

Operating and Maintenance Manual

Mikro-Pulverizer® Model #4

*Carefully read this manual before attempting
to operate or service this equipment*

**Record the model and serial number of your equipment
and always refer to them when ordering replacement parts
or requesting service assistance.**

For replacement parts or service, call (800) 526-4491

FOREWORD

The #4 MIKRO-PULVERIZER™ hammer mill is a high speed, close tolerance hammer mill with very high grinding efficiency and output.

The basic design of the #4 Mikro Pulverizer™ hammer mill can be adapted for a variety of applications. Record your machine MODEL TYPE and SERIAL NUMBER. Refer to them when ordering replacement parts.

IMPORTANT:

Before installing, operating or maintaining this equipment, carefully read this Manual and follow the Safety recommendations in Section II.



HOSOKAWA MICRON POWDER SYSTEMS

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Aftermarket Services

Thank you for choosing Hosokawa Micron Powder Systems as your supplier of powder processing equipment.

As a Hosokawa Micron Powder Systems customer, you receive much more than high quality equipment and spare parts. Your purchase is supported by our extensive resources and more than seventy years of applications experience, all of which are combined in our Aftermarket Services team.

We will work with your operators, engineers and managers to keep your powder processing lines up and running. When you're ready to automate, integrate, modernize or expand, call us—we're ready to help.

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For technical assistance, please call us at (908) 273-6360. You may request to speak directly to the departments listed below. Additional information about our services is available from the Aftermarket Services Department.

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Our Process Technology Department consists of engineers who are dedicated to providing state-of-the-art powder processing assistance.

- System optimization
- Process troubleshooting
- Technical seminars
- Installation consultation
- System upgrades

MECHANICAL FIELD SERVICE

Our Mechanical Field Service group has been through extensive training and has experience providing:

- Mechanical start-up
- Mechanical repair
- Maintenance seminars
- Mechanical inspections/evaluations

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- Electrical repair or troubleshooting
- Control System consultation
- Control System upgrades

SPARE PARTS

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- Blanket spare parts orders
- In-house factory repair
- In-house rebuilds/refurbishing
- Quantity discounts
- 24-hour delivery of stock items

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SECTION I

PROCESS DESCRIPTION

1-1.- PROCESS DESCRIPTION:

Grinding and pulverizing are processes in which materials are reduced in size as they are impacted by high speed rotating hammers. The term "pulverizing" is applied to fine grinding and derives from the word "polvo" (dust).

Hammer Mills are made in a number of different configurations, but consist essentially of a revolving shaft with either rigid or free swinging hammers. Hammers are designed in different sizes and shapes depending on the application. The shaft and rotor rotate in a housing which contains liners or breaker plates of various configurations. A screen encloses the bottom of the rotor to regulate the size of discharged product.

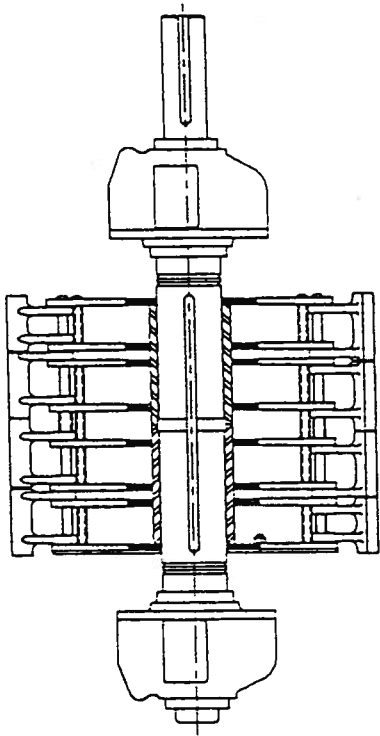
The most important variables in the pulverizing operation are:

- The size, power, and configuration of the Hammer Mill.
- The tip speed of the hammers.
- The type of hammers used.
- The size and configuration of the screen.
- The condition of the grinding and impact surfaces.
- The characteristics of the material to be processed.

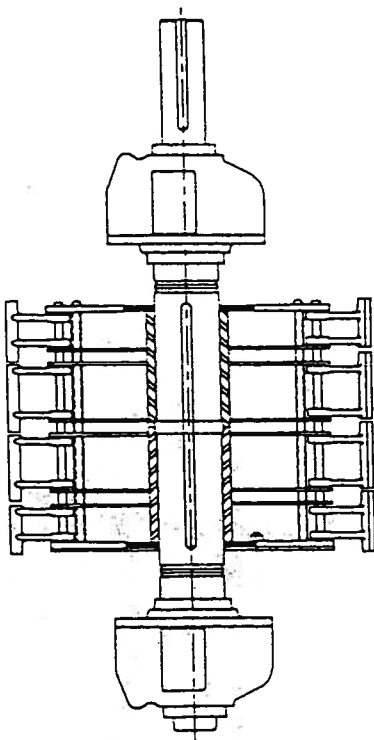
The size, power, and configuration of the pulverizer; along with the feed material size and required particle size of the finished product, determine the grinding capacity of the mill.

The speed of the hammers is a factor which affects the fineness of the product. The faster the speed, the finer the product.

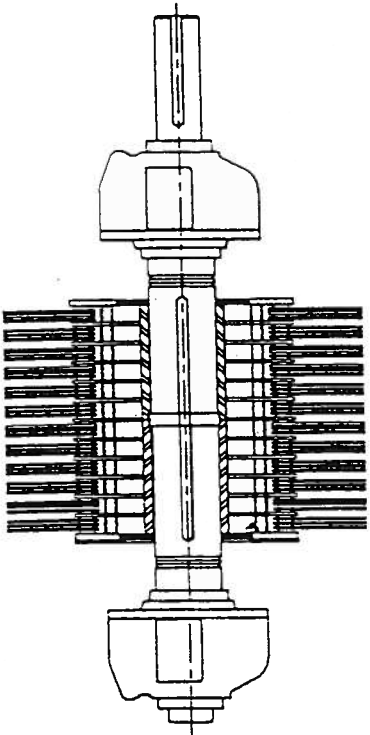
The type of hammer selected is very important (Refer to Fig. 1). Stirrup type hammers are recommended for fine grinding. Bar type hammers are used for coarser grinding or for producing a narrower particle size distribution.



HEAVY FORGED STIRRUP HAMMER



LIGHT FORGED STIRRUP HAMMER



BAR HAMMER ROTOR ASSEMBLY

ROTOR ASSEMBLIES

FIG. 1

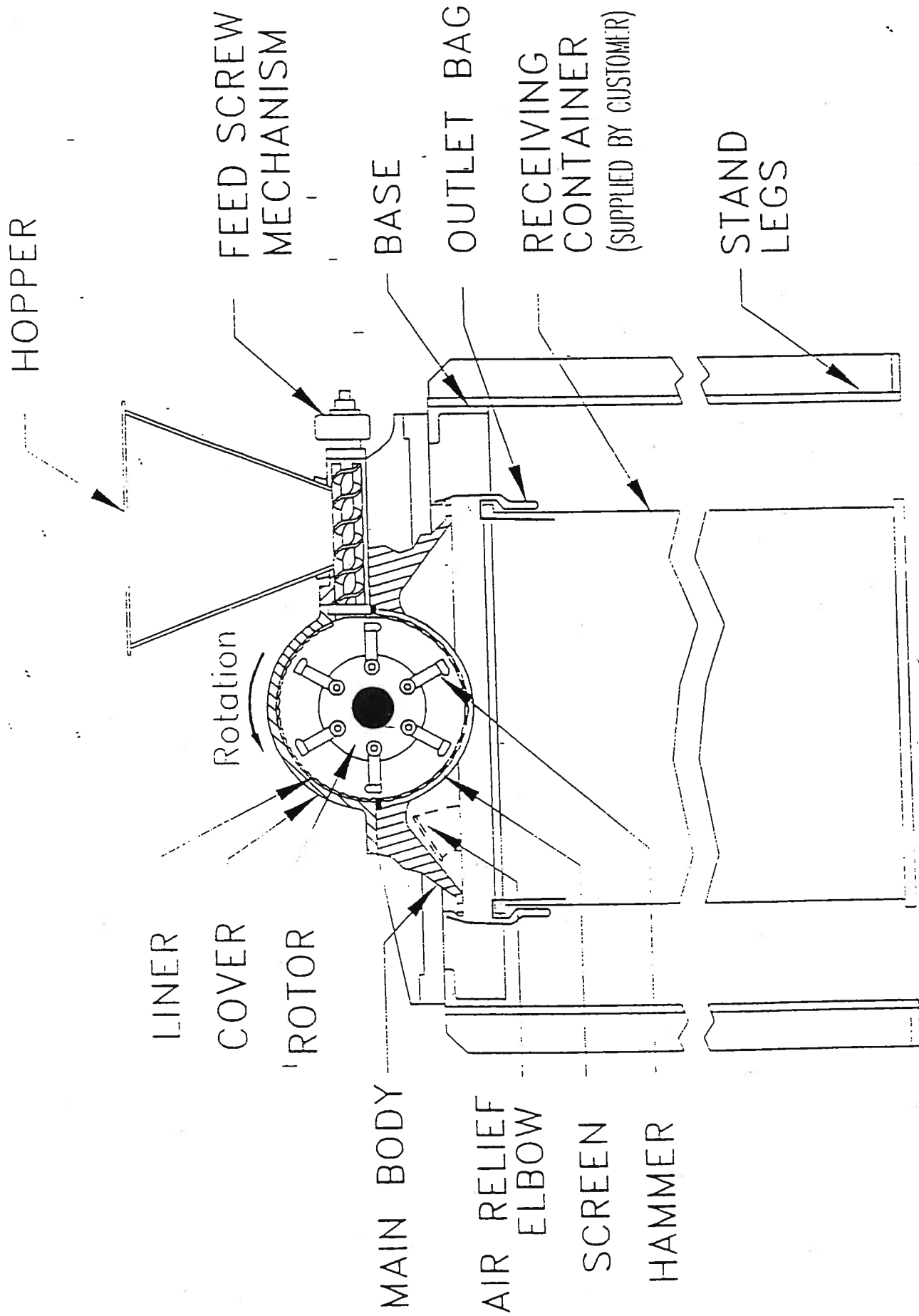


FIG. 2

The final item affecting the size of the finished product is the size and configuration of the screen holes. A smaller screen opening will deliver a finer product.

Generally, the process can be summarized as follows (Refer to Figure 2):

The material is fed into a hopper mounted above the Feed Screw. A variable speed drive gear conveys the material in a uniform fashion to the grinding chamber.

The hammers impact the material as it enters the grinding chamber propelling it toward the multiple deflector liner. This action fractures the material and is repeated until the particle size is small enough to allow the product to pass through the screen located at the bottom of the mill body.

There are adjustable vents on each side of the cover to allow air to enter the grinding chamber for purpose of cooling and also to reduce any vacuum at the feed screw mechanism produced by the fan action of the rotor. A larger vent, typically connected to a filter bag, is located on the main body of the mill. Its function is to allow for an escape path for the air flow created by the rotor. The filter bag also traps fine dust particles created during the grinding process.

SECTION II

SAFETY

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2-1.- GENERAL

NOTE: Before installing, operating, or maintaining this equipment, carefully read this Manual and the following Safety Recommendations.

- Follow all plant Working Rules and use recommended Safety Equipment.
- Read the Owner's Manual.
- The area around the Mill is dusty. Use a suitable respirator per plant policy and OSHA recommendations.
- While working around the Mill, steel toed safety shoes and safety goggles or safety glasses with side shields must be worn at all times.
- The Mill produces a noise level somewhat higher than the acceptable limit of 85 dba at 1 meter from the noise source. OSHA approved ear protection must be worn while working around the Mill.
- Keep hands and clothing clear of the Feed Hopper, Mill openings, Air inlets or any moving parts.
- To eliminate the possibility of sparking occurring within the Mill, all metallic scrap must be separated from the feed material before it enters the grinding chamber.
- Be sure Mill is electrically grounded.
- The motors must be permanently wired to an approved NEMA enclosure, in accordance with all local codes and the National Electric Code.
- Before the Mill is opened for inspection or repairs, make sure the main power is disconnected and the switch is locked out.

- When operating the Mill, all safety guards must be in place.
- Should abnormal levels of vibration or noise develop, immediately shut off the equipment, investigate the problem and do not re-start the unit until the problem has been corrected. Contact the MPS Service Department for assistance.

