"
5'x12'	136-250	30", 36" or 42"	23'0"	10'2"	7'9"
6'x8'	153-325	36", 42" or 48"	20'2"	12'8"	10'4"
6'x10'	185-390	36", 42" or 48"	22'2"	12'8"	10'4"
6'x12'	215-465	36", 42" or 48"	24'2"	12'8"	10'4"

Size DxD	Pulley Size		Horsepower		Rod Charge Pounds	Approximate Shipping Wt., Lbs.	
	Dia.	Face	To Run	Motor		Belt	Motor
3'x5'	30" 8"		14	15	4500	8700	8700
3'x6'	30" 10"		17½	20	5500	9450	10500
3'x8'	30" 10"		22	25	7500	10850	12300
3'x9'	30" 10"		24	25	8500	11600	13100
4'x6'	42" 10"		34	40	9800	18600	20500
4'x8'	42" 10"		42	50	13400	21650	23850
4'x10'	42" 10"		49	50	16900	25750	28200
5'x8'	54" 14"		73	75	20900	32400	36000
5'x10'	54" 14"		88	100	26500	37350	42000
5'x12'	54" 14"		103	125	32100	42500	47800
6'x8'	60" 16"		130	150	30000	50000	56300
6'x10'	60" 16"		150	175	38000	56000	62300
6'x12'	60" 16"		175	200	46000	62000	69500

RODS, Denver Steel Grinding



Standard 2" Denver High Carbon Steel Grinding Rods

THE Denver Equipment Company is prepared to furnish all types and sizes of steel rods as shown in table. Standard sizes of these rods are finest quality, high carbon, hot rolled, machine straightened steel and meet low cost, long wear requirements for use in operation of all types of rod mills.

Denver Steel Grinding Rods are made of a special steel which breaks up without twisting when final wear oc-

(Continued on next page)

curs. This is extremely important in maintaining full grinding capacity and eliminating the difficulty of removing wire-like, worn rods which twist and bend into an inseparable and space filling mass of interlaced wires if breaking does not occur. Rods are shipped in lengths cut to suit the length of each particular customer's rod mill.

Diameter Inches	Wt. Lbs Per Linear Foot	Circumference Inches	Diameter Inches	Wt. Lbs. Per Linear Foot	Circumference Inches
3/4	1 0431	1 9635	3 1/2	28 2057	10 2102
7/8	1 5021	2 3562	3 3/4	32 7117	10 9956
1	2 0444	2 7489	3 1/2	37 3520	11 7810
1 1/8	2 6704	3 1416	4	42 7258	12 5664
1 1/4	3 3796	3 5343	4 1/4	48 2334	14 1863
1 1/2	4 1725	3 9270	4 1/2	54 0746	15 9043
1 3/4	5 0487	4 3197	4 3/4	60 2500	17 7206
1 7/8	6 0081	4 7124	5	66 7909	19 6350
1 1/2	8 1780	5 4978	5 1/2	80 7782	23 7583
1 1/4	9 3881	5 8905	6	96 1330	28 2744
2	10 6814	6 2832	6 1/2	112 8425	33 1831
2 1/4	13 5187	7 0686	7	130 9476	38 4846
2 1/2	16 6896	7 8540	7 1/2	150 2076	44 1787
2 3/4	20 1946	8 6394	8	170 9030	50 2656
3	24 0332	9 4248			

SAMPLER, ORE, Denver (Snyder Type)



Simplex Denver (Snyder Type) Ore Sampler

THE Denver (Snyder Type) Ore Sampler is available in both simplex and tandem units. The simplex unit is for final sample cuts of 5%, 10%, or 15% of the material fed to the sampler; and the tandem unit is for final sample cuts as small as one-fourth of 1% of the amount of material fed to the sampler.

or pans carrying one or more sample cutters, sample and reject housings, and horizontal shaft and bearings. Shaft is direct-connected through coupling to gearmotor, thus driving the sample pan or pans at a uniform rate of speed. Tandem units are also provided with a mixing barrel which receives the first cut and, after mixing it thoroughly,

discharges it through another sample pan, having one or more cutters, which cuts out the final sample.

