



Jaw Crusher Manual

24" x 8" - 42" x 36" Series

JAW CRUSHER REFERENCE

Machine Size: _____

Serial No: _____

Date Supplied: _____

CHAPTER

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GENERAL INFORMATION

CHAPTER

1

SECTION

1. CRUSHER NUMBER AND FEED OPENING
2. TABLE OF APPROXIMATE WEIGHTS FOR LIFTING PURPOSES
3. GENERAL OVERALL DIMENSIONS

Section 1. Crusher Number and Feed Opening

This manual covers the following sizes

MACHINE	FEED OPENING				GENERAL DIMENSION DRAWING NUMBER
	INCHES		M.M.		
	WIDTH	GAPE	WIDTH	GAPE	
24 x 8	24"	8"	610	205	A5751
24 x 10	24"	10"	610	265	
24 x 12	24"	12"	610	205	
24 x 15	24"	15"	610	380	A5752
30 x 20	30"	20"	760	510	A5754
36 x 8	36"	8"	915	205	A5755
36 x 10	36"	10"	915	265	
36 x 12	36"	12"	915	305	
36 x 24	36"	24"	915	610	A5756
42 x 8	42"	8"	1065	205	A5758
42 x 10	42"	10"	1065	255	
42 x 12	42"	12"	1065	305	
42 x 14	42"	14"	1065	355	
42 x 16	42"	16"	1065	405	
42 x 27	42"	27"	1065	685	A5764
42 x 32	42"	32"	1065	813	A5759
42 x 36	42"	36"	1065	915	

The varying gape sizes in each series is obtained by fitting different jawplates, keeper plates or stationary jaws

Section 2.

Table of Approximate Weights for Lifting Purposes

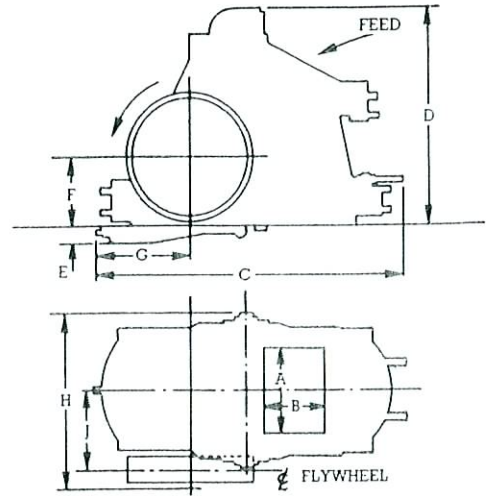
MAIN COMPONENT	WEIGHT LBS/KGS											
	24x8	24x10	24x12	24x15	30x20	36x8	36x10	36x12	36x24	42x16	42x27	42x36
KEEPER PLATE	100	100	100	110	80	90	90	90	90	170	60	60
	46	46	46	50	36	41	41	41	41	78	28	28
WEAR PLATE	30	30	30	50	100	65	65	65	150	100	120	300
	14	14	14	23	46	30	30	30	68	46	55	136
CHEEK PLATE	55	55	55	80	230	100	100	100	210	140	220	340
	25	25	25	37	92	46	46	46	96	64	100	155
HINGE PIN	120	120	120	160	450	500	500	500	500	900	900	900
	55	55	55	73	205	227	227	227	227	410	410	410
PITMAN	100	100	100	100	150	215	215	215	215	280	280	280
	46	46	46	46	68	98	98	98	98	127	127	127
TOGGLE PIN	25	25	25	25	33	45	45	45	45	50	50	50
	12	12	12	12	15	21	21	21	21	23	23	23
FRONT TOGGLE	70	70	70	70	160	200	200	200	200	210	210	210
	32	32	32	32	73	92	92	92	92	96	96	96
REAR TOGGLE	70	70	70	70	150	180	180	180	180	200	200	200
	32	32	32	32	68	82	82	82	82	92	92	92
ECCENTRIC SHAFT	250	250	250	260	410	610	610	610	610	800	800	800
	114	114	114	118	186	277	277	277	277	363	363	363
FLYWHEEL ASSEMBLY	700	700	700	700	1100	1200	1200	1200	1200	1100	1600	1600
	318	318	318	318	500	545	545	545	545	500	726	726
OIL CHAMBER COVER	50	50	50	60	120	130	130	130	150	160	170	180
	23	23	23	28	55	60	60	60	68	73	78	82
STATIONARY JAW	700	700	700	900	1500	1500	1500	1500	2500	1600	3200	4500
	318	318	318	410	680	680	680	680	1134	726	1452	2050
SWING JAW	1400	1400	1400	2200	3800	3200	3200	3200	6000	4500	6100	9000
	635	635	635	1000	1724	1452	1452	1452	2722	2042	2767	4082
JAWPLATE	600	500	600	650	1000	1300	1000	1000	2500	1500	2000	3800
	273	227	273	298	454	590	454	454	1134	680	908	1724
TOTAL CRUSHER WEIGHT NETT	7,650	7,650	7,650	10,100	18,600	18,200	18,200	18,200	26,800	22,500	34,400	46,700
	3,470	3,470	3,470	4,580	8,440	8,260	8,260	8,260	12,160	10,200	15,600	21,200

Section 3. General Overall Dimensions

Approximate general dimensions of our standard Jaw Crushers.

Do not use this table for actual installation work, for which certified drawings will be furnished.

For recommended horse power, and speed see Table 1 Chapter 12.



	FEED OPENING		DIMENSIONS IN														
	MM INS		MM INS														
	A	B	C	D	E	F	G	H	J								
24 x 8	610 24"	205 8"	2030 80"	1350 53"	125 5"	560 22"	635 25"	1320 52"	560 22"								
24 x 10		255 10"															
24 x 12		305 12"															
24 x 15		380 15"															
30 x 20		760 30"								510 20"	2700 106"	1930 76"	150 6"	585 23"	840 33"	1530 60"	715 28"
36 x 8		915 36"								205 8"	2540 100"	1550 61"	125 5"	660 26"	840 33"	1780 70"	790 31"
36 x 10	255 10"																
36 x 12	305 12"																
36 x 24	610 24"		2870 113"	2285 90"	150 6"	660 26"	840 33"	1780 70"	765 30"								
42 x 8	1065 42"	205 8"	3225 127"	1680 66"	150 6"	660 26"	1040 41"	1880 74"	890 35"								
42 x 10		255 10"															
42 x 12		305 12"															
42 x 14		355 14"															
42 x 16		405 16"															
42 x 27		685 27"								3175 125"	2390 94"	150 6"	660 26"	965 38"	2060 81"	940 37"	
42 x 32		813 32"								3505 138"	2820 111"	125 5"	660 28"	965 38"	2060 81"	940 37"	
42 x 36		915 36"															

INTRODUCTION

SECTION

1. FOREWORD
2. GUARANTEE
3. SAFETY PRECAUTIONS
4. INITIAL INSPECTION
5. SPARES

Section 1. Foreword

This instruction manual has been carefully compiled to provide comprehensive information relating to the machine with which it is delivered.

Every effort has been made to ensure quick and easy reference to any part of the manual. It has been laid out such that it can be used as the basis for personnel training programmes.

It is strongly recommended that operators and fitters read the contents of this manual thoroughly to familiarize themselves with the construction, operation and capabilities of the machine.

To ensure that the efficient day-to-day running of the machine is maintained it is essential that this manual be kept readily available for reference purposes.

Remember, your machine is designed to provide efficient trouble-free operation. Machine incorrect adjustments or lack of maintenance will result in the efficiency and reliability of the machine being impaired.

If during operation any problem arises which is not covered by this manual please contact our Service Department or your nearest representative.

The old adage that if this manual is your friend, it will meet the high standards set for ease of access to information. Comments or technical queries to our Marketing Department would be pleased to receive your comments.

Section 2. Guarantee

The following standard conditions shall apply to equipment supplied by BROWN LENOX & CO. LIMITED. The Buyer shall be deemed to have accepted the conditions of sale when the machine is delivered to the site.

The Company shall be liable for any defects in materials or workmanship which shall be discovered by the Buyer within the period of 12 months from the date of delivery of the machine. The Company shall be responsible for the cost of any repairs or replacement parts required, as requested by the Buyer and if practicable to replace with the originally ordered product.

All replacements required will be charged at the list price when applying but if the Company should accept that such original parts were defective then credit will be given to the Buyer in respect of charges made thereon.

 **Brown Lenox**

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- (a) The defect occurs within 12 months of the date of delivery and is reported to the Company in writing within 7 days of the discovery thereof.
- (b) The defect is not the result of fair wear and tear, carelessness or improper treatment or inadequate lubrication or by any omission to comply with any instructions given by the Company.
- (c) The Company shall not be held liable for any costs either incidental or consequential arising out of such defects.
- (d) The Company does not accept responsibility for parts or components not manufactured by it but will endeavour to obtain satisfaction from the manufacturers of such parts or components and will pass on to the Buyer any benefit derived. The buyer shall be responsible for the cost of removing the defective part or fitting the new part.
- (e) The benefit of this term shall apply only to the Buyer.
- (f) That no part has been fitted to the equipment sold which was not supplied by the Company.
- (g) Any replacement part agreed to be defective will be delivered by the Company carriage paid to the customer's nearest collection in the United Kingdom or to the port of exportation.

Section 3. Safety Precautions

THIS MANUAL CONTAINS THE NECESSARY INFORMATION FOR THE INSTALLATION AND MAINTENANCE OF YOUR MACHINE. IN CARRYING OUT THE INSTRUCTIONS WE WISH TO DRAW YOUR ATTENTION TO THE IMPORTANCE OF OBSERVING ALL THE FOLLOWING SAFETY PRECAUTIONS.

1. Always lock the machine to the power supply before carrying out any maintenance work on a machine.
2. Never use the machine unless all the safety devices and safety fixtures are properly fitted to the equipment. Whether any safety device is fitted or not, proceed with the work only if the installation of the equipment is approved by a competent person and always use the correct lifting points.
3. Always use the correct lifting technique and procedure.
4. Always operate the machine within the recommended limits of speed and with the recommended lifting points.
5. When lifting the machine or parts refer to weight chart and use correct load and secure the rated lifting points (Fig 1).

6. Procedures for dismantling and re-assembling should always be observed when carrying out maintenance work
7. Operate the machine in accordance with the Mines and Quarrying Act, Factory Acts or statutory regulations that apply to your particular industry

Section 4. Initial Inspection

(to be performed on delivery)

This machine has been completely assembled and test run prior to leaving the factory. However, it is essential that a check be carried out on the machine at the time of delivery. This check must not be delayed until installation of the machine.

Our crushing machines are normally delivered assembled and packed on wooden skids. All accessories such as tool kits, manuals, lubricant charts, are delivered in separate packing cases (Fig. 1).

Check the machine carefully for signs of damage which may have occurred during transit.

Check against the Bill of Lading, Freight Bill or Shipping Manifest that all the items have been delivered and are undamaged.

In the event of shortage or damage the carrier must be notified immediately to ensure that any claims can be processed without undue delay.

Section 5. Spares

When ordering spare parts it is **IMPORTANT** that the **MACHINE SERIAL NUMBER** is quoted. This number will be found stamped on the machine name plate.

If the serial number is preceeded with the letter 'M' it means that the Jaw Crusher has been built using metric components and it is **IMPORTANT** when ordering the serial number that the 'M' is included.

It is strongly recommended that only genuine replacement parts manufactured by the BROWN LENOX are used. This will guarantee that the replacement parts have been used and will ensure interchangeability of parts.

BROWN LENOX

SERIAL No.

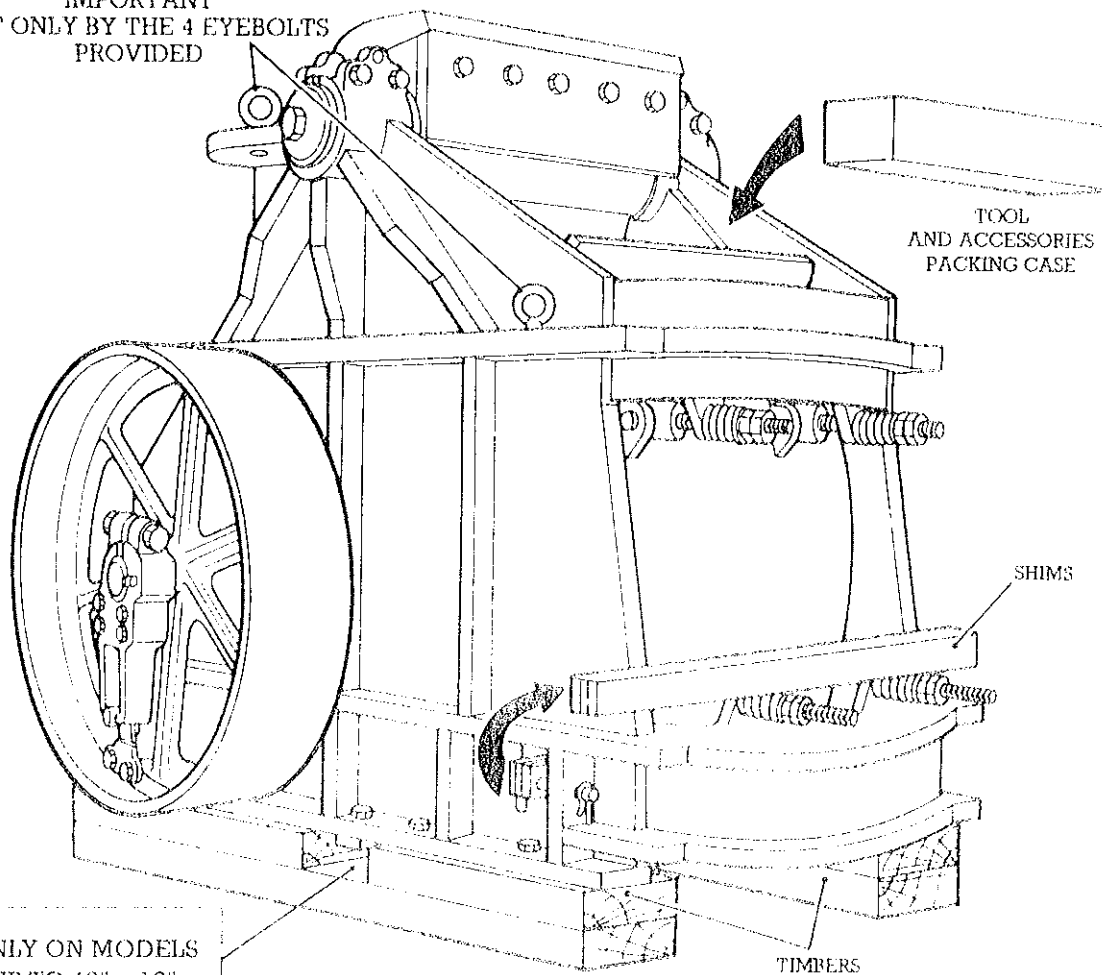
SIZE

MAX R.P.M.

H.P.

BROWN LENOX LTD. LIMITED
POWDERED MILLS & GRANULATORS
GREAT BRITAIN

'IMPORTANT'
LIFT ONLY BY THE 4 EYEBOLTS
PROVIDED



ONLY ON MODELS
UP TO 42" x 16"

FIG. 1

SECTION

1. FOUNDATION LOADS
2. TYPICAL INSTALLATION

Section 1. Foundation Loads

Crusher Foundations can vary vastly to suit site requirements and soil conditions. It is therefore not the intention of this Manual to advise on the Civil Engineering aspects of foundations.

It is essential that, whatever type of foundations are used, they are designed to withstand the dynamic and static loads of the crusher.

These loads are shown on the General Dimension Drawing enclosed.

Section 2. Typical Installation

Concrete foundations should be cast approximately 1" - 1½" (25 - 40mm) lower than the final height to allow for grouting.

Mild steel foundation bolts (not supplied) must be to the diameter, and spacing shown on the General Dimension Drawing enclosed. Space must be provided in the foundations for the Pullback Rod and the Limit Bar (Fig. 1) and provision made for the draining of oil from the oil chamber.

It is essential that the crusher's Eccentric Shaft is level.

It is recommended that steel wedges placed under the crusher frame about 12" apart, be used to level the crusher.

The face of the flywheel can be used to check the level of the eccentric shaft by an accurate machinists spirit level.

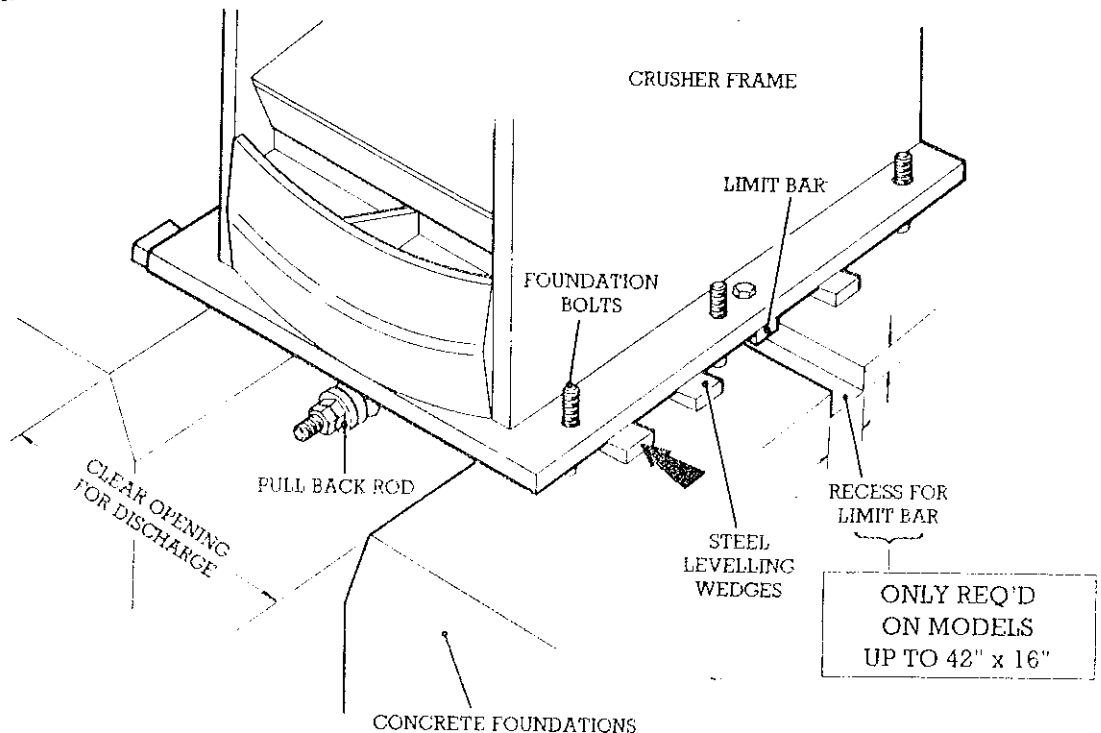
It is not so important to level the crusher lengthwise but this should be as level as possible, using the crushers base as a datum.

The steel levelling wedges should be left in place when finally grouting the foundations.

Allow the grout to fill up to about 1" (25mm) around the sides of the crusher frame. (Fig. 2).

When installing the crusher on steelwork it is recommended that hardwood blocks are used between the crusher frame and the steel foundations. The blocks will help the crusher to bed down when the foundation bolts are tightened by taking up slight discrepancies in the flatness of the steel foundations and the crusher frame. (Fig. 3).

Check the level of the eccentric shaft and if necessary adjust the wooden blocks by planing.



TYPICAL ONLY

FIG. 1

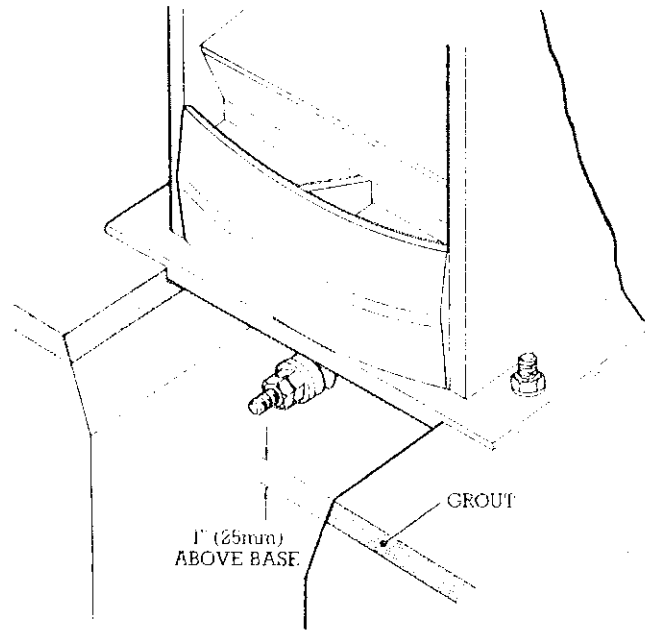


FIG. 2

FOR BOLTING DIMENSIONS
SEE GENERAL DIMENSION DRAWING

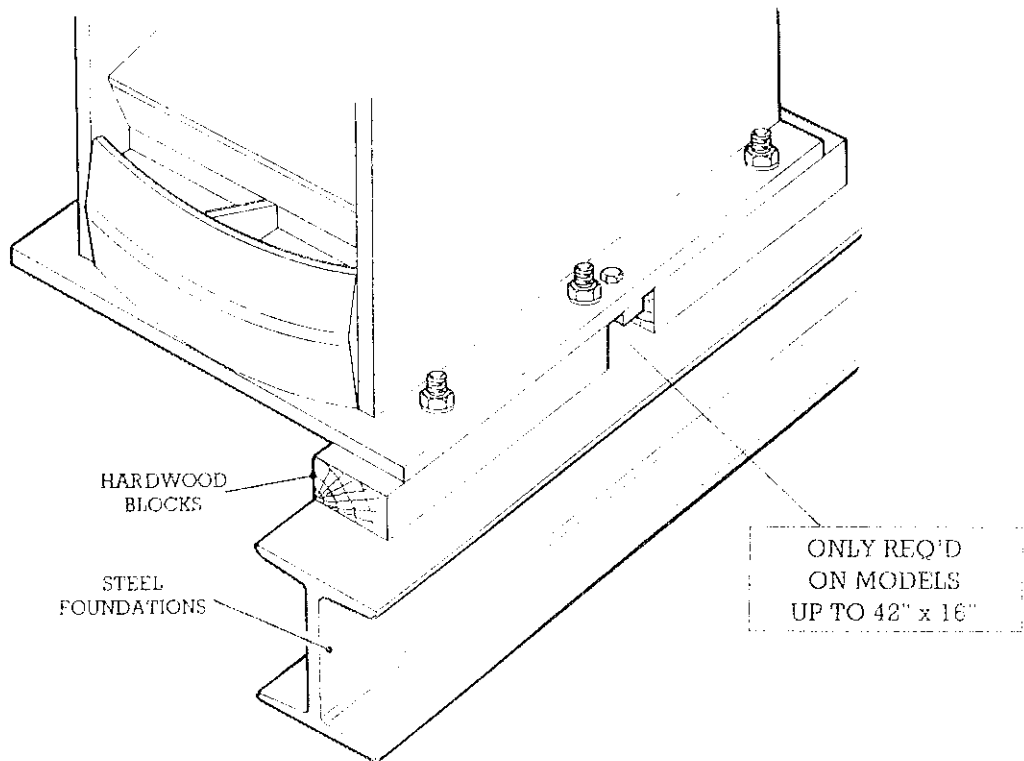


FIG. 3

SECTION

1. CHECK LIST PRIOR TO STARTING THE CRUSHER
2. STARTING THE CRUSHER
3. RUNNING IN CRUSHER
4. FAILURE TO START

Section 1. Check list prior to starting the Crusher

1. Crushers are delivered without oil in the sump. Before running the sump must be filled using the correct grade oil and quantity as shown in table Chapter 11 Section 7.
To do this, remove the oil filler plug and pour oil up to the level indicator in the sight window. Refit the plug securely.
NOTE:
The crusher must not be operating when this is carried out.
2. The hinge pin housing is packed with grease at the works. The grease level should be checked by pumping grease into the nipple at the centre of the housing until grease is seen at the pressure relief valves.
3. Check that the Stauffer lubricator on the crusher flywheel is full of grease. Give the lubricator three full turns to ensure that the flywheel bush is well lubricated.
4. Check Breather Hole in the Filler Plug is clear. (Refer to Chapter 11 Section 6).
5. Check that electrical connections have been made to the oil flow switch. (Refer to Chapter 11 Section 5/5A)
6. Check Foundation bolts are tight.
7. Check 'V'- drive belts are correctly tightened (Refer to Chapter 12 Section 4).
8. Check the drive guard is in position.
9. Check Crusher chamber is empty
10. Remove the Priming Plug and Prime Oil Pump
11. Replace plug and securely tighten.