2-2.- EQUIPMENT SAFETY FEATURES:

The hammer mill incorporates the following safety features:

- **Fabrication:**
Our Mills are designed and built with safety in mind. All materials used have been carefully selected. All our Mills are inspected by our Quality Control personnel during fabrication and assembly.
- **Housing Cover Limit Switch:**
This Switch is interlocked with the Main Drive so that the main motor cannot run if the Cover is not in place.
- **Electric Interlock Between Motors:**
The Main Drive Motor and Feed Screw Motor are interlocked so that the Feed Screw Motor cannot be started unless the Main Drive Motor is running.
- **V-Belt Guards:**
All V-Belt Drives are protected with OSHA approved guards.
- **Moving Parts:**
All moving parts are enclosed.

2-3.- WARNING LABELS:

The following drawing identifies potential hazards.

SECTION III

EQUIPMENT DESCRIPTION

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3-1.- FEED SYSTEM

(Refer to Drawings #4-621916-M1)

The Pulverizer FEED SYSTEM consists of the following items:

- Hopper (A) with a nominal capacity of 2.3 cu. ft. (Hopper capacity ranges from 1.0 to 2.8 cu. ft.). Hopper (A) is bolted to Feed Screw Mechanism (B).
- Feed Screw Mechanism (B) is a triple screw conveyor consisting of Motor (C), driving Gear Reducer (D), Adjustable Speed Drive (E), and three Screws (F).

3-2.- PULVERIZER

(Refer to Drawings #4-621916-M1)

The PULVERIZER itself consists of the following items:

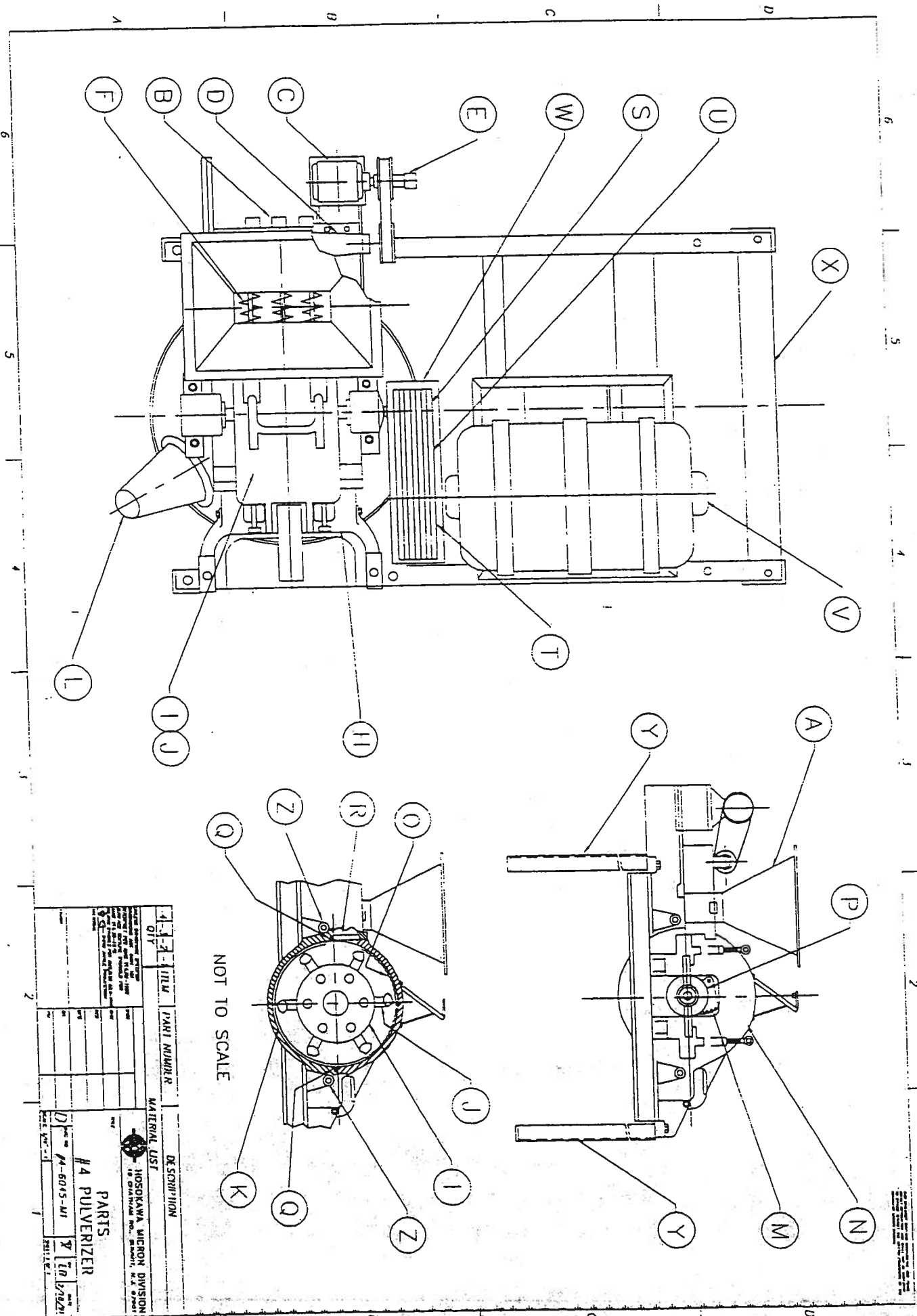
- Pulverizer Assembly consists of a Main Body (H), a Rotor Assembly (I), Cover (N) and Hammers (J).

There are retaining grooves to locate and support the Screen (K) on the interior walls of the Main Body (H). Four Screen Tightening Cams (Z) secure the Screen (K) by pinching each corner of the screen between the cam and the inner radius of the retaining groove.

The bottom of Main Body (H) is open to discharge the pulverized material into a container or pneumatic conveying system.

Air Relief Elbow (L) located on the side of the Main Body (H) is used to relieve the air flow produced by the rotation of Rotor (I). The Air Relief Elbow (L) is typically connected to a Filter Bag which traps the fine dust generated during the grinding process. When a pneumatic conveyor is used, the Air Relief Elbow is replaced with an Air Relief Cover Plate.

There are two Air Inlet Control Gates (M) one on each side of the Cover (N), with adjustable openings to let air in and to reduce any vacuum at the Feed Screws (F) caused by fan action of the Rotor (I).



NOT TO SCALE

MATERIAL LIST		DESCRIPTION	
QTY	PART NUMBER	DESCRIPTION	REMARKS
1	11111	GRINDING CHAMBER	
1	11112	GRINDING ROLLERS	
1	11113	GRINDING ROLLER SUPPORTS	
1	11114	GRINDING ROLLER SPRINGS	
1	11115	GRINDING ROLLER BOLTS	
1	11116	GRINDING ROLLER NUTS	
1	11117	GRINDING ROLLER WASHERS	
1	11118	GRINDING ROLLER LOCKWASHERS	
1	11119	GRINDING ROLLER PIN	
1	11120	GRINDING ROLLER PIN	
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1	11199	GRINDING ROLLER PIN	
1	11200	GRINDING ROLLER PIN	

PARTS
H4 PULVERIZER

HOSOKAWA MICRON DIVISION
1000 CENTRE STREET
MILWAUKEE, WIS. 53212

DATE: 10/1/72
DRAWN BY: [Signature]
CHECKED BY: [Signature]

The upper part of the Main Body (H) surface is machined and drilled to receive Cover (N); Pillow Blocks (P) and End Dust Seals (Q).

Bolted to inside of Cover (N) is a multiple deflector Liner (O), made of hard alloy steel. End Dust Seals (Q) are rubber seals located at each end of Screen (K). The feed side end dust seal is held in place by the Hold Down Plate (R).

3-3.- PULVERIZER DRIVE:

(Refer to Drawings #4-621916-M1)

The PULVERIZER DRIVE consists of the following items:

The Driven Sheave (S) is mounted on the Rotor Shaft. Driven Sheave (S) is connected by V-Belt (U) to the Drive Sheave (T), which is mounted on Motor (V) shaft. Motor (V) is mounted on Slide Rails to adjust tension of V-Belts (U). V-Belt Drive is covered by Safety Guard (W).

3-4.- PULVERIZER SUPPORT:

(Refer to Drawings #4-621916-M1)

The PULVERIZER SUPPORT consists of the following items:

- **Structural Mill Base:**

Feed Screw Mechanism (B), Main Body (H), and both Drives are bolted to a common Base (X).

- **Supporting Legs:**

Base (X) is bolted to four Stand Legs (Y) which support the mill. These legs (Y) should be anchored to suitable floor or foundation. (See Section IV, 4-1. pg. IV-1).

3-5.- ELECTRIC CONTROLS:

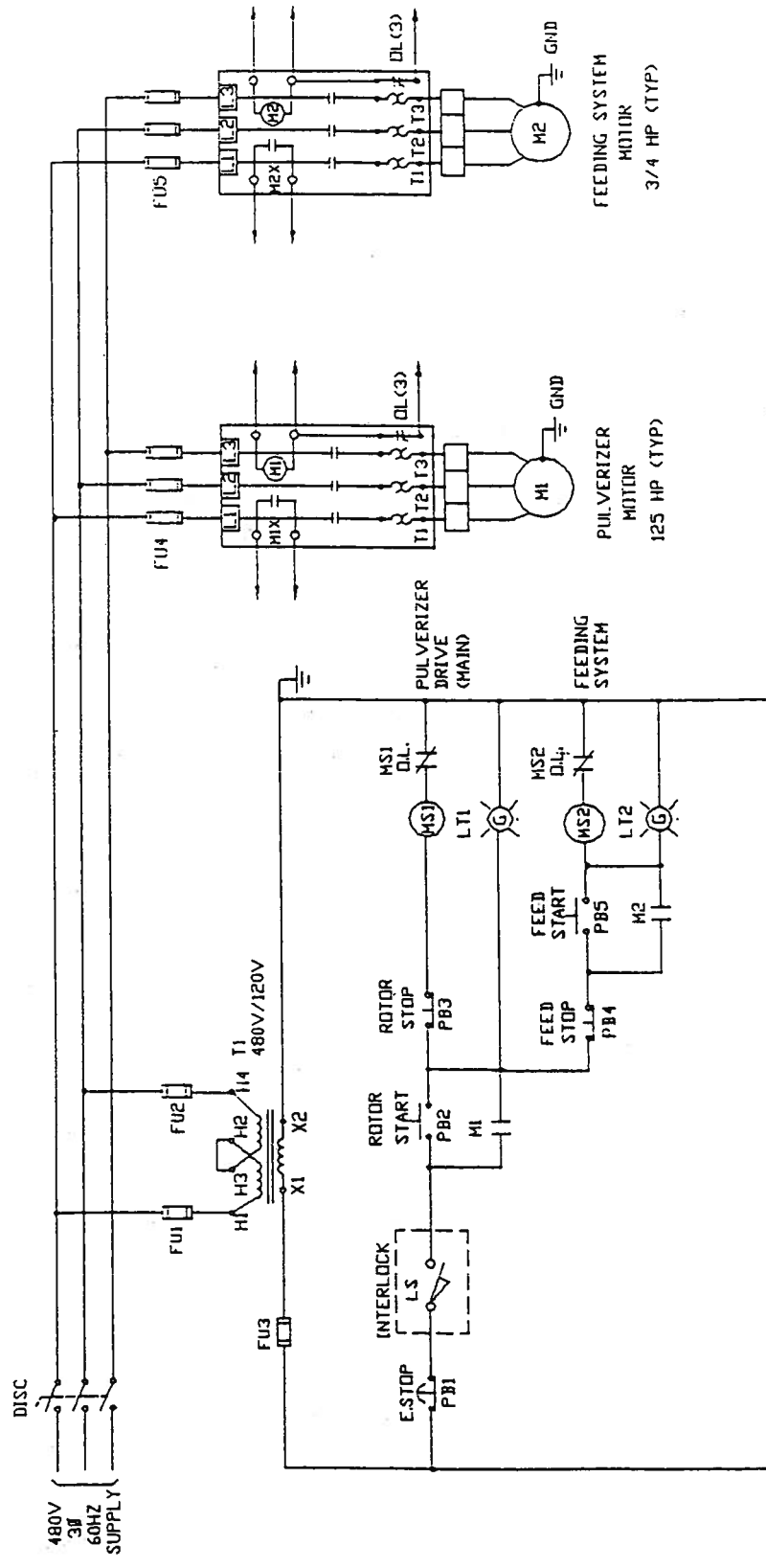
(Refer to suggested Wiring Diagram on next page)

MICRON POWDER SYSTEMS normally supplies the following controls for the standard #4 hammer mill:

1. Push-buttons type starters for the main drive motor and feed screw mechanism motor.
2. A limit switch for the housing cover.
3. An ammeter for the main drive motor.