Denver (Snyder Type) Ore Samplers have all parts mounted on a structural steel frame, requiring only two steel or wood supports to place the sampler in proper position to receive the material to be sampled. Sampler feed may be taken from the discharge of a



Tandem Denver (Snyder Type) Ore Sampler

belt conveyor, elevator, or an ore chute. (Continued on next page)

These samplers are of all steel construction and designed to provide maximum accuracy in the sampling of materials. Both simplex and tandem units are very compact, requiring only an absolute minimum of headroom.

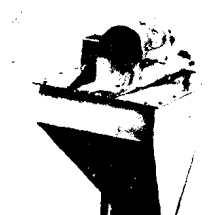
More complete information can be obtained by writing any Denver Equipment Company office.

*Sampler Size (No. 1 Pan Outside Diameter)	Percent Feed In Final Sample		Maximum Diameter Feed Particle	No. 2 Sample Pan Outside Diameter	Dimensions Mixing Barrel	
	One Cutter Per Pan	Two Cutters Per Pan			Dia. Small End	Dia. Large End	Lgth.
24" Simplex	5.00	10.00	7 1/2"			
36" Simplex	5.00	10.00	1 1/2"			
48" Simplex	5.00	10.00	1 7/8"			
24" Tandem	0.25	0.50	3/8"	35"	24"	28" 18"
36" Tandem	0.25	0.50	1 1/8"	54"	36"	40" 18"
48" Tandem	0.25	0.50	1 5/8"	72"	48"	52" 18"

*Sampler Size (No. 1 Pan Outside Diameter)	Sample Cutter Opening Width		Overall Dimensions			Speed R. P. M.	Motor H. P.	Approx. Shipping Weight, Lbs.
	No. 1 Pan	No. 2 Pan	L	W	H			
24" Simplex	2 3/4"		2' 10"	6' 10"	2' 10"	38	1/2	510
36" Simplex	3 3/4"		3' 10"	6' 10"	4' 2 1/2"	27	1/2	830
48" Simplex	5 5/8"		5' 0"	6' 10"	5' 7"	19	3/4	1150
24" Tandem	2 3/4"	3 1/4"	3' 10"	8' 4"	4' 4 1/2"	27	1 1/2	1200
36" Tandem	3 3/4"	5 1/8"	5' 4"	8' 4"	6' 4 1/2"	17	1 1/2	1870
48" Tandem	5 5/8"	7 5/8"	6' 10"	8' 4"	8' 0"	13	1 1/2	2000

*Other sizes of Denver (Snyder Type) Ore Samplers, both larger and smaller, available if required. Also, special types of these samplers to solve particular problems can be provided when the need arises.

SAMPLER, ORE, Denver (Vezin Type)



Denver (Vezin Type) Ore Sampler

THE Denver (Vezin Type) Ore Sampler is one of the most widely accepted automatic samplers in use today.

It consists of a sheet steel housing within which operates a cylinder having two or more scoops secured to it. The cylinder and scoops are made of sheet steel and the cylinder is mounted upon a vertical shaft which is driven through bevel gearing by a horizontal shaft having tight and loose driving pulleys or an individual electric motor drive. The entire mechanism is supported in a welded steel frame and the housing forms a hopper at the bottom for receiving rejects from the sampler.

In operation, the cylinder and scoops revolve slowly, causing the scoops to pass under the end of the chute discharging the ore to be sampled. The scoops cut out the sample as they pass through the stream of ore. The sample

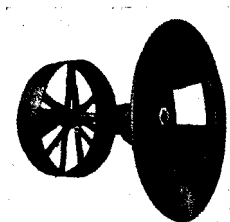
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passes through the revolving element and then is conducted by a pipe or chute to units which reduce or prepare the sample for testing or study. The rejects fall into the hopper from whence they are returned to the circuit.

This sampler can be furnished with a rotating disk feeder mounted on the same shaft, thus giving a uniform feed for sampling. Several disks and cutters can be mounted on the same rotating shaft, thereby simplifying the plant layout.

Denver Equipment Company builds these samplers to handle any practicable size of material and to cut almost any size of sample desired. Recommendations and detailed information on Denver (Vezin Type) Ore Samplers will be gladly provided upon request.