Section 2. Starting the Crusher

1. Ensure when starting the Crusher that the By-Pass Button or timer is held for approximately 5 seconds to allow the Oil Flow Switch to operate. (Refer to Chapter 11 Section 5/5A).
2. Check direction of rotation of Flywheel as shown by Arrow on Frame or see Fig. 1 Chapter 12.

3. Check Oil Flow from the Oil Spray Pipe (Manifold) immediately after starting. This will be visible by removing the Filler Plug in the Oil Chamber Cover
4. Check speed of Flywheel is correct to recommended speed given in Chapter 12 Table 1
5. If there is a knocking sound from the Oil Chamber this means the toggles are not being pulled back into the toggle seats due to insufficient tension on the Pullback Rod.
Adjust the Pullback Rod until the knock stops (Refer to Chapter 6 Section 2)
6. Check for excessive vibration
Any excessive vibrations are usually caused by the crusher foundation bolts not being sufficiently tightened down or a weakness in foundations.

Section 3. Running in Crusher

During the first day of Crushing the feed should be restricted and applied intermittently to allow bedding in of components. Initial crushing should be carried out at maximum acceptable closed side setting and gradually closed down to obtain the required product

The crusher must **not** be set down below the minimum recommended closed side setting.

During this period frequently check the bearing housings for any sign of overheating of eccentric shaft bearings.

If flywheel safety arms trips out, reset as Chapter 9.

After a full days crushing check for any loose nuts on keeper plates, check and wearing plates etc.

Section 4. Failure to Start

1. Check Electrical Circuit, Motor, Starter
2. Crusher Starts but Fails to Run Continuously
 - a. Check the oil flow switch is correctly wired to the starter. (Refer to Chapter 11 Section 5A)
 - b. Check that the oil system pipe joints are tight on suction side and that the Priming Plug is Tightly sealed
 - c. Check flywheel rotation is correct direction

CRUSHER FRAME ASSEMBLY

CHAPTER

4

SECTION

1. DESCRIPTION

Section 1. Description

The Crusher Frame is fabricated from mild steel plate and cast steel components into an integral fully welded assembly.

Jigs are used to machine the frame ensuring accuracy and interchangeability.

Parts of the Frame are shown in Fig 1.

TYPICAL ALL
OTHER MACHINE

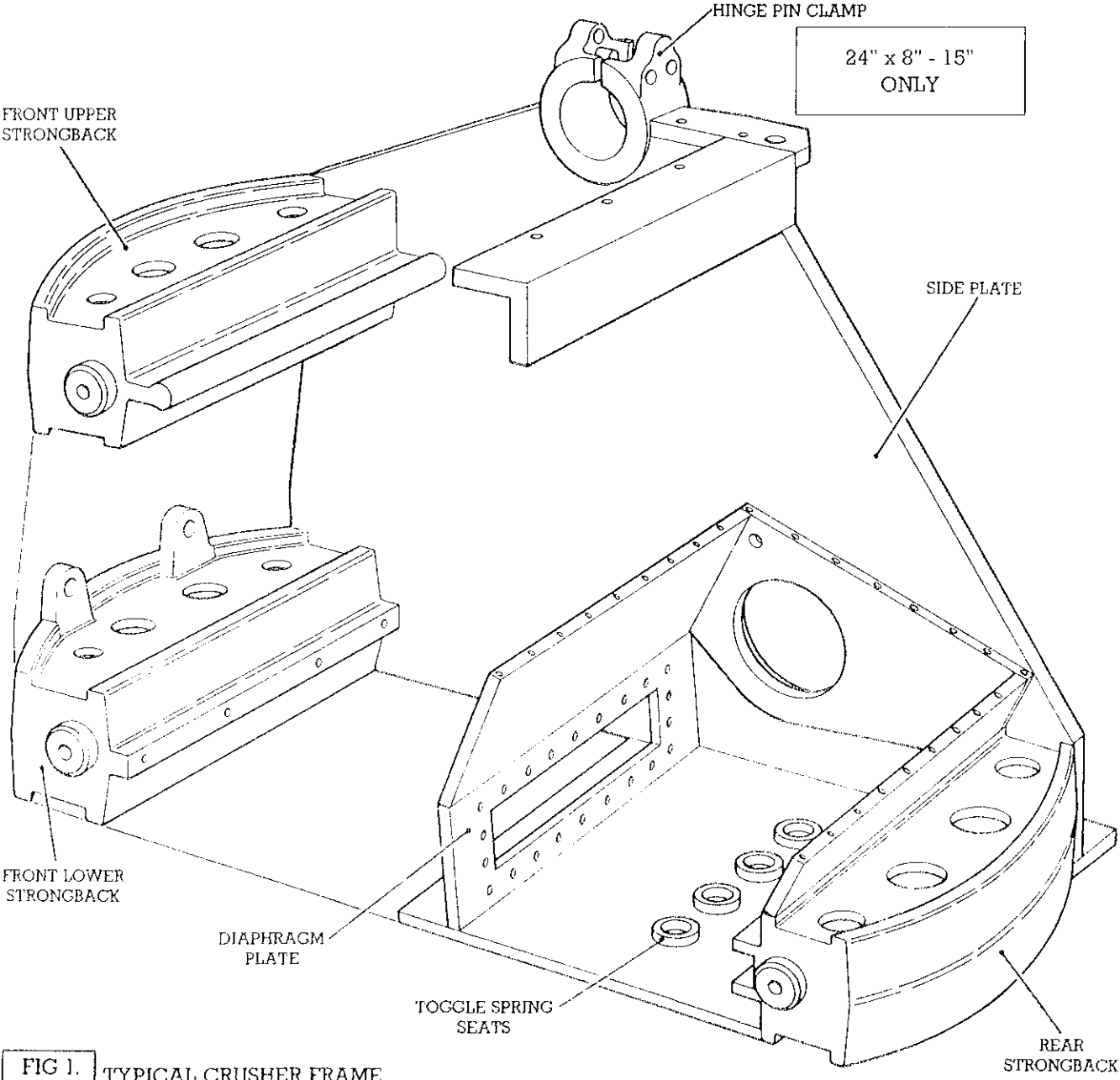
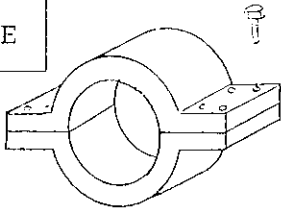


FIG 1. TYPICAL CRUSHER FRAME

SECTION

1. DESCRIPTION
2. REMOVAL AND REPLACEMENT

Section 1. Description

The Cheek and Wear Plates are bolted to the inside of the Crusher Frame acting as liner plates to the crushing chamber.

These plates prevent the material being crushed from wearing the Crusher Frame Side Plates.

Section 2. Removal and Replacement

1. It may be necessary to Jack back the Stationary Jaw to give access to holding bolts. (Refer to Chapter 10 Section 2). If bolts are still not accessible the Jawplate will have to be removed. (Refer to Chapter 7 Section 2).
2. Remove the Wearing Plate Bolts. Free the Wearing Plates from the crusher frame using a pinch bar.

3. Lift the Wearing Plates from the crusher via the feed opening, using Lifting Tackle as shown Fig 1A.
3. Remove the top cheek plate bolts. Slacken off the bottom cheek plate bolts but do not remove. This will prevent the cheek plate from slipping down. Free the cheek plate from the crusher frame using a pinch bar. Attach lifting tackle through one of the top bolt holes (Fig. 1A) and taking the weight of the cheek plate, remove the bottom cheek plate bolt. Lift the cheek plates from the crusher via the feed opening. (Refer to Chapter 1 Section 2 for Weights)
4. Fit replacement cheek and wear plates in reverse order.

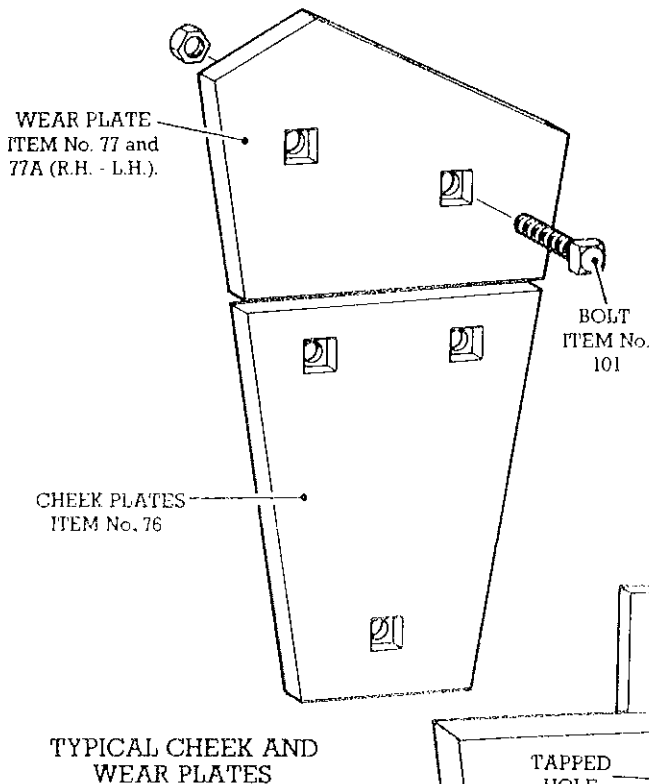
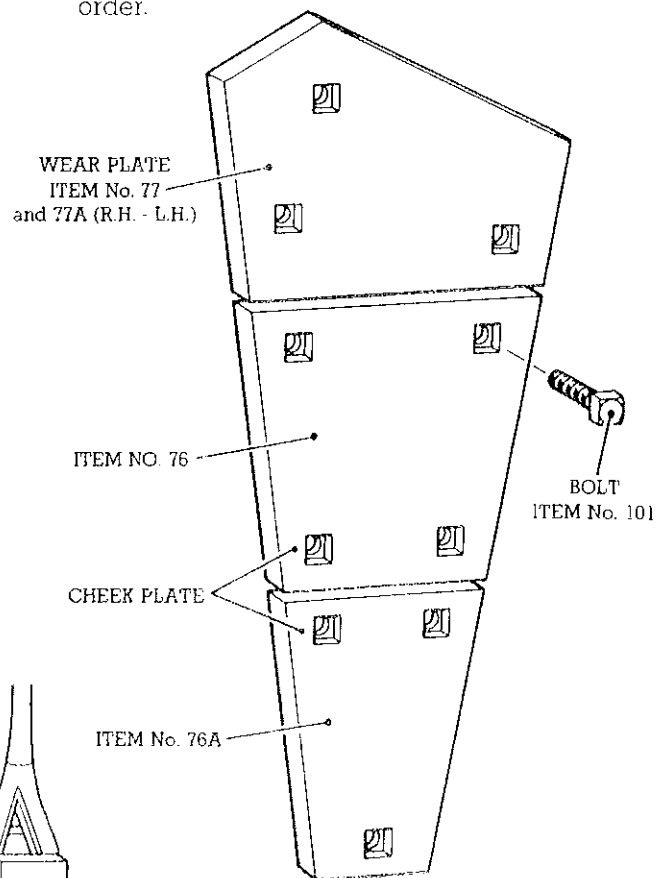


FIG. 1



TYPICAL CHEEK AND WEAR PLATES (36 x 24 & 42 x 32/36)

FIG. 2

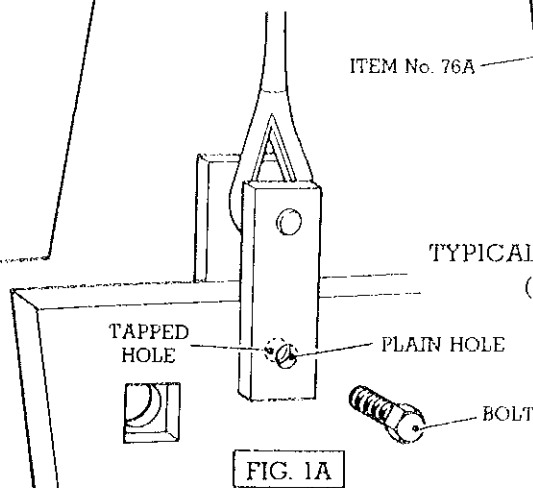


FIG. 1A

SWING JAW AND
ASSOCIATED PARTS

CHAPTER

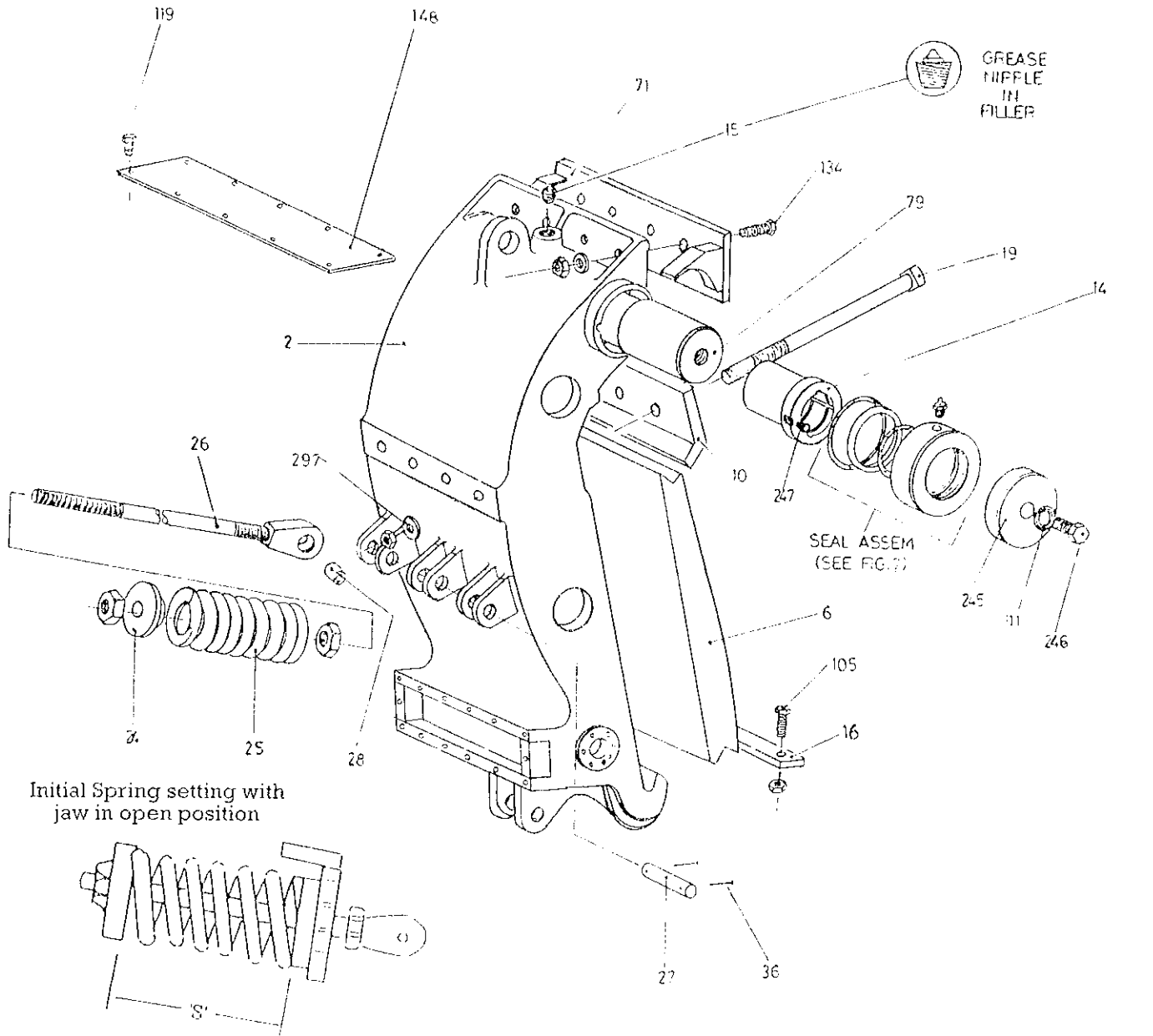
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SECTION

1. DESCRIPTION
 2. PULLBACK ROD
Adjustment, Removal and Replacement
 3. LIMIT BAR
 4. HINGE PIN, BUSHES AND SEALS
Removal and Replacement
 5. SWING JAW GUIDE
Description, Adjustment, Removal and Replacement
-

SWING JAW AND ASSOCIATED PARTS. CHAPTER 6

TYPICAL ARRANGEMENT
42" x 27", 32" x 36" ONLY



Initial Spring setting with
jaw in open position

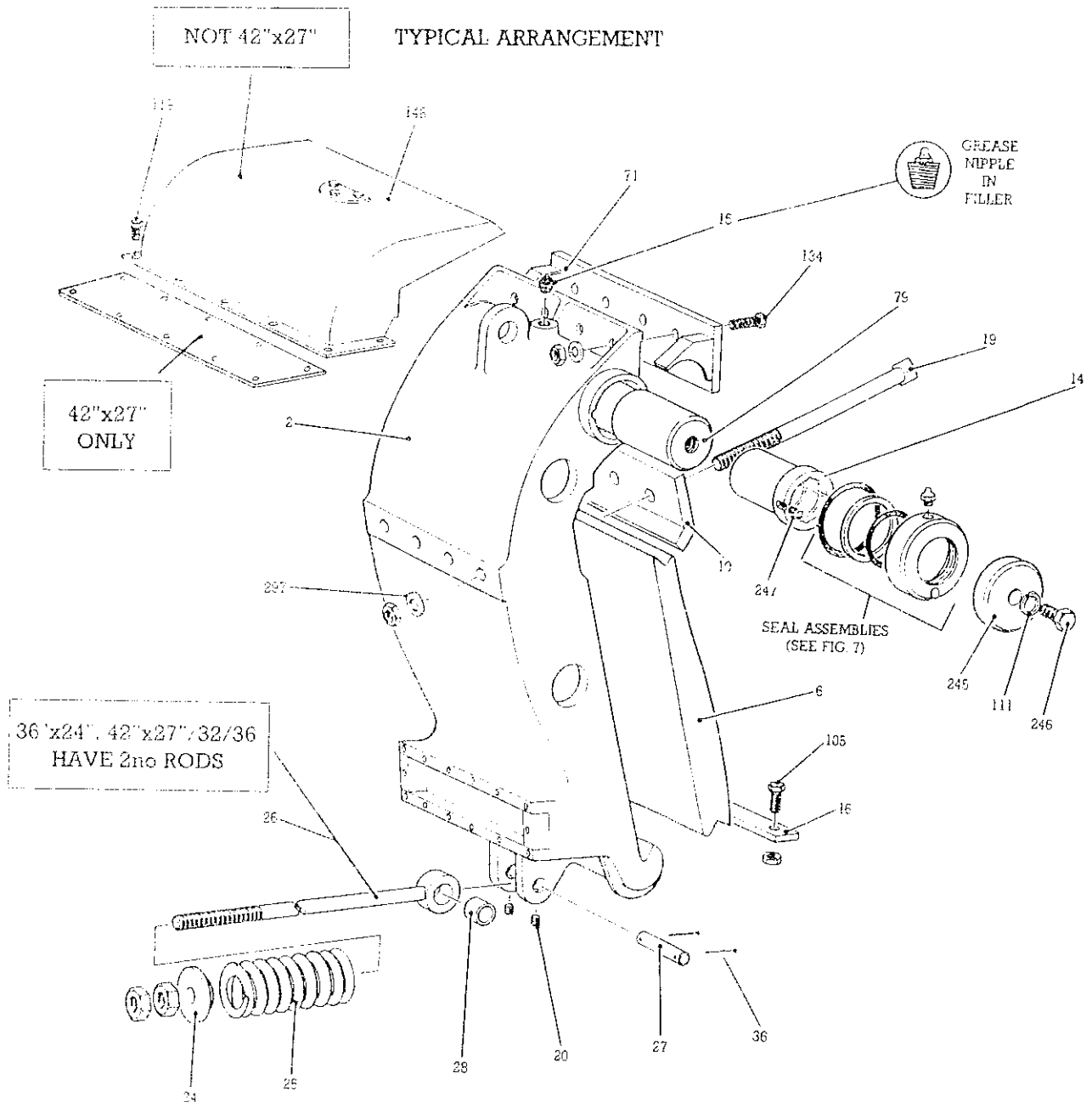
Compressed Spring Length
114 = 12 1/8" = 308mm
120 = 12 1/8" = 308mm

ITEM No.	DESCRIPTION	ITEM No.	DESCRIPTION	ITEM No.	DESCRIPTION
2	Swing Jaw	25	Pullback Rod Spring	119	Setscrew
6	Jawplate	26	Pullback Rod and Eye	134	Guard Bolt
10	Moveable Keeper Plate	27	Pullback Rod Pin	148	Swing Jaw Guard
14	Hinge Pin Bush	28	Pullback Rod Bush	245	Hinge Pin Washer
15	Filler Plug	36	Split Pin	246	Hex Hd Set Screw
16	Limit Bar	71	Hinge Pin Guard	247	Socket Set Screw
19	Keeper Bolt	79	Hinge Pin	296	Keeper Spring 44 x 8 - 42 x 38
20	Socket Set Screw	105	Limit Bar Bolt	297	Washer
24	Pullback Rod Washer	111	Lock Washer		

SWING JAW ASSEMBLY (42" x 27", 32" & 36")

FIG. 1

SWING JAW AND ASSOCIATED PARTS. CHAPTER 6



ITEM No.	DESCRIPTION	ITEM No.	DESCRIPTION	ITEM No.	DESCRIPTION
2	Swing Jaw	25	Pullback Rod Spring	119	Setscrew
6	Jawplate	26	Pullback Rod and Eye	134	Guard Bolt
10	Moveable Keeper Plate	27	Pullback Rod Pin	148	Swing Jaw Guard
14	Hinge Pin Bush	28	Pullback Rod Bush	245	Hinge Pin Washer
15	Filler Plug	36	Split Pin	246	Hex Hd Set Screw
16	Limit Bar	71	Hinge Pin Guard	247	Socket Set Screw
19	Keeper Bolt	79	Hinge Pin	297	Washer
20	Socket Set Screw	105	Limit Bar Bolt		
24	Pullback Rod Washer	111	Lock Washer		

SWING JAW ASSEMBLY

FIG. 1A

Section 1. Description

The Swing Jaw Assembly and associated Parts comprise of-

Pullback Rod/s, Limit Bar, Hinge Pin, Bushes, Seals, Swing Jaw Guard, Hinge Pin Guard (Fig 1)

The Swing jaw is fitted with bronze Hinge Pin Bushes and pivots on a Hinge Pin located at the top of the crusher frame. A spring tensioned Pullback Rod is fitted to the bottom of the Swing Jaw and connects to the crusher frame, holding the Swing Jaw in position against the toggle mechanism.