The two motors should be interlocked so that the feed screw cannot operate unless the main drive is running. The limit switch is provided to prevent the operation of the mill when the cover is not properly closed. The ammeter is provided to display the amperage drawn by the main drive motor. This reading gives the operator an indication of the main drive motor loading and should be used to adjust the feed rate appropriately.

See typical wiring diagram (pg. III-4) for suggested electrical configuration.



NOTE ALL FUSES TO BE SIZED ACCORDING TO NEC

MODEL NO. 4 PULVERIZER
TYPICAL WIRING DIAGRAM
(FOR REFERENCE ONLY)

LEGEND

FU-FUSE
LS-LIMIT SWITCH
PB-PUSH BUTTON
DISC-DISCONNECT
LT-LIGHT
DL-OVERLOAD
M-MOTOR
T-TRANSFORMER
MS-MOTOR STARTER

3-6.- EQUIPMENT DATA:

DESIGN DATA:

MAIN DRIVE.....	40 to 75 HP
ROTOR MAXIMUM SPEED.....	3450 RPM
ROTOR MINIMUM SPEED (LFS HAMMER)	1500 RPM
ROTOR DIAMETER.....	24"
APPROXIMATE STATIC PRESSURE....	6.0" W.G.
ROTOR INERTIA.....	120.6 LBS-FT ²
POWER REQUIREMENTS.....	Per Specifications
WEIGHT (APPROX.).....	3800 LBS
FLOOR AREA REQUIRED.....	72 SQ. FT. (12 ft. x 6 ft.)

SECTION IV

INSTALLATION

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4-2 CLEARANCE REQUIREMENTS	PG. IV-1
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4-5 INITIAL LUBRICATION	PG. IV-4

4-1.- FOUNDATION REQUIREMENTS:

(For location of Supporting Legs, refer to drawing #4-621916-M)

The static load carried by the four Supporting Legs 3,800 lbs.

The floor or foundations where the Pulverizer is to be located must be level. The floor must be at least 6" reinforced concrete on firm soil base. If concrete piers are used, they must be at least one foot square and not more than 6" high.

4-2.- CLEARANCE REQUIREMENTS:

There should be a minimum of six feet of clearance on all four sides of the mill once it is installed. Consideration must be given to the placement of the mill so that the receiving containers can be changed without difficulty. There must be enough headroom to properly support the filter bag and to permit installation of appropriate rigging to assist in routine maintenance.

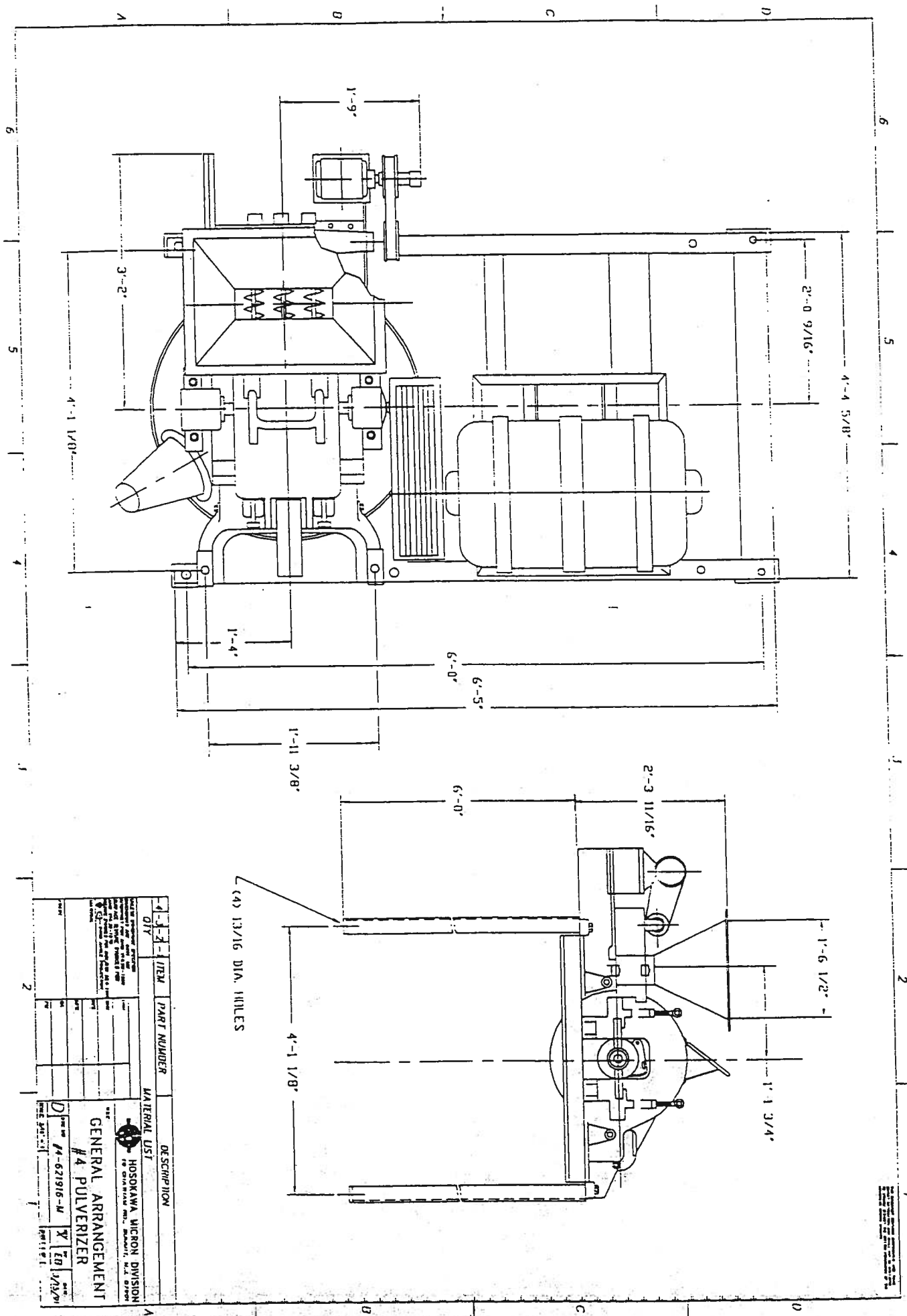
4-3.- UNLOADING EQUIPMENT:

4-3.1 CRATES AND EQUIPMENT INSPECTION:

Inspect all the crates visually before opening them to identify any damage during transportation.

Inspect the appearance of all painted items.

Check for hardware that may have loosened during transport. Tighten any loose hardware.



4-3.2 UNLOADING:

Use a 2 1/2 Ton (5,500 lb) capacity hoist for unloading and assembling the Pulverizer.

When handling the Pulverizer Assembly, (Drawing #4-621916-M), use nylon straps around the end of housing arms.

- NOTES:**
- 1.- DO NOT PUT SLINGS OR STRAPS AROUND THE ROTOR OR SCREEN AREA, SINCE THIS COULD RESULT IN DAMAGE TO THE SCREEN.
 - 2.- DO NOT USE THE SWING BOLTS TO LIFT THE PULVERIZER.
 - 3.- DO NOT REST ROTOR ASSEMBLY ON FLOOR. ASSEMBLY MUST BE SUPPORTED BY THE HOUSING.
 - 4.- DO NOT BOUNCE OR HIT ASSEMBLY DURING LIFTING.

4-4.- ASSEMBLY INSTRUCTIONS:

- NOTES:**
- For assembly instructions refer also to Section III, "EQUIPMENT DESCRIPTION"
 - The Pulverizer has been assembled at our factory and only the Hopper and Frame Legs must be put together.

- Check Foundation level.
- Bolt four legs to Structural Mill Base Frame, Snug nuts.
- Lift Frame with legs and locate over Foundation, using nylon straps around Frame. Make sure load is well balanced.
- Secure Legs to Floor or Foundation using 3/4" lag bolts.

- Level and square Pulverizer Frame.
- Tighten bolts of Legs to Frame.
- Rotate Rotor by hand to make sure it rotates freely. If Rotor is not free to rotate, refer to Section VI "Maintenance" Par 6-3.2 for detailed assembly of Rotor.
- Adjust V-Belt tension by moving Motor on Slide Rails. Proper V-Belt tension is a belt deflection of 5/8" when subjected to a 5 lb. load at the center between the sheaves.
- Tighten Motor bolts.
- Install V-Belt Safety Guard.
- Install Hopper over Feed Screw Mechanism. Make sure both contacting surfaces are clean. Use gasket if necessary to get a good seal.
- Wire electrical controls to the mill. See Section 3-5 for suggested wiring diagram.
- Verify that the Safety Limit Switch operates properly (See par. 3-5). **DO NOT** verify the limit switch operation by running the mill, but check it according to the following procedure:
Lock out the main power to the mill. When the mill cover is properly closed, use a multimeter to measure continuity across the limit switch terminals located in the control box. Open the mill cover slightly and verify that you can no longer measure continuity across the terminals.
- Check all lubrication points for proper lubrication. Refer to Section VI, par. 6-1 "Preventive Maintenance" for instructions and lubricant specifications.
- Make sure that the machine is clear of all foreign objects and that all the bolts are properly tightened.
- Restore main power to the mill.

- Jog Pulverizer to check direction of rotation (See Fig. 2, Section I). Change Rotation if it is not correct.
- Jog Feed Screw Mechanism Motor and check for correct rotation.
- Install Air Relief Bag.
- Install Receiving Container.
- Run Pulverizer empty for 1/2 hour to check bearing temperature (see par. 6-1.2), and listen for any unusual noise or vibration. Stop and start Motor periodically. Verify that the Feed Screw Motor interlock operates properly. (See par. 3-5).
- After the run-in period, re-check all bolts and fasteners for tightness.

4-5.- INITIAL LUBRICATION:

The equipment is fully lubricated prior to testing at the factory, however, after installation, all the lubrication points should be checked (Feed Screw Mechanism Bearings, Worm Gear Reducer, Variable Speed Pulleys, and Pillow Blocks).

For oil and grease recommendations, see Section VI "Preventive Maintenance", (par. 6-1.1 and 6-1.2) of this Manual.

SECTION V

START UP

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5-2 START UP	PG. V-2
5-3 SHUTDOWN	PG. V-2
5-4 EMERGENCY SHUTDOWN	PG. V-3
5-5 POWER FAILURE	PG. V-3

5-1.- PRECAUTIONS BEFORE START-UP:

Before starting up after the Run-In period, make sure that:

- All bolts are properly tightened
- The Housing Cover is properly closed. Do not use excessive force on the Swing Bolts. Hand tight clamping will provide an adequate seal.
- The Housing Cover Safety Limit Switch works properly. (See page IV-2, par. 4-4)
- Electrical interlock between Main Motor and Feed Screw Motor works properly.
- The Screen is properly installed in the mill.
- Lubrication levels have been checked.
- The Air Inlet Control Gates are half open. (Adjust them as required during operation).
- No tools have been left around the machine and drives.
- The Safety Guards are in place.
- Vent port is connected to Air Relief Bag.
- Operators are using all the safety equipment required and are following all plant safety rules and regulations. (See Section II "Safety", for required safety equipment).
- Operators have been properly trained in the operation of the Hammer Mill.

5-2.- START-UP:

The actual Start-up (and Operation) of the Pulverizer is very simple and requires normal attention by the operator.

To start a grinding cycle:

- Start the Pulverizer Motor by pushing START Push-button for Main Motor.
- Start the Feed Screw Motor and Adjust it to operate at it's slowest speed.
- Feed raw material into the Hopper.
- Adjust feed rate according to Main Motor load (Ammeter reading at Control Panel), by changing Feed Screw speed.
Recommended Maximum feed rate is determined by monitoring the Ammeter. Do not exceed 95% of maximum name plate amperage for main drive motor.
- Stop system as required to change Receiving Container and/or Air Relief Bag. Follow Shut-Down Procedure.
- NOTE: Once the rotor has stopped, any material that remains in the grinding chamber must be removed before the mill is restarted. Since the fan action of the rotor may also pull certain types of material past the feed screw, the hopper and feed trough should also be free of material before starting a grinding cycle.

