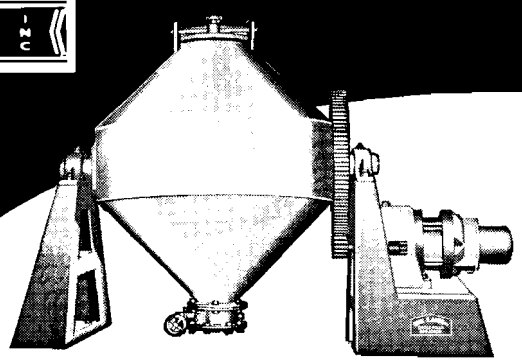
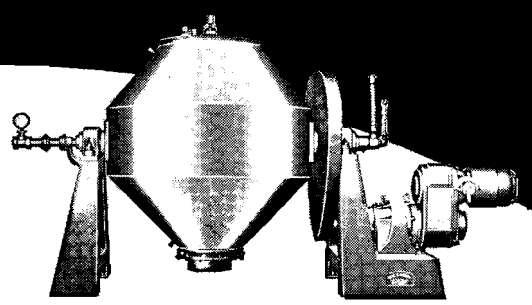
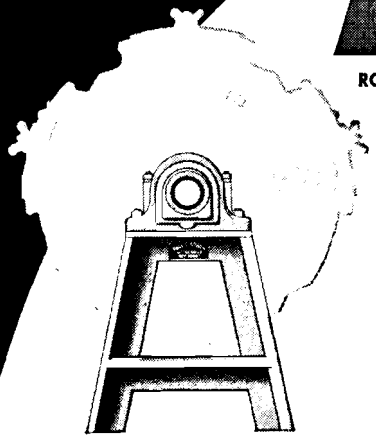
PAUL O. ABBÉ INC



ROTA-CONE BLENDER — 48" DIA. AND LARGER



ROTA-CONE VACUUM DRYER — 48" DIA. AND LARGER



PLASTIC ROTA-CONE IN MOTION SHOWING HOW ATOMIZING SPRAY ELEMENT COATS THE EVER-CHANGING SURFACE OF MATERIAL.

PAUL O. ABBÉ ROTA-CONES—extensively used for all kinds of dry blending. In a matter of minutes a thorough blend can be obtained, regardless of the number of different materials and their comparative weights. The mixing action is extremely gentle and particle size and shape are not affected.

The Rota-Cone is also extremely useful for uniformly adding limited quantities of liquid to a dry base. An atomized spray, rigidly positioned over the batch, coats the constantly changing surface of dry material. This ensures a uniform distribution of the liquid. Wet areas, in the batch and on the blender walls, are avoided.

The use of an agitating element greatly enlarges the usefulness of the Rota-Cone Blender. Soft lumps are quickly dispersed and particle reaggregation is prevented. Fibrous masses can be separated and blended with dry or liquid additives without seriously affecting their structure.

The spraying and beating elements in combination or singly, can also, in many cases, be used to advantage in the Rota-Cone Vacuum Dryers.

PAUL O. ABBE ROTA-CONE VACUUM DRYERS—efficiently and economically dry a wide variety of materials in the form of

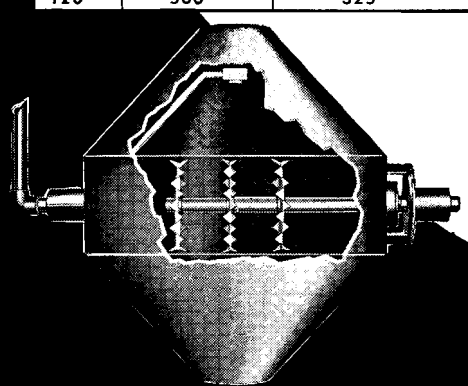
Powders	Chips	Shavings
Granules	Pellets	Filter Cake
Flakes	Crystals	Slurries

Temperature sensitive materials can be dried at low temperatures because of the high vacuum obtainable. Toxic fumes or vapors are always contained within the vacuum line and cannot escape into the working area. Solvent recovering is possible by means of a condenser. Particle size and shape are not affected, even where friable flakes or crystals are involved. Drying is rapid and thorough.

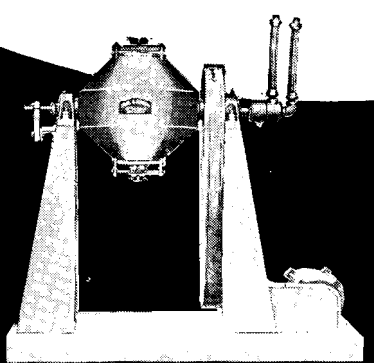
TABLE OF ROTA-CONE SIZES

Diam.	Total Volume Cubic Feet	Maximum Operating Capacity Cubic Feet
9"	.2	0.14
12"	.5	0.3
18"	1.7	1.1
24"	3.9	2.5
30"	7.7	5.0
36"	13.5	8.8
42"	21	13
48"	32	20
54"	45	30
60"	62	40
66"	83	54
72"	108	70
78"	137	90
90"	210	135
96"	255	165
108"	365	240
120"	500	325

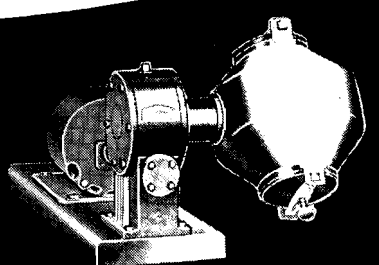
Paul O. Abbé Rota-Cones are of all-welded construction. The completely assembled cones are lathe-turned to insure perfect alignment. They are supported by rugged steel stands and the heavy steel motor base is an integral part of the main stand. Heavy duty antifriction roller bearings are standard equipment. Rota-Cone Vacuum Dryers are available in steel, stainless steel, aluminum, Monel, or bronze, and they can be lined with rubber or plastic.



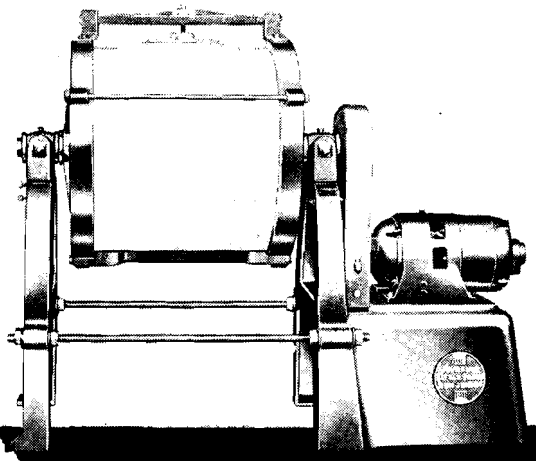
CUT-AWAY VIEW OF ROTA-CONE SHOWING SAW-TOOTH AGITATING ELEMENT AND SPRAY NOZZLE. OTHER TYPES OF AGITATING ELEMENTS CAN BE SUPPLIED, DEPENDING UPON MATERIAL TO BE HANDLED.

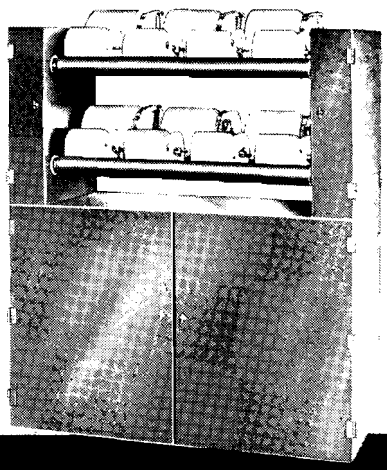


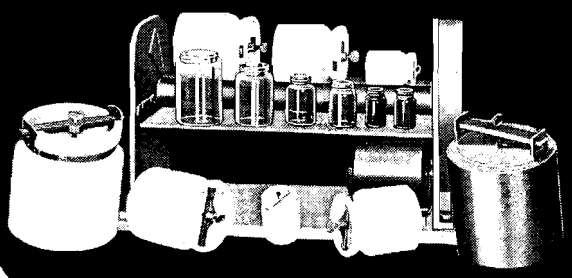
12" ROTA-CONE VACUUM DRYER

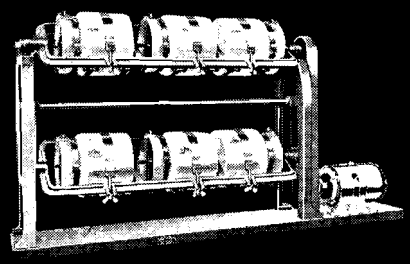


9" ROTA-CONE BLENDER









FOR DEVELOPING NEW PRODUCTS - MAKING SAMPLES - AND IMPROVING PRODUCTION ROUTINES.

PAUL O. ABBÉ JAR ROLLING MILLS—are custom built from standard parts. This makes it possible to meet the individual requirements of the user without the extra cost custom equipment usually entails. They are built in single or multiple tiers, with 2 or more rolls per tier. Roll sizes range from 2" to 6" in diameter and 12" to 7 ft. long. Roll spacing is adjustable for different size jars. The roll surface is Neoprene, vulcanized to a steel core and smoothly ground to exact size. Other roll materials, including conductive rubber, wood, steel, etc., can also be furnished. All rolls are driven to prevent jar slippage and insure a uniform jar speed. Antifriction bearings are lifetime lubricated. Graphited bronze ball bearing jar stops prevent jars from creeping off ends of rolls. All drive parts are completely enclosed for safe, clean operation.

FRAME TYPE JAR MILLS—more than 350 types and sizes—for laboratory—pilot plant—and semi-production work.

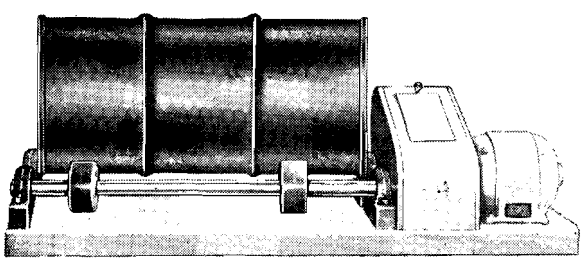
TRUNNION MOUNTED JAR MILLS—built in 5 sizes, ranging from 8 to 57 gallons. They are especially recommended for pilot plant, semi-production, and larger laboratory batches.