A Limit Bar stop is fitted to the crusher frame and acts as a safety device restricting the forward movement of the Swing Jaw in the event of Pullback Rod or Spring failure.

The Swing Jaw Guard prevents material falling and lodging between the Swing jaw and the crusher frame.

The Hinge Pin Guard prevents wear on the Swing Jaw casting by the feed material.

Section 2. Pullback Rod

ADJUSTMENT, REMOVAL AND REPLACEMENT

INITIAL SPRING SETTING WITH SWING JAW IN FULLY OPEN POSITION. (SEE PART 4 SECTION 2).

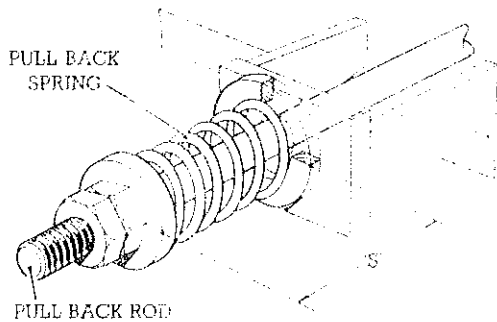


FIG. 2

MACHINE	S'	
	ins	mm
24 x 8/12	8 $\frac{3}{4}$ "	210
24 x 15	12"	305
30 x 20	12 $\frac{1}{4}$ "	308
36 x 8/12	12"	305
36 x 24	12"	305
42 x 8/16	12 $\frac{1}{4}$ "	312
42 x 27	15 $\frac{1}{4}$ "	384
42 x 32/36	15"	381

ADJUSTMENT

The Pullback Rod and Spring is fitted to keep the Swing jaw located and in tension against the toggle mechanism.

Sufficient spring tension will allow the toggle hammer in their locating seats.

Although the springs are pre-set at manufacture, there will be occasions when the Pullback Rod assembly is dismantled for maintenance reasons and it will be necessary to spring test the tensioned rod. The correct length of the rod is shown in Fig 2.

REMOVAL AND REPLACEMENT

Turn the flywheel and the swing jaw to their maximum open position. Remove the nut and washer that pin the spring to the pullback rod. Remove the existing diameter. This will prevent the spring from conversion of the flywheel to the open position required.

Remove Nuts, Washers and Springs.

Disconnect Pullback Rod from the crusher frame removing the Pullback Rod Pin and its associated Nut (Fig 3).

Check the Pullback Rod Pin and Pin Nut for wear and replace if necessary.

Re-assemble in reverse order.

Remove the washer/bush from the rod in the chamber.

To correctly tension the spring test as follows: the fully "open" position that is when the swing jaw is at the end of its open stroke by an additional crushing stroke.

The length of spring to use is shown in Fig 2 as shown in Fig 2.

As the Pullback Rod is inserted into the chamber ensure it is seated.

Turn the swing jaw to the closed position and adjust the spring tension to the correct setting until the limit bar clamps.

Section 3. Limit Bar

A Limit Bar is fitted to the crusher frame across the width of the crusher bed and is positioned slightly forward of the Swing Jaw.

In the event of a Pullback Rod or Spring failure, in the event of the Pullback Rod Nut assembly failing, there is a tendency for the Swing jaw to swing forward causing damage to the rubber mechanism and the crusher frame.

The Limit Bar will restrain the swing jaw from swinging forward by the distance.

The crusher should be checked for correct Limit Bar level on a regular basis.

A clearance of 1/2" should be maintained between the back edge of the Limit Bar and the crusher frame. The maximum clearance is shown in Fig 3.

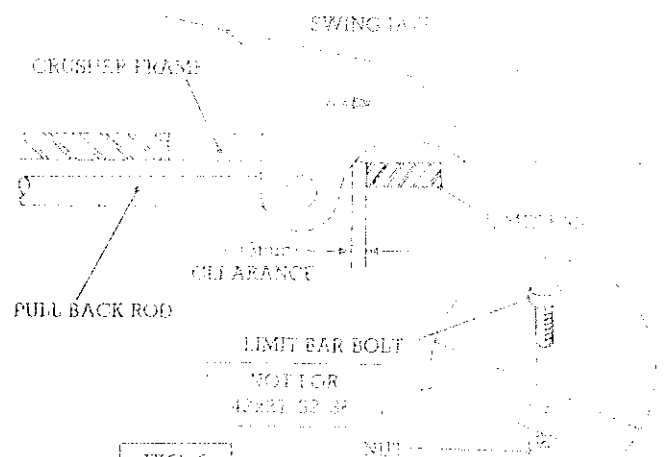


FIG. 3

JAW PLATES AND KEEPER PLATES

CHAPTER

7

SECTION

1. DESCRIPTION
2. REMOVAL AND REPLACEMENT

Section 1. Description

Jaw plates are manufactured in a number of different types including Plain - Toothed - Reversible - Non Reversible, with the appropriate Keeper Plates.

The Jaw plates are machined on the backs and on the locating Vee's at each end and are clamped to the Jawstock at the Top Vee by a Keeper Plate.

Keeper Plates are bolted to the Jawstock and are provided in different types as shown in (Fig. 3) Types 'A' and 'B' for Swing Jaw and (Fig. 4) Types 'C' and 'D' for Stationary Jaw.

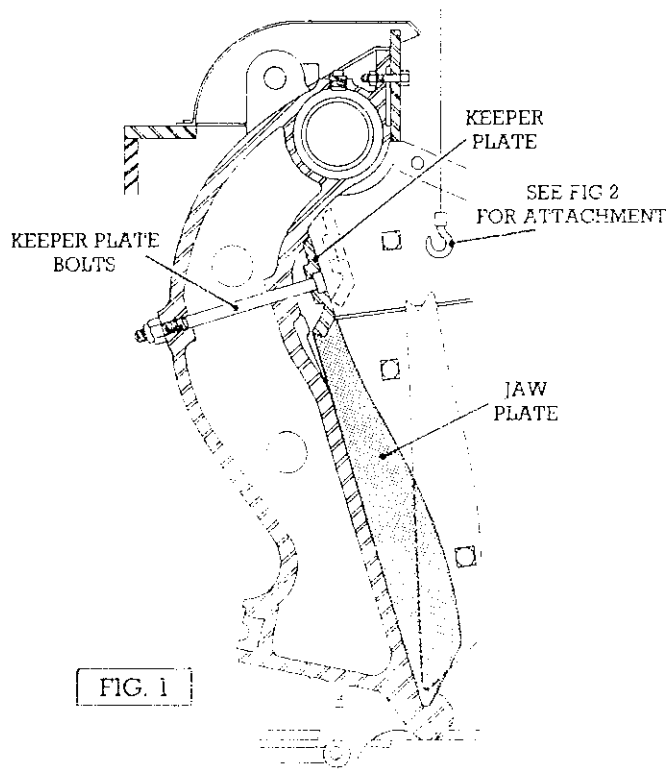


FIG. 1

Section 2. Removal and Replacement

REMOVAL

1. Remove Keeper Plate (Fig. 1) by slinging from the bolt holes
2. Using a pinch bar, lever the jaw Plate away from the Jaw at the top

3. Lift the Jaw Plate out of the crusher using the lifting holes provided in the Jaw Plate (See Fig. 2) (Refer to Chapter 1 Section 2 for weights).

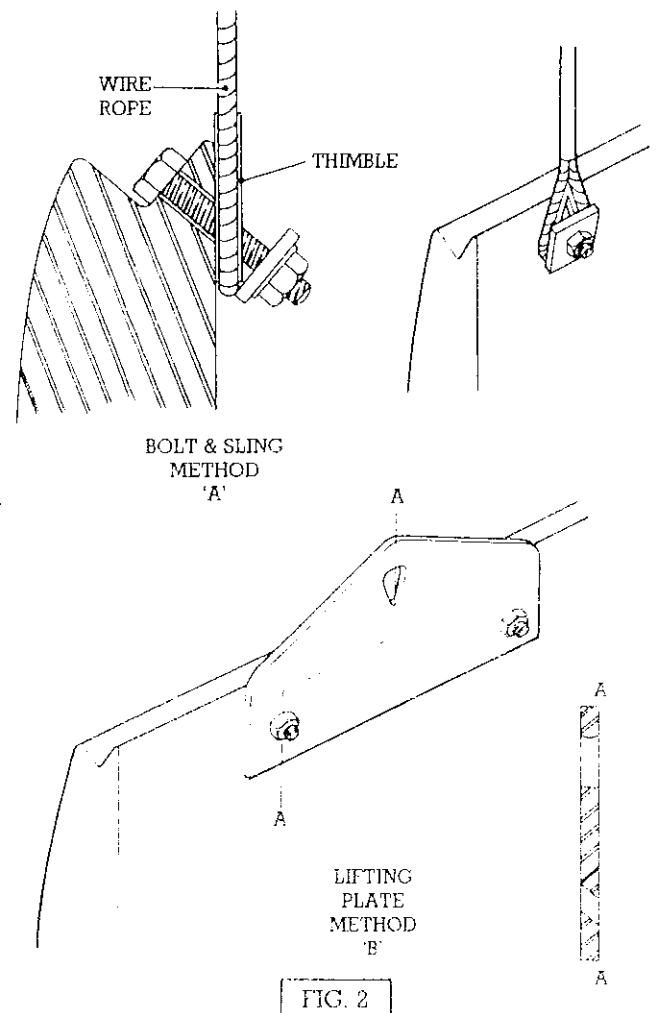


FIG. 2

REPLACEMENT

1. Thoroughly clean the face of the Jawstock which the jaw Plate will gear and dist. the bearing hole in the bottom of the Jaw
2. Attach lifting tackle to Jaw Plate as Fig. 2 and lower Jaw Plate into position on Jaw, keeper plate near to vertical and ensuring that the bottom of the plate locates into the Vee at the bottom of the Stationary Jaw
3. Prevent Jaw Plate from falling away from Jawstock using wood block and remove lifting tackle
4. Wedge Jaw Plate tight against face of Jawstock and lower keeper plate into position

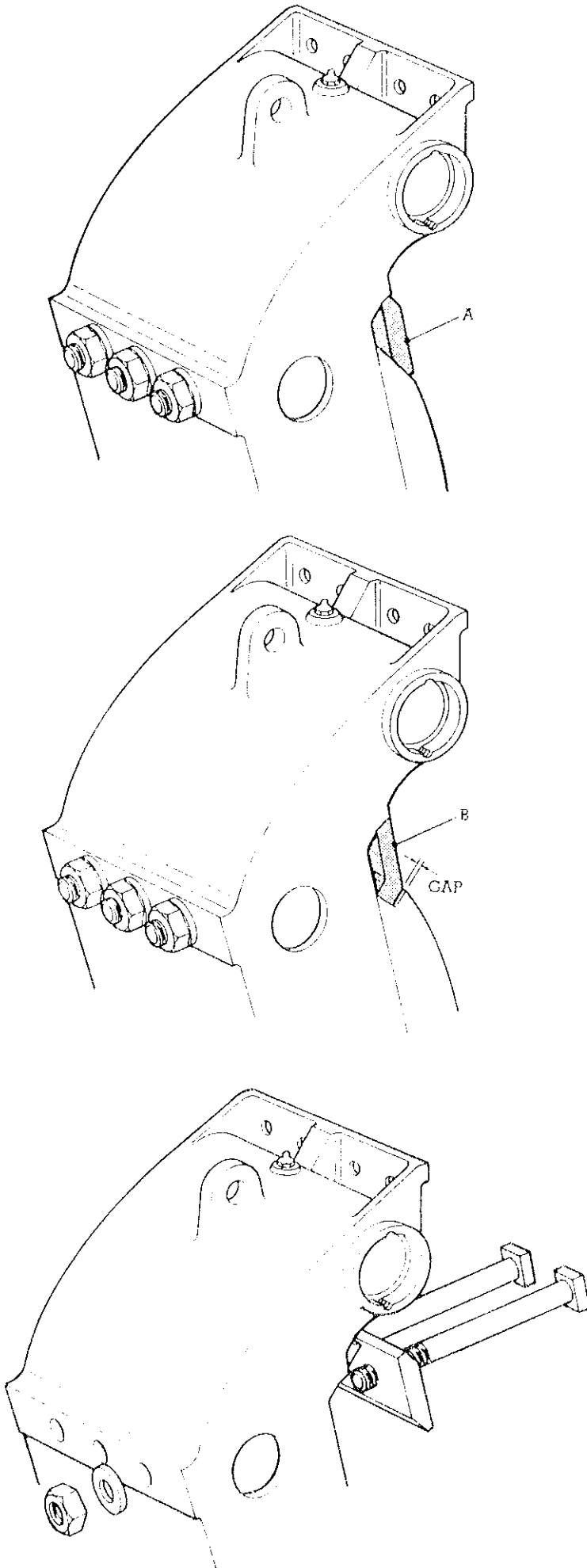


FIG. 3

- 8 Replace Keeper Plate.
Tighten up bolts.

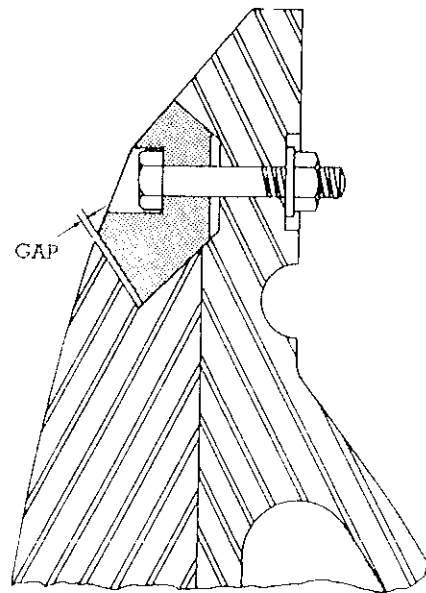
NOTE: There are basically two types of Keeper Plates fitted to the Swing Jaw, types 'A' and 'B' (Fig 3) depending on the type of Jaw Plate fitted

When Jaw Plates with a locating vee (Type B) are fitted it is important that there is a gap of approximately $\frac{1}{8}$ " (3mm) between the Keeper Plate and the Jaw Plate (Fig 3)

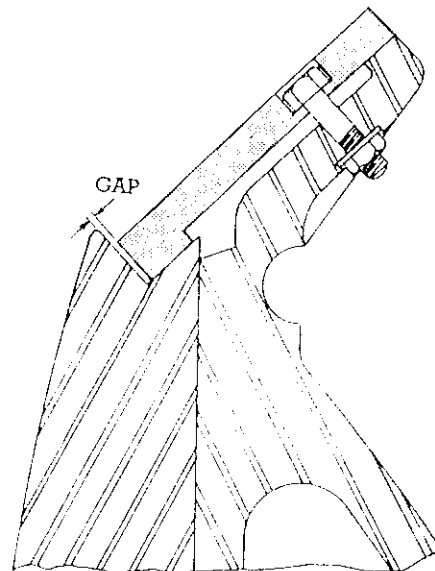
There are also two types of Keeper Plates used on the Stationary Jaw depending on the Type of Jaw as (Fig 4) Type 'C' and 'D'.

9 **IMPORTANT**

After the machine has operated for a few hours, check nuts for tightness.



TYPE C (36x24 - 42x36)



TYPE D (24x8 - 36x12)

FIG. 4

Section 4.

Hinge Pin, Bushes and Seals REMOVAL AND REPLACEMENT

REMOVAL

1. Erect the lift rigment and remove the lift from the Hinge Pin and Trolley (See Chapter 3 Section 1)
2. Remove the pusher from frame (See Fig. 4)

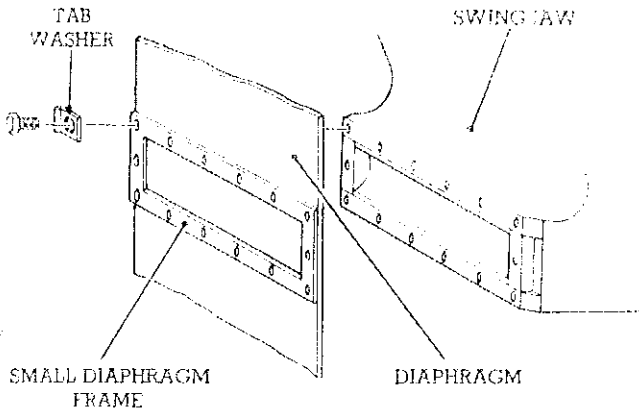
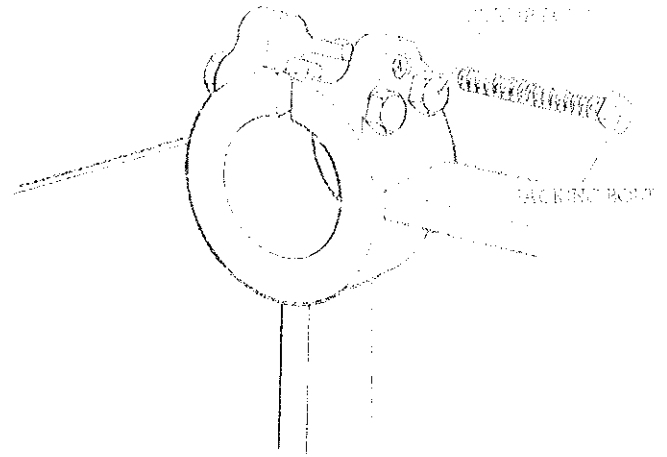


FIG 4

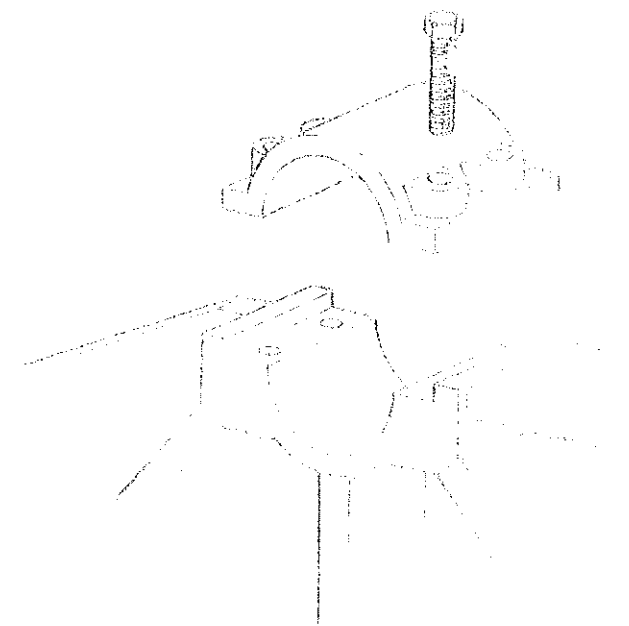
3. Remove Swing Jaw Guard and Hinge Pin Guard (Fig. 5)
4. Remove upper Wearing Plates (Refer to Chapter 3 Section 1)
5. Remove the Full Circle End Assembly (Refer to Section 1)
6. Remove the Hinge Pin Cap Washer (See Fig. 5)
7. If the Hinge Pin is located in Clamp Type Housing (Fig. 5) slacken off the Hinge Pin Clamp belts on both sides and spring open the clamp with the Chain Screws
8. If the Hinge Pin is located in a split Cap Type housing (Fig. 5A) remove Cap bolts and Cap
9. Where Swing Jaw Guide Assemblies are fitted (if applicable) these must be removed and the Swing Slides removed from the Sides of the Swing Jaw (See Section 5)
10. Attach Hinge Trolley to the lifting beam on the Swing Jaw and take the weight of the jaw
11. When the Hinge Pin is in a Clamp Type housing (Fig. 5) the Hinge Pin must be drawn to the top of the housing with a chain and winch and a wire rope (See Fig. 6B)
12. Attach the wire rope to the Hinge Pin and Cap Bolt and run the wire rope over the top of the jaw
13. The Swing Jaw must be lifted until the Hinge Pin is clear of the Swing Jaw and gear wheels with the top of the Crusher Frame
Insert a steel support bar to push the cast base so that the Hinge rests on top of the frame. This bar will now support the jaw when the lift is gradually taken off (Fig. 6)
(Alternatively, the Swing Jaw may now be removed completely from the Crusher Frame)
14. Remove the Push separating screws from the Hinge Pin bushes