5-3.- SHUT-DOWN:

At the end of the grinding cycle or at any time during the operation, the pulverizer can be stopped using the following procedure:

- Stop feeding the Pulverizer by pushing the STOP push-button of the Feed Screw Motor.

- Continue to run the Pulverizer until it is empty.
- When Main Motor Ammeter reads "idle load", stop Pulverizer by pushing the STOP push-button of the Main Motor.
- Make sure that the Pulverizer comes to a complete stop before attempting to do anything.
- After changing Container or Air Relief Bag, the Pulverizer can be started again, by following the above start-up procedure (Par. 5-2).

5-4.- EMERGENCY SHUT-DOWN:

In case of emergency push the STOP push-button at the Control Panel.

CAUTION:

Before opening the Mill, make sure that the Main Power Switch is disconnected, properly tagged out and locked out.

When the emergency condition is over, open the Mill and clean the material in the Rotor area, to make sure the Rotor is free to rotate.

5-5.- POWER FAILURE:

If there is a power failure while the Pulverizer is operating, the Main Motor and Feed Screw Motor will stop, and they will not re-start by themselves when the power is restored. Before attempting to re-start the Main Motor, the grinding chamber must be emptied.

CAUTION:

Before opening the Mill, make sure that the Main Power Switch is disconnected, properly tagged out and locked out.

When the grinding chamber is empty, re-start the Pulverizer by following the Start-up procedure (Par. 5-2).

SECTION VI

MAINTENANCE

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6-1.- PREVENTIVE MAINTENANCE:

Maintenance of the Pulverizer is very simple and only requires a small amount of planned maintenance time.

6-1.1 LUBRICATION:

Refer to "Lubrication Chart" and "Lubrication Graph" in this SECTION.

- Pulverizer Drive Motor:

Follow recommendations of Motor Manufacturer.

- Pulverizer Pillow Blocks:

The Pillow Blocks are supplied with OIL CUPS that have spring hinged covers.

The oil level in the oil cup should be 1/8" from the top, when the machine is not running. When the Pulverizer is running, the oil level in the cup will lower as some of the oil is drawn into the bearing.

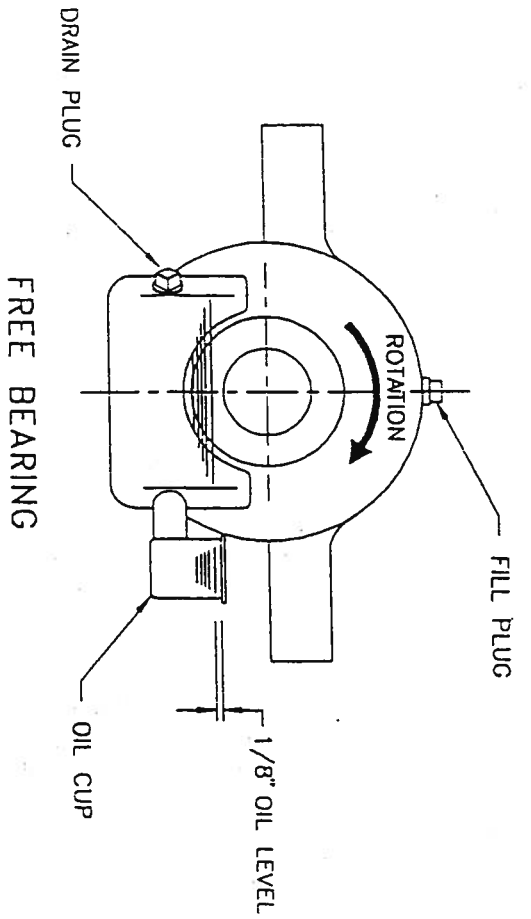
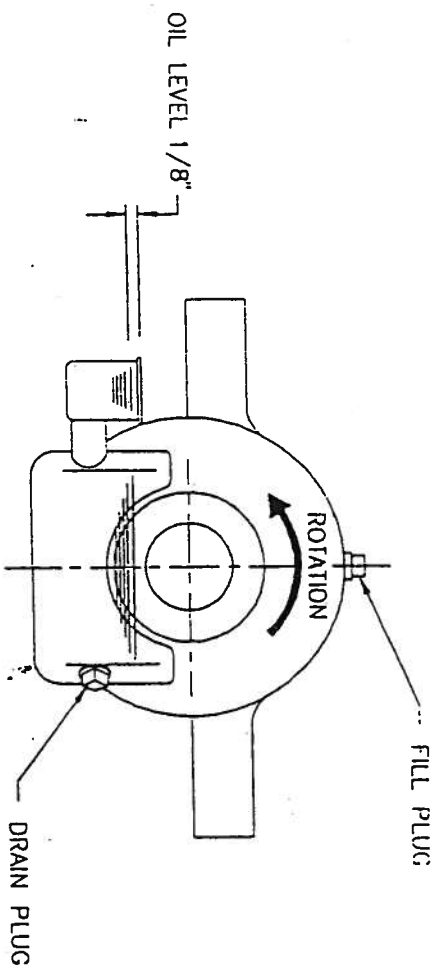
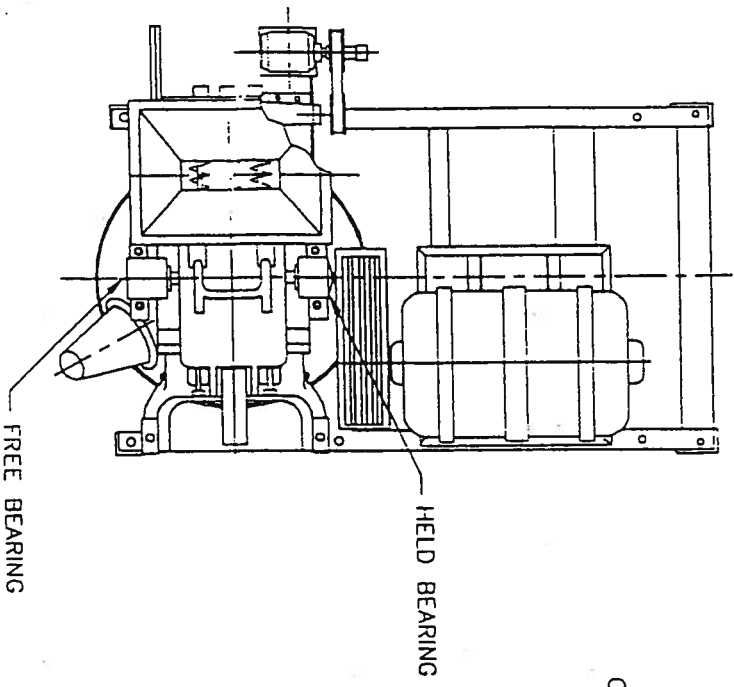
Oil should never be added while the unit is running. The proper oil level in the cup can only be determined when the machine is stopped.

The oil in the pillow blocks should be changed once a month. Drain the oil through the drain plug located at the base of the pillow block and refill through the fill plug located at the top.

Note that the oil level in the cup is the same as the oil level in the pillow block. Do not replace the oil cups with any type other than the type that is supplied with the mill. The reference for proper oil level will be lost if different oil cups are used. Also, note the location of the oil cups in relation to mill rotation. (See Fig. 3).

Recommended oil: SAE-20 grade, non foaming, non detergent oil (See chart for industrial grade oils of equivalent viscosity).

NOTE: For units operating at cryogenic temperatures, contact MICRON POWDER SYSTEMS Service Department for proper grade of lubricant.



PILLOW BLOCK LUBRICATION

FIG. 3

- Feed System Worm/Gear Reducer:

Reducer is lubricated at the factory. The oil in the reservoir must be checked every week and must be changed every three (3) months. (The Gear Box requires approx. 3 pints of oil). Bushings and ball bearings are equipped with grease fittings. Grease once a week using a low pressure gun.

Recommended Oil and Grease: See Chart.

- Variable Speed Pulleys:

Pulleys are equipped with grease fittings. Lubricate every week using a low pressure gun.

Recommended Grease: See Chart.

6-1.2 DAILY PREVENTIVE MAINTENANCE:

Check Rotor Pillow Blocks for any unusual temperature change. After the mill has run for one hour under load, carefully touch the Pillow Block. If you cannot hold your hand to the pillow block, the bearing is too hot (over 140°F) and requires attention.

While the unit is running under load, listen for any unusual noise. (DO NOT remove your ear plugs). If you hear any unusual noise or vibration, notify your supervisor immediately.

6-2.- VIBRATION:

VIBRATION LIMITS:

Following are Vibration Velocity Limits (in/sec), under no load conditions:

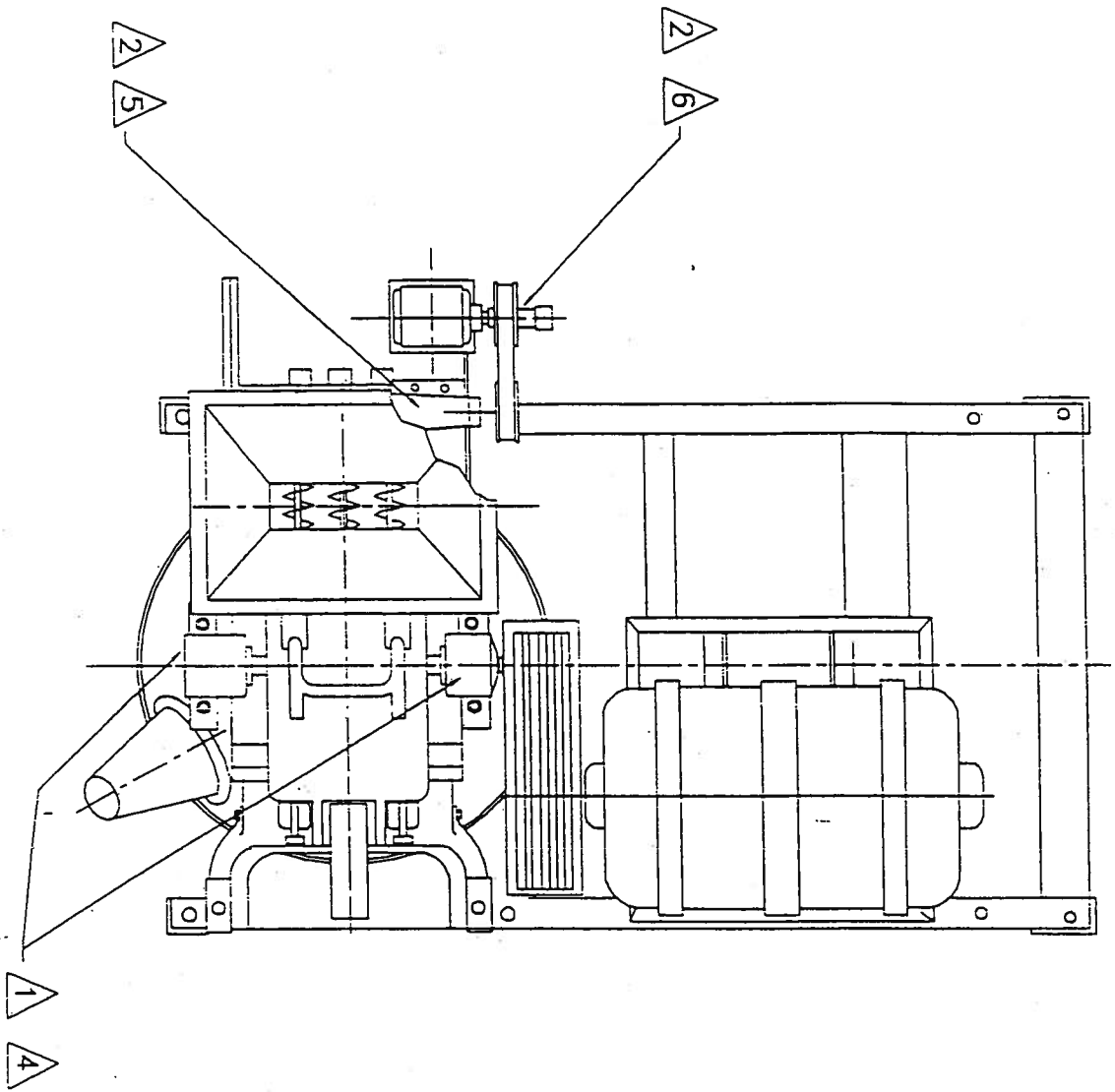
- 0.15 in/sec or less is NORMAL.
- 0.15 to 0.40 in/sec - Identify and correct source of vibration.
- Greater than 0.40 in/sec - Shut down Mill. DO NOT run until source of vibration is corrected.