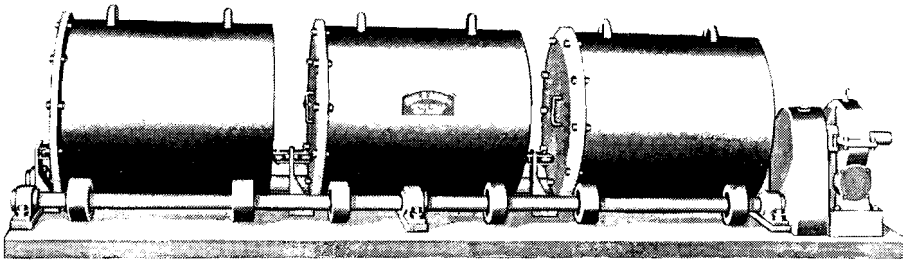
JARS—made of highest quality white vitrified porcelain fortified with alumina for extra density and resistance to abrasion and impact. Jars can also be supplied in steel, stainless steel, bronze, etc. Rubber linings can also be furnished.

PAUL O. ABBÉ BARREL ROLLERS—made in single and multiple units. They can be arranged for rolling standard or special drums. Spacing is adjustable to suit different sizes, and variable speed drives can also be furnished for speed adjustments to compensate for changes in the size of the drums to be rolled.

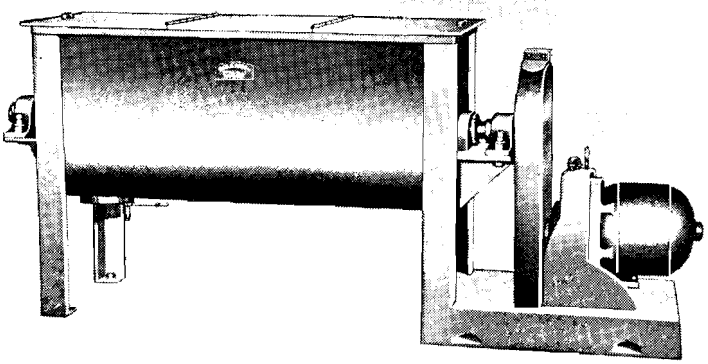
STANDARD JAR SIZES

Size of Jar	Outside Diameter Inches		Contents Gallons
	Diam.	Height	
Mijit	3.13	3.87	½ Pt.
S.S. Specimen	5.13	5.50	0.25
Specimen	5.25	5.80	0.25
Bacilli	6.06	6.60	0.41
S.S. Assay	8.75	9.00	1.25
Assay	8.75	9.65	1.25
No. 0	12.75	9.65	3.00
No. 1	13.40	12.50	4.00
Domestic	11.25	13.12	4.00
No. 2	14.75	16.50	7.00
No. 2A	22.50	24.50	30.00
No. 3	18.00	10.25	8.00
No. 4	18.00	19.00	13.50
No. 5	23.00	19.50	24.25
No. 5A	25.30	23.25	35.30
No. 6	30.00	24.50	57.00

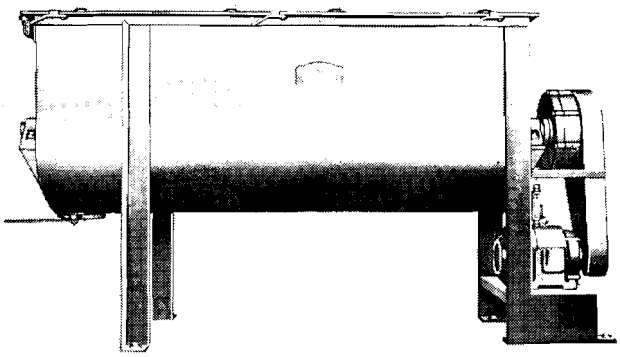




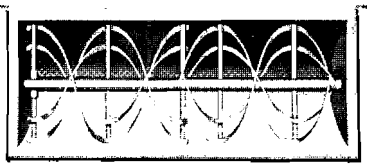
WRITE FOR SECTION A OF CATALOG "Y" FOR FURTHER DETAILS



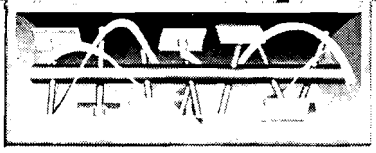
A MIXER WITH ROLLER CHAIN AND GEAR MOTOR DRIVE



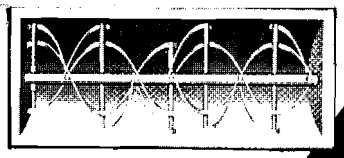
RIBBON MIXER WITH SHAFT PACK DRIVE



DOUBLE SPIRAL BLADE



DOUBLE SPIRAL BLADE WITH MULLERS



DOUBLE SPIRAL BLADE WITH INTERRUPTED OUTER FLIGHT

PAUL O. ABBÉ RIBBON MIXERS—in addition to their primary function of dry blending, these mixers are often used to mix liquids and slurries, for crystallizing, densifying, and chemical or physical reactions. They can be arranged for either batch or continuous operation.

Various types of discharge valves are available for quickly and easily unloading the finished batch. Location of the valve can be either at the end or in the center.

Mixing blades are furnished in a wide range of styles to permit the selection of a type that will most efficiently handle the materials involved. Three of the most popular styles are illustrated.

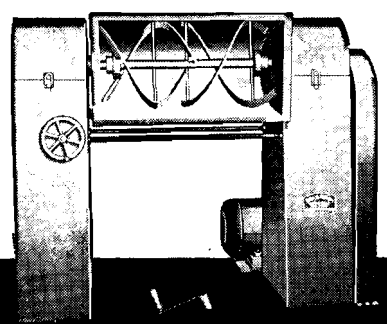
Paul O. Abbé Ribbon Mixers are ruggedly built to provide years of trouble-free low-cost operation. Mixing bowls are of welded steel construction. Heavy duty antifriction roller bearings are mounted outboard so no oil or grease from the bearings can get into the mixer bowl, and no material from the mixer can work its way into the bearings. Easily adjusted packing boxes seal the mixer shaft. Jackets, for any pressure, can be supplied with any size Ribbon Mixer for heating or cooling the batch.

Mixers are built with various metals, including steel, stainless steel, aluminum, bronze, Monel, etc. They can also be lined with rubber or plastic.

STANDARD RIBBON MIXER SIZES

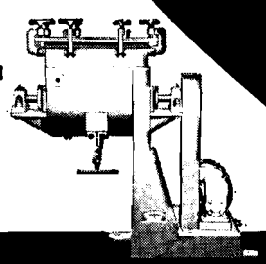
Size	Mixing Volume Cu. Ft.	Mixing Volume Gals.	Bowl Dia.	Bowl Height	Bowl Length
0	.1	.6	6"	7"	5"
1	1.0	8	12"	15"	16"
2	1.3	10	12"	15"	20"
3	1.8	14	12"	15"	28"
4	3.5	27	14"	17"	40"
5	7.5	55	18"	22"	50"
6	11	82	18"	22"	74"
7	17	125	22"	26"	76"
8	20	146	22"	26"	90"
9	26	192	26"	30"	84"
10	36	270	30"	35"	88"
11	46	346	30"	35"	114"
11-A	59	444	36"	42"	100"
12	72	540	42"	48"	90"
13	91	684	42"	48"	114"
14	119	893	48"	54"	114"
15	150	1125	54"	63"	114"
16	186	1400	60"	69"	114"

Larger sizes and variations in those listed can be furnished.



RIBBON MIXER WITH TILTING BOWL

JACKETED LABORATORY RIBBON MIXER WITH VACUUM COVER

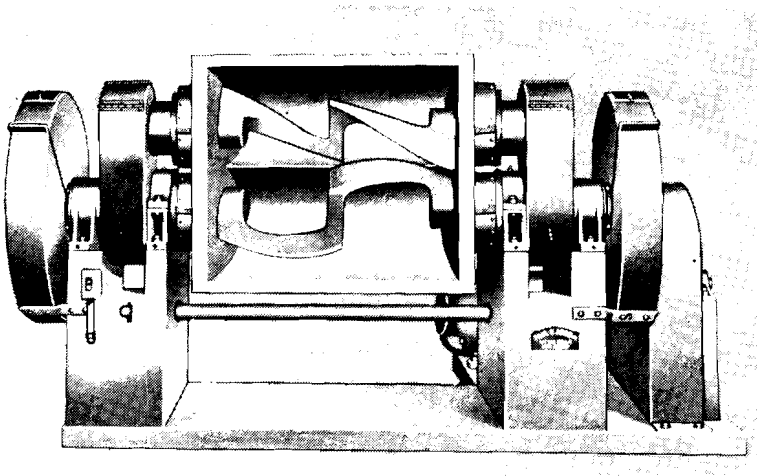


PAUL O. ABBÉ INC

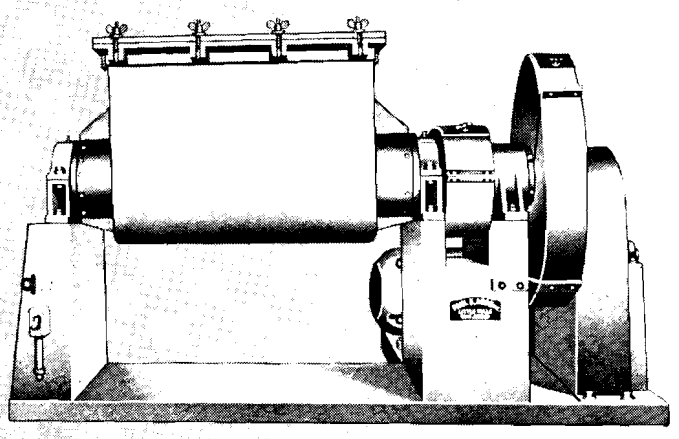
141 CENTER AVENUE, LITTLE FALLS, NEW JERSEY - TELEPHONE: 201-CL 6-4242

REPRESENTATIVES

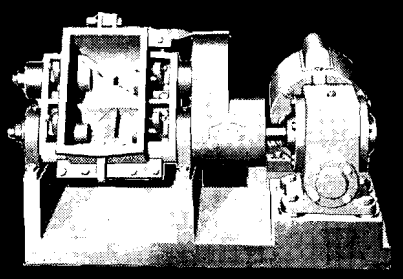
ATLANTA 5, GEORGIA: George H. Crossley & Associates, 3390 Peachtree Rd., N. E., Telephone: 231-4278
CHICAGO 6, ILLINOIS: Stolley & Orlebeke, 605 W. Washington Blvd., Telephone: DE 2-1737
CINCINNATI 44, OHIO: R. F. Kleinfeldt Co., 2234 Berrywood Drive, Telephone: BE 1-1200
CLEVELAND 2, OHIO: R. F. Kleinfeldt Co., 8905 Lake Avenue, Telephone: AT 1-2552
SAGINAW, MICHIGAN: A. C. Beckert Co., 21 Berger Road, Telephone: 793-2420
ST. LOUIS 19, MISSOURI: P. W. Wittke Co., PO Box 52, Webster Groves, Telephone: WO 1-8494
FOREIGN: Columbian Carbon International Inc., 380 Madison Ave., New York 17, N. Y.