15. To remove the Hinge Pin Bushes push down the Jacking Screws and Plates as shown in Fig. 6. If the Bushes are worn and damaged they must always be replaced. Push down the plates until they are flush with the top of the Hinge Pin. Once the bushes are removed, the Hinge Pin must be freed from the housing and removed from the crusher (See Fig. 6C)



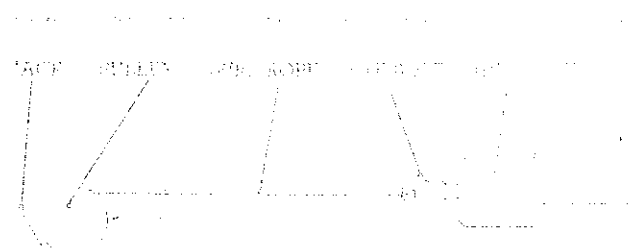
CLAMP TYPE HINGE PIN HOUSING

FIG 5



SPLIT CAP TYPE HINGE PIN HOUSING

FIG 5A



EXTRACTION EQUIPMENT FOR HINGE PIN

FIG 6B

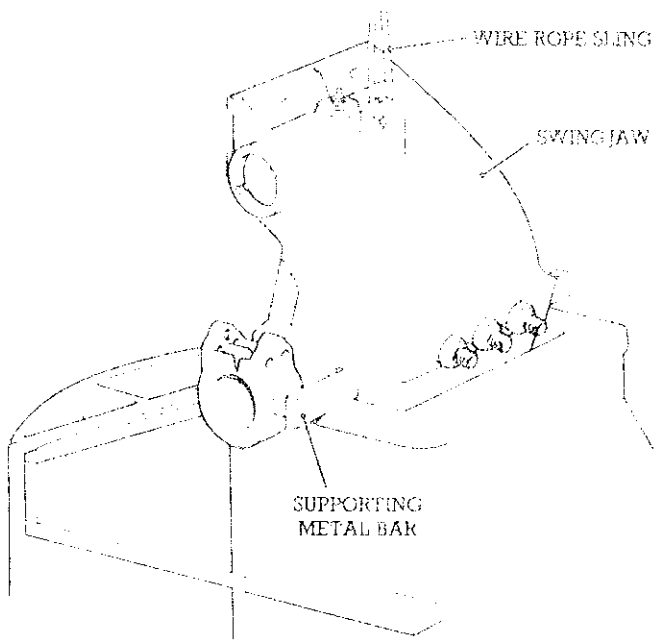
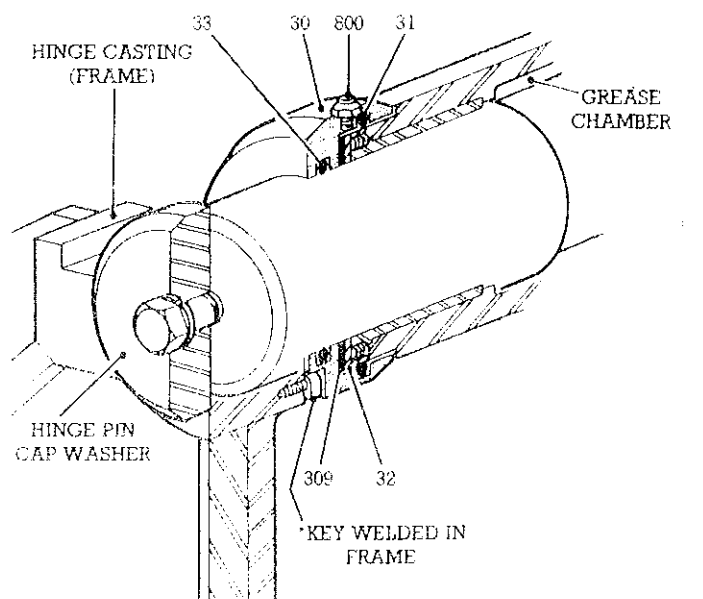
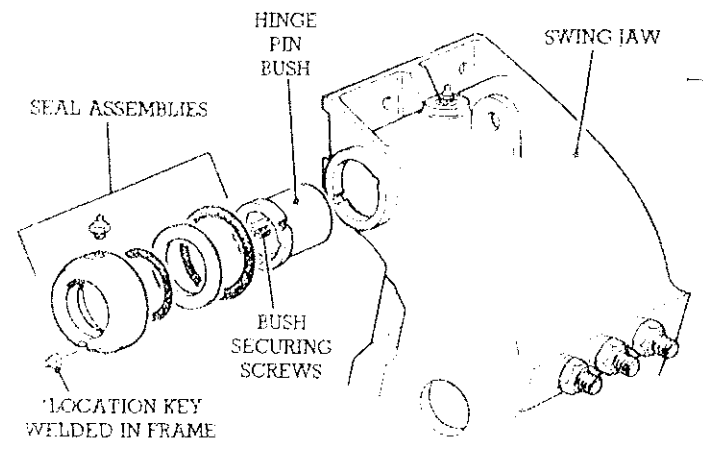


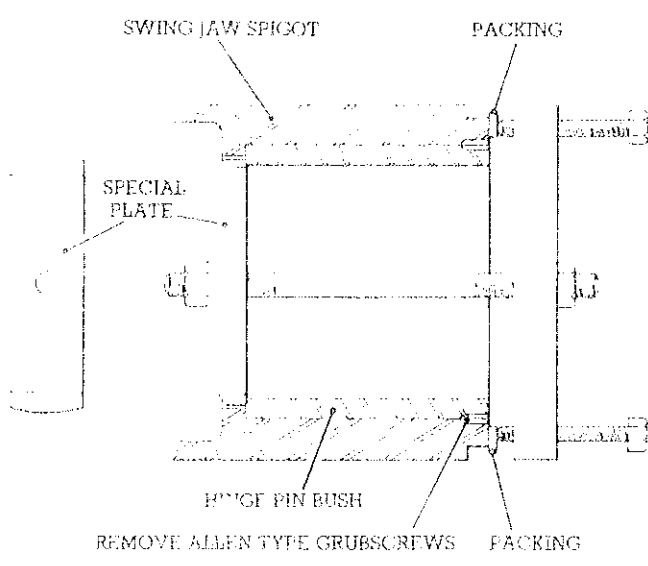
FIG. 6



ITEM No.	DESCRIPTION
30	Seal Housing
31	Outer 'O' Ring
32	Thrust Washer
33	Inner 'O' Ring
309	Shim Steel
800	Pressure Relief Valve

HINGE PIN SEAL ASSEMBLY AND COMPONENTS

FIG. 7



EXTRACTION EQUIPMENT FOR HINGE PIN BUSHES

FIG. 8

REPLACEMENT

1. Use the extraction equipment to remove the hinge pin bush from the swing jaw. The bush should be removed without damage to the swing jaw.
2. When the bush is removed, clean the hole in the swing jaw with a wire brush and remove any debris.
3. The hole in the swing jaw may be cleaned and the bush removed for alignment. If necessary, the hole should be hand scraped or lapped to allow free movement of the shaft and a clearance of 0.001 to 0.002 in. (0.025 to 0.050 mm) should be obtained.
4. Drill and tap the hole half and half in the end of the shaft and the hole and secure bush with a grease plug.

5. With Pin removed Grease the bushes with the grease.
6. Insert the Seal Housing into the Hinge Casting (Frame) and the Hinge Pin Bush into the Swing Jaw as shown in Fig. 7.
7. Insert the Swing Jaw into the frame making sure the slot in the seal housing locate onto the seal housing Locating Key.
8. Check the clearance between the Seal Housing and the Hinge Casting face (Fig. 10). This clearance should be 0.010" - 0.020". If necessary adjust the number of Shims to give this clearance. (Fig. 7).
9. Line up the Hinge Pin bores in the frame and jaw and enter the Hinge Pin turning the Pin at the same time to assist its passage through the Seals.

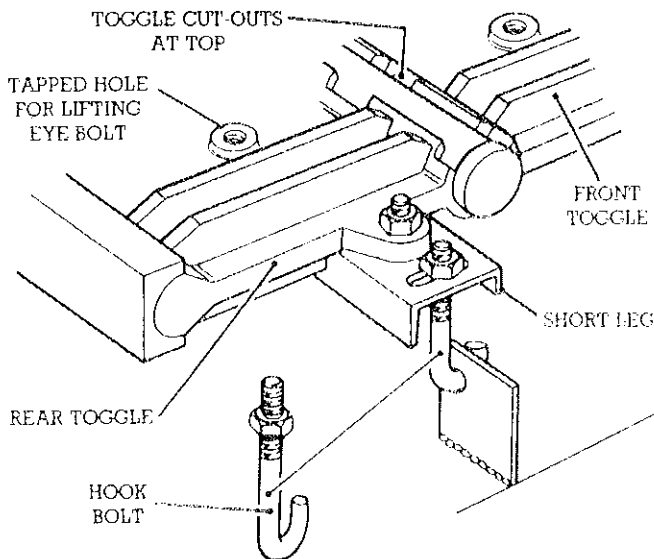


FIG. 4

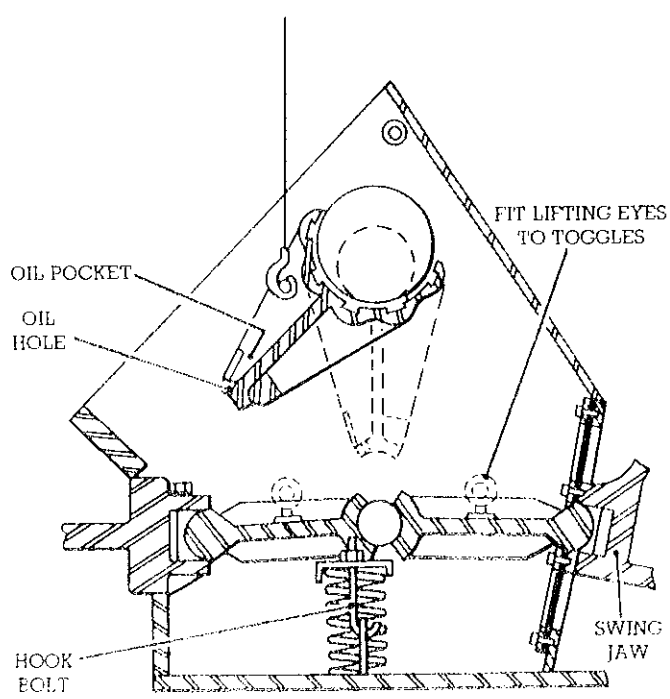


FIG. 5

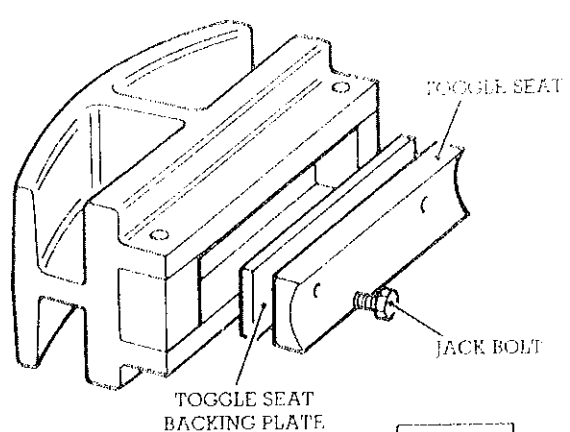
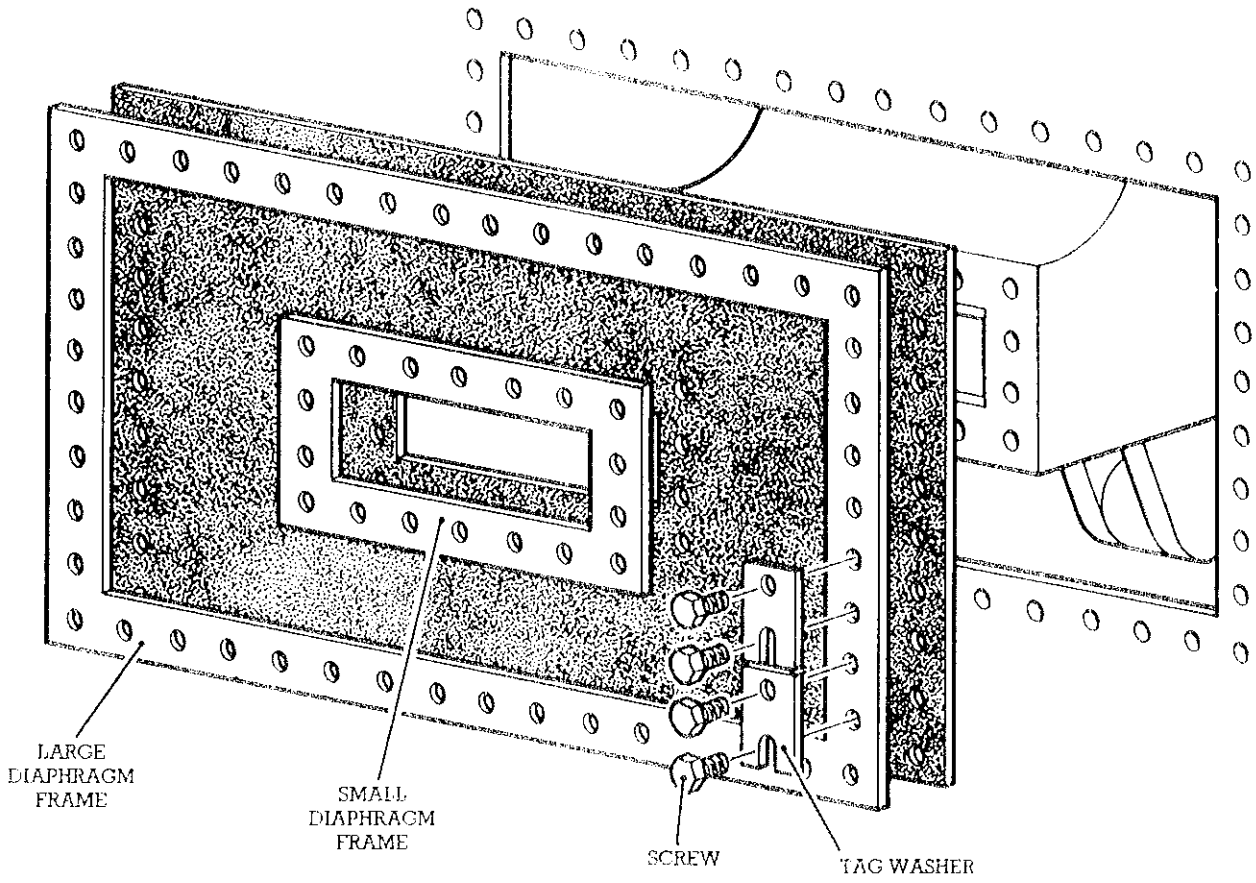


FIG. 6

REPLACEMENT

14. Refit Toggle Seats tapping with hide hammer.
15. Coat ALL Bearing surfaces with lubricating oil before proceeding. If new components are fitted coat Bearing surfaces with anti-scuffing oil
16. Refit Toggle Springs over locating rings (See Fig 1).
17. Locate Toggle Spring Channel centrally in position over springs ensuring short leg of channel is at front (See Fig 4)
18. Refit Hook Bolts to Channel and tighten to give approx. 1" (25mm) spring compression.
19. Place rear Toggle with underside machined location on Channel and bolt to Channel hand tight **only**. Push Toggle down to locate convex end into rear Strongback Toggle Seat.
20. Refit front Toggle with the cut-away Concave Bearing area on top (See Fig.4) supporting the concave end on the rear Toggle Spring Channel and locate convex end into Swing Jaw Toggle Seat
21. Place Toggle Pin centrally between concave faces of Front and Rear Toggle.
22. Fully tighten bolts securing rear Toggle to Channel
23. Further tighten the Hook Bolts compressing the Toggle mechanism until there is sufficient space to allow Pitman to be re-located between Eccentric Shaft and Toggle Pin as shown in Fig. 5. Ensure Pitman is re-assembled with oil pockets and oil holes positioned as Fig.5.
24. Remove wedge from Flywheel and turn Flywheel until the Eccentric Shaft is on bottom dead centre and remove wedge between Swing Jaw and Oil Sump Frame.
25. Rotate the Flywheel by hand a few times to check that the Pitman and Toggles are running smoothly
26. If a new Pitman has been fitted it will be necessary to check for any high spots between the White Metal Bearing surface of the Pitman and Eccentric Shaft.
First wipe all oil off the Eccentric Shaft.
Apply "Engineers Blue Marking Ink" onto the exposed part of the Eccentric Shaft.
Rotate the Flywheel, by hand, a few times, to transfer the "Blue Marking" from the Eccentric Shaft onto the White Metal Bearing of the Pitman.
Remove the Pitman as previous.
Inspect the "Blue Markings" on the Pitman Bearing and if necessary relieve any heavy markings by hand scraping
Replace the Pitman as Fig. 5.
27. Rotate the Flywheel to bring Eccentric to bottom dead centre. Place wedge between Flywheel and frame. Remove Toggle Channel Hook Bolts.
Remove Wedge.
Rotate Flywheel by hand to ensure free operation
28. Replace Oil Drain Plug
29. Fill Oil Chamber to correct level
30. Replace Oil Chamber Cover
31. Remove Priming Plug (See Fig 4 Chapter 11) and prime Oil Pump
32. Start and run Crusher
N.B. If new components have been fitted allow Crusher to run without crushing for approx. 2 - 4 hrs.

**SECTION 3. Diaphragm
REMOVAL AND REPLACEMENT.**



REMOVAL AND REPLACEMENT
OF DIAPHRAGM

FIG. 7A

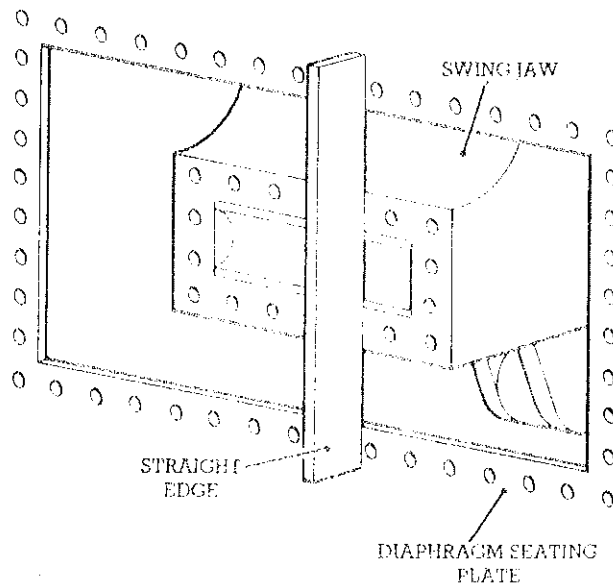


FIG. 7

SECTION

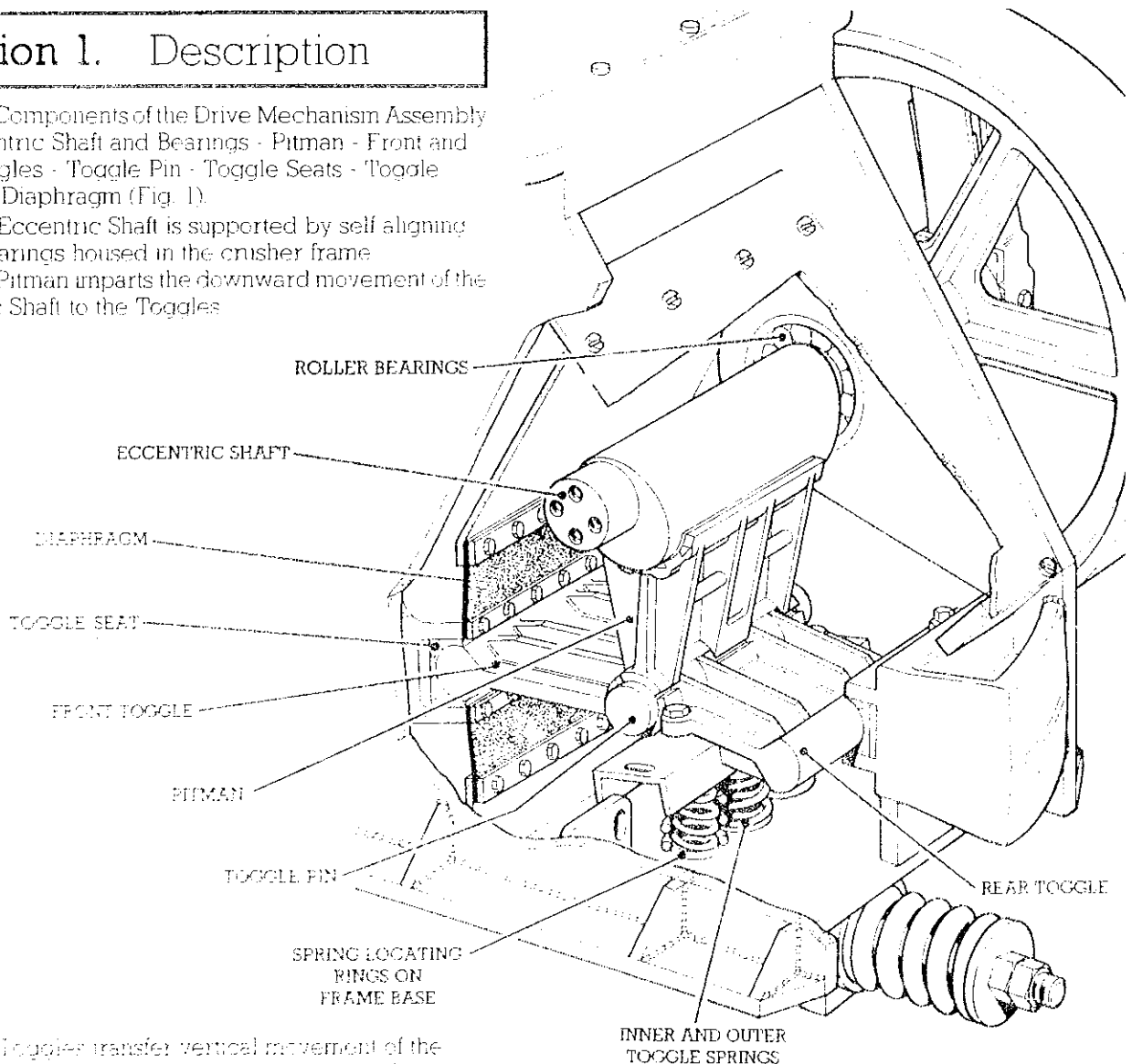
1. DESCRIPTION
2. PITMAN, TOGGLE PIN, TOGGLE SEATS, TOGGLE SPRINGS, TOGGLES.
Removal and Replacement
3. DIAPHRAGM
Removal and Replacement.
4. ECCENTRIC SHAFT, BEARINGS, AND BEARING HOUSINGS.
Removal and Replacement.