6-3.- ASSEMBLY INSTRUCTIONS:

6-3.1 CHANGING SCREENS:

- Stop feeding the Pulverizer but keep the Mill running until the grinding chamber is empty.
- Stop Main Motor.
- Disconnect Main Power Switch, lock it out, and tag it out.
- Loosen the eye nuts on the four swing bolts and disengage them from the cover.
- Remove the two bolts holding the Cover to the Feed Screw Mechanism.
- Pull up on the Cover handle to rotate the cover up and away from the Main Body. The Cover will remain hinged to the Main Body at the end opposite the Feed Screw Mechanism. Rotate the cover until it comes in contact with the stop plate.
- Loosen the four Screen Cam Locks by using two wrenches; one to hold the cam and one to loosen the locknut.
- Remove Hold Down Plate and End Dust Seal nearest Feed Screw.
- Remove End Dust Seal opposite to Feed Screw.
- Pull up on the Screen at the end opposite the Feed Screw while pushing down on the Screen at the Feed Screw end to slide the Screen out of its retaining groove.
- Before installing a new Screen, clean the guide groove.
- Slide new Screen in the retaining grooves. If the grooves are clean, the screen will slide very easily, with no effort.
- Center the Screen in the retaining grooves and lock it in place with the Screen Cam Locks. Use two wrenches on each Cam Lock. One wrench should be used to turn the cam so that it pinches the Screen between the Cam and the inner radius of the retaining groove. Use a second wrench to snug the lock nut and secure the Cam in place.
- The two Cams on each end of the Screen should be snugged as a pair so that the Screen is not distorted.
- Once all the Cams have been snugged, check to insure that the Screen is not distorted and then tighten all four lock nuts. You must use two wrenches, one to hold the Cam in place and one to tighten the lock nut.

LUBRICATION GRAPH



EVERY WEEK (OIL)	1
EVERY WEEK (GREASE)	2
EVERY MONTH (REPLENISH)	3
EVERY MONTH (CHANGE)	4
EVERY 3 MONTHS (CHANGE)	5
EVERY YEAR (CHANGE)	6

- Clean and check End Dust Seals. Replace the seals if the gasket material is worn. Make sure that the gasket is oriented so that it faces up to seal against the cover and toward the center of the grinding chamber to seal against the Screen.
- Clean pads for the Cover. This surface **MUST BE** completely clean.
- Install Hold Down Plate.
- Clean the Cover Mounting Surface.
- Install the Cover. Check that all bolts are properly tightened.
- Rotate Rotor by hand to make sure it rotates freely.
- Connect Power and start the unit.

6-3.2 CHANGING ROTOR AND HAMMERS:

NOTE: Worn hammers can significantly reduce output capacity. A spare set of hammers should be kept on hand in the event an unscheduled replacement is required.

- Stop feeding the Pulverizer but keep the Mill running until the grinding chamber is empty.
- Stop Main Motor.
- Disconnect Main Power Switch, lock it out, and tag it out.
- Loosen the eye nuts on the four swing bolts and disengage them from the cover.
- Remove the two bolts holding the Cover to the Feed Screw Mechanism.
- Pull up on the Cover handle to rotate the cover up and away from the Main Body. The Cover will remain hinged to the Main Body at the end opposite the Feed Screw Mechanism. Rotate the cover until it comes in contact with the stop plate.
- Remove Pillow Block Bolts.
- Remove Rotor assembly using nylon slings at both ends of the shaft. **DO NOT** sling through hammer stirrups. Rest the Rotor Assembly on Pillow Blocks.
- If Hammers are to be replaced, make sure that the balanced hammers are installed in the proper position. Each packaged set of new Hammers contains two equally weighted rows that must be installed 180° apart. Also, make sure that the gap between the hammers are staggered in such a way that the gap in one row is not in line with the gaps in the adjacent rows.

- To remove and replace the hammers, first remove the countersunk screws and nuts that prevent the rotation of the king pin retaining disc. The two 3/4" holes in the retaining disc allow the removal of the king pins. Line up the holes in the retaining disc with a pair of king pins located 180° apart. These two rows make up a hammer set and must be replaced at the same time with a packaged set of balanced hammers. The packaged sets contain two rows of left handed or right handed hammers. Left and right handed hammers must be installed in alternate rows. The flat face of the hammer should impact the feed material as it enters the grinding chamber and propel it up toward the liner (See Fig. 1 and 2).
- Once one set of opposing rows have been replaced, rotate the king pin retaining disc, expose the adjacent king pin and repeat the process until all hammers have been replaced. Always rotate the king pin retaining disc in the same direction. Once all the hammers have been replaced, reinstall the countersunk screws and nuts on the retaining disc. Use locktite to prevent them from loosening.
NOTE: Never replace individual hammers. Always use complete sets that are properly balanced.

- o o o -

- The above instructions apply to Stirrup type hammers. A similar method is used to change Bar type hammers. First remove the screws and nuts of the King Pin Retaining Disc and rotate the disc to line up the two 3/4" holes in any two king pins located 180° apart. Remove the king pins and hammers.

Each row of replacement Bar hammers are wired together as a row and also wired to its complementary balanced row. These two rows are to be installed 180° apart on the rotor.

- Once one set of opposing rows have been replaced, rotate the king pin retaining disc, expose the adjacent king pin and repeat the process until all hammers have been replaced. Always rotate the king pin retaining disc in the same direction. Once all the hammers have been replaced, reinstall the countersunk screws and nuts on the retaining disc. Use locktite to prevent them from loosening.

- o o o -

- Before reinstalling the Rotor in the mill, check that all components in the grinding chamber are serviceable (Screen, End Dust Seal, etc.).
- Before installing the Rotor Assembly, clean and inspect all machined surfaces. This surface must be completely clean.
- Install Rotor Assembly onto locating dowel pins and press both Pillow Blocks down to seat on the Main Body. **PILLOW BLOCKS ARE NOT TO BE SHIMMED.**
- Position Swing Bolt assemblies over Pillow Blocks and secure with four bolts.
- Check for free rotation of the Rotor by hand ensuring that there is no interference with the Rotor.
- Install Hold Down Plate and close the Cover.
- Secure the Cover to the Feed Trough using the two (2) bolts.
- Install the bolts holding down the Cover.
- Position eye-nuts from (4) Swing Bolt Assemblies over Cover and tighten.
- Check the oil level in the pillow blocks. Fill if necessary. See SECTION 6-1.1.
- Install belts and belt guard.
- Jog the main motor to check again for interference of the Rotor Assembly.

6-3.3 CHANGING FEED SCREW MECHANISM:

- Stop feeding the Pulverizer but keep the Mill running until the grinding chamber is empty.
- Stop Main Motor.
- Disconnect Main Power Switch, lock it out, and tag it out.
- Remove Hopper.
- Remove Belts on Adjustable Speed Drive.
- Remove Bolts between Cover and Feed Housing.
- Remove Bolts between Main Body and Feed Housing.
- Before installing new Feeder clean base pads.
- Reverse above procedure for installing New Feeder.

6-3.4 CHANGING BEARINGS:

- Stop feeding the Pulverizer but keep the Mill running until the grinding chamber is empty.
- Stop Main Motor.
- Disconnect Main Power Switch, lock it out, and tag it out.
- Open Housing Cover by loosening the eye-nuts on the (4) Swing Bolt Assembly, the bolts holding the Cover to the Main Body and the two bolts holding the Cover to the Feed Screw Mechanism.
- Remove belt guard.
- Loosen motor mounting bolts and move motor to loosen and remove drive belts.
- Remove Drain Plugs from Pillow Block and drain oil.
- Remove Pillow Block Bolts.
- Remove Rotor assembly using nylon slings at both ends of the shaft. Rest the Rotor Assembly on Pillow Blocks.
- It is recommended that the hammers be removed prior to performing bearing removal and installation. Follow the instructions in 6-3.2. If the same hammers are to be used again, they must be marked and stored so that they can be replaced on the Rotor in their original locations and the Rotor will remain balanced.
- Loosen and remove the outboard Flinger.
- Loosen the four bolts securing the inboard end cover to the Pillow Block Housing. Separate the end cover from the Pillow Block. If gasket is damaged, replace with new gasket.
- Remove the Pillow Block from the Bearing and shaft. Inspect the bore of the Pillow Block for indications of the bearing outer race spinning.
- Unlock lock-washer tab from locknut. Loosen and remove locknut and lock-washer.
- Use a bearing puller behind the inner race of the bearing to remove it. The shaft journal should be inspected to determine proper dimensions. Should the bearing become seized on the shaft, other methods of removal may be necessary. If this becomes necessary, the shaft journals should be inspected prior to installing new bearings. Contact the Service Department for assistance.

- Once the shaft journal has been determined to provide a proper fit, the new bearing may be installed using a press and sleeve or a sleeve and a hammer. In either case, the sleeve must fit against the outside wall of the inner race. A film of light oil will aid in the installation. This applies only to bearings with an O.D. of four inches or less. The shoulder on the shaft should make contact with the inner race of the bearing.
- Install lock-washer and locknut. Insure that lock-washer tab is bent into locknut slot.
- Apply a thin coat of oil to bore of the Pillow Block and slide Pillow Block over bearing evenly.
- Secure inboard end cover to Pillow Block with four bolts.
- Install and secure outboard Flinger. Flinger is not to make contact with Pillow Block Housing.
- Repeat above steps for opposite side. It is recommended that both bearings be changed during the same disassembly operation.
- Before installing the Rotor Assembly, clean all machined surfaces. These surfaces should also be free of nicks or peens.
- Complete the installation per paragraph 6-3.2.

6-3.5 CHANGING V-BELTS:

- Stop feeding the Pulverizer but keep the Mill running until the grinding chamber is empty.
- Stop Main Motor.
- Disconnect Main Power Switch, lock it out, and tag it out.
- Remove V-Belt Guard.
- Loosen Belts by sliding Main Motor on rails.
- Remove Belts and install a new matched set.
- Adjust Belt tension (Follow instructions in Section 4-4).
- Install Guard.