LARGE SIZE HEAVY DUTY
MASS AND PASTE MIXER



LARGE SIZE NORMAL DUTY
MASS AND PASTE MIXER



LABORATORY MASS AND PASTE MIXER

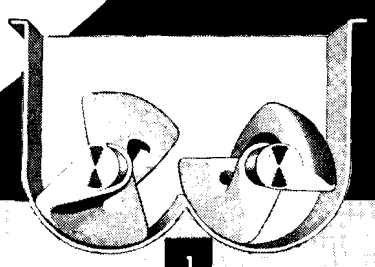
PAUL O. ABBÉ MASS and PASTE MIXERS have been developed for fast, thorough mixing and kneading of all types of pastes. They are made with single or double end drive. Single end is preferred for normal duty—double end for heavy duty. They are equipped with antifriction bearings throughout. Packing glands are easily accessible for maintenance and provide freedom from contamination. Machine-cut gears are completely enclosed at all times for protection from dust and dirt. Hydraulic dumps are furnished with the larger mixers, and either manual or hydraulic on the smaller sizes.

Mixing bowl and blades furnished in steel, stainless steel, brass, aluminum, Monel, or other metals. Bowls can also be lined with rubber or plastic.

Standard blade designs are illustrated and they can be installed for either tangential or overlapping operation.

Jackets for heating or cooling can be supplied, and where high pressures are involved A.S.M.E. code construction is used.

Dust proof covers, and covers for vacuum or pressure, are optional.



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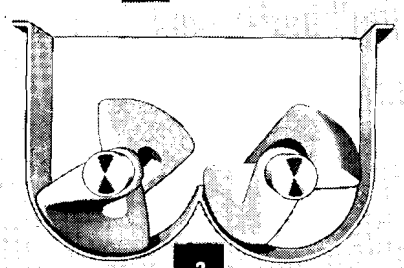


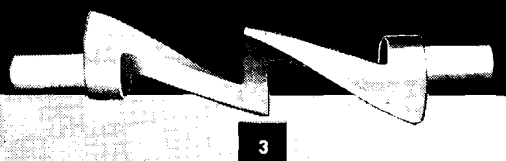
2

MASS AND PASTE MIXER SIZES

Size No.	Bowl Capacity Gallons	Mixing Capacity Gallons	HP
0B	1/3	1/4	1/4 - 1/3
0A	3/4	1/2	1/4 - 1/2
1B	2	1	1/2 - 1
1A	4	2	3/4 - 1 1/2
1	5	3	3/4 - 2
2	8	5	1 - 3
3	20	10	1 1/2 - 5
5	40	20	3 - 7 1/2
7	70	40	7 1/2 - 15
8	90	60	10 - 25
9	115	75	10 - 25
10	160	100	15 - 30
11	250	150	15 - 40
12	300	200	20 - 50
13	450	300	25 - 60

**WRITE FOR CATALOG "D"
FOR COMPLETE DETAILS**

1 OVERLAPPING BLADES
2 TANGENTIAL BLADES
3 CINCINNATUS BLADE
4 DISPERSION BLADE



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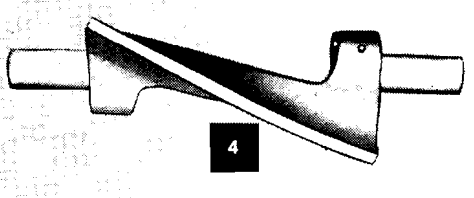

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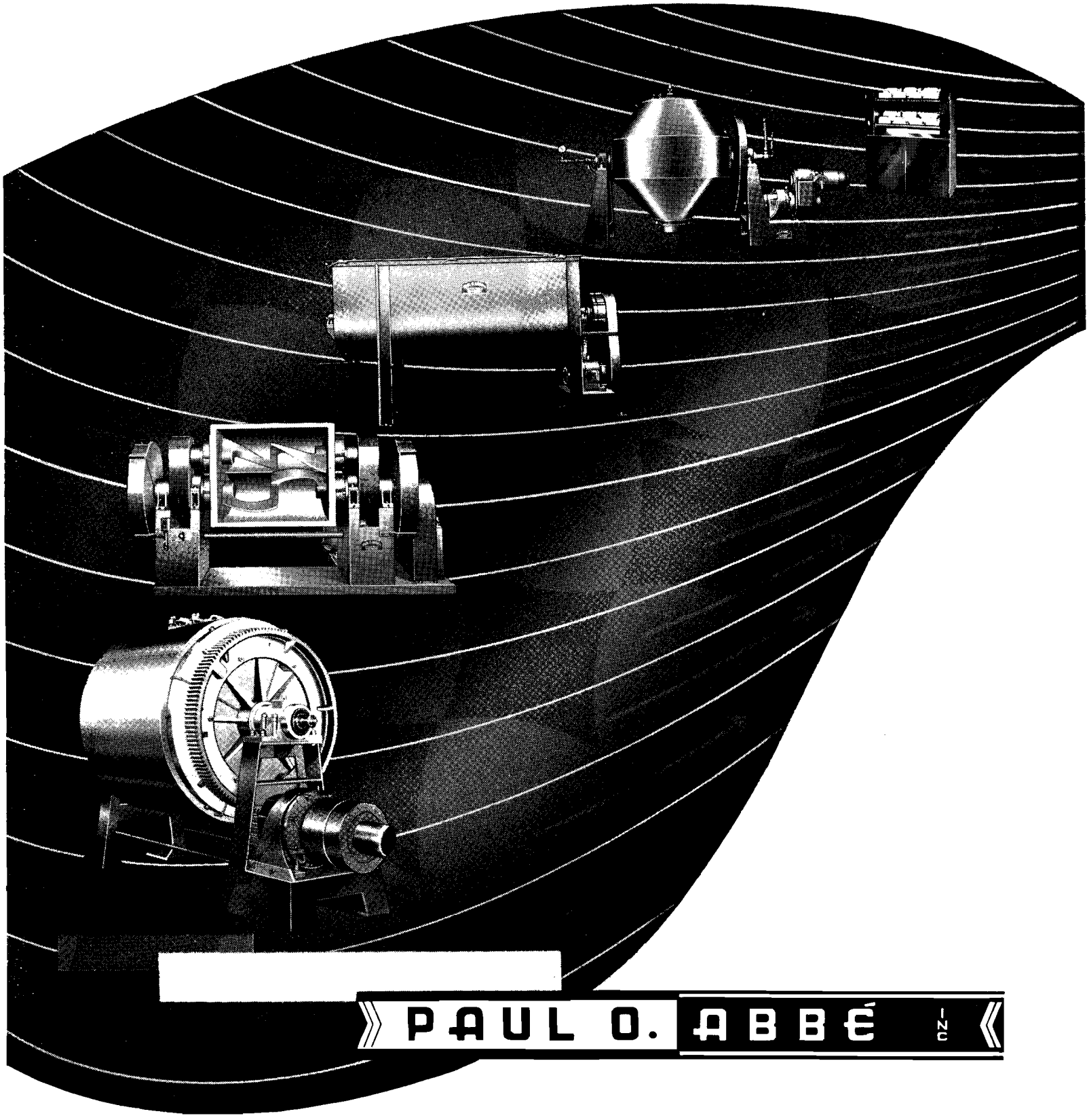


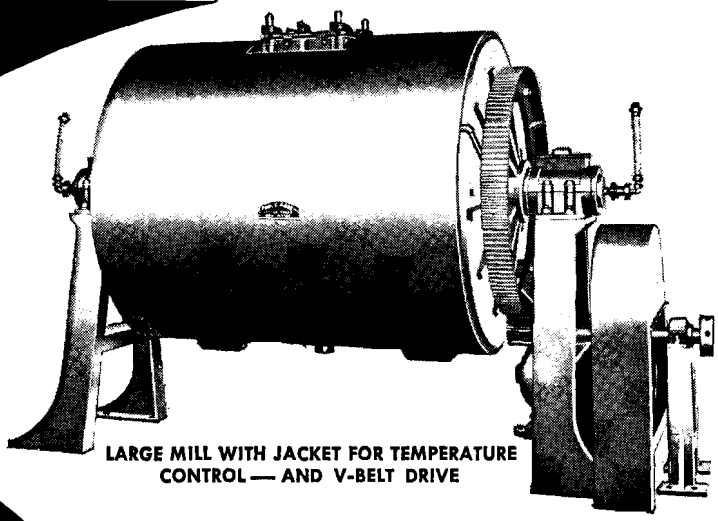
PAUL O. ABBÉ INC

WALTER [illegible]
P. O. BOX [illegible]
HOUSTON, TEXAS 77024
HO 8-5142

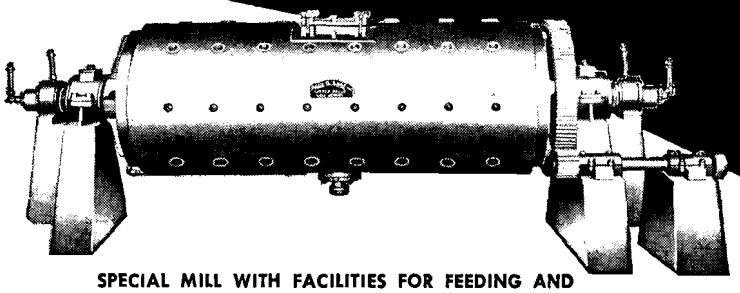
Paul O. Abbé has pioneered in the design and manufacture of Chemical Processing Equipment for Plant and Laboratory since 1893 which has set and maintained standards for rugged durability and efficiency unmatched in its field.

We maintain a Technical Service Department, available to customers for confidential cooperation in the solving of special problems and aid in maintaining strict quality production standards.