SAMPLER, ORE, Denver-Snyder



Denver-Snyder Ore Sampler. Note Simple Sturdy Construction

THE Denver-Snyder Sampler is one of the most simple and efficient sampling machines ever devised. It consists of a circular casting, having one or more openings (depending upon the per cent sample desired) in its sloping flange, and mounted on the end of a horizontal shaft.

The ore to be sampled is directed by a spout so that it falls inside the flange of the sampler. The rejections slide off the flange into a hopper while the samples fall through the cutter.

A large number of these samplers are in operation and in every instance they are giving satisfaction.

Machine Size	Disc Diam.	Max. Size Feed Particle	Overall Dimensions		Pulley Size T&L	Speed R.P.M.	H.P. Motor	Approx. Ship. Wt., Lbs.	
			Lgth.	Diam.				Belt	Motor
27	27"	1"	48"	28"	16"x3 1/2"	22-28	1/2	420	545
42	42"	2 1/2"	48"	44"	30"x3 1/2"	14-18	1	1130	1250
60	60"	4"	48"	64"	42"x4 1/2"	10	1 1/2	2370	2600

We have often been referred to as the "Diagnosticians of the ore dressing industry." Perhaps we can help you with your mineral recovery problems. Please let us try.

SAMPLER, ORE AND PULP, Deco Automatic



Deco Automatic Ore and Pulp Sampler

THE Deco Automatic Ore and Pulp Sampler is designed to operate suitable sample cutters for the intermittent removal of accurate samples from streams of wet or dry materials at predetermined time intervals. The cutter is carried on a ball-bearing roller carriage assembly thus replacing the sliding contact found on old-style samplers. This mechanism is located in proper relationship to the stream of material to be sampled, the operation of the mechanism

moves the cutter through the stream in a straight line and at a uniform speed. As it passes through the stream, the cutter is designed to deflect a representative portion of the stream into a suitable container.

The driving unit of the Deco Automatic Ore and Pulp Sampler is a gearmotor, operating only intermittently and controlled by a time switch. A roller chain, driven by a sprocket wheel mounted on the gearmotor shaft, is carried over an idler sprocket wheel. This sprocket wheel runs upon an axle supported by a pedestal bearing which also provides for adjustable chain tension.

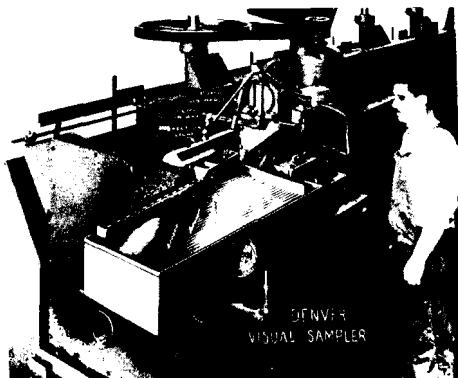
The sample cutter, suspended from the carrier block, is moved back and forth by the engagement of an extended pin connecting two links of the chain with the disengaging arms mounted on the carrier block.

The direction of the cutter travel is reversed, after each succeeding sample cut, by means of the opposite directions of travel the extended pin assumes in following the path of the chain travel over the sprockets.

At the limits of the carrier travel, energy to the motor is cut off by the opening of a limit switch and the carrier remains at rest until the circuit is restored by the time switch through the second limit switch at the opposite end of the carrier travel.

Standard cutter travel is 16" or 21" but is available up to 30" on size No. 1. Cutter travel on No. 2 (Heavy duty) is 36" and greater to meet your requirements.

Machine Size	Cutter Travel	Dimensions			Height Including Cutter		Approx. Ship. Wt., Lbs.	
		L	W	H	Min.	Max.	Do-estic port	Ex-foreign port
No. 1	16"-30"	36"	16"	17 1/2"	44 1/2"	50"	350	385
No. 2	36" up	52"	25"	17 1/2"	44 1/2"	50"	630	690



SAMPLER, Denver Visual

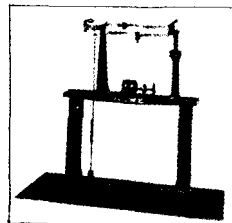
DENVER Visual Samplers make possible immediate adjustment of concentration circuit to assure best recovery and grade of concentrates. Changes in grind, flotation time, reagent application and cleaning or recleaning arrangements can be made and put into effect long before ordinary laboratory assay reports would indicate such changes as necessary.