Section 1. Description

The Components of the Drive Mechanism Assembly are Eccentric Shaft and Bearings - Pitman - Front and Rear Toggles - Toggle Pin - Toggle Seats - Toggle Springs - Diaphragm (Fig. 1).

The Eccentric Shaft is supported by self aligning Roller Bearings housed in the crusher frame

The Pitman unparts the downward movement of the Eccentric Shaft to the Toggles

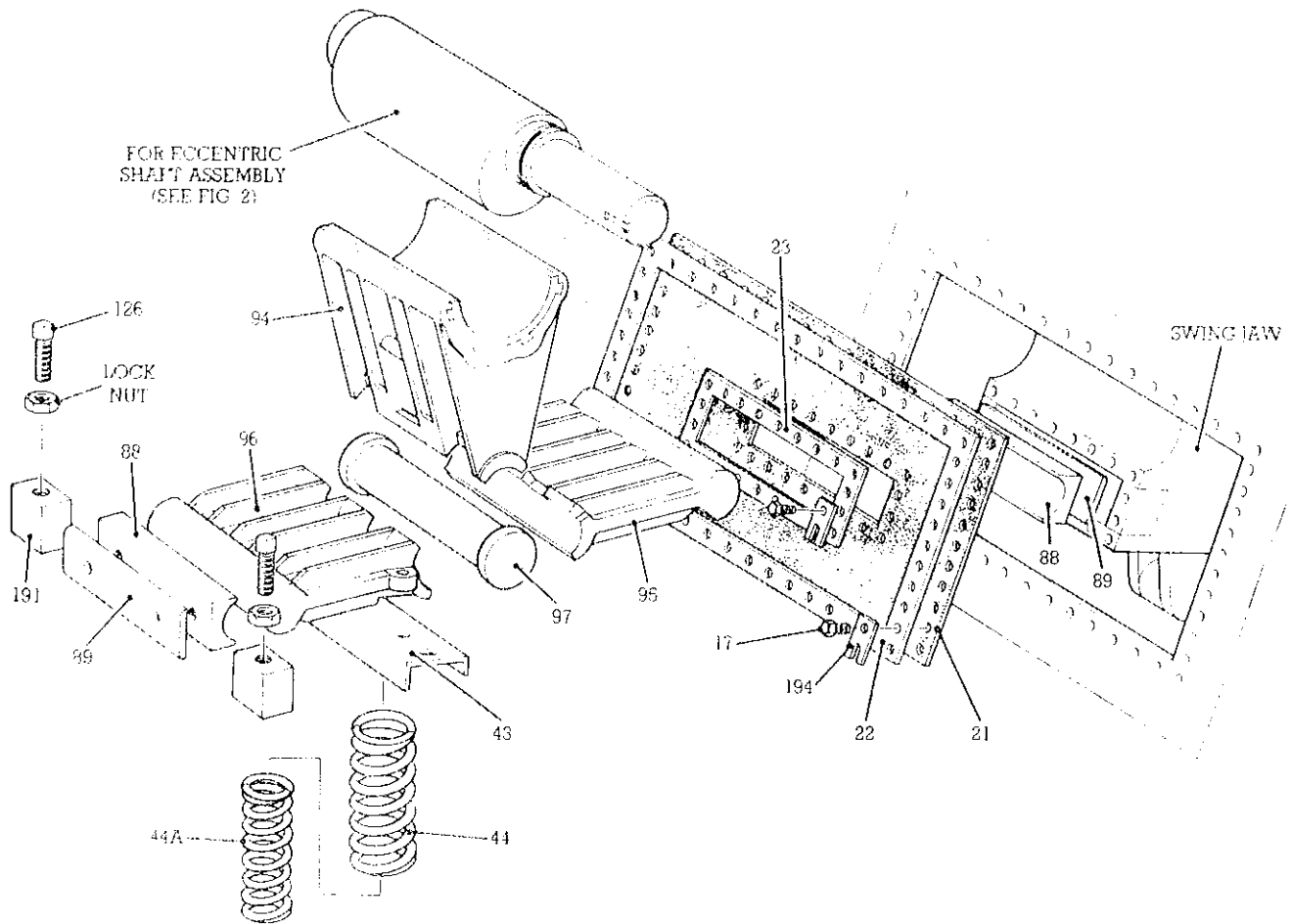


The Toggles transfer vertical movement of the Pitman to a horizontal movement of the Swing Jaw

One end of the Pitman and the Toggles locate onto the Toggle Pin. The other ends of the Toggles locate into the Toggle Seats situated at the rear Strongback and Swing Jaw

DRIVE MECHANISM ASSEMBLY

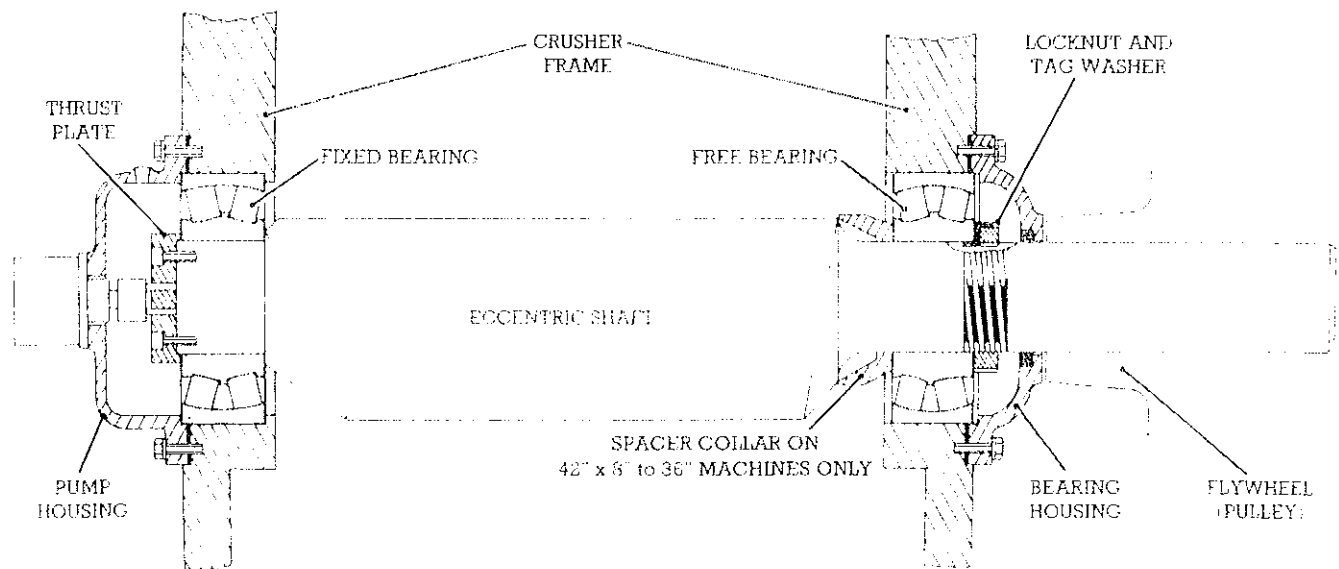
FIG. 1



ITEM No.	DESCRIPTION	ITEM No.	DESCRIPTION	ITEM No.	DESCRIPTION
17	Hex. Head Set Screw	44	Outer Toggle Spring	97	Toggle Pin
21	Diaphragm	88	Toggle Seat	126	Square Head Set Screw
22	Large Diaphragm Frame	89	Toggle Backing Plate	126A	Lock Nut
23	Small Diaphragm Frame	94	Pitman	191	Locating Block
43	Toggle Spring Channel	95	Front Toggle	194	Tab Lock Washer
44A	Inner Toggle Spring	96	Rear Toggle		

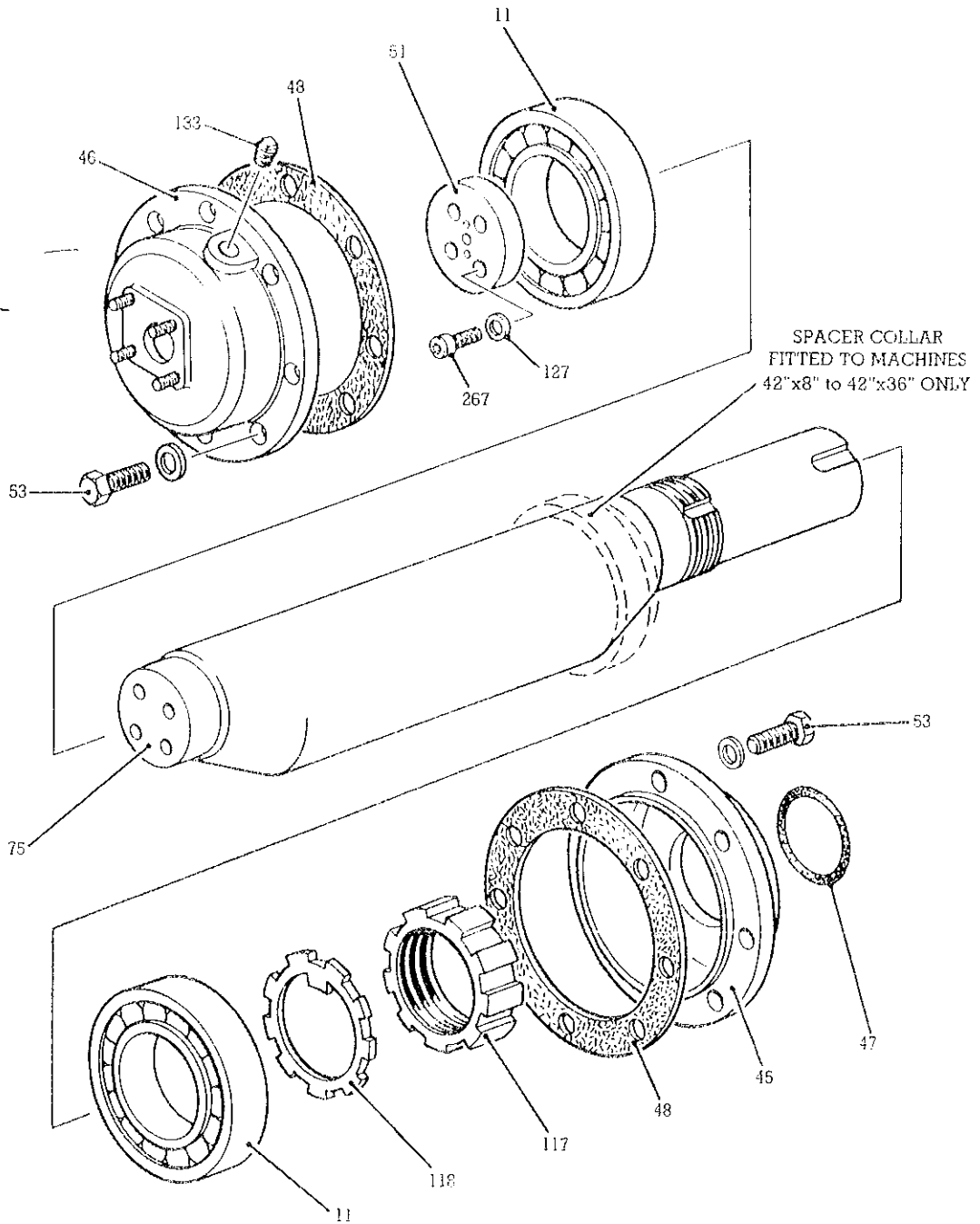
DRIVE MECHANISM COMPONENTS

FIG. 1A



ECCENTRIC SHAFT ASSEMBLY

FIG. 2



ITEM No.	DESCRIPTION
11	Roller Bearing
45	Bearing Housing
46	Pump Housing
47	Housing Seal
48	Housing Gasket
51	Shaft Keeper Plate
53	Hex. Head Setscrew
75	Eccentric Shaft
117	Lock Nut
118	Tag Washer
127	Spring Lock Washer
133	Plug
267	Socket Hd. Capscrew

ECCENTRIC SHAFT COMPONENTS

FIG 2A

Section 2. Pitman, Toggle Pin, Toggle Seats, Toggle Springs, Toggles.

REMOVAL AND REPLACEMENT.

REMOVAL

- 1 Thoroughly clean away all dust and dirt from outside of Oil Chamber Cover. Remove Oil Chamber Cover (REFER TO CHAPTER II SECTION 6)
- 2 Remove Oil Chamber Drain Plug and drain out the Oil. Flush out the Oil Chamber with diesel to remove any sludge. (REFER TO CHAPTER II SECTION 6)
- 3 Turn the Flywheel until the Eccentric Shaft is on BOTTOM dead centre. Place a wedge (A) between the Flywheel and the Crusher Frame to prevent turning (Fig 3)
- 4 With the Eccentric Shaft on BOTTOM dead centre and the Swing Jaw now in its maximum forward position, place a wedge (B) between the back of the Swing Jaw and the Oil Sump Frame to hold the Jaw in position (Fig. 3)
- 5 Locate the Hook Bolts (Supplied with the Tool Kit) through the holes in the Toggle Spring Channel and hook into the slotted plates located in the bottom of the Oil Chamber

Fit the nuts to the Hook Bolts and finger tighten (Fig 4)

- 6 Attach lifting tackle to the lifting Pin on the Pitman and take the weight (Fig 5)
- 7 Remove the wedge from the Flywheel and turn the Flywheel until the Eccentric Shaft is on TOP dead centre. (Safety Arm at Bottom) Replace the wedge
- 8 Remove Pitman by lifting and rotating about the Eccentric Shaft (See Fig 5)
- 9 Carefully slacken back the nuts on the Hook Bolts which will allow the Toggles to move upwards. When the Toggle Pin is sufficiently exposed the Toggle Pin can then be removed
- 10 Remove Front Toggle using lifting eyes provided (FIG 5)
- 11 Remove bolts holding Rear Toggle to channel and remove Toggle
- 12 Slacken and remove Hook Bolts then lift out channel and check Toggle Springs
- 13 To remove Toggle Seats clean out tapped holes and withdraw seats using extraction bolts supplied (See FIG 6)

N.B. It is not normal practise to remove the backing plates. If, however, these are removed, care must be taken to ensure they are replaced correctly. These plates may have been taper machined to give correct alignment across Toggle Seats and reference stamped Fly side - Pump side

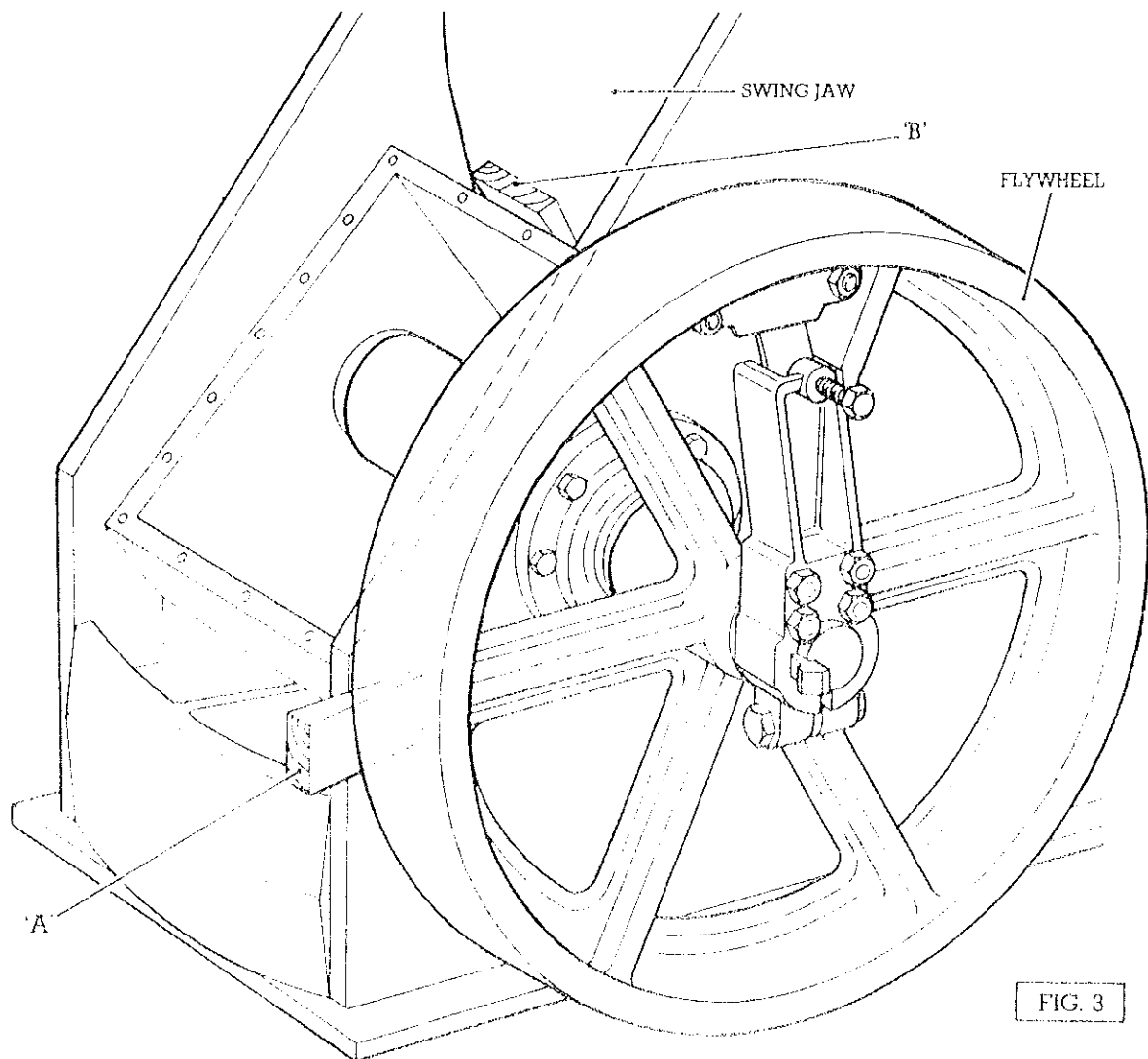


FIG. 3

REMOVAL

1. Remove Pitman, Toggle Pin, Front and Rear Toggles.
At the completion of this operation the wedge between the Flywheel and the Crusher Frame and also the wedge between the Swing Jaw and Oil Sump Frame should remain in position. (Refer to Section 2).
2. Remove the Large and Small Diaphragm Frames Items 22 and 23.
Remove the Diaphragm. Item 21 (Fig. 1 and 1A).

REPLACEMENT

3. Bring Swing Jaw into line with the Diaphragm seating plate face as near as possible. See Fig. 7.
This can be achieved by adjusting the wedge located behind the Swing Jaw and if necessary adjusting the tension on the Pullback Rod Springs.
4. Position the Diaphragm together with the small Diaphragm frame onto the Swing Jaw. Secure with screws and tag washers.
Do **not** tighten screws or lock tag washers.
5. Place the large Diaphragm frame into position against the Diaphragm and secure using screws and Tag Washers.
Do **not** tighten screws or lock Tag Washers. See Fig. 7A.
6. Check if Diaphragm is seating correctly and tighten up all the screws systematically around the Diaphragm until the Diaphragm is compressed approx. 1/16" (1.5mm)
Do **not** over tighten.
7. If any of the Diaphragm protrudes into the Toggle Seat area of the small frame this should be carefully trimmed off.
8. Bend the Tag Washers onto the screw heads to secure the screws.
9. Remove the wedge from the Swing Jaw.
10. Replace the Pitman, Toggle Pin, and Toggles. (Refer to Section 2).
11. Reset the Pullback Rod if necessary. (Refer to Chapter 6 section 2).

Section 4. Eccentric Shaft, Bearings and Bearing Housings.

REMOVAL AND REPLACEMENT.

Before proceeding, the following equipment should be made available: Jacking Screws and Plates, Spacer Tubes, Steady Bar, hollow Bore Pam. For details see Figs. 8, 10, 13, & 15

REMOVAL

1. Drain the oil chamber and remove the Pitman, Toggle Pin, and Toggles (Refer to Section 2).
Remove the wedge from the Flywheel.
Turn the Flywheel until the Eccentric Shaft is on bottom dead centre.