TROUBLESHOOTING CHART

SYSTEM: #4 Pulverizer

Equipment Section	Symptoms	Possible Cause	Remedy	
MILL	Mill stops - Starter heaters overload	a.- Feeding too fast	Slow Feeder	
		b.- Rotating backwards	Reverse rotation	
		c.- Foreign object jamming rotor	Remove object	
		d.- Screen is blinding	See following symptom	
	Screen is blinding	Material stays on screen		
	Material is blowing out of the mill	a.- Material is too sticky	Reduce stickiness of feed material	
		b.- Material is melting	Cool material and/or air	
			a.- Air inlet and/or exhaust are closed	Open intake and/or exhaust
			b.- Cover not tight	Clear obstruction and secure cover
c.- Incorrect rotation			Reverse rotation	
d.- Screen has blinded condition			See above symptom	
e.- Discharge bag or chute is full or plugged			Turn off machine and empty bag or unplug chute/hopper	

TROUBLESHOOTING CHART

SYSTEM: #4 Pulverizer

Equipment Section	Symptoms	Possible Cause	Remedy
MILL	Premature bearing failure	a.- Improper lubrication b.- Insufficient lubrication c.- Wrong bearing d.- Rotor imbalance	Provide specified oil Keep oil to specified level Procure correct bearing Balance rotor
		e.- Improper hammer installation f.- Heavy and/or inconsistent feeding material	Install hammers per instructions Adjust feed mechanism to deliver material at a slower rate
	Change in product particle size	a.- Feed material has changed (in composition or size) b.- Worn or damaged screen	Adjust feeder Replace screen
	Variation in Mill Motor load (amperage)	a.- V-belts slipping b.- Feed rate varying c.- Inconsistent feed material	Adjust belt tension 1. Check feed supply 2. Check feeder operation Adjust preparation of feed material

TROUBLESHOOTING CHART

SYSTEM: #4 Pulverizer

Equipment Section	Symptoms	Possible Cause	Remedy
MILL	Reduced capacity	a.- Worn hammers b.- Worn liner	Replace with new set Replace with new liner
		c.- Reduced rotor speed	Check drive for worn or loose V-belts. Replace belts with matched set. For direct drive, check coupling installation.
FEED SCREW	Feed screw jam	Foreign object jamming screw	Clear object from feed screws
	Feeds too fast	Too much suction at feed end	Open air intake and adjust as required
NOTE: FOR ANY PROBLEMS NOT IDENTIFIED HERE, PLEASE CONTACT MPS SERVICE DEPARTMENT			

SECTION VII

PARTS LIST

#4 PULVERIZER MILL TYPES

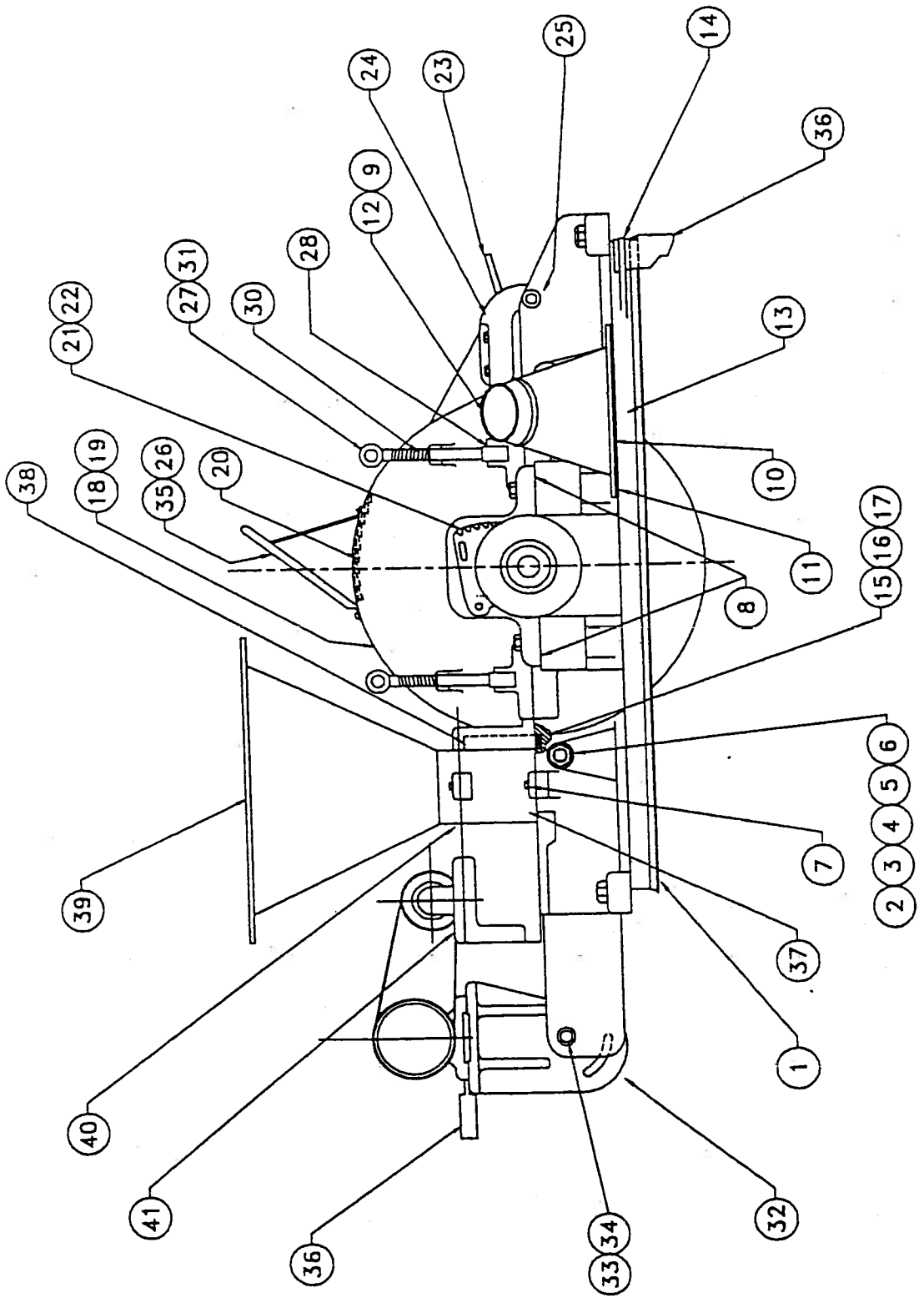
#4 PULVERIZER ROTOR TYPES

#4 PULVERIZER FEED SCREW MECHANISM

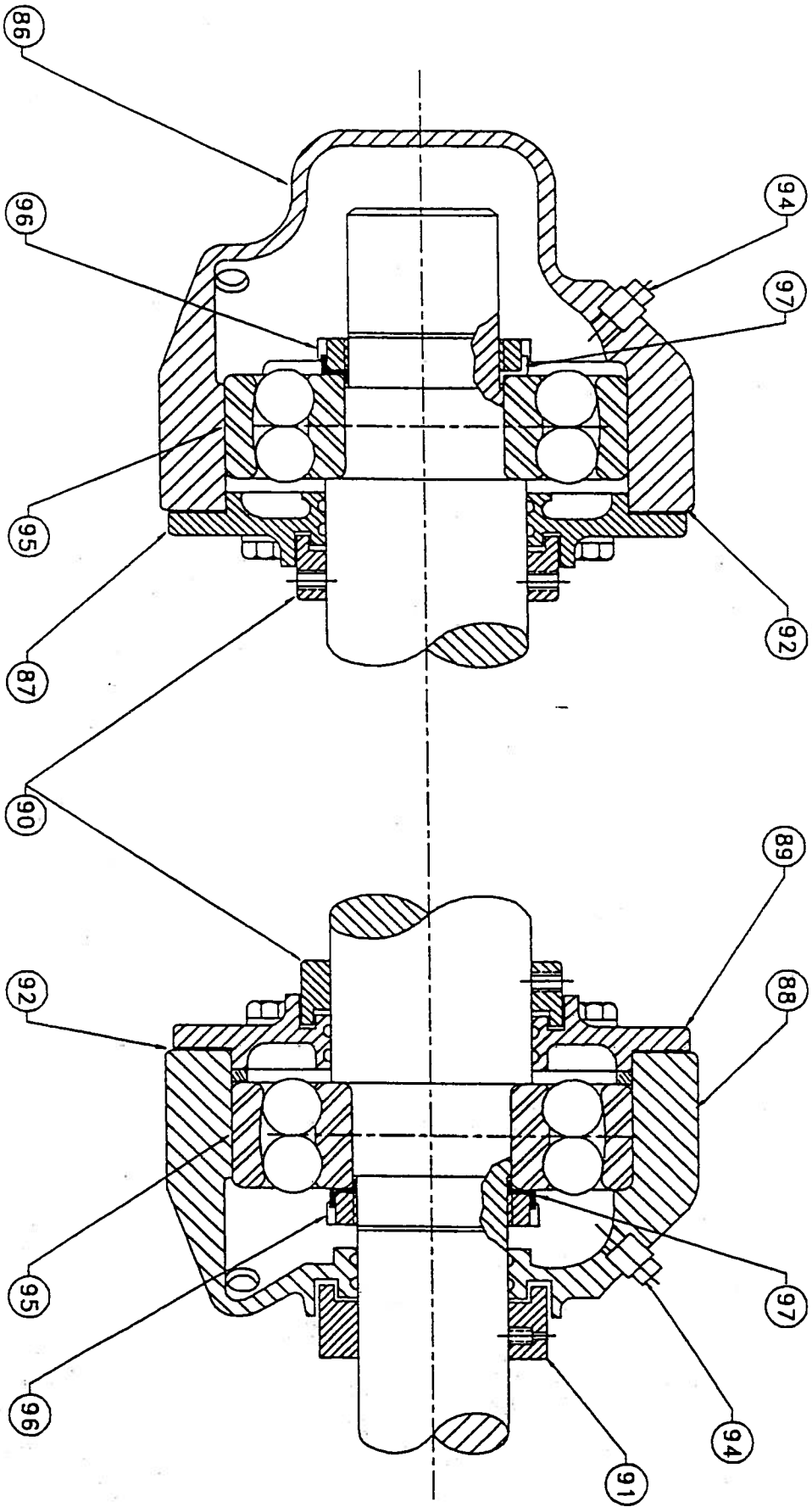
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AND