PAUL O. ABBÉ INC

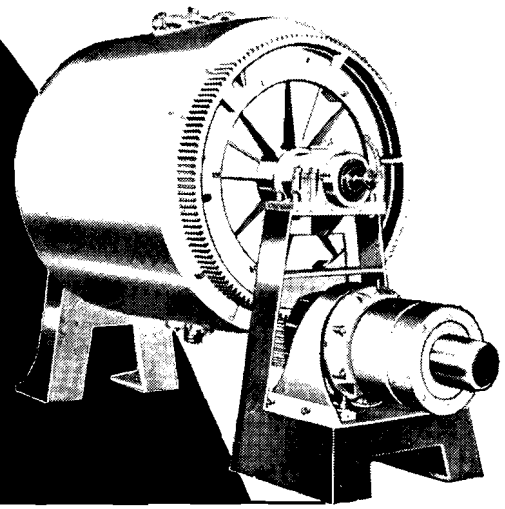


LARGE MILL WITH JACKET FOR TEMPERATURE CONTROL — AND V-BELT DRIVE



SPECIAL MILL WITH FACILITIES FOR FEEDING AND REMOVING AIR, GAS, OR LIQUID, WHILE MILL IS RUNNING. USED ON CHEMICAL REACTIONS AND OTHER SPECIAL APPLICATIONS

LARGE MILL WITH JACKET FOR TEMPERATURE CONTROL — AND GEAR MOTOR DRIVE WITH MAGNETIC BRAKE



GRINDING - MIXING - REACTIONS

Rugged all steel cylinders and ends, with oversize forged steel trunnions insure years of continuous trouble-free performance. Fine tooth gears provide highest efficiency and quiet operation. Pinion is bottom mounted to equalize running strains and permit periodic changes in rotation for longer life to the gears and lining.

The heavy steel motor base is an integral part of the main stand, which prevents misalignment.

Jackets can be installed on the cylinders, or cylinders and ends, of any mill for circulating a heating or cooling medium for temperature control. Baffles in the jacket insure uniform circulation.

Steel Ball Mills—Grinding cylinders are chrome manganese but can be furnished in stainless steel or other metals. Replaceable steel liner plates are also available. Chip proof baffle bars are easily replaced when worn to maintain highest operating efficiency.

Pebble Mills—Linings available include standard and high density porcelain—imported or domestic Burrstone—various types of rubber—and other special materials.

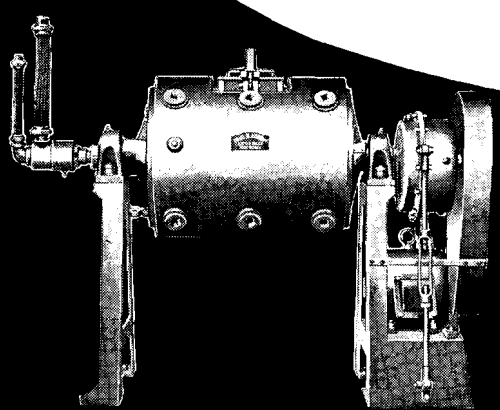
Standard or high density porcelain—special selected imported flint pebbles—thru-hardened steel balls—stainless steel—bronze—and other metals in a wide range of sizes.

Built in diameters from 2 ft. to 6 ft., and lengths from 10 ft. to 22 ft.

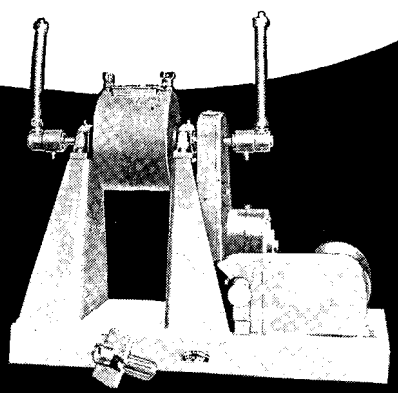
STANDARD MILL SIZES

Mill No.	Inside Diameter & Length of Cylinder		Total Volume of Cylinder	
	Dia.	Length	Lined Pebble Mills Gallons	Unlined Steel Ball Mills Gallons
9	15"	21"	9	16
8	18"	24"	16	26
8½	21"	28"	28	42
8A	24"	30"	40	59
8B	24"	36"	49	70
7	32"	24"	60	83
6	32"	36"	94	125
5A	37"	48"	166	223
5B	42"	48"	220	287
4A	45"	48"	251	330
4B	48"	60"	369	470
3A	54"	48"	389	476
3C	54"	60"	494	594
2	60"	48"	470	587
2A	60"	60"	597	734
2B	60"	72"	726	883
2½	62"	72"	778	944
1	72"	60"	853	1057
1A	72"	72"	1035	1269
0	72"	96"	1405	1692
0A	72"	108"	1585	1903
0B	72"	120"	1765	2120
00	90"	120"	2850	3300

Operating capacity—
Wet grinding: 25-60% of total volume
Dry grinding: 25% of total volume



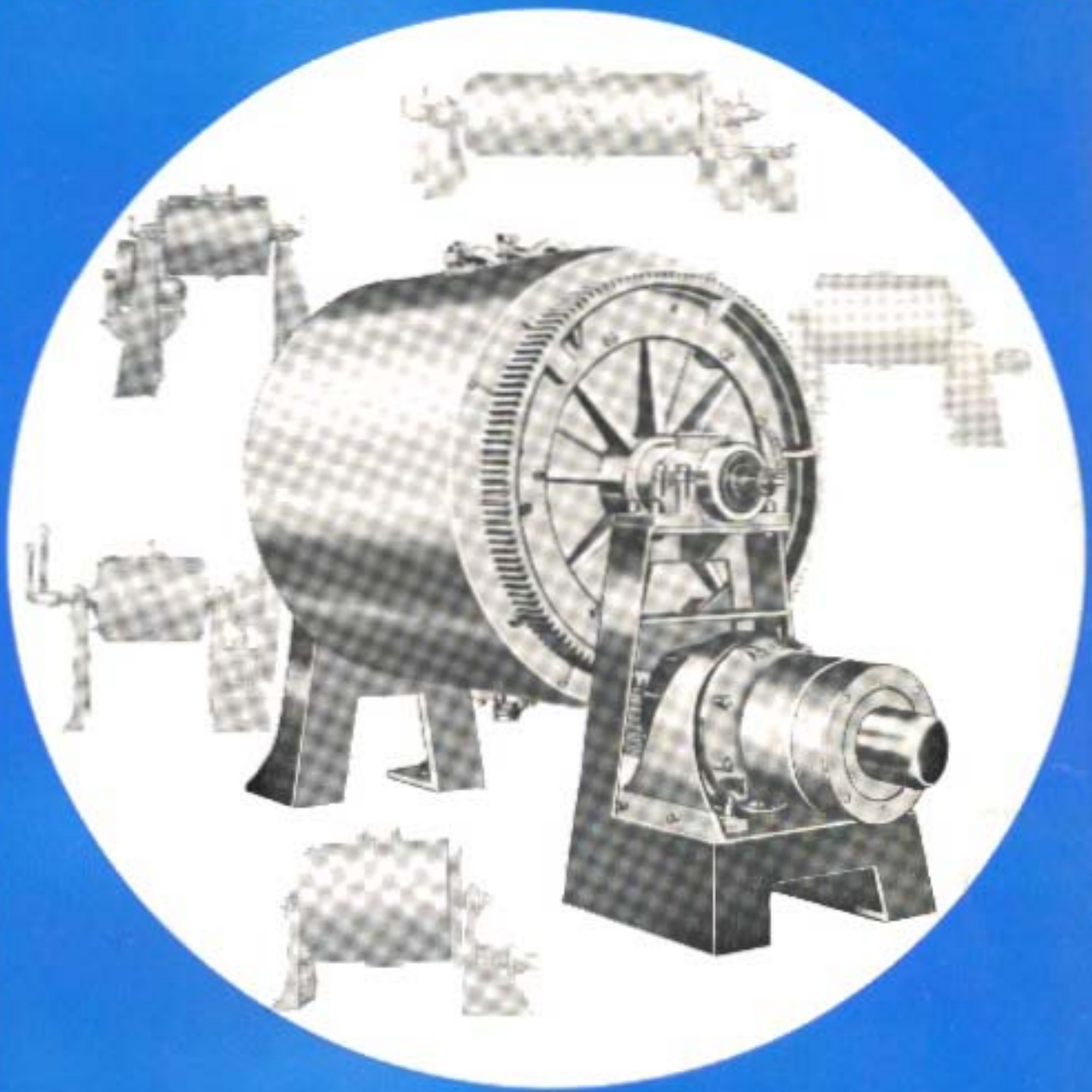
SMALL JACKETED STEEL BALL MILL WITH TORQUE-ARM DRIVE



JACKETED LABORATORY STEEL BALL MILL

CATALOG B-1

BALL & PEBBLE MILLS



PAUL O. ABBÉ INC.

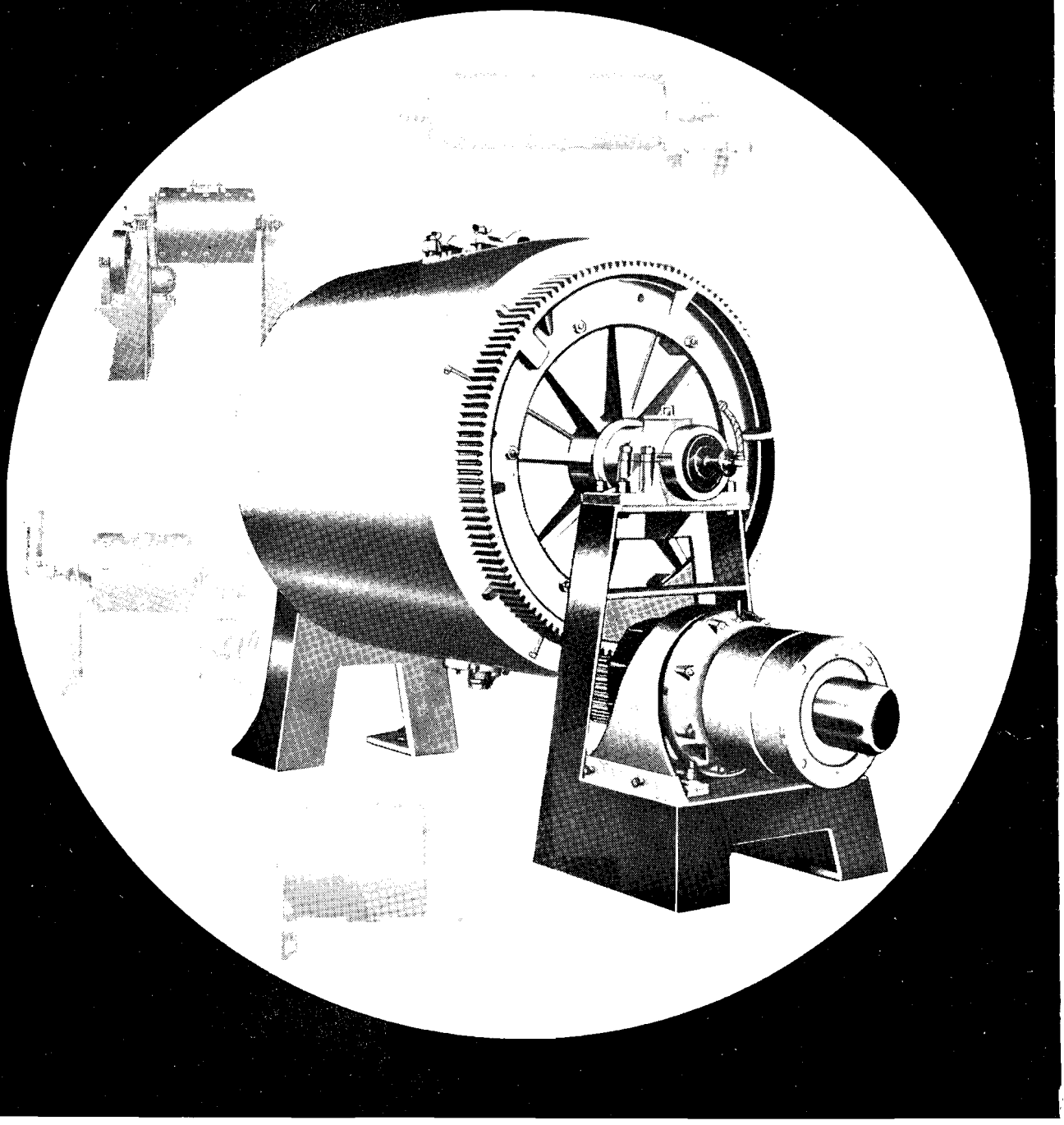
152 CENTER AVENUE • LITTLE FALLS, NEW JERSEY