2. Remove the Safety Arm from the Eccentric Shaft (Refer to Chapter 9 Section 2B or 5B)
3. Remove the Flywheel from the Eccentric Shaft (Refer to Chapter 9 Section 3 or 6).
4. Thoroughly clean away all dust and dirt from the Bearing Housing, Pump Housing, Pump and Lubrication piping
5. Remove Oil Pump, complete with Pump Driving Hub, Pump Gasket, Filters and pipework (Refer to Chapter 11 Section 1 and 2)
6. Remove Pump Housing, Pump Housing Gasket, and Thrust Plate (FIG. 2A)
7. Remove Bearing Housing and Bearing Housing Gasket. (FIG. 2A)
8. Before proceeding to remove the Eccentric Shaft it will be necessary to support the shaft using two slings suitably protected to prevent damaging the shaft. Attach the Steady Bar to the short journal end of the shaft as Fig. 8.
The Jacking Plate assembly and Hollow Ram Jack can now be fitted as Fig. 8.
Apply pressure to the shaft end with the hydraulic jack to release the shaft from the fixed Bearing.
A sharp blow to the Jacking Plate may be necessary to assist the Jack initially.
The shaft must be moved sufficiently so that the end of the Shaft is free from the fixed Bearing and the Flywheel side Bearing is clear of the frame bore.
The Jacking Plate assembly and Ram should now be removed. The Steady Bar can be used to control the shaft movement and guide its passage through the frame bore as far as the two slings will allow Fig. 8A.
Protective material should be placed in the Flywheel side frame bore under the Eccentric Shaft.
The shaft can now be lowered and rested to allow the slings to be repositioned as Figs. 8A.
It will be necessary to provide a suitable support structure at the flywheel end of the shaft when finally repositioning the slings for the removal of the Shaft from the frame. (See Figs. 8B).
With the shaft securely supported on the slings the Steady Bar and support structure can be removed.
9. With the Eccentric Shaft out of the crusher the Lock Nut and Tag Washer can be removed
10. Remove the Bearing from the Pump side by tapping out of its frame bore using a copper or hardwood drift against the outer bearing ring only (Fig. 9)
11. Remove the Bearing from the Eccentric Shaft on the Flywheel side by using jacking studs and plate (Fig. 10). Alternatively the bearing can be removed by reversing the shaft and passing through the pump side bore until the bearing is located against the shoulder and the same method applied as shown in Fig. 8 using longer jacking screws. The same slinging procedure as used for removing the shaft must be employed.
N.B. If the bearing is not being re-used it can be removed by dismantling the rollers and removing the outer race. The inner race can then be heated to expand and tapped off the shaft using hammer and drift

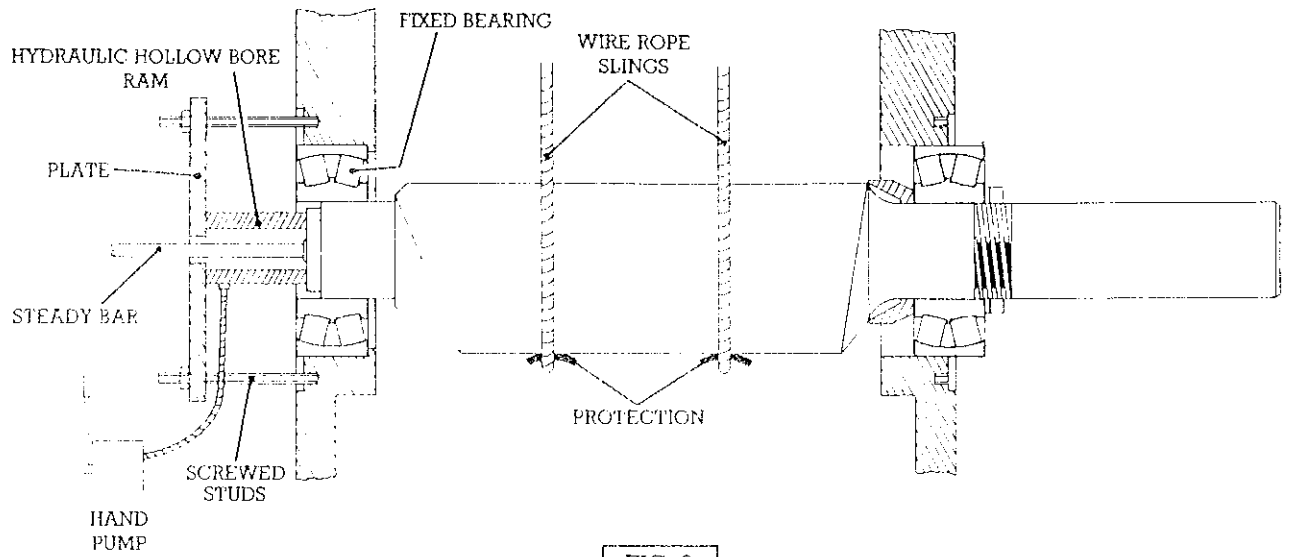


FIG. 8

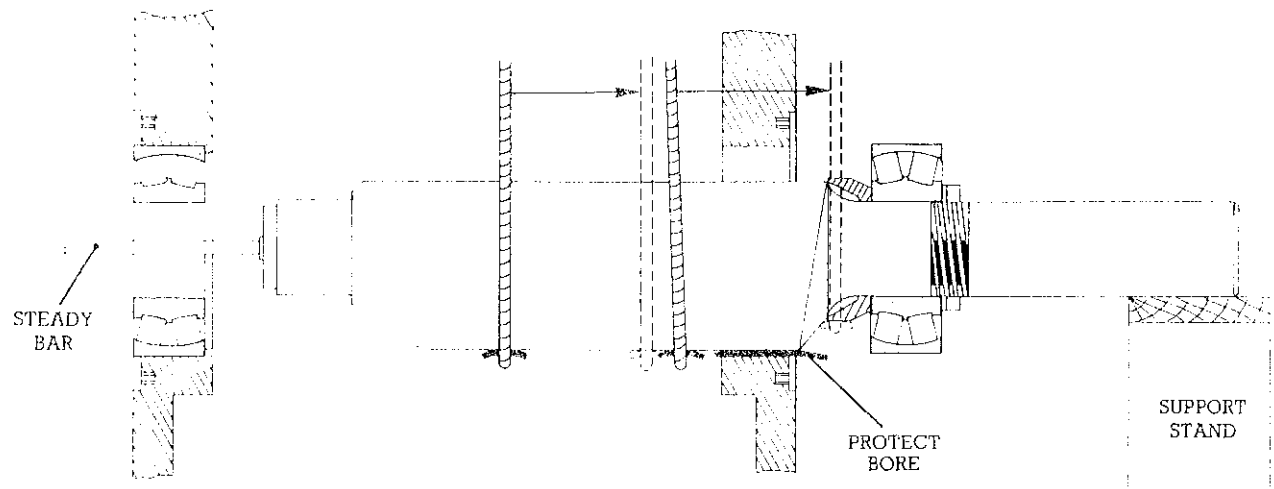


FIG. 8A

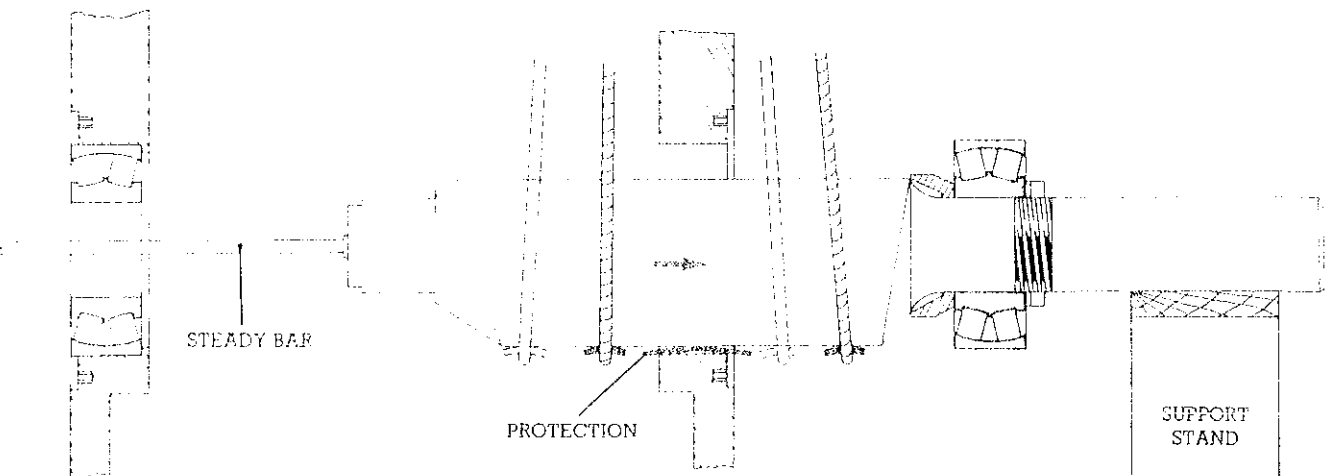
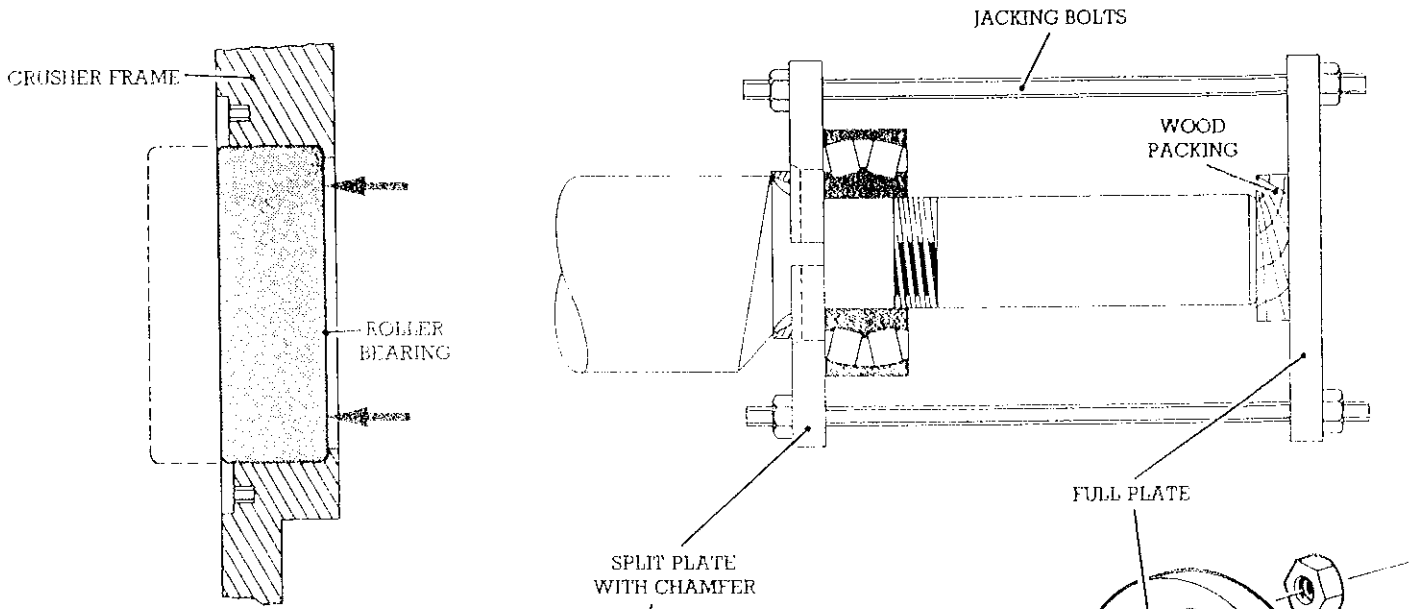
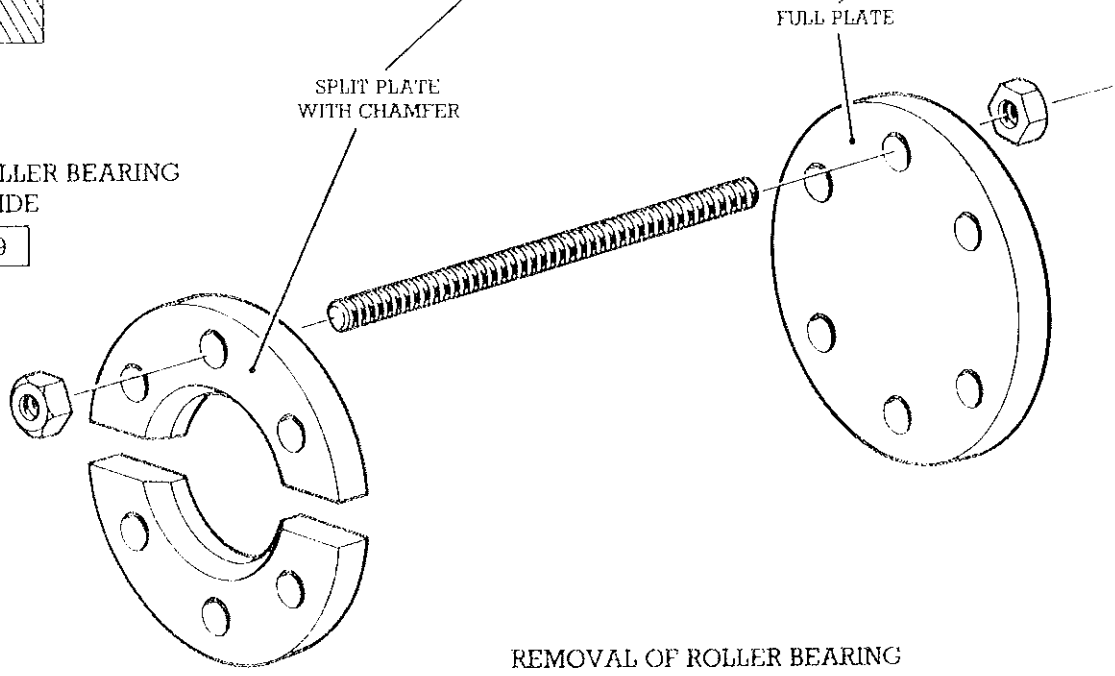


FIG. 8B



REMOVAL OF ROLLER BEARING
PUMP SIDE
FIG. 9



REMOVAL OF ROLLER BEARING
FLYWHEEL SIDE
FIG. 10

REPLACEMENT

1. Both Roller Bearings should be tried for fit in the crusher frame housing bores. The bearings should only be a slight interference fit in the bores and should only require a light tap to fit. Remove after test.
2. The pump side bearing must be fitted to the shaft prior to assembly into the frame. To fit the Roller Bearings onto the pump side of the Eccentric Shaft, it will be necessary to heat the bearing in oil to expand the bore. Using a suitable string the Bearing should be submerged in an oil bath having a temperature of 60°C (140°F) for approx. 30 mins. The Bearing should then be fitted to the shaft by tapping the inner ring with a hide hammer until the inner bearing ring is locating firmly against the shoulder on the Eccentric Shaft (Fig. 11)
3. Fit the Thrust Plate to the end of the Eccentric Shaft (Fig. 11). Allow Bearing to cool before proceeding.
4. The Eccentric Shaft must be installed in the crusher by passing the Flywheel end through the pump side frame bore. Support the shaft using two protected

- slings and enter the shaft as far as possible into the bore (Fig. 12A). Place a suitable support structure under the shaft outside the crusher frame and place protective packing in the frame bores under the Eccentric Shaft. The shaft can now be lowered and the slings repositioned to carry the shaft through the bores. Line up the pump side roller bearing squarely to the frame bore (Fig. 12B). Remove protective packing from the bore. To initially enter the outer ring squarely into the frame bore it may be necessary to raise the flywheel end of the shaft slightly to allow the outer diameter of the eccentric to pass through the frame bore. Using the jacking Screws, plate and tube, press the bearing into the frame bore until the outer ring of the bearing is fully located against the frame bore shoulder ensuring the tube locates only on the outer ring of the Bearing (See Fig. 13)
5. Slacken back the Jacking Plate sufficiently to remove the tube. Tighten back the Jacking Plate so that it is clamping on the Thrust Plate. This will keep the bearing located in its bore during further operations (Fig. 14).

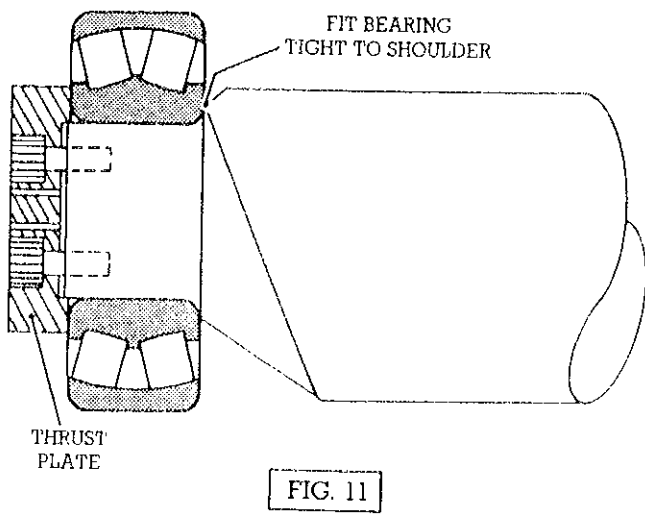


FIG. 11

6. The flywheel side bearing can now be installed. Do not heat up this bearing as this would expand the outer bearing ring preventing the fitting into the bearing housing. Place the Roller Bearing over the end of the Eccentric Shaft as far as the shoulder. Adjust the alignment of the shaft if necessary, to line up the Bearing and Shaft squarely in line with the frame bore. Remove protective packing from frame bore. Assemble the Jacking Screws and Plate as shown in Fig. 15 using plate No. 2 and by using a piece of tube locating on the **inner** bearing ring proceed to jack the bearing onto the shaft. At the same time as jacking it is necessary to tap the **outer** bearing ring into the frame bore using a hide hammer.
7. When the free side bearing has been fully located against the shoulder on the Eccentric Shaft the jacking plates No. 1 and 2 and screws can be removed.

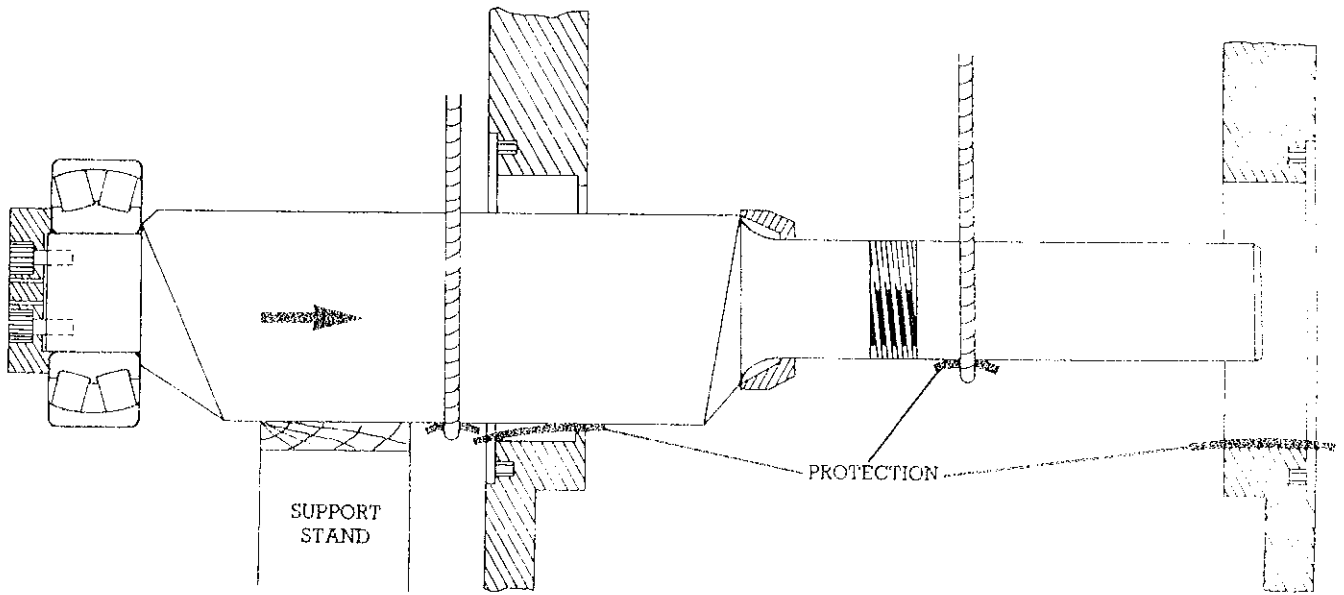
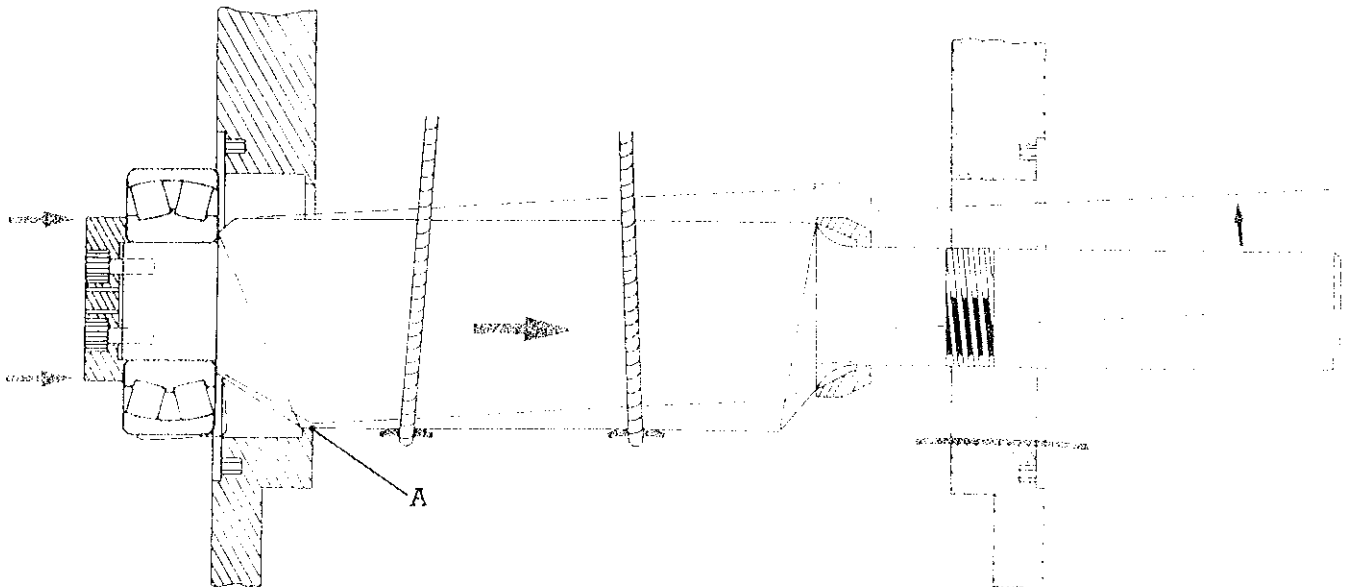


FIG. 12A



If necessary raise end of shaft as shown to give clearance at point 'A' when entering outer ring of bearing.