SPARE PARTS LIST



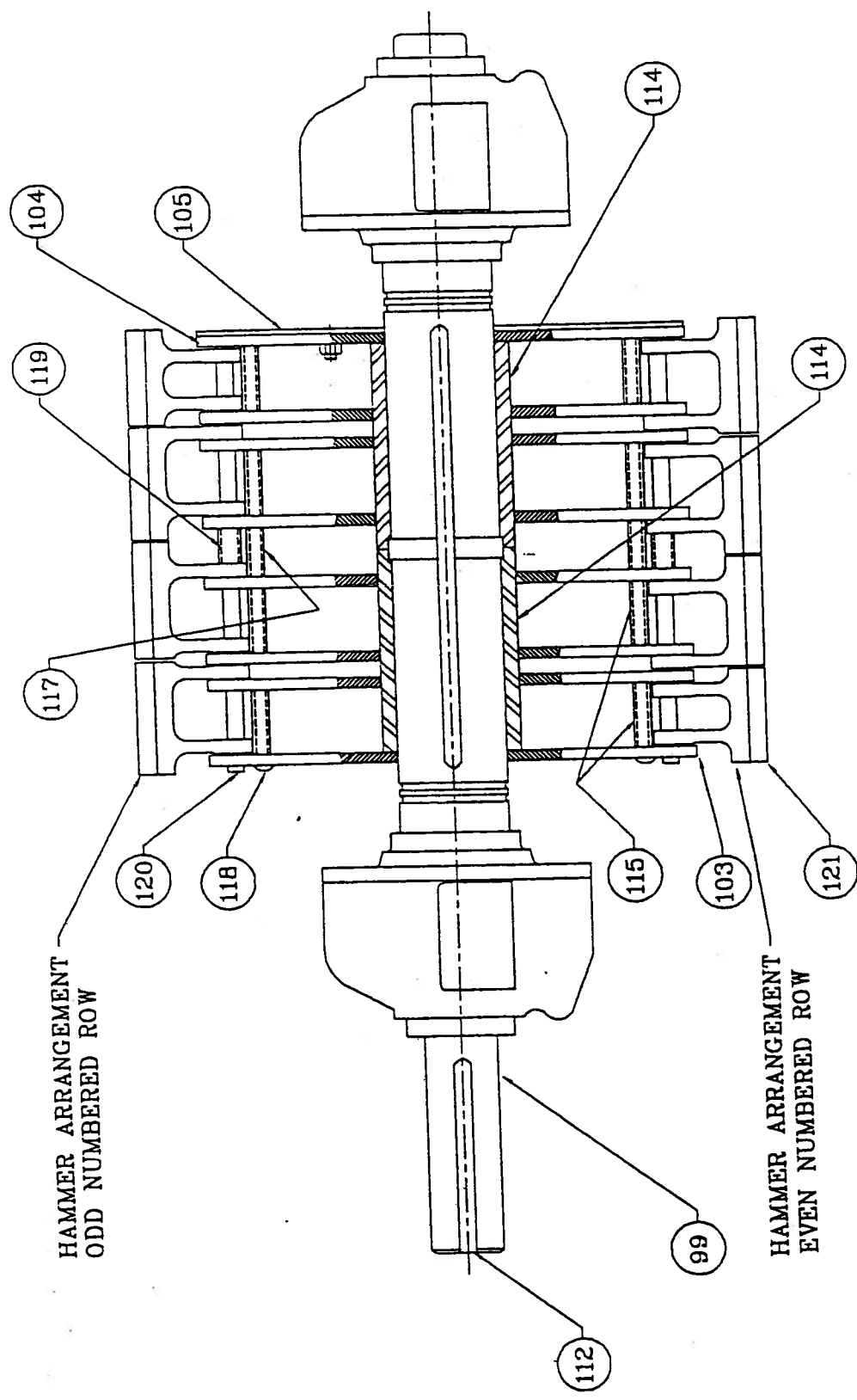
MIKRO-PULVERIZER - BASIC



FREE - OPPOSITE DRIVE SIDE

HELD - DRIVE SIDE

PILLOW BLOCK ASSEMBLY

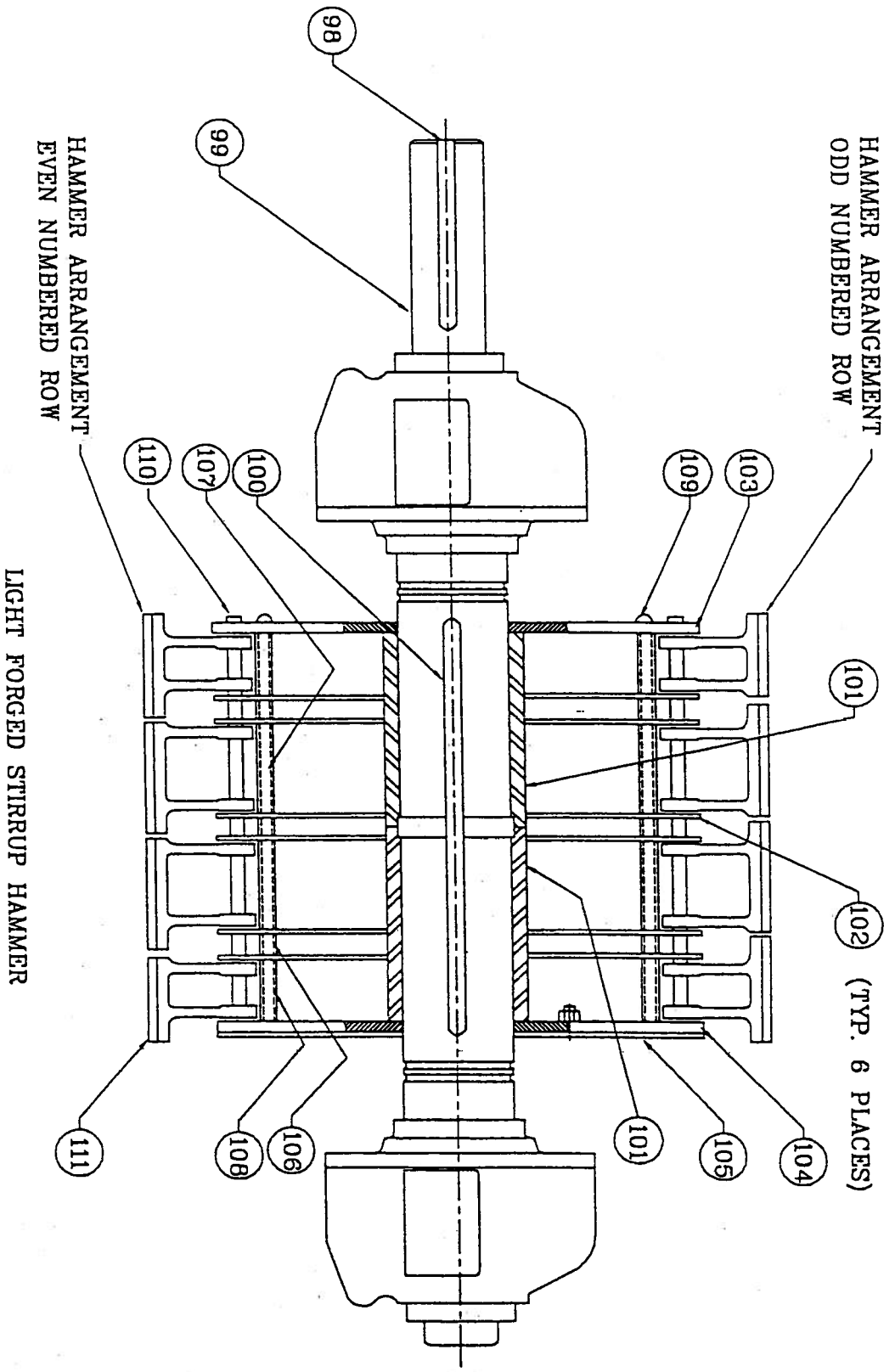


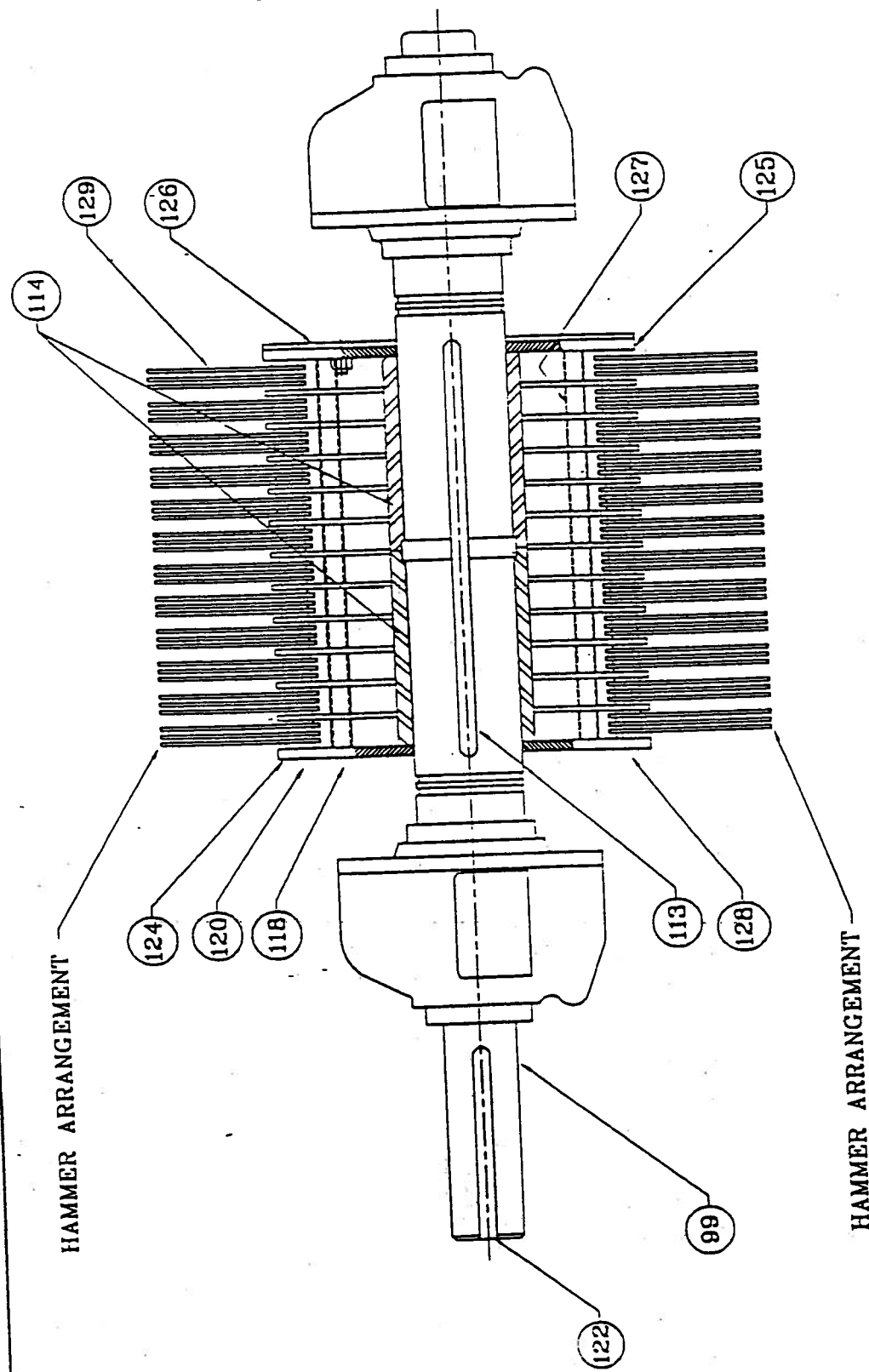
HAMMER ARRANGEMENT
ODD NUMBERED ROW

HAMMER ARRANGEMENT
EVEN NUMBERED ROW

HEAVY FORGED STIRRUP HAMMER

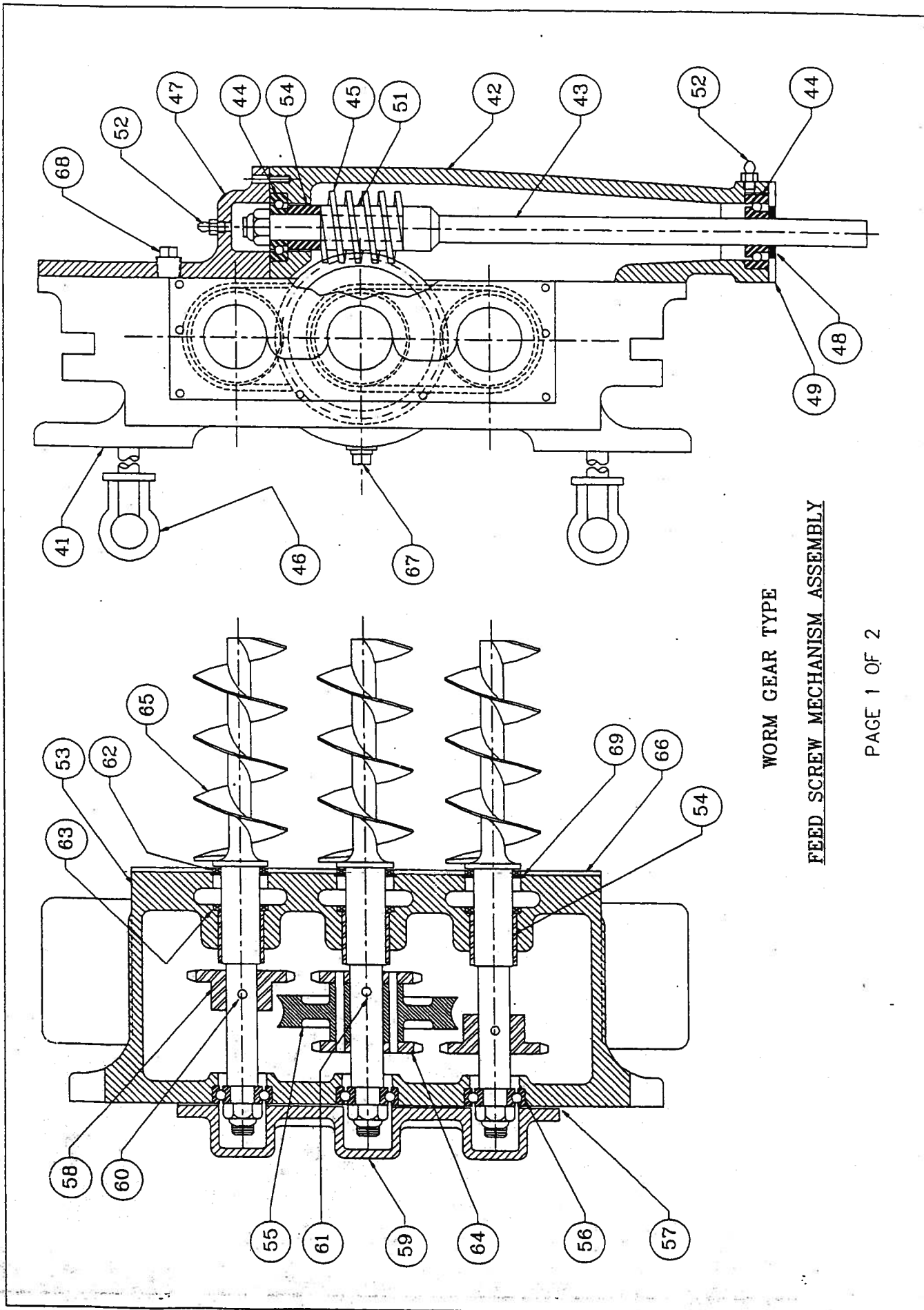
ROTOR ASSEMBLY TYPES





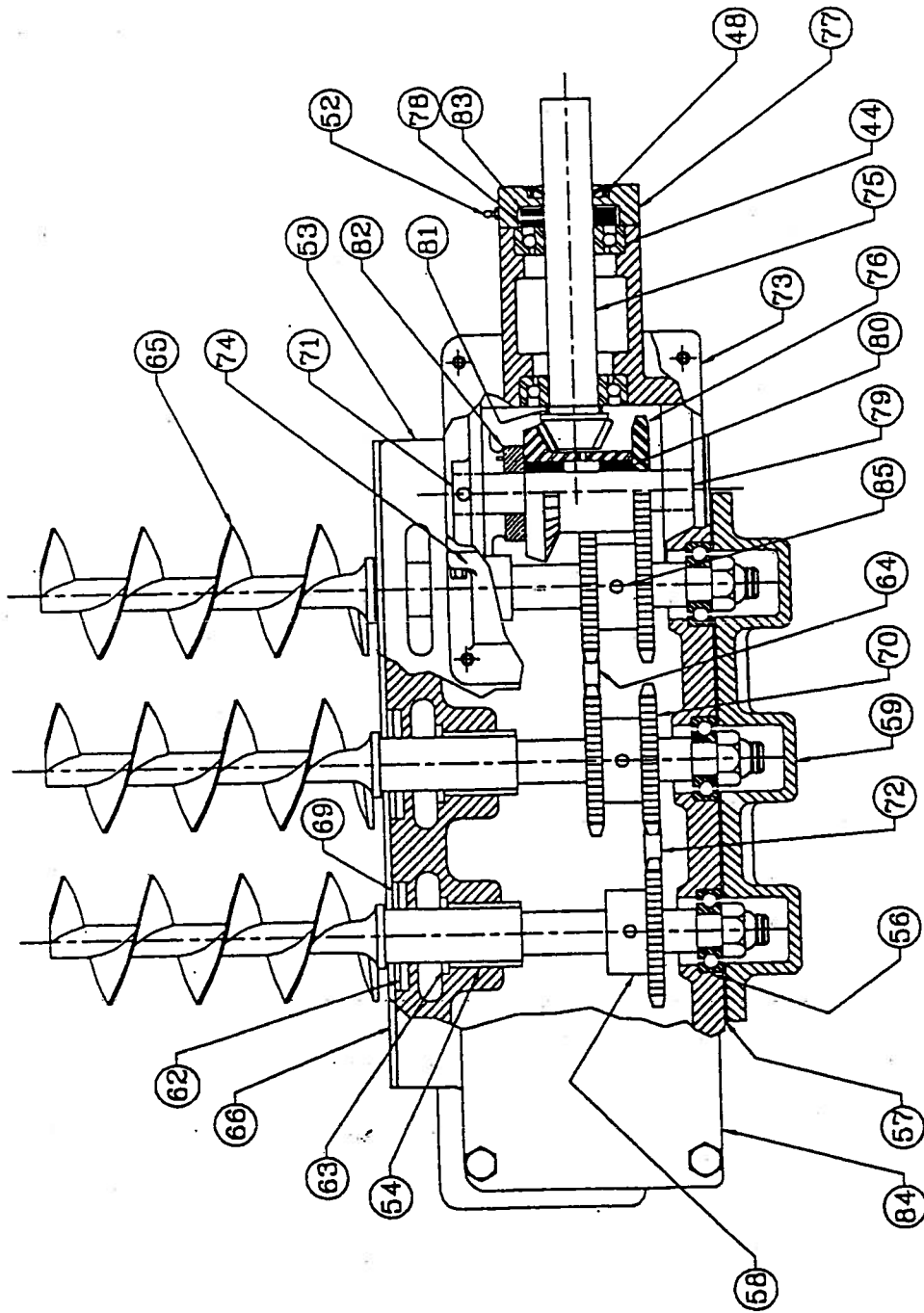
BAR HAMMER ROTOR ASSEMBLY

ROTOR ASSEMBLY TYPES



WORM GEAR TYPE
FEED SCREW MECHANISM ASSEMBLY

Equipment Section	Assembly Type	Ref. Number	Part Description/Name	Qty. Req'd.	Stock Number
MILL	#4 Basic	1	Main Body		
		2	Screen Tightening Cam		
		3	Spacer Spools, 2" OD x 1" ID x 1" Wide - CRS		
		4	Fibre Washer, 1 3/4" OD x 1" ID x 1/16" Wide		
		5	Fibre Washer, 2 1/8" OD x 1" ID x 1/16" Wide		
		6	1" Hex Nut		
		7	Dowel Pin, 3/4" OD x 1 1/4" Long - CRS		
		8	Dowel Pin, 1/2" OD x 1 1/4" Long - CRS		
		9	Air Relief Elbow		
		10	Air Relief Elbow Cover Plate		
		11	Air Relief Elbow Gasket		
		12	Air Relief Bag		
		13	Outlet Bag Toggle Fastening Device Assembly		
		14	Outlet Bag Gasket, 1/8" x 3/4" x 96" Cir. - Rubber		
		15	Main Body Screen End Dust Seal Assemblies		
		16	Screen End Dust Seal Ledge Angle		
		17	Screen End Dust Seal - Neoprene		
		18	Mill Housing Cover Assembly		
		19	Mill Housing Cover		
		20	Multiple Deflector Liner		
		21	Air Inlet Control Gate, Right Hand		
		22	Air Inlet Control Gate, Left Hand		



BEVEL GEAR TYPE
FEED SCREW MECHANISM ASSEMBLY

BILL OF MATERIAL

SYSTEM: #4 Pulverizer

Equipment Section	Assembly Type	Ref. Number	Part Description/Name	Qty. Req'd.	Stock Number
MILL	#4 BASIC (Cont.)	23	Mill Housing Cover Stop Plate - HRS		
		24	Mill Housing Cover Hinge - CI		
		25	Mill Housing Cover Hinge Pin - CRS		
		26	Mill Housing Cover Handle Assembly		
		27	Swing Bolt Assembly - CI		
		28	Swing Bolt Anchors - CI		
		29	Swing Bolt Anchors Pins - CRS		
		30	Swing Bolts - Steel		
		31	Swing Bolt Eye Nuts - Steel		
		32	Feed Drive Motor Swing Bracket - CI		
		33	Bronze Bushing, 5/8" ID x 7/8" OD x 3/4" Long		
		34	Tie Bolt - Steel		
		35	Handle - CRS		
		36	Outlet Bag		
		37	Feed Trough Assembly		
		38	Hold Down Plate		
		39	Hopper Assembly		
		40	Hopper Base		
		41	Feed Scre Mechanism Assembly		

BILL OF MATERIAL

SYSTEM: #4 Pulverizer

PAGE: 3 OF 7

Equipment Section	Assembly Type	Ref. Number	Part Description/Name	Qty. Req'd.	Stock Number
FEEDER	#4 WORM GEAR	42	Worm & Feed Drive Shaft Housing - CI		
		43	Feed Drive Shaft - CRS		
		44	Feed Drive Shaft Bearing		
		45	Steel Worm Gear		
		46	Eye Nut - Steel		
		47	Bearing Cover - CI		
		48	Packing Ring		
		49	Bearing Retainer Washer - Steel		
		50	Steel Spacer Bushing		
		51	Woodruff Key		
		52	Alemite Fittings		
		53	Feed Screw & Gear Housing with Bushings - CI		
		54	Bronze Bushing		
		55	Worm Gear & Sprocket Assembly - Steel		
		56	Bearing		
		57	Bearing Retaining Plate Gasket		
		58	Single Sprockets - Steel 16T KSC		
		59	Gear Housing Gap - CI		
		60	Single Sprocket Taper Pin - Steel 2" Long		

BILL OF MATERIAL

SYSTEM: #4 Pulverizer