WALTER H. KNAPP
P. O. BOX 19085
HOUSTON, TEXAS 77024
HO 8-5142

TELEPHONE CLifford 6-4242

CATALOG B-1

BALL & PEBBLE MILLS



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DESIGN AND CONSTRUCTION

GEARS AND PINIONS

FINE PITCH MACHINE-CUT GEARS are standard equipment on Paul O. Abbé Mills, assuring smooth, quiet, vibration-free operation. The strength safety factor is sufficient to carry loads many times the rated capacity of the Mills and for this reason, with normal care, they last for many years even on a twenty-four hour daily schedule. The Ring Gears are bolted to steel pads on the Mill head and if replacements are ever necessary they can be quickly made on the job. The outer circumference of the Gears is less than that of the Mill cylinder. This provides maximum safety in operation and there is less chance of spilling material on the gear teeth.

Note: In some dry grinding operations it is desirable to completely enclose the cylinder with a dust housing. In these cases, gears can be installed on the outside of the bearing. See Figures on pages 24 and 25.

PINION LOCATION

It is especially important to see that the countershaft or direct motor drive is securely mounted. These are the first to feel the shock of the initial starting torque and must absorb a good portion of the running strains as well. Centering the pinion at the bottom of the gear is the best insurance for smooth, trouble-free performance and, consequently, all standard Paul O. Abbé Mills are driven in this manner. Some of the other advantages of this bottom pinion mounting are listed as follows:

1. Drive pressures on countershaft bearings and motor base deflected diagonally downward, thereby distributing strains equally on base and bolts.
2. Rotation of pinion can be made in either direction without affecting alignment or increasing running strains. This means effectively doubling the life of both gear and pinion, as well as increased convenience and versatility of installation.
3. No extended bearing support-arm to allow swaying or misalignment.
4. Pressure on bearings equalized.
5. Correct alignment maintained, insuring even meshing of gears.
6. Mills run more quietly and smoothly than with other types of mountings, and power costs are less. Gears wear longer — many Paul O. Abbé Mills have been running as long as 30 years with original gears, despite continued service.
7. Any drive installed does not protrude beyond the rim of Mill, even when guards are included. This minimizes floor space requirements.
8. Less operating hazard because pinion is installed at bottom of large gear — out of the way.

When desired, other locations for the pinion are available.

BEARINGS

Either babbitted or anti-friction roller bearings can be supplied with any Paul O. Abbé Ball and Pebble Mill. Our standard main bearings are babbitted with a high grade babbitt that has had the test of many years of successful service. They are designed in accordance with the best engineering practice so that running friction is kept at a minimum. An extra large bearing surface eliminates the danger of bearing fatigue.

A section of brick grease placed in the top half of the bearing provides sufficient lubrication for many months, even when running on a twenty-four hour schedule.

The countershafts of mills driven by V-belt or Silent Chain run at considerably faster speeds than the Mills, hence self-aligning heavy duty anti-friction roller bearings are furnished on these countershafts.

STANDS

Paul O. Abbé Ball and Pebble Mills are mounted on sturdy stands, providing adequate clearance under the discharging valve. These stands are machine-finished on all metal contact surfaces and have extra wide feet for greater floor bearing and stability. They are exceptionally strong and heavy and are designed to absorb all starting and running strains.

There are many occasions when the height must be changed to meet special operating conditions. If this is the case, high or low steel stands can be provided. Elevating the Mill can also be accomplished with concrete sub-bases. These are considerably heavier than the steel stands, however, and should be avoided where the floor load is limited.

DESIGN AND CONSTRUCTION

PATENTED STEEL FOR BALL MILL SHELL

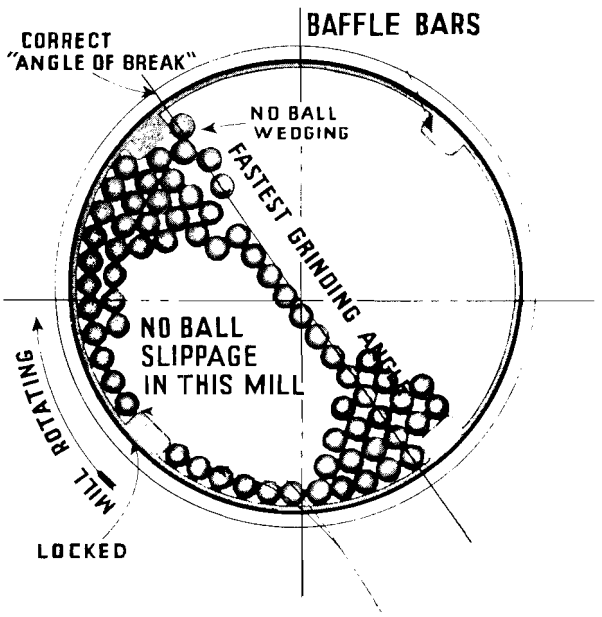
The shell in a Paul O. Abbé steel ball mill is a patented Chrome Manganese Steel. Every plate is tested chemically and mechanically, and must meet very rigid specifications before being passed for construction. A high tensile strength provides an extra safety factor for the heaviest load of Balls and Material. The hard, tough qualities of this special patented steel reduce the danger of contamination, excessive wear, and ridging of the shell. Butt welded seams and joints, made by skillful welders, provide a seamless, smooth, inner surface—leak-proof and easy to clean. We can furnish Liners in place of the special Chrome Manganese Steel Shell whenever desired, in plain or corrugated types; and made of different kinds of metal to suit any special operating requirements.

BAFFLE BARS

Webster defines a baffle as "something which controls or directs flow." No better description could possibly be applied to the Paul O. Abbé baffle bars, for they have been specifically designed to direct the flow of balls and material in order to attain the most efficient grinding action.

A glance at the illustration shows why these bars work so well. The flat-sided baffle bars assure the maximum locking effect along the cylinder wall. All backward movement is thereby eliminated. The position of the balls does not change until they reach the correct angle of break. When they finally break away from the cylinder wall they achieve the swift maximum grinding energy which occurs only when the correct angle of break is maintained and backward slipping of the charge is eliminated.

The bars are shallow, eliminating excessive lifting or throwing of the balls. The outer edges in contact with the balls are smoothly rounded to eliminate any danger of chipping or flaking. There are many advantages in this type of bar but the most important are as follows:



This row of Balls "locked"--no friction, no wear on Shell while Mill revolves.

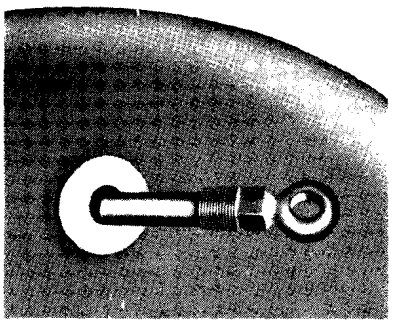
• • • •

1. Faster Grinding.
2. More uniform results.
3. No ridging of the shell thereby increasing its life by many years.
4. Less wear to the ball charge.
5. Less contamination because excessive wear is eliminated.

Paul O. Abbé baffle bars are made of a special chip proof, heat treated steel which resists the grinding and impact action of the steel balls. They last for many years, generally as long as the shell itself. Since any projections inside the Ball Mill shell are subject to wear there can be severe cases when the baffle bars will not last as long as the mill shell, and must be replaced. On such occasions replacements can be quickly and easily made on the job, since the bars are bolted to the cylinder.

Welded bars can be supplied where requested.

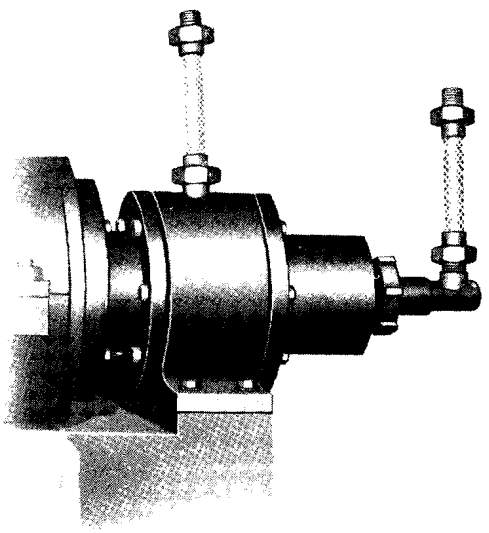
ACCESSORIES



AIR VENTS

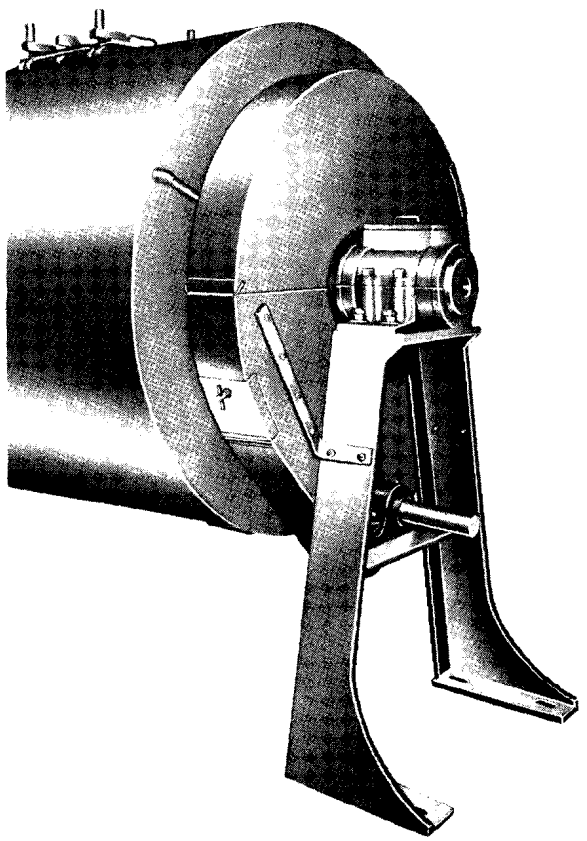
All wet grinding mills are equipped with air vents. They are used for releasing pressure that might build up while grinding, extracting samples at intermittent stages of the grinding cycle, and for attaching an air line when air pressure is desired to facilitate discharging. These vents are generally located in the head opposite the gear drive. Bronze plug closures are standard but other materials like Steel, Stainless, or Cast Iron can also be supplied.