FIG. 12B

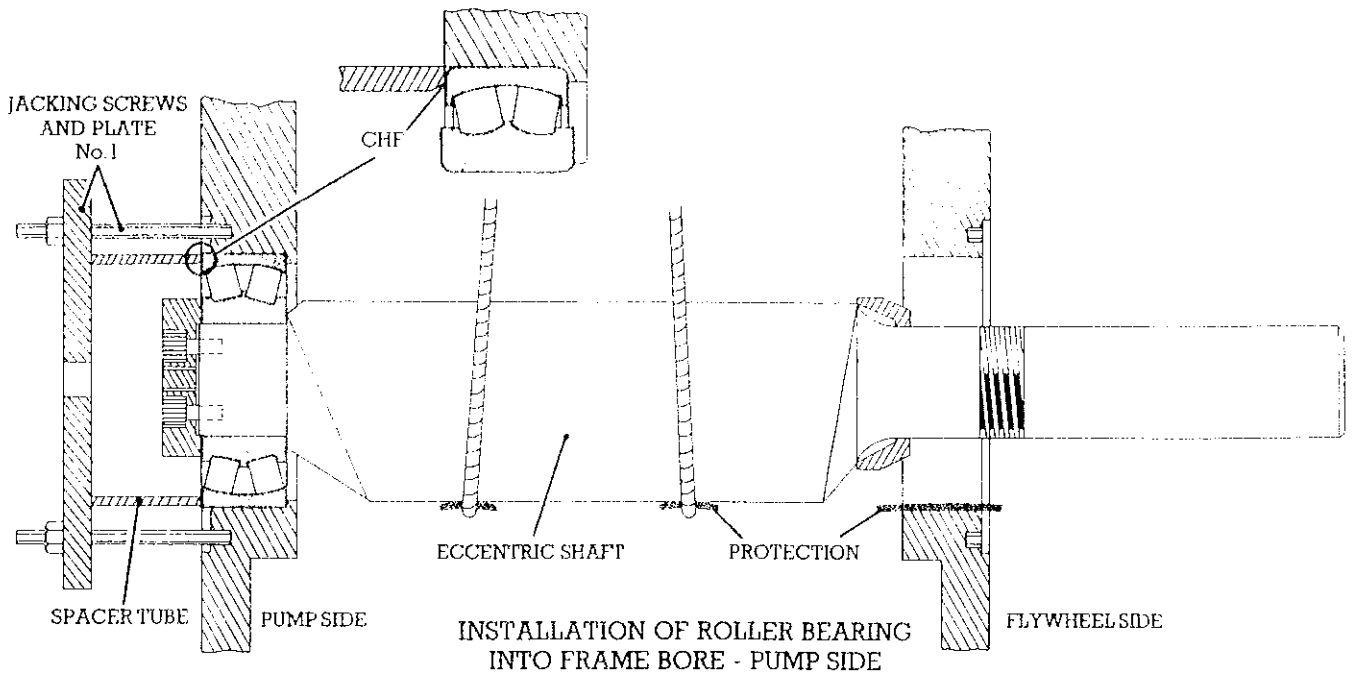


FIG. 13

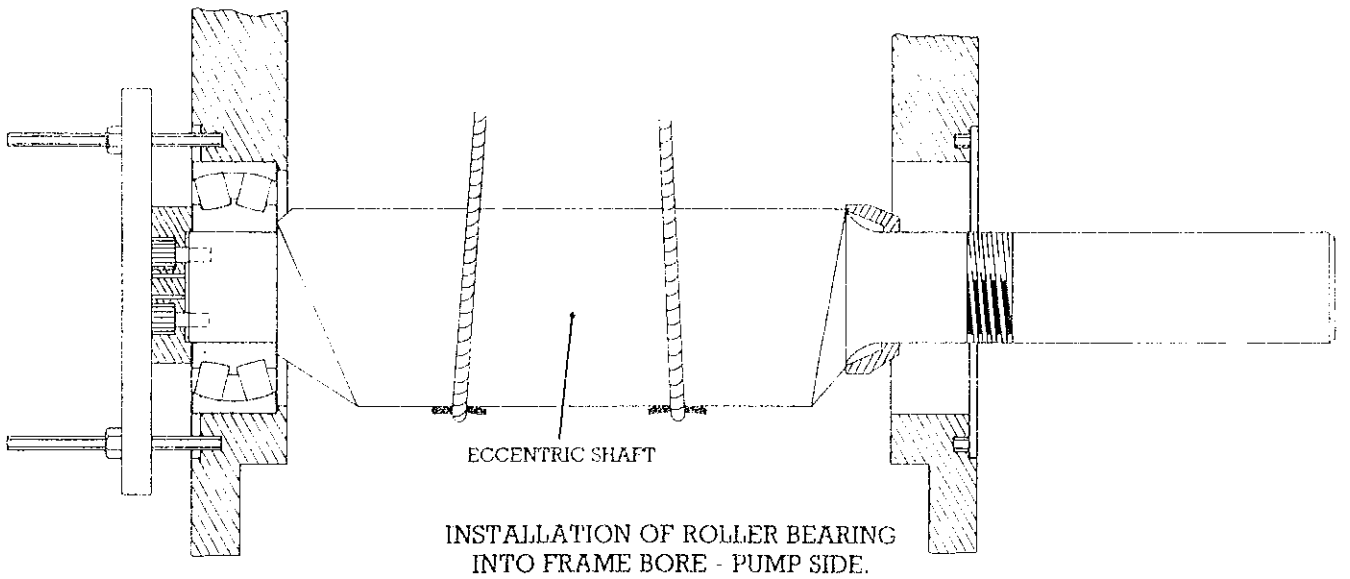


FIG. 14

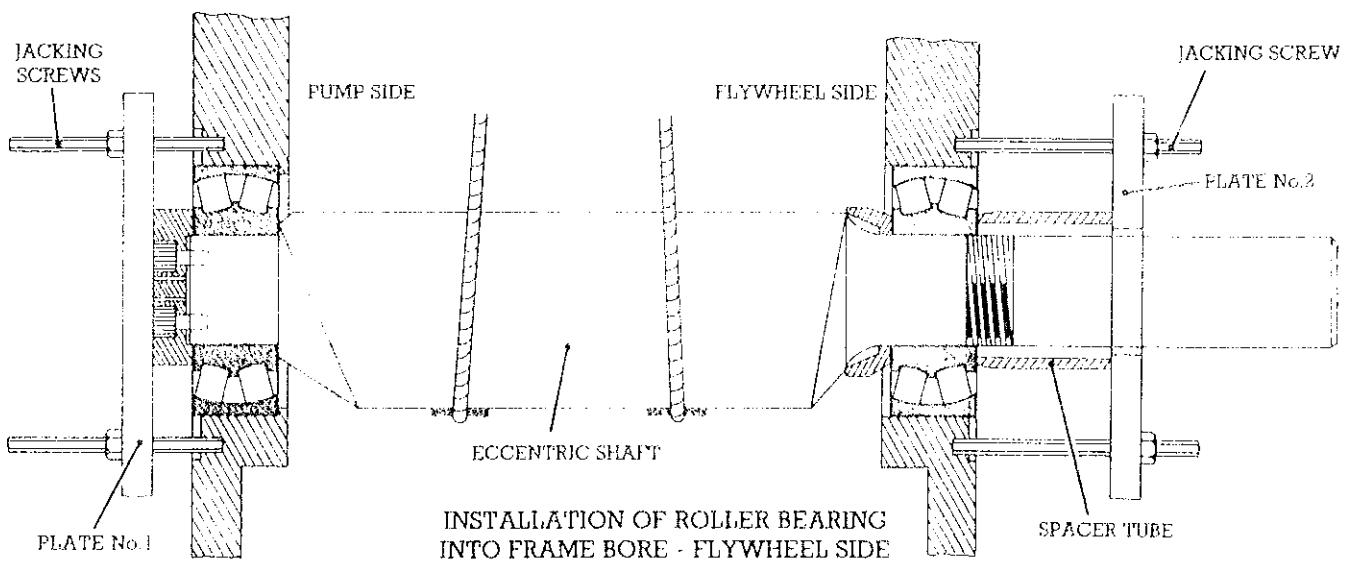


FIG. 15

8. Fit the Tag Washer and Locknut.
Tighten up the Nut and secure by bending over the Tags into the nut recesses.

9. **IMPORTANT**

After assembly it will be necessary to centralise the inner and outer bearing rings of both bearings. Rock the Eccentric Shaft to settle the rollers and check the radial clearance using a feeler gauge on both inner and outer races. Insert the gauge at the top of the bearing and check the clearance by sliding the feeler gauge over the top of the rollers (Fig. 16).

The radial clearances before and after fitting are given in Fig. 17. If the radial clearances are not even over the four races, adjustments can be made by tapping the **outer ring** of the **free bearing** only in the appropriate direction (Fig. 17).

The Eccentric Shaft should be rocked after tapping and before checking the radial clearances.

The bearing cages should be free to revolve by hand.

10. Assemble Pump Housing and Pump Housing Gasket
Assemble Bearing Housing and Bearing Housing Gasket.

Assemble Oil Pump (complete with Pump Driving Hub) Gasket, Filters and Pipe work.

Assemble Flywheel.

Assemble Safety Arm.

Assemble Toggles, Toggle Pin and Pitman

Replace oil in Oil Chamber.

Start up Crusher.

Run Crusher without crushing for 2 - 3 hours to run-in new components.

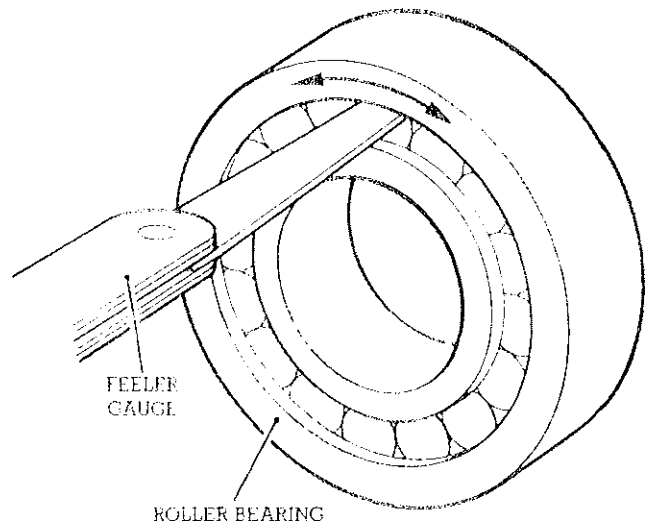
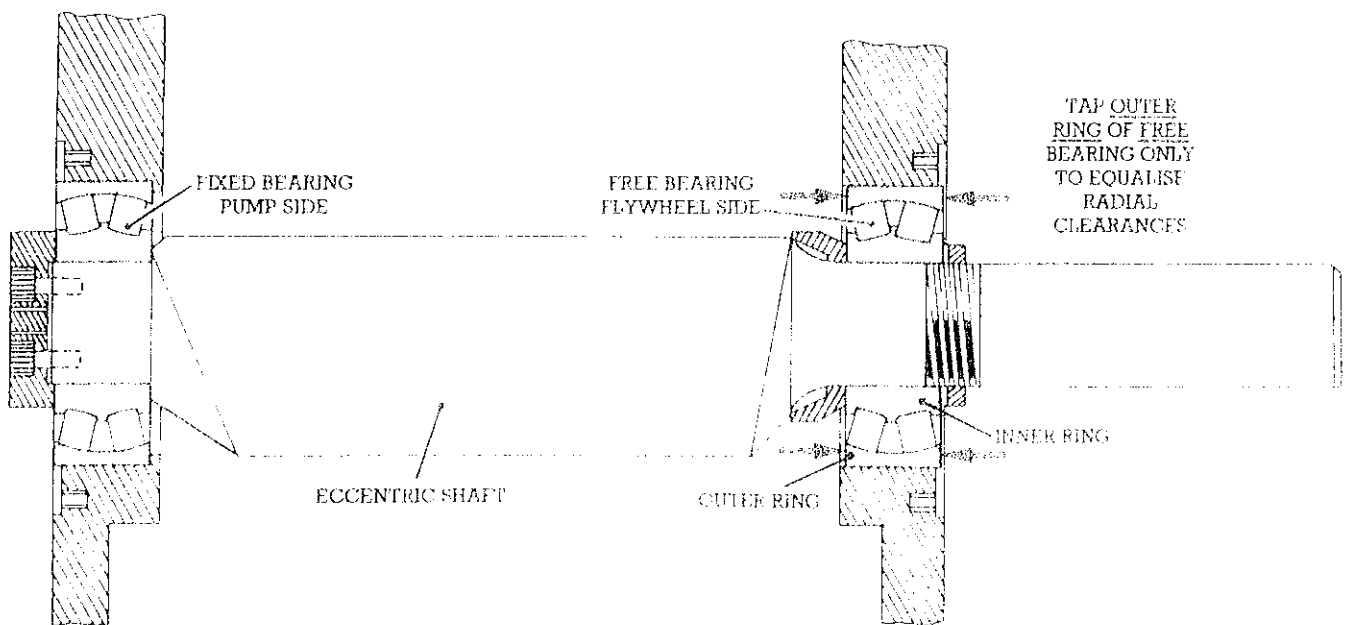


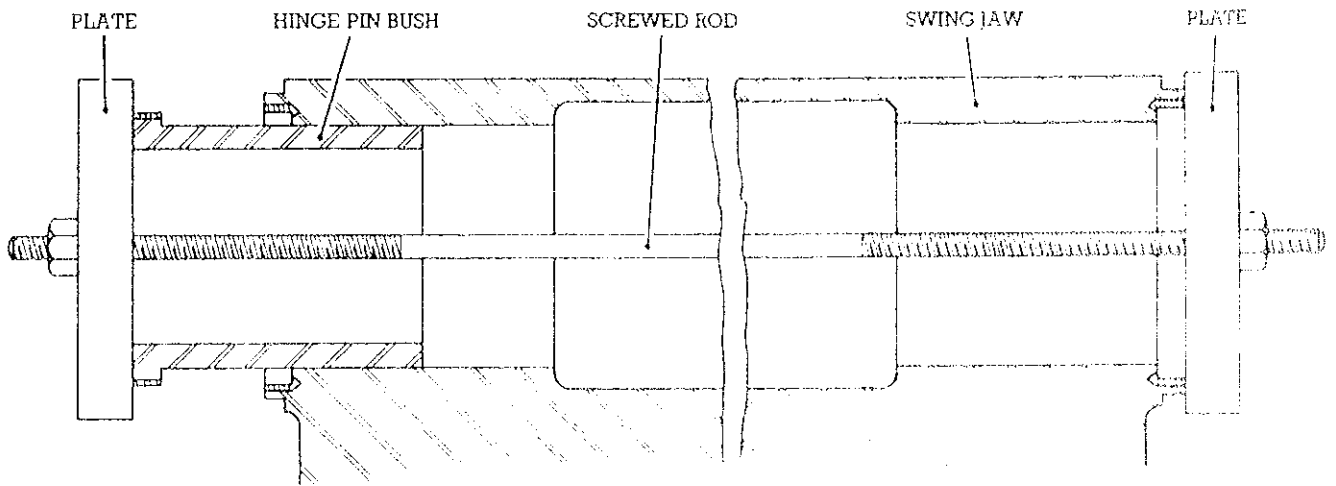
FIG. 16

MACHINE SIZE	RADIAL BEARING CLEARANCES			
	BEFORE FITTING		AFTER FITTING	
	ins	mm	ins	mm
24 x 8 - 36 x 12	0.004"	0.102	0.003"	0.076
	0.006"	0.152	0.005"	0.127
36 x 24 - 42 x 36	ins	mm	ins	mm
	0.005"	0.127	0.004"	0.102
	0.007"	0.178	0.006"	0.152



EQUALISING ROLLER BEARING CLEARANCES ON ECCENTRIC SHAFT ASSEMBLY

FIG. 17



FITTING OF HINGE PIN BUSHES

FIG. 9

- 26 Remove the Sling from the Jaw.
- 27 Where Clamp Type Housings are fitted (Fig 5) Remove the jacking Screws and tighten the clamp bolts.
- 28 Where split Cap type housings are fitted refit cap and secure
- 29 Refit Toggle Mechanism as Chapter 8 Section 2.
- 30 Refill the Hinge Pin Chamber with the correct grade of grease (See Lubricant Chart, Chapter 11, Section 7).

Section 5.
Swing Jaw Guide (42x32/36)
 DESCRIPTION, ADJUSTMENT, REMOVAL AND REPLACEMENT

DESCRIPTION

Two Adjustable Guide Assemblies (Fig 10) are provided to restrain any side movement of the Swing Jaw. These units are mounted on the lower end of the Swing Jaw and the adjacent main frame side plate.

The Guide Assembly comprises of a stub shaft attached to the Swing Jaw and a housing attached to the main frame which carries a screwed adjusting plug. The adjusting plug locates against a semi-spherical self-aligning phosphor bronze thrust ball which locates into a stub shaft mounted on the Jaw.

A flexible diaphragm is positioned between the frame and stub shaft to retain lubricating oil in the housing.

A further flat rubber seal is provided between the diaphragm and the Swing Jaw to prevent damage to the diaphragm by the ingress of stone dust.

A Guard is also provided attached to the main frame of the main frame side plate to deflect stones from the guide area.

An Inspection Cover Item 272 with a filler and drain plug Item 271 is provided in the housing.

ADJUSTMENT

1. Loosen off both screws Item 274.
2. Rotate Adjusting Plug Item 273 until the desired amount of clearance is obtained between the frame and jaw.
3. Turn up Crusher and swing jaw. Insert a new ball in the empty and jaw and frame should engage. Turn adjusting plug clockwise until ball is contact is made then slacken back the ball screw Item 274 until drive shaft screws.
4. Repeat the above adjustment with the opposite Guide assembly.
5. Always ensure these guide assemblies are lubricated the top of the jaw hinge and shaft with the grease made of oil used in the crusher chamber.

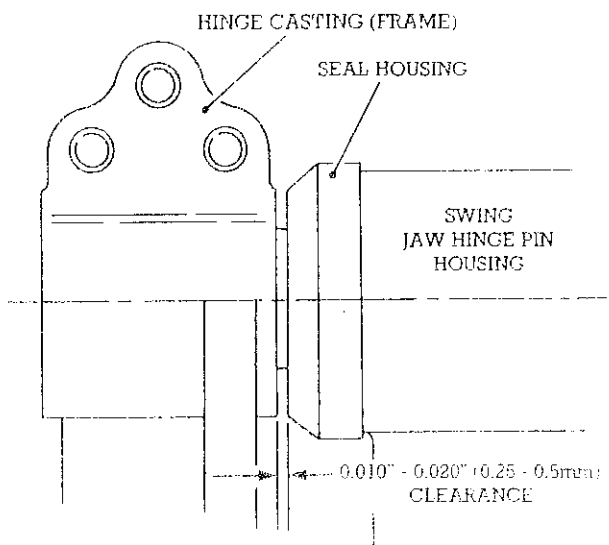
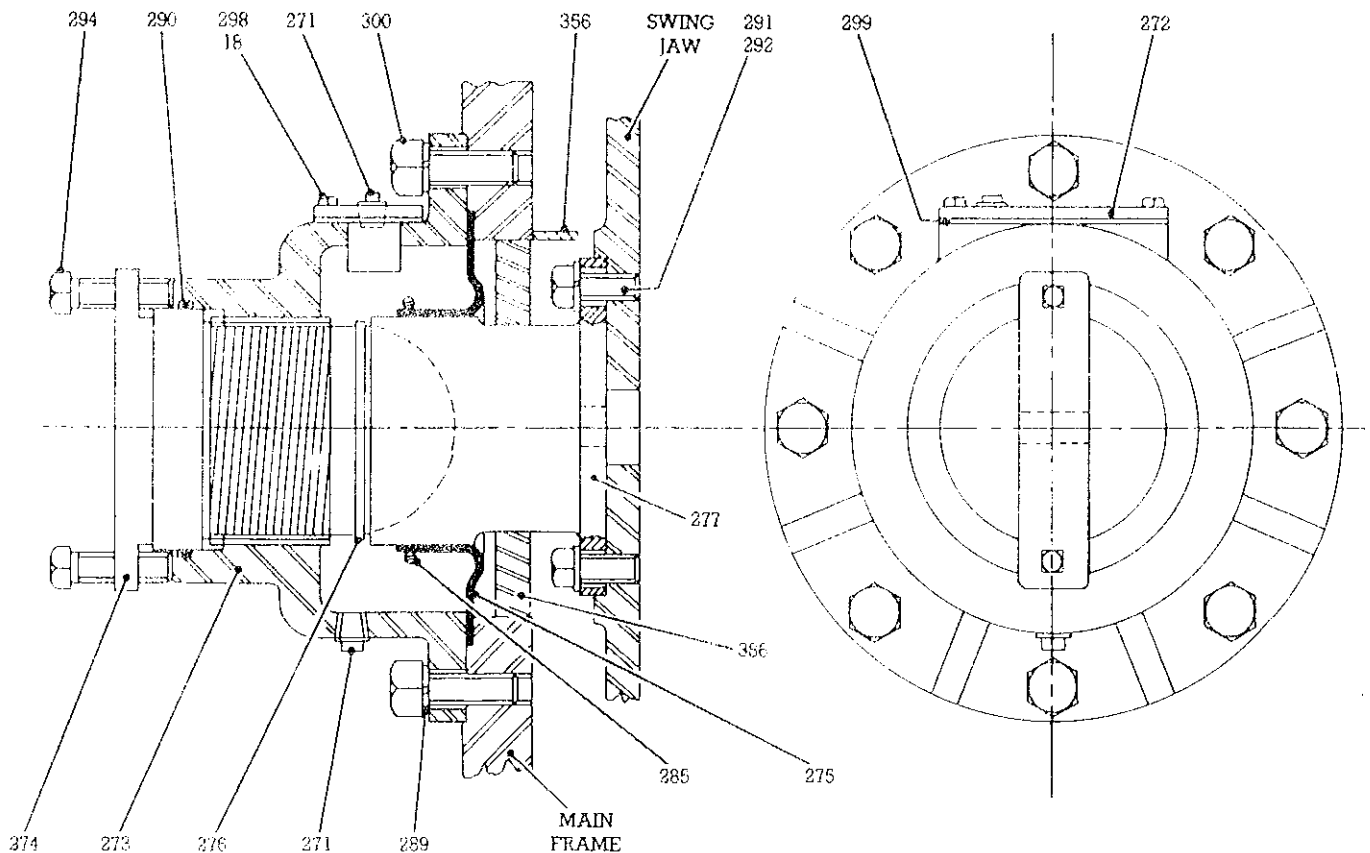


FIG. 10



SWING JAW GUIDE (42"x32"/36")

FIG. 11

Removal and Replacement of Housing, Seals and Stub Shaft.