Denver Visual Sampler consists of a Denver-Wilfley Laboratory Concentrating Table with linoleum covered deck, and a 3/4" Denver Suction-Pressure Diaphragm Pump. (Rubber-covered deck for table is available.) Both table and pump are mounted on a structural steel base and both machines are driven by V-belts from one only 1/2 horsepower electric motor. A welded steel launder is provided for continuous disposal of table concentrates and tailings. A 110 volt lamp with flexible arm is provided for daylight type illumination over the deck. A Mineralight Lamp can also be attached for use in detecting fluorescent minerals. Generally, a balance line is provided on the pump discharge which counteracts pumping pulsations and provides an even feed to the table.

This self-contained unit is manufactured in two sizes:
 No. 13-A has concentrating table with deck of 40"x18".
 No. 13-B has concentrating table with deck of 50"x24".

Size	Table Deck Size	Capacity Tons, 24 Hrs.	Motor HP	Pump Size	Dimensions		
					L	W	H
13-A	40"x18"	1/2-2	1/2	3/4"	5'9 3/4"	21 3/4"	28"
13-B	50"x24"	3/4-3	1/2	3/4"	6'7 3/4"	25 1/4"	28"

SCALE, Denver Platform



Denver Platform Scale

THIS general purpose, ball-bearing, platform scale can be used for wheelbarrow and other bulk weighing of concentrates, reagents, mill supplies, and other materials.

The Denver Platform Scale is a self-contained unit, fits into a shallow floor opening, and is easy to install.

This scale has a bronze arrow-point beam which is mounted on a sturdy stand with self-aligning bearings. Both poises have set screws.

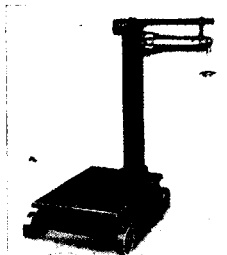
*Scale Size Capacity Pounds	†Platform Dimensions		Floor Opening Dimensions			Approximate Shipping Wt. Lbs.	
	L	W	L	W	H	Domestic	Export
2500	46"	38"	47"	67 1/4"	10 3/4"	770	850
3500	48"	48"	48 3/4"	77"	12 3/4"	1150	1265
6000	60"	48"	60 3/4"	77"	12 3/4"	1500	1650

*Beams available to give capacities up to 10,000 pounds.
 †Platform dimensions give length as parallel to beam.

INQUIRIES

Your inquiries are solicited. Further details, specifications and bulletins on any items listed in this handbook will be supplied promptly. We will be most happy to give you our recommendation on any problem without obligation. Our primary objective is to help you by supplying sound information and proven mill equipment that will make more profit for you.

SCALE, Denver (Portable) Platform



Denver (Portable) Platform Scale

THE all-steel Denver (Portable) Platform Scale, as illustrated, is ideal for weighing large samples and other products which require accurate weighing in a mill or mill laboratory. This scale is also widely used throughout industry to check weights of materials received, materials used in various batch treatment processes, and batch scale treatment products in determining test results.

The pulley cap and center panel of the platform are made of alloy steel, pressed to shape

and reinforced, making a very rigid and rust resisting unit. The lever system is made heavy, with a large factor of safety, and all bearings are self-aligning. The loops, bearings, nose irons, and weights are rust resistant, assuring long life with sustained accuracy. The complete unit is mounted on wheels, thus making it portable.

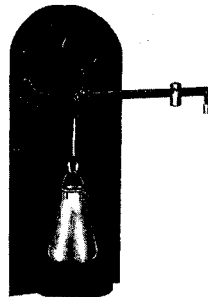
Scale Size Capacity, Pounds	Beam Calibration, Pounds	*Platform Dimensions		Overall Height	Approximate Shipping Wt., Lbs.
		L	W		
500	50x¼	16"	25"	45"	150
1000	100x¼	18"	27"	48"	210
1500	100x½	22"	31"	52"	400
2000	100x¾	25"	32"	54"	490
2500	100x1	25"	34"	56"	600

*In the platform sizes above, the first figure is the dimension parallel with the beam.