DOUBLE ROTARY UNION



For chemical reactions, drying, distillation, etc., it is sometimes necessary to Jacket the outside of the Cylinder for temperature control of the batch and at the same time provide for drawing a vacuum, applying pressure, or introducing gases or liquids to the inside of the mill. The Paul O. Abbé double rotary union shown above has been designed to permit the fluid for the jacket to flow to and from the mill, and at the same time leave the center of the trunnion open so that the pressure can be controlled or the necessary fluids added to the batch as the mill is revolving.

GEAR GUARDS

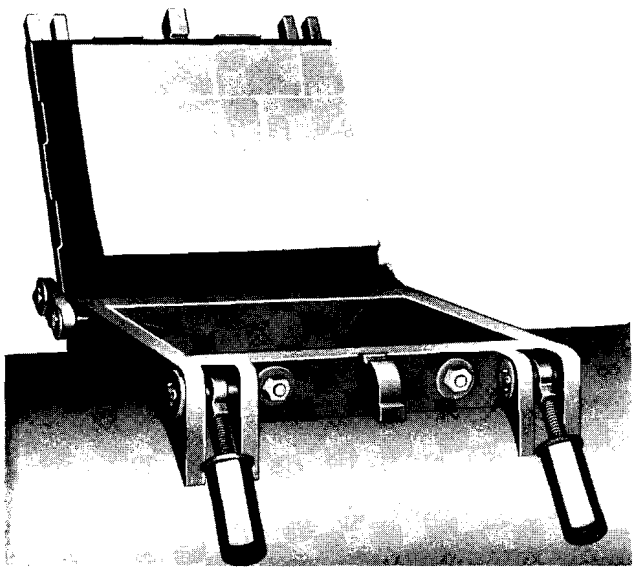


Gear guards that totally enclose both the large gear and pinion can be furnished when desired. They comply with all the safety regulations and also prevent dust and grime from collecting on gears.

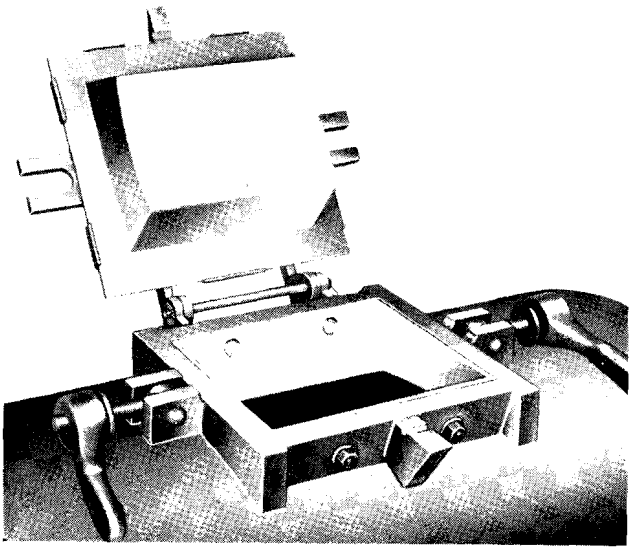
DESIGN AND CONSTRUCTION

HINGED COVERS, as illustrated, are supplied on all Mills equipped with Built-In Discharge Valves. This arrangement saves gaskets and insures constant alignment of the cover. The hinge is transferable from one side of the cover to the other, permitting complete flexibility in locating the loading side of the Mill.

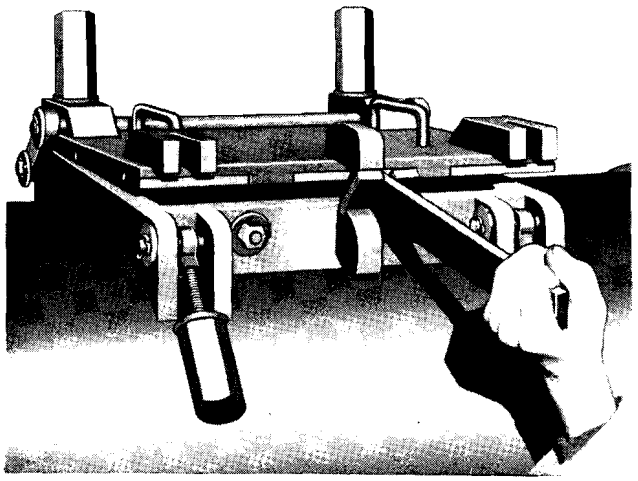
Illustrations show standard designs with swing bolts, but crossbar closures can be furnished when desired.



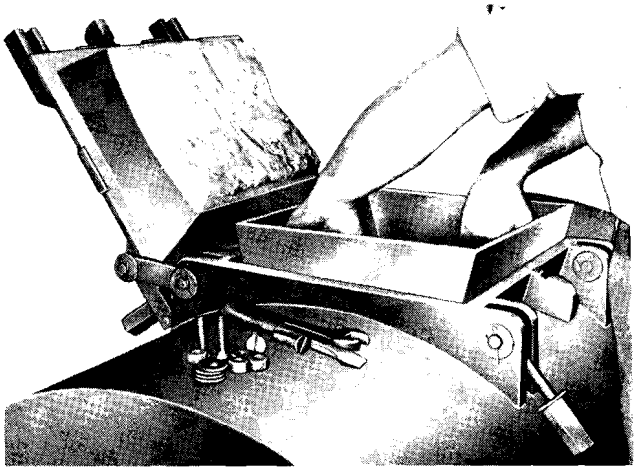
Porcelain lined hinged cover. Standard design for all mills 37" in diameter and larger.



Burrstone lined hinged cover. Standard design for all mills 32" in diameter and smaller.



HANDY WEDGE BAR (above) breaks the cover seal quickly and easily by either a push or pull, from above, below, or in front of the mill. The bar is not attached to the Mill and after using, may be placed to one side — out of the way.

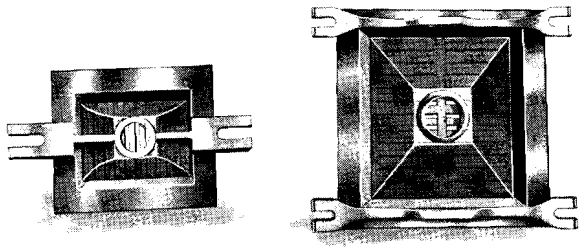


STEEL MANHOLE FRAMES are standard on all Paul O. Abbé Mills. They are welded to the Mill Shell, thus eliminating any danger of leakage. The flanges on the Pebble Mill Frames are detachable as shown above, and may be easily replaced.

WET DISCHARGES

WET DISCHARGE COVER

For discharging, this cover replaces the grinding cover. It is equipped with a grate which allows the material to flow out of the mill but retains the pebbles or balls. It is possible to install a valve to control the flow if desired.

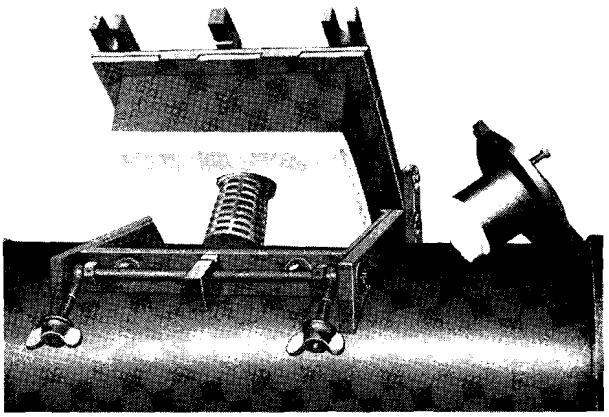


COMBINATION GRINDING AND WET DISCHARGE COVER

The Combination Cover, like the Built-in Discharges, eliminates the need for a separate wet discharge cover. While grinding a solid plug is retained in the opening of the cover and to discharge this is replaced by a grate plug which allows the material to flow from the mill and retains the grinding media.

A valve can be installed on the outside of the grate plug to control the flow of material, if desired.

Combination covers are available with all types of mills and linings, including steel ball mills. Supplied unhinged, if preferred.



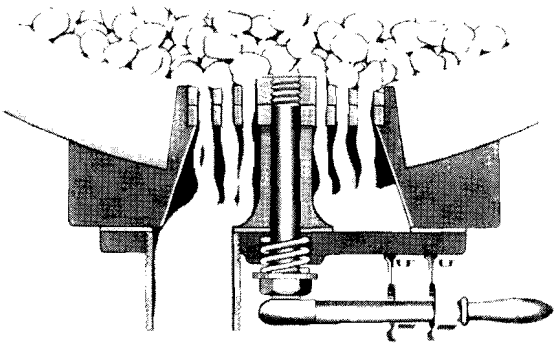
PATENT DISCHARGE VALVE

This type of valve is usually installed opposite the manhole opening but can be supplied as part of the grinding cover. It eliminates the need for an extra discharge cover.

It seals the mill inside the grinding chamber. To discharge, a quarter turn of the handle lines up slotted openings in a sliding grate parallel with similar openings in a stationary grate. The material then flows out through the openings and the grinding media are retained in the mill.

The grate surfaces are carefully ground to provide a positive seal against leaks. A coil spring applies constant pressure to seal the valve while the mill is running and control the flow of material during discharge.