Equipment Section	Assembly Type	Ref. Number	Part Description/Name	Qty. Req'd.	Stock Number
FEEDER	#4 WORM GEAR (Cont.)	61	Worm Gear & Sprocket Taper Pin - Steel 2 1/4"		
		62	Outside Packing Ring		
		63	Lip Seal		
		64	#29 Roller Chain - Steel		
		65	Feed Screw		
		66	Packing Retaining Plate - CRS		
		67	Pipe Plug - Steel		
		68	Pipe Plug Vented - Steel		
		69	Packing Retaining Washer - CRS		
#4 BEVEL GEAR	#4 BEVEL GEAR	70	Double Sprocket - Steel 16T KSC		
		71	Freeze Plug - HRS		
		72	#32 Roller Chain - Steel		
		73	Bevel Gear Housing - CI		
		74	Bevel Gear Housing Cover - CI		
		75	Feed Drive Shaft & Bevel Gear Assembly - Steel		
		76	Sprocket & Gear Assembly - Steel		
		77	Bearing Cap - CI		
		78	Bearing Retainer - CRS		

Equipment Section	Assembly Type	Ref. Number	Part Description/Name	Qty. Req'd.	Stock Number
FEEDER	#4 BEVEL GEAR	79	Jack Shaft - CRS		
		80	Bronze Bushing		
		81	Spacer - Steel Tubing		
		82	Bronze Thrust Collar Assembly		
		83	Shims, .005, .008, 010 CRS		
		84	Feed Screw & Gear Housing Top Cover - CRS		
		85	Double Sprocket Taper Pin - Steel 2 1/2" Long		
ROTOR	#4 PILLOW BLOCK	86	Pillow Block Housing (Opp. Drive Side) - CI		
		87	Pillow Block End Cap (Opp. Drive Side) - CI		
		88	Pillow Block Housing (Drive Side) - CI		
		89	Pillow Block End Cap (Drive Side) - CI		
		90	Flinger 3" Bore - CI		
		91	Flinger 2 1/4" Bore - CI		
		92	Gasket - Vellumoid		
		93	Oil Cup		
		94	1/4" Pipe Plug		
		95	Bearing		
		96	Lock Nut		
		97	Lock Washer		
ROTOR	#4 LFS	98	Rotor Shaft - Disc Assembly		

BILL OF MATERIAL

SYSTEM: #4 Pulverizer

Equipment Section	Assembly Type	Ref. Number	Part Description/Name	Qty. Req'd.	Stock Number
ROTOR	#4 LFS (Cont.)	99	Rotor Shaft		
		100	Key - CRS		
		101	Rotor Spools		
		102	Rotor Discs		
		103	Rotor Disc		
		104	Rotor Disc		
		105	King Pin Retaining Disc		
		106	Spacers		
		107	Spacers		
		108	Spacers		
		109	Tie Rods		
	#4 HFS	110	King Pins		
		111	LFS Hammers		
		112	Rotor Shaft & Disc Assembly		
		113	Key - CRS		
		114	Rotor Spool		
		115	Spacers		
		116	Spacers		
		117	Spacers		
118	Tie Rods				

SPARE PARTS

SYSTEM: #4 Pulverizer

Equipment Section	Drawing Number	Ref. Number	Part Description/Name	Qty. Req'd.	Cost	Lead Time	Stock Number
Mill			Hammers				
			Liners				
			Screens				
			Rotor Bearings				
			Kingpins				
Feeder			Feed Screw Bearings				
			Feed Screw Packing				
			Steel Worms				
			Bronze Wormgears				
Accessories			Air Relief Bags				
			Outlet Bags				

SECTION VIII

DRAWINGS LIST

DRAWING LIST

SYSTEM: #4 Pulverizer

Manual Section	Drawing Number	Drawing Title	Revision	Latest Date/Revision
I	FIG. 1	ROTOR ASSEMBLY TYPES (2 Rotors)		
I	FIG. 2	MILL CROSS SECTION (Schematic)		
III	4-6045-M1	MILL GENERAL ARRANGEMENT (Parts)		
III		TYPICAL ELECTRICAL WIRING DIAGRAM		
IV	4-621916-M	GENERAL ARRANGEMENT (Main Dimensions)		
VI	FIG. 3	PILLOW BLOCK LUBRICATION		
VI		LUBRICATION GRAPH		
VII		MILL ASSEMBLY PULVERIZER BASIC		
VII		PILLOW BLOCK ASSEMBLY		
VII		ROTOR ASSEMBLY TYPES - Pg. 1 of 3		
		ROTOR ASSEMBLY TYPES - Pg. 2 of 3		
		ROTOR ASSEMBLY TYPES - Pg. 3 of 3		
VII		FEED SCREW MECHANISM - WORM GEAR		
VII		FEED SCREW MECHANISM - BEVEL GEAR		