Reliable Denver Ore Tests insure your mining investment.

The Denver Equipment Company has specialized for many years in developing flotation processes and manufacturing flotation equipment. Complete batch and continuous test laboratories are maintained for research on flotation applications. Submit your problems to our experienced staff of Flotation Engineers . . . take advantage, now, of this test service. Write to any one of the Deco offices.

SCALE, Denver Pulp Density



Denver Pulp Density Scale

THE Denver Pulp Density Scale provides a very fast and accurate means of determining the specific gravity of pulps and liquids. It simplifies the procedure of obtaining the specific gravity of mill products, thereby saving considerable time for the mill operator.

This scale is used wherever metallurgical results depend on the ratio of water to solids, such as in ball mill discharge, classifier overflow, thickener discharge, conditioner discharge, agitator circuit, etc.

Construction of the unit is as illustrated at left. The pulp container is made of spun aluminum and has an over-

flow slot near the top which permits easy, accurate filling to exactly one liter. In balanced position, with full pulp container, the reading on the beam gives the specific gravity of the pulp directly. The percent solids is then obtained by applying this reading to the pulp density table which is furnished with each Denver Pulp Density Scale. To adapt this scale to higher specific gravity mediums it is only necessary to balance it with 1000 grams of water by adding weight at the end of the beam. When properly balanced, the Denver Pulp Density Scale then has a range from 1,000 to 3,300 grams. By utilizing this method of raising the scale range, the specific gravity of any pulp can be found.

*Capacity Grams	Approximate Shipping Weight, Lbs.		Export Volume, Cu. Ft.
	Domestic	Export	
2300	7	11	1.1

*Adjustable to 3300 grams or higher.

Denver Equipment Company publishes DECO TREFOIL, an exchange of helpful engineering information designed to improve milling. DECO TREFOIL is published every other month. If you are connected with mining and do not receive DECO TREFOIL please write to us.

utels, both undersize and oversize; and a cone on the feed end. It can be furnished with any type of punched plate or screen cloth specified by the customer. The 48" and 60" diameter Denver Trommel Screens are furnished with steel tire and roller drive.

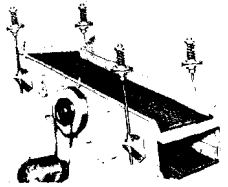
These screens are well adapted for operation in series, with a range of screen openings to give graded products for use in stage treatment of ores.

Let us make recommendations for your proposed trommel screen installation or redesign your present flowsheet for greater efficiency through use of a trommel screen.

Trommel Screen Size	*Approximate Trommel Screen Capacities for Various Sizes of Screen Openings—Tons Per Hour					Spray Water Gallons Per Minute	Speed R.P.M.	Motor H.P.
Dis. L	1"	3/4"	1/2"	3/8"	1/4"			
30" 60"	12	9	6	4	2	10	16-22	75
36" 72"	15	11	7	5	3	12	16-20	1 0
42" 84"	18	14	8	6	4	14	15-18	1 5
48" 96"	22	16	11	8	5	16	14-17	2 0
60" 120"	27	21	14	10	6	20	13-16	3 0

*Data is for open circuit and based on 1 1/2° to 12° slope. Capacities will increase or decrease as slope is increased or decreased.

SCREEN, VIBRATING, Denver-Dillon



Suspension Type Denver-Dillon Vibrating Screen—Double Deck

DENVER-DILLON Vibrating Screen has rapidly come to the front as a leader in the sizing and dewatering of mining and industrial products. Its almost unlimited uses vary from the screening for size of crusher products to the accurate sizing of medicinal pellets. The Denver-Dillon Vibrating Screen is also used for wet sizing by operating the screen on an uphill slope, the lower end being under the surface of the liquid.

The main feature of the Denver-Dillon Vibrating Screen is the patented mechanism. In operation, the screen shaft rotates on two eccentrically mounted bearings, and this eccentric motion is transmitted into the screen body, causing a true circular throw motion, the radius of which is equivalent to the radius of eccentricity on the eccentric portion of the shaft. The simplicity of this construction allows the screen to be manufactured with a light weight but sturdy mechanism which is low in initial cost, low in maintenance and power costs, and yet has a high, positive capacity.