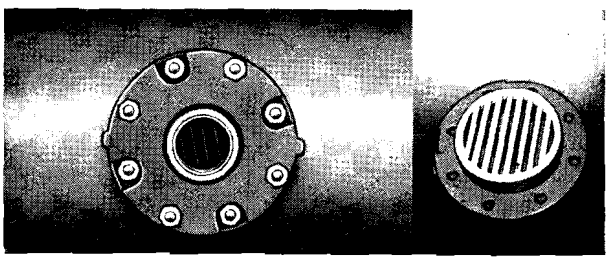
Not recommended with steel balls.



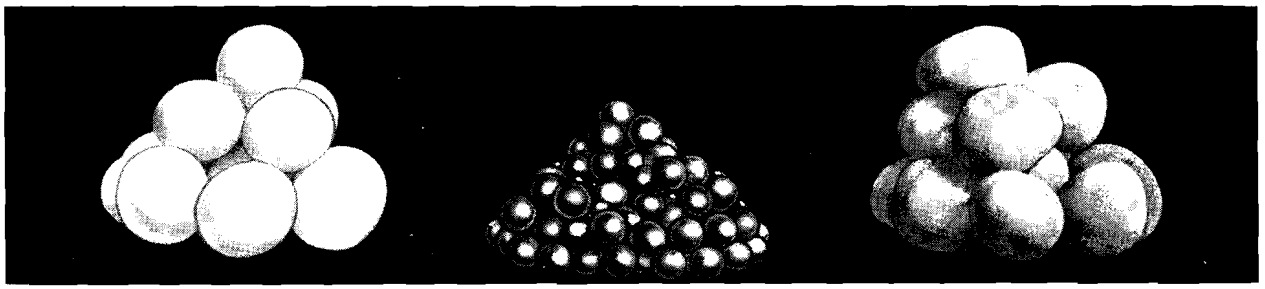
BUILT-IN DISCHARGE GRATE

This type of valve is usually installed opposite the manhole opening. This valve has no internal closure. While the slots remain open as the Mill is running, the material does not pack in the space behind them because this area is constantly being flushed out as the cylinder revolves.

A threaded opening is provided for a plug cock or some other type of quick acting valve, if desired.



GRINDING MEDIA



FLINT PEBBLES

Paul O. Abbé imported French flint pebbles are the most popular and versatile of all grinding media. Their irregular shapes, exposing large grinding surfaces, insure the highest degree of grinding efficiency and are particularly effective where very fine grinding or complete dispersion is required in the shortest possible time. These pebbles are extremely hard and dense, thus eliminating all danger of contamination and insuring perfect grinding results on the most delicate products.

They are being used for grinding frit, glazes, white and colored paints, enamels and lacquers, food products, latex compounds, aniline dyes, graphite and clay mixtures for lead pencils, plastics, chemicals, and all other products ordinarily handled in Pebble Mills. Flint pebbles can be used in Mills having any type of lining; Burrstone, standard and high density porcelain, rubber, or even in unlined Mills.

The best grade pebbles are obtained from the Normandy beach in France. Exceptional care is taken in their selection. They are lighter in color, more uniform in size, and have fewer defects than ordinary pebbles. As a result of this discriminating selection, superior results may be expected using Paul O. Abbé selected French flint pebbles.

PORCELAIN BALLS

Where a pure white grinding media is required, Paul O. Abbé porcelain balls are recommended. Due to a carefully controlled manufacturing process, they will not chip or break in service. They have a dense, vitrified structure which is impervious to moisture and color. Consequently they can be cleaned easily and used with any type of lining whether porcelain, burrstone, steel, etc.

HIGH DENSITY BALLS

For faster grinding Paul O. Abbé high density porcelain balls are available in all sizes. They weigh 40% more than standard porcelain balls and this extra weight provides more efficient grinding, especially on products that are difficult to break up like vitreous enamel and some types of paint. Except for steel balls, Paul O. Abbé high density balls are the fastest grinding media now in use.

STEEL BALLS

Paul O. Abbé steel balls are made of an alloy steel especially adapted for Ball Mill grinding and they insure the very highest quality finished product. A uniform heat treatment provides a through hardness of 60 to 65 Rockwell C.

They are supplied polished or unpolished. The polished balls require no conditioning. The unpolished balls have all scale removed and will develop a high polish after a few runs.

SPECIAL METAL BALLS

Metal balls made of the following materials can be furnished when required:

Cast nickel alloy	Bronze
Stainless steel	Brass
Chilled iron	Aluminum
Forged low carbon steel	Tungsten carbide

SIZES AND WEIGHTS OF BALLS AND PEBBLES

PORCELAIN BALLS		HIGH DENSITY PORCELAIN BALLS		STEEL BALLS		FLINT PEBBLES	
1/2" Dia	175 to lb	1/4" Dia.	975 to lb	1/4" Dia	430 to lb	No. A-1	1/2" Long 90 to lb
3/4" "	56 " lb	1/2" "	150 " lb	3/8" "	125 " lb	No. B-2	5/8"- 3/4" " 55 " lb
1" "	24 " lb	3/4" "	47 " lb	1/2" "	53 " lb	No. C-3	3/4"- 1" " 24 " lb
1 1/4" "	10 " lb	1" "	15 " lb	5/8" "	26 " lb	No. 00	1"-1 1/4" " 6 " lb
1 1/2" "	6 " lb	1 1/4" "	8 " lb	3/4" "	17 " lb	No. 0	1 1/4"-1 3/4" " 4 " lb
2" "	2.5 " lb	1 1/2" "	4.6 " lb	7/8" "	9.5 " lb	No. 1	1 3/4"-2 3/8" " 2 " lb
2 1/2" "	1.3 " lb	1 3/4" "	2.9 " lb	1" "	7 " lb	No. 2	2 3/8"-2 7/8" " 1 " lb
3" "	.9 " lb	2" "	2 " lb	1 1/4" "	3.5 " lb	No. 3	2 7/8"-3 1/2" " .8 " lb
		2 1/2" "	1 " lb	1 1/2" "	2 " lb		
				2" "	.8 " lb		

"ALL STEEL" PEBBLE MILLS

SIZES AND SPECIFICATIONS OF PAUL O. ABBÉ PEBBLE MILLS

Pebble Mill No	Inside Diameter and Length of Cylinder		Total Volume of Cylinder				Batch Sizes										Speed† R P M		Recommended Horsepower of Motors‡	
			Porcelain or High Density Lined		Burrstone Lined		Porcelain or High Density Lined					Burrstone Lined								
							Dry Material	Wet Material				Dry Material	Wet Material							
	Diam	Lgth	Cu Ft	Gals	Cu Ft	Gals	Lbs*	Gals	40% Charge Gals	60% Charge Gals	Thin** down Cap Gals	Lbs*	Gals	40% Charge Gals	60% Charge Gals	Thin** down Cap Gals	Dry	Wet	Porcelain or Flint Media	High Density Media
9	15″	21″	1 2	9			30	2 3	3 6	5 4	6 3						50	46	½	½
8	18″	24″	2 1	16			53	4	6	10	11						44	41	½	¾
8½	21″	28″	3 7	28			92	7	11	17	20						41	38	¾	¾
8A	24″	30″	5 4	40	4 7	35	135	10	16	24	28	117	9	14	21	24	38	35	1½	1½
8B	24″	36″	6 6	49	5 8	43	165	12	20	29	34	145	11	17	26	30	38	35	1½	1½
7	32″	24″	8	60	7 4	53	200	15	24	36	42	178	13	21	32	37	32	29	2	2
6	32″	36″	12 6	94	11 4	85	315	24	38	56	66	285	21	34	51	59	32	29	2	3
5A	37″	48″	22	166	22	163	550	42	66	100	116	550	41	65	98	114	30	28	3	5
5B	42″	48″	30	220	29	216	750	55	88	132	154	725	54	86	130	151	26	24	3	5
4A	45″	48″	34	251	34	251	850	63	100	151	176	850	63	100	151	176	25	23	5	7½
4B	48″	60″	49	369	46	346	1230	92	148	222	258	1150	86	138	208	242	24	22	7½	10
3A	54″	48″	52	389	47	351	1300	97	156	234	272	1175	88	140	211	246	23	21	7½	10
3C	54″	60″	66	494	60	448	1650	124	198	297	346	1500	112	179	269	314	23	21	10	15
2	60″	48″	63	470	59	442	1580	118	188	282	329	1475	110	177	265	309	22	20	10	15
2A	60″	60″	80	597	76	566	2000	149	237	359	418	1900	142	226	340	396	22	20	10	15
2B	60″	72″	97	726	92	688	2420	182	290	436	508	2300	172	276	413	481	22	20	15	20
2½	62″	72″	104	778	99	740	2600	195	312	468	545	2475	185	296	444	518	21	19	15	20
1	72″	60″	111	853	114	853	2850	213	341	513	597	2850	213	341	513	597	18	16	15	20
1A	72″	72″	138	1035	138	1035	3450	259	414	622	725	3450	259	414	622	725	18	16	20	25
0	72″	96″	188	1405	188	1405	4700	351	562	843	984	4700	351	562	843	984	18	16	25	30
0A	72″	108″	212	1585	212	1585	5300	396	634	952	1110	5300	396	634	952	1110	18	16	25	40
0B	72″	120″	236	1765	236	1765	5900	441	706	1059	1236	5900	441	706	1059	1236	18	16	30	40
00	90″	120″	381	2850	381	2850	9500	713	1140	1710	1995	9500	713	1140	1710	1995	16	14	50	60

Pebble Mill No	Inside Diameter and Length of Cylinder		Clearance of Shell to Floor	Depth of Valve	Height of Mill	Floor Space Required		Grinding Media Charge Lbs***			Approx. Shipping Weights Lbs Motor Driven Mills Not Including Media			
											Porcelain or Burrstone Lined		High Density Lined	
	Diam	Lgth				V-Belt or Silent Chain Drive	Compack Drive	Flint Pebbles	Porcelain Balls	High Density	Unjacketed	Jacketed	Unjacketed	Jacketed
9	15″	21″	18″	5″	3′ 3″	3′ 8″x 3′ 5″	4′ 9″x2′ 2″	60	53	81	900	950	980	1050
8	18″	24″	17″	6″	3′ 6″	3′11″x 3′ 6″	5′ 0″x2′ 8″	105	93	141	1100	1200	1200	1300
8½	21″	28″	16″	6″	3′ 8″	4′ 4″x 3′ 9″	6′ 8″x3′ 0″	185	165	248	1300	1450	1450	1550
8A	24″	30″	20″	6″	4′ 3″	5′ 7″x 4′ 0″	7′ 1″x3′ 3″	270	240	365	1900	2100	2050	2250
8B	24″	36″	20″	6″	4′ 3″	6′ 2″x 4′ 0″	8′ 1″x3′ 3″	330	295	445	2000	2300	2200	2500
7	32″	24″	23″	6″	5′ 2″	5′11″x 4′ 9″	7′ 4″x3′10″	400	355	535	2300	2600	2550	2850
6	32″	36″	23″	6″	5′ 2″	6′ 9″x 5′ 2″	7′ 5″x3′10″	630	560	845	2700	3100	3000	3350
5A	37″	48″	20″	6″	5′ 5″	7′ 6″x 5′ 7″	9′ 8″x4′ 3″	1100	980	1480	4300	4800	4750	5300
5B	42″	48″	21″	6″	5′10″	8′ 7″x 6′ 3″	9′ 6″x4′ 8″	1500	1330	2020	5200	5800	5800	6400
4A	45″	48″	25″	8″	6′ 7″	8′ 7″x 6′ 0″	10′ 5″x4′10″	1700	1510	2280	6100	6800	6800	7500
4B	48″	60″	24″	8″	6′ 9″	9′10″x 6′ 3″	11′ 3″x5′ 5″	2450	2180	3290	7500	8400	8400	9300
3A	54″	48″	21″	8″	7′ 0″	8′10″x 6′11″	10′ 3″x6′ 6″	2600	2320	3490	7700	8400	8500	9300
3C	54″	60″	21″	8″	7′ 5″	10′ 2″x 7′ 0″	10′ 9″x6′ 6″	3300	2940	4430	8800	9700	9800	10800
2	60″	48″	24″	8″	7′ 7″	10′ 0″x 6′10″	11′10″x6′ 5″	3150	2800	4230	11500	12400	12500	13400
2A	60″	60″	24″	8″	7′ 7″	10′ 8″x 6′10″	12′ 1″x6′ 4″	4000	3560	5370	11700	12800	12900	14000
2B	60″	72″	24″	8″	7′ 9″	11′ 5″x 7′ 1″	14′ 3″x6′ 5″	4850	4320	6520	11800	13400	13100	14800
2½	62″	72″	24″	8″	7′11″	11′ 8″x 7′ 8″	14′ 3″x6′ 6″	5200	4630	6980	12200	13900	13600	15300
1	72″	60″	30″	8″	9′ 1″	12′ 2″x 9′ 1″	13′ 5″x7′ 5″	5700	5080	7650	18200	19900	19900	21600
1A	72″	72″	30″	8″	9′ 1″	13′ 2″x 9′ 1″	14′ 9″x7′ 5″	6900	6140	9260	19200	21100	21200	23100
0	72″	96″	30″	8″	9′ 1″	15′ 3″x10′ 1″	17′ 6″x7′ 5″	9400	8360	12610	22600	25100	25100	27600
0A	72″	108″	30″	8″	9′ 1″	16′ 3″x10′ 1″	18′ 9″x7′ 5″	10600	9430	14230	23600	26300	26200	28900
0B	72″	120″	30″	8″	9′ 1″	17′ 3″x10′ 1″	19′ 1″x7′ 5″	11800	10500	15830	25700	28800	28400	31500
00	90″	120″	36″	9″	11′ 1″	18′ 9″x10′ 7″	21′ 0″x9′ 2″	19000	17000	25600	28800	32600	32600	36400

Dry charging capacity based on sand weighing 100 lbs. per cubic foot.

** Thinned down capacity 70% of total contents.

*** Flint Pebble and Porcelain Ball Charge Based on 50% of Mill Volume. High Density Charge Based on 55% of Mill Volume.

† Speeds are the best average that have been calculated through experience. Some materials require changes in Mill speed, which is taken into consideration at time Mill is furnished. See page 2B.

‡ Recommended horsepowers are for average conditions. Power requirements may change with material weight and in some types of dry grinding. It is best to consult our engineering department for specific recommendations.

"ALL STEEL" BALL MILLS

SIZES AND SPECIFICATIONS OF PAUL O. ABBÉ STEEL BALL MILLS

Ball Mill No	Inside Diameter and Length of Cylinder		Total Volume of Cylinder		Batch Sizes — Dry Material		Batch Sizes — Wet Material		Wet Material Thinned Down Capacity**		Speed† R P M		Recommended Horsepower of Motors‡
	Diameter	Length	Cu Ft	Gallons	Lbs *	Gals	40% Charge Gals	60% Charge Gals	1/3 Ball Charge Gals	1/2 Ball Charge Gals	Dry	Wet	
9	15″	21″	2	16	50	4	6	10	13	11	44	41	¾
8	18″	24″	3 5	26	88	7	10	16	21	18	41	38	1
8½	21″	28″	5 6	42	140	11	17	25	34	29	37	34	1½
8A	24″	30″	8	59	200	15	24	35	47	41	36	33	3
8B	24″	36″	9	70	225	18	28	42	56	49	36	33	3
7	32″	24″	11	83	275	21	33	50	66	58	31	28	3
6	32″	36″	17	125	425	31	50	75	100	87	31	28	5
5A	37″	48″	30	223	750	56	89	134	178	156	28	26	7½
5B	42″	48″	38	287	950	72	115	172	229	200	25	23	7½
4A	45″	48″	44	330	1100	83	132	198	264	231	24	22	10
4B	48″	60″	63	470	1575	118	188	282	376	329	22	20	15
3A	54″	48″	64	476	1600	119	190	286	381	333	21	19	15
3C	54″	60″	79	594	1975	149	238	357	475	416	21	19	20
2	60″	48″	78	587	1950	147	235	352	470	412	19	17	20
2A	60″	60″	98	734	2450	183	294	441	587	513	19	17	25
2B	60″	72″	118	883	2950	221	353	530	707	617	19	17	25
1½	62″	72″	126	944	3150	236	378	567	755	660	19	17	30
1	72″	60″	141	1057	3520	264	423	634	845	740	17	15	30
1A	72″	72″	170	1269	4250	317	507	761	1015	888	17	15	40
0	72″	96″	226	1692	5650	423	677	1017	1350	1185	17	15	50
0A	72″	108″	254	1903	6350	476	761	1142	1520	1332	17	15	60
0B	72″	120″	283	2120	7070	530	848	1272	1690	1480	17	15	60
00	90″	120″	441	3300	11020	825	1320	1982	2640	2310	14	12	75

Ball Mill No	Inside Diameter and Length of Cylinder		Clearance of Shell to Floor	Depth of Valve	Height of Mill	Floor Space Required — V-Belt or Silent Chain Drive	Floor Space Required — Compack Drive	Ball Charge Lbs — 33⅓%	Ball Charge Lbs — 50%	Approximate Shipping Weights, Motor Driven Mills Lbs (Not Including Balls) — Unjacketed	Approximate Shipping Weights, Motor Driven Mills Lbs (Not Including Balls) — Jacketed
	Diameter	Length									
9	15″	21″	18″	8″	3′ 4″	4′ 1″x 3′10″	4′11″x2′ 4″	200	300	780	840
8	18″	24″	17″	8″	3′ 7″	4′10″x 4′ 0″	5′ 2″x2′10″	350	525	1000	1080
8½	21″	28″	15″	8″	4′ 0″	4′ 8″x 3′10″	7′ 1″x3′ 4″	560	840	1200	1320
8A	24″	30″	20″	10″	4′ 7″	6′ 1″x 4′ 7″	7′ 7″x3′10″	780	1170	1560	1780
8B	24″	36″	20″	10″	4′ 7″	6′10″x 4′10″	7′ 2″x3′10″	930	1395	1630	1890
7	32″	24″	21″	10″	5′ 1″	6′ 2″x 5′ 0″	6′10″x4′ 6″	1100	1650	2200	2470
6	32″	36″	21″	10″	5′ 1″	7′ 3″x 5′ 3″	7′10″x4′ 6″	1680	2520	2480	2870
5A	37″	48″	23″	10″	6′ 0″	8′ 7″x 5′ 9″	10′ 1″x5′ 0″	2980	4470	3560	4120
5B	42″	48″	20″	12″	6′ 3″	8′ 5″x 6′ 8″	10′ 3″x5′ 6″	3830	5745	4560	5190
4A	45″	48″	25″	11″	6′11″	9′ 1″x 6′ 4″	11′ 0″x5′ 9″	4400	6600	7640	8310
4B	48″	60″	23″	12″	7′ 0″	9′10″x 6′ 9″	12′11″x6′ 1″	6280	9420	6980	7850
3A	54″	48″	20″	12″	7′ 3″	9′ 6″x 7′ 0″	12′ 0″x6′ 6″	6350	9525	7240	8030
3C	54″	60″	20″	12″	7′ 3″	10′ 2″x 7′ 0″	12′ 6″x6′ 6″	7940	11910	8900	9870
2	60″	48″	24″	12″	8′ 1″	9′ 7″x 8′ 0″	13′ 0″x7′ 0″	7840	11760	9940	10760
2A	60″	60″	24″	12″	8′ 1″	11′ 1″x 8′ 0″	14′ 0″x7′ 0″	9800	14700	11160	12230
2B	60″	72″	24″	12″	8′ 1″	12′ 1″x 8′ 0″	15′ 0″x7′ 0″	11700	17700	12780	14430
1½	62″	72″	23″	12″	8′ 2″	13′ 1″x 8′ 0″	14′ 6″x7′ 3″	12600	18800	12950	14650
1	72″	60″	32″	12″	9′ 4″	13′ 3″x 9′ 8″	14′ 6″x8′ 1″	14100	21200	16300	18000
1A	72″	72″	32″	12″	9′ 4″	14′ 3″x 9′ 8″	16′ 3″x8′ 1″	17000	25400	18000	20000
0	72″	96″	32″	12″	9′ 4″	17′ 0″x 9′ 8″	18′10″x8′ 1″	22600	33900	23000	25500
0A	72″	108″	32″	12″	9′ 4″	18′ 2″x10′ 1″	20′ 1″x8′ 1″	25400	38200	24200	26800
0B	72″	120″	32″	12″	9′ 4″	19′ 6″x10′ 1″	21′ 8″x8′ 1″	28300	42400	26300	29400
00	90″	120″	35″	12″	11′ 7″	20′ 6″x11′ 5″	22′ 9″x9′ 7″	44000	66000	34800	38600

* Dry charging capacity based on sand weighing 100 lbs. per cubic foot.

** With 1/3 ball charge thinned down capacity is 80% of total volume. With ½ ball charge, thinned down capacity is 70% of total contents. Variation in ball charge changes the operating capacity of Mill.

† Speeds are the best average that have been calculated through experience. Some materials require changes in Mill speed, which is taken into consideration at time Mill is furnished. See page 2B.

‡ Recommended horsepowers are for average conditions. Power requirements may change with material weight and in some types of dry grinding. It is best to consult our engineering department for specific recommendations.