The Denver-Dillon Vibrating Screen is available in single and multiple deck units for floor mounting or suspension. The side panels are equipped with flanges containing precision punched bolt holes so that an additional deck may be added in the future by merely bolting the new deck either on the top or the bottom of the original deck. The advantage of this feature is that added capacity is gained without purchasing a separate mechanism, since the mechanisms originally furnished are designed for this feature. A positive

method of maintaining proper screen tension is employed, the method depending on the wire diameter involved. Screen cloths are mounted on rubber covered camber bars, slightly arched for even distribution.

Standard screens are furnished with suspension rod or cable assemblies, or floor mounting brackets. Initial covering of standard steel screen cloth is included for separations down to 20 mesh. Suspension frame, fine mesh wire, and dust enclosure are furnished at a slight additional cost. Motor driven units include totally-enclosed, ball-bearing motors. The Denver-Dillon Vibrating Screen can be driven from either side. The driven sheave is included on units furnished without the drive.

The following table shows the many sizes available. Standard screens listed below are available in single and double deck units. The triple and quadruple deck units consist of double deck units with an additional deck or decks flanged to the original deck. Please consult our experienced staff of screening engineers for additional information and recommendations on your screening problems.

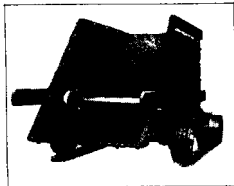
More complete information can be obtained by writing any Denver Equipment Company office.

Screen Size		*Dimensions			*Approximate Shipping Weight, Lbs.	
W	L	L	W	H	Domestic	Crated for Export
1'	3'	3'-2"	2'-0"	2'-4"	240	290
1'	4'	4'-1"	2'-0"	2'-9"	260	335
1 1/2'	3'	3'-2"	2'-6"	2'-4"	275	330
1 1/2'	4'	4'-1"	2'-6"	2'-9"	320	385
1 1/2'	6'	5'-11"	2'-6"	3'-6"	400	460
2'	4'	4'-1"	3'-0"	2'-9"	380	455
2'	6'	5'-11"	3'-0"	3'-6"	980	1175
3'	6'	6'-1"	4'-3"	3'-9"	1075	1290
3'	8'	7'-11"	4'-3"	4'-7"	1310	1570
3'	10'	9'-9"	4'-3"	5'-4"	1600	1920
4'	8'	8'-1"	5'-5"	5'-0"	1490	1790
4'	10'	9'-11"	5'-5"	5'-9"	1760	2110
4'	12'	11'-9"	5'-5"	6'-6"	2640	3170
5'	10'	9'-11"	6'-9"	5'-11"	2740	3290
5'	12'	11'-9"	6'-9"	6'-9"	3015	3620
5'	14'	13'-7"	6'-9"	7'-7"	3380	4055
6'	12'	11'-9"	7'-9"	6'-10"	3230	3875
6'	14'	13'-7"	7'-9"	7'-7"	3630	4355

*Applies to single deck screens, less drive, mounted at 22 1/2° slope.

Denver Ore Tests are made on an "actual cost" basis. This brings the world's finest laboratory equipment and skilled technicians to your service at a very low cost.

SKIP, Denver Ore and Water



Denver Ore and Water Skip for Inclined Shaft—Style "B" Without Top

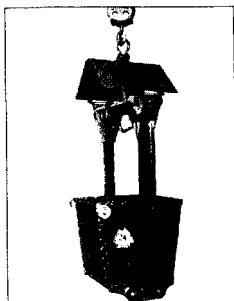
illustration above shows the style "B" skip without a top or upper side. Denver Ore and Water Skips are also available with riveted steel tops. The table below includes only data on units having steel tops but additional information on units without tops will gladly be furnished upon request.

When ordering, specify whether for ore or water, capacity desired, weight of one cubic foot of material to be handled, track gauge, angle of incline of shaft, and any limiting dimensions.

*Machine Size	Capacity, Cu. Ft.	Steelwork Thickness	Approximate Shipping Wt., Lbs.
1	10	$\frac{3}{8}$ "	550
2	15	$\frac{1}{2}$ "	800
3	20	$\frac{5}{8}$ "	1050
4	25	$\frac{3}{4}$ "	1300
5	30	$\frac{7}{8}$ "	1600

*Data on units equipped with steel tops only.

SKIP OR BUCKET, Denver Self-Dumping



Heavy Duty Denver Self-Dumping Skip or Bucket with Hinged Hood for Extremely Difficult Operation

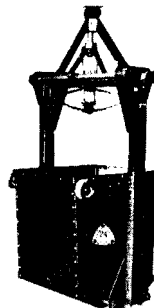
THE Denver Ore and Water Skip is furnished in a few standard sizes, but any size or style can be supplied. When these skips are used for handling water an automatic valve is supplied which is placed in the bottom.

Two styles are made as to attachment of the wheels and axles. In style "A" the axles are riveted to the sides, while in style "B" the axles extend across beneath the car. The

DENVER Self-Dumping Skip or Bucket is heavily built to withstand the wear and tear of loading, rapid hoisting, and strains incident to dumping.

Two styles are available. Style No. 1 is the standard type and Style No. 2 is the heavy duty type with hinged hood. The standard type will satisfy most operating conditions, but for extremely difficult operating conditions and heavy loading the heavy duty type is preferable.

The standard type ore bucket or skip is of the self-dumping type, constructed of $\frac{1}{2}$ " boiler plate, and heavily reinforced with iron bands.



Standard Denver Self-Dumping Skip or Bucket—Style No. 1—Suitable for Most Operating Conditions



Denver Self-Dumping Skip or Bucket With Dumping Iron Shown at Right

Guides are made of heavy channels, flared on the ends, and solidly riveted to the carrier and headframe. Head-frame yoke and safety dogs are of carbon cast steel. The lifting eyebolt is made of forged steel while the safety mechanism is the widely used, extra heavy duty type. Safety dogs are of ample size and so shaped to make it impossible for them to turn over and not grip the guides, as they are operated by a heavy elliptical spring.

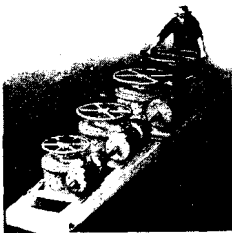
Dumping rails can be supplied for either the Style No. 1 or the Style No. 2 Denver Self-Dumping Skip or Bucket. These dumping rails are made of rolled steel angles. They are welded to heavy sideplates and so designed to permit the skip or bucket to hang inverted on the frame after dumping has occurred. Two guide horns, riveted to the sides of the skip or bucket, guide it into the dumping rail which in turn reverses the unit while it is being lowered. Approximate shipping weight of dumping rails is three hundred pounds per pair.

The importance of reliability and experience in building the type of equipment used in the mining and milling industry cannot be over-emphasized. Requirements are very exacting. It is not only the cost of the equipment and the realization that the remote places where this equipment is often used makes replacements and repairs very difficult to obtain, but also the importance of providing maximum safety protection for the human lives at stake.

Machine Size	Capacity Cu. Ft.	Approximate Shipping Weight, Lbs.	
		Standard Type	Heavy Type
1	20	1200	1600
2	30	1500	2000
3	35	1700	2265
4	40	2000	2665

NOTE: Due to the large number of variable dimensions, the Denver Self-Dumping Skip or Bucket is made only on order and in accordance with specific requirements.

SPEED REDUCER, Denver Integral Lift Vertical Worm Gear



Several Sizes of Totally-Enclosed Denver Integral Lift Vertical Worm Gear Speed Reducers

THE Denver Integral Lift Vertical Worm Gear Speed Reducer is used on Denver Center and Side Air-lift Agitators, Denver Hydroclassifiers, and on thickeners in many mills and industrial plants where it is necessary to have a simple, compact, totally - enclosed, self - lubricated reduction unit. This unit is widely used to step down speeds of high-speed motors to the slow speed required by many ore dressing and industrial machines. It has particular application on mechanisms where a positive lifting device

is necessary to prevent the stirring arm, or rakes, from sticking due to rapid settling of solids during power interruptions or overloads. Other uses are for metal skimming, mixing, blending, dissolving, emulsifying, saponifying, sulphonating, causticising, washing, scrubbing, and many other uses.

A high-grade bronze is used in the machined, cut-tooth, worm gear and the worm and worm shaft are machined from an alloy steel shaft—hardened, ground, and polished. The worm ring gear is bolted to the quill which transmits the torque to a splined vertical output shaft. The output shaft may be raised or lowered by means of a handwheel located on the top of the gear case. Oversize tapered roller bearings assume vertical loads, while ball bearings on the worm shaft take thrust loads in either direction as well as radial loads. Ample use of leather oil seals prevents oil leakage and protects the bearings from dirt. All parts are precision machined to close tolerances, and wearing parts are generously lubricated to give long wearing life and freedom from repairs. This is important in helping to keep costs low in plants where several units may be used on various machines.

The horsepower ratings given in the table below are for service with 8 to 10 hours duty, and free from recurrent shock loads. For service with 8 to 10 hours duty where recurrent shock loads occur or 24 hour service where no shock loading is experienced, the horsepower ratings must be reduced by dividing by 1.2. For service with 24-hour shock load duty, the horsepower ratings must be reduced by dividing by 1.33. For operation requiring intermittent service where the maximum cycle of operation calls for not more than 15 minutes running in a two-hour period, the horsepower ratings may be divided by 0.7. In no case must the thermal rating be exceeded.

(Continued on next page)

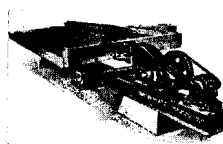
Speed Reducer Size	Gear Ratio	Input Horsepower Ratings at Various Worm Shaft R.P.M.							
		100	200	300	580	720	870	1150	1750
No. 8	55/1	.93	1.6	2.2	3.2	3.6	4.0	4.6	5.6
No. 10	60/1	1.6	2.7	3.6	5.2	5.8	6.5	7.5	8.6
No. 12	60/1	2.6	4.3	5.7	8.1	9.1	10.0	11.3	13.6
No. 15	60/1	4.8	7.8	10.1	14.4	16.0	17.3	19.3	21.5
No. 18	60/1	7.9	12.6	16.1	21.9	24.4	26.7	29.3	32.4

Speed Reducer Size	Gear Ratio	Thermal Rating H.P.	*Output Torque Inch-Lbs.	Approximate Efficiency Percent	Allowable Vertical Thrust Load Lbs.
No. 8	55/1	5.4	23600	74	2800
No. 10	60/1	7.3	42300	72	4000
No. 12	60/1	9.8	69500	72	5000
No. 15	60/1	14.6	132000	72	6000
No. 18	60/1	20.2	209000	72	7000

*Output torque ratings given are for 100 R.P.M. worm speed—use these ratings for all worm speeds below 100 R.P.M.. For output torque at other speeds use: $T = \frac{\text{Input H.P.} \times 63000}{\text{Output Shaft R.P.M.}} \times \text{Efficiency.}$

Speed Reducer Size	Maximum Vertical Lift	Input Shaft Diameter	Output Shaft Diameter	Overall Dimensions			Approx. Shipping Wt., Lbs.
				L	W	H	
No. 8	9"	1 1/8"	2 1/16"	26"	23"	58 3/4"	800
No. 10	12"	1 3/8"	3 3/8"	30 1/2"	27 3/4"	70 3/4"	1400
No. 12	18"	1 1/2"	3 1/4"	40 1/2"	34 3/4"	96"	2500
No. 15	18"	1 11/16"	4 1/8"	45 3/4"	40 3/4"	96"	2900
No. 18	21"	2 3/8"	4 11/16"	51 3/4"	46 1/2"	106 1/4"	4000

TABLE, Deister Plat-O Concentrating



Deister Plat-O Concentrating Table

THE Deister Plat-O Concentrating Table exemplifies simple, low cost, high quality equipment for the separation and recovery of the free mineral in ores containing gold, silver, platinum, copper, tin, lead, zinc, iron and other minerals having a similar range of specific gravities.

The metallurgical superiority claimed for this unit over others in the concentration and recovery of minerals is due to three important and exclusive features: (1) patented plateau systems; (2) patented riffling systems; and (3) patented self-oiling head motion for maximum efficiency and low power requirements.