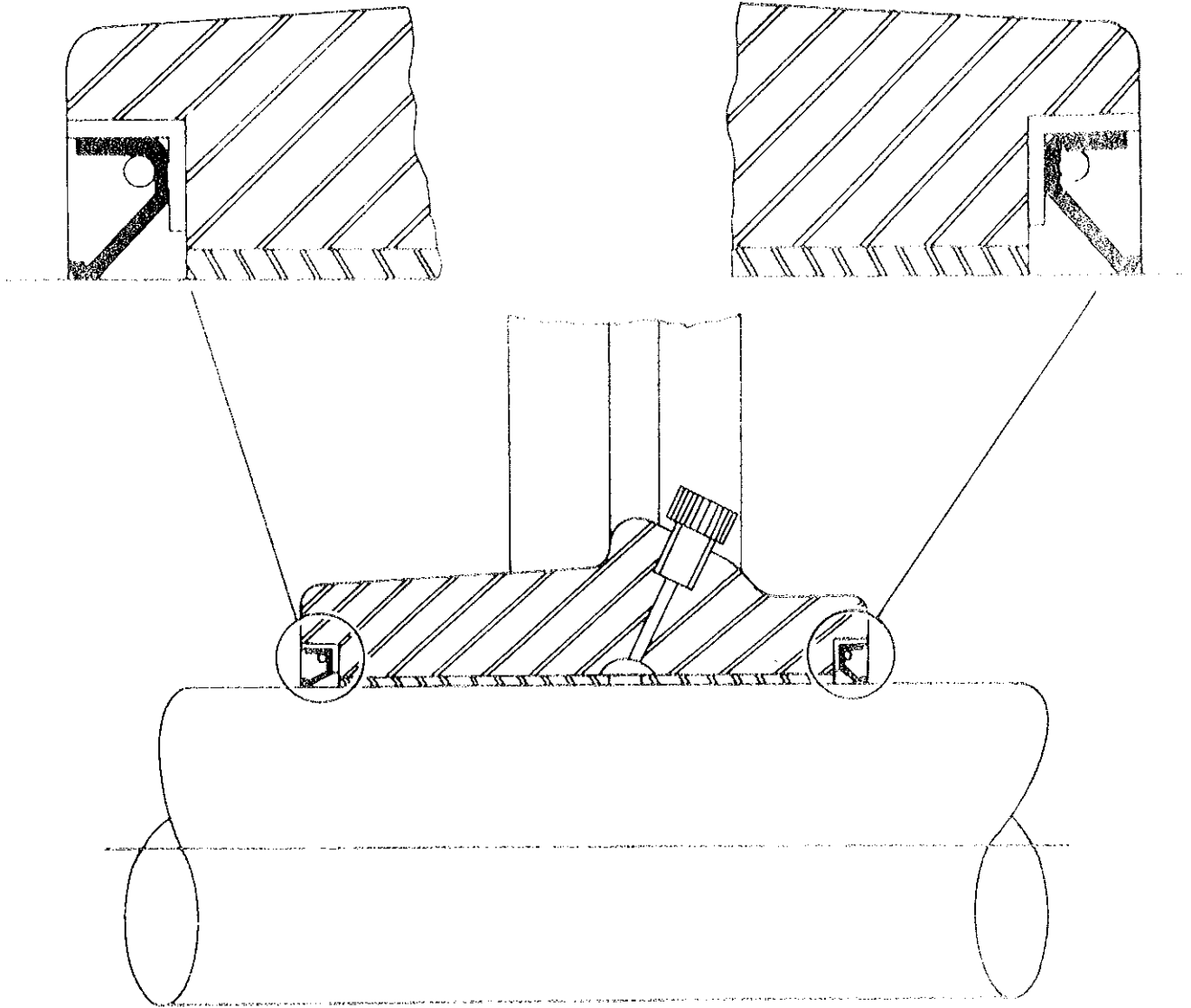
REMOVAL

1. Drain off oil from Housing
2. Slacken off lock screws Item 294 and unscrew and remove adjusting plug from housing
3. Remove housing bolts Item 300 and remove housing
If necessary use extraction bolts in holes provided
4. Remove the thrust ball (held by suction only)
5. Remove securing clip Item 285 from Diaphragm and remove from sub shaft
6. Remove rubber dust shield by withdrawing over stub shaft
7. Remove sub shaft from frame and remove stub shaft
If necessary use extraction bolts in deep frame

ASSEMBLY

8. Assemble in reverse order ensuring that the Diaphragm is correctly located and the seal is not frayed before attaching the securing clip
9. Apply grease to the thrust ball to retain in position during assembly
10. Ensure jubilee washers are fitted to sub shaft and housing bolts
11. Adjustment should now be made

ITEM No.	DESCRIPTION
18	Hex Hd Setscrew
271	Drain/Filter Plug
272	Housing Cover
273	Jaw Guide Housing
274	Adjusting Plug
275	Diaphragm
276	Thrust Ball
277	Jaw Guide Shaft
285	Jubilee Clip
289	Spring Washer
290	'O' Ring Seal
291	Hex Hd Setscrew
292	Spring Washer
294	Hex Hd Setscrew
298	Spring Washer
299	Gasket
300	Hex Hd Setscrew
356	Guard
386	Dust Seal



FIT SEALS AS SHOWN TO ALLOW
RELEASE OF EXCESS GREASE.

FIG. 6

42 x 27 - 42 x 36 MACHINES

Section 4. Description

The flywheel is mounted on one end of the eccentric shaft and provides the means of driving the crusher, usually from an electric motor and V belts. The Drive from the flywheel to the eccentric shaft is taken through the safety arm assembly (Fig. 7).

The safety arm assembly acts as a torque limiter designed to disengage the driven flywheel from the eccentric shaft in the event of transmission uncrushable entering the Crusher. The safety arm is keyed to the eccentric shaft and carries a set of Leaf Springs:

The longest leaf spring has a chamfered edge at one end and is deflected inwards to engage the safety shoe which is secured by two studs to the flywheel rim.

The safety shoe recess has a taper face corresponding to the leaf spring and allows the leaf spring to disengage under shock load.

The opposite end of the Leaf Spring is also deflected inwards and secured by a 'Dummy' Safety Shoe

which does NOT have a recess to engage the spring. The shoe is used only to deflect the spring inwards to give equal deflection all the time in operation and to the opposite direction.

The release of the pressure is permitted to occur from the eccentric shaft when the safety arm assembly, between the two safety shoes and the flywheel.

When the safety shoe assembly separates, the leaf spring moves back to the vertical position and allows the flywheel to rotate freely on the eccentric shaft.

The eccentric shaft also drives the oil lubrication pump; therefore with the eccentric shaft disengaged from the drive the oil flow switch will ring out the drive motor to prevent unnecessary free-rotation of the flywheel.

Section 5. Safety Arm Assembly

The Leaf Spring is pre-tensioned at the factory by a number of spacer washers (Fig 7) fitted behind the safety shoes. It is important that these washers are replaced if at any time the safety shoes are removed.

In the event of the safety arm frequently disengaging the tapered locating faces of the leaf spring and safety shoe should be examined for wear and if necessary replaced. If these faces are in good condition and correct seating is achieved then one washer should be removed from each of the studs holding the two safety shoes.

If tripping still occurs consult your local Brown Lenox Agent/Distributor

The recommended spring setting is shown in

Fig 2

Section 5A. Resetting

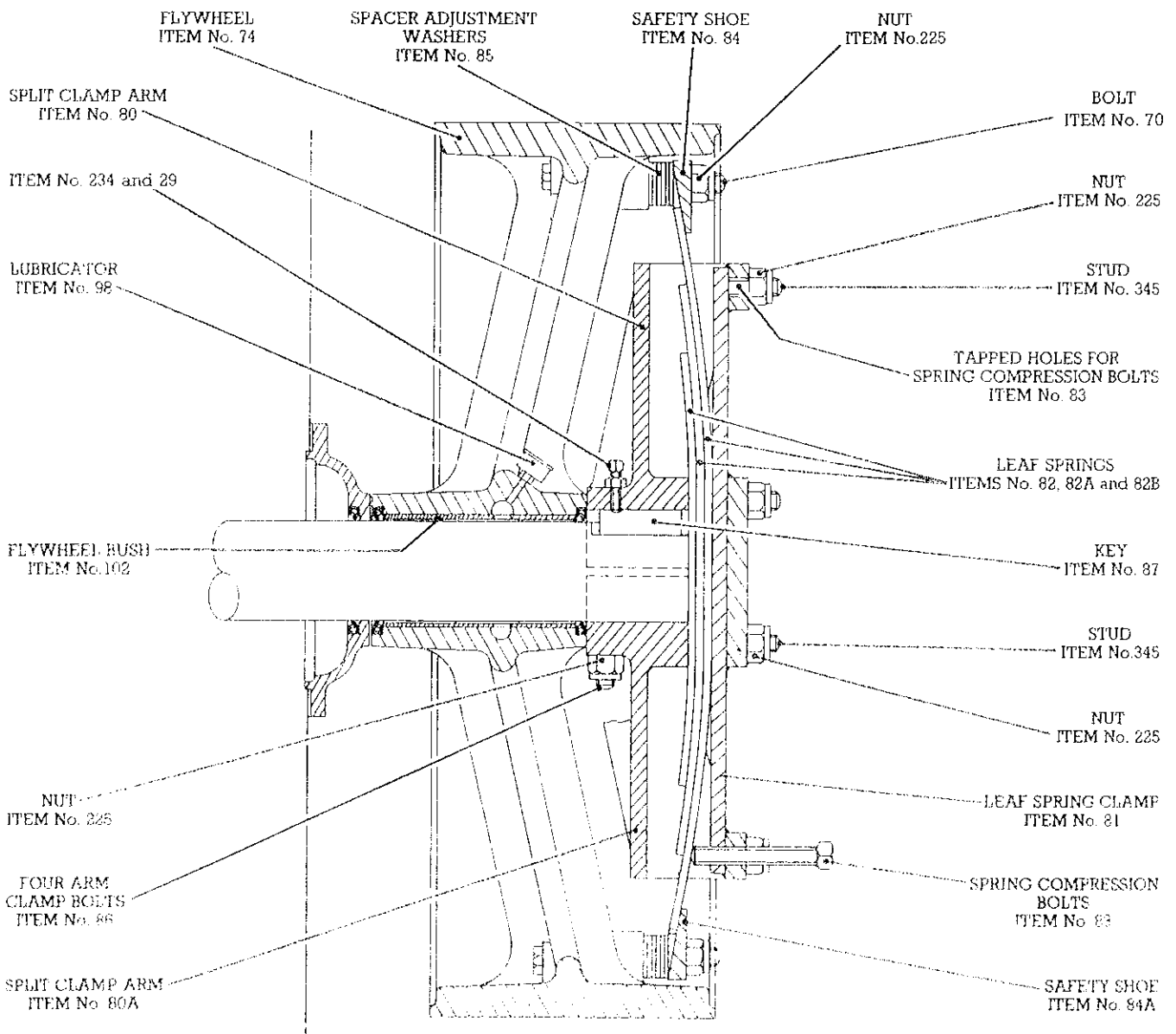
In the event of the safety arm tripping out it can be re-set as follows:-

1. Insert the spring compression bolts into the safety arm and screw in to deflect the leaf springs sufficiently to clear the inside face of the safety shoes.

Rotate the flywheel and align the spring with the safety shoe recess. Gradually screw out the leaf spring compression bolts ensuring that the tapered edge of the leaf spring seats correctly onto the tapered face of the safety shoe. (Fig. 3 'B').

IMPORTANT.

REMOVE THE SPRING COMPRESSION BOLTS BEFORE THE CRUSHER IS RE-STARTED



42"x27"/32"/36" MACHINES

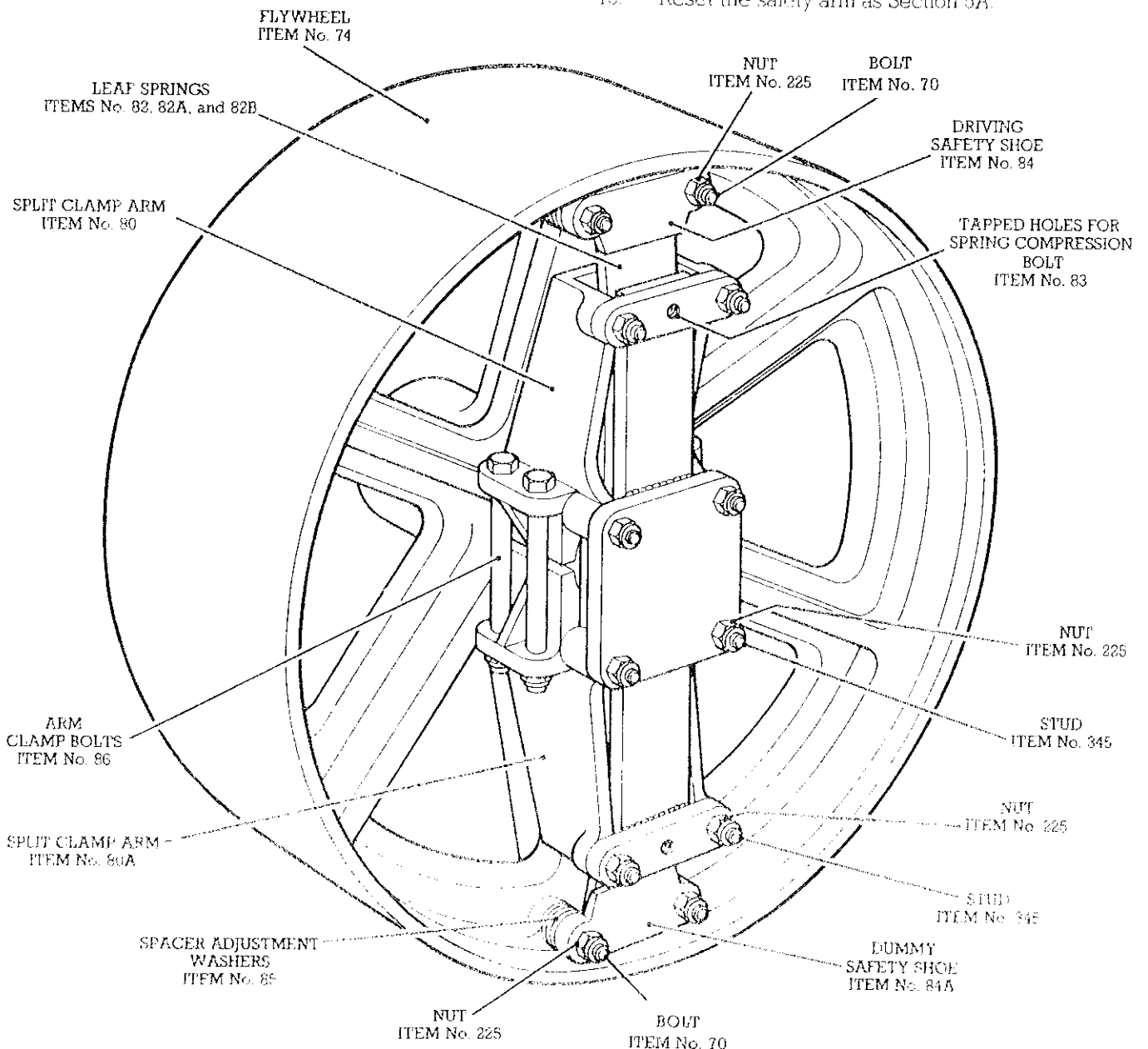
FIG. 7

Section 5B. Removal and Replacement

2. Insert the spring compression bolts into the safety arm and screw in to deflect the leaf springs sufficiently to disengage the spring from the safety shoe. Turn the flywheel until the leaf spring is clear of the safety shoes.
3. Remove the spring compression bolts (FIG. 7)
4. Remove the 8 lock nuts (ITEM 225) securing the spring holding clamp and remove clamp.
5. The leaf springs can now be removed.
6. Remove key securing bolt (ITEM 234) (Fig. 7)
7. Using a sling to support the two halves of the safety arm, slacken off the four clamp bolts (ITEM 86) sufficiently to allow the removal of the safety arm.
8. Remove key (ITEM 87) (Fig. 7).
9. Replace in Reverse order.

FITTING NEW LEAF SPRINGS

10. Remove leaf spring clamp and springs as described in Section 5B (2 - 5)
11. Check fit of new leaf springs in safety arm recess. A close fit should be obtained **Maintaining Free Movement.**
12. The tapered drive end of the long leaf spring should be checked for fit in the safety shoe recess. The spring should seat against the bottom of the shoe recess with the tapered drive faces in contact and a minimum of clearance at the non-drive edge. (Fig. 3 'B')
13. Install leaf springs with the shortest length spring first, see Fig. 7 ensuring all springs are positioned equally either side of the shaft. The tapered drive edge of the longest spring must be positioned correctly to locate in the safety shoe recess as shown in Fig. 3 'B'.
14. The spring clamp can now be fitted and secured using the eight lock nuts (ITEM 225).
15. Reset the safety arm as Section 5A.



42"x27"/32"/36" MACHINES

FIG. 8

Section 6. Flywheel

REMOVAL AND REPLACEMENT

The flywheel is fitted with a bronze bushing and crease seal as shown in Fig 9 and 10

Extensive Wear of the bush is indicated by a noticeable 'Wobble' of the Flywheel

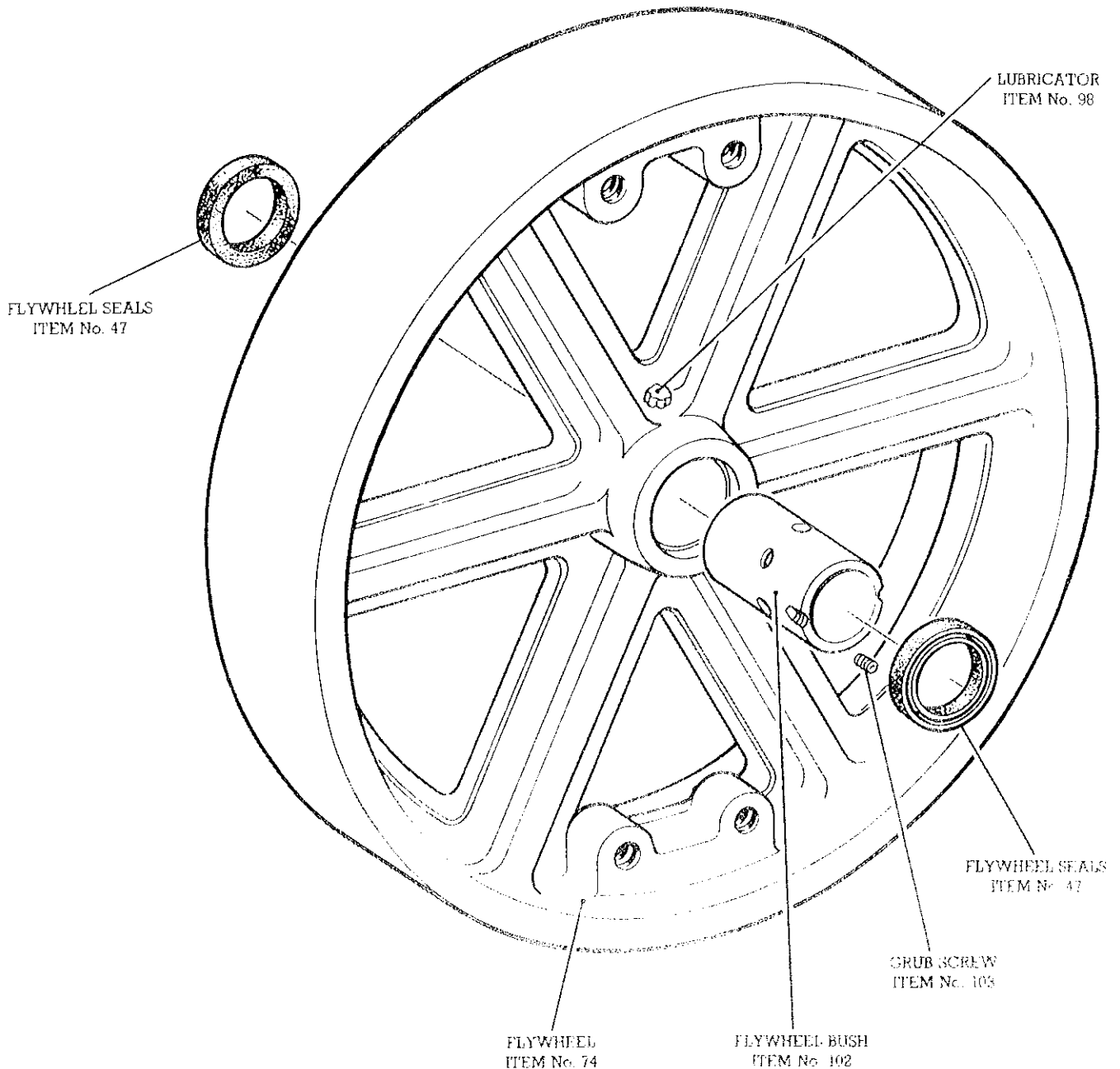
REMOVAL

- 1 Remove the safety arm (Refer to Section 5B)
- 2 Attach a lifting sling to the flywheel and support the weight of the flywheel
- 3 Slowly withdraw the flywheel from the eccentric shaft taking care not to damage the flywheel seals
- 4 Inspect Seals and Bush

- 5 To fit a new bush, remove seals and bush securing screw, Item 103 Fig 9 and press out bush
Press in new bush, drill and tap bush and flywheel for the bush securing screw
N.B. Replace seals as shown in Fig. 10 to allow release of grease from bush

REPLACEMENT

- 6 Smear the bore of the flywheel bush with molybdenum disulphide grease
- 7 Attach lifting sling to the flywheel and line up with the eccentric shaft. Slide the flywheel onto the eccentric shaft taking care not to damage the seals.
- 8 Replace safety arm and reset as Section 5A and 5B



FLYWHEEL COMPONENTS

FIG. 9.

24 x 8 - 42 x 16 MACHINES

SECTION

1. DESCRIPTION
2. SAFETY ARM ASSEMBLY
- 2A. RESETTING
- 2B. REMOVAL AND REPLACEMENT
3. FLYWHEEL - Removal and Replacement

42 x 27 - 42 x 36 MACHINES

SECTION

4. DESCRIPTION
5. SAFETY ARM ASSEMBLY
- 5A. RESETTING
- 5B. REMOVAL AND REPLACEMENT
6. FLYWHEEL - Removal and Replacement

24 x 8 - 42 x 16 MACHINES

Section 1. Description

The flywheel is mounted on one end of the eccentric shaft and provides the means of driving the crusher, usually from an electric motor and 'V' belts. The Drive from the flywheel to the eccentric shaft is taken through the safety arm assembly. (FIG. 1)

The safety arm assembly acts as a torque limiter designed to disengage the driven flywheel from the eccentric shaft in the event of tramp iron or uncrushable entering the Crusher

The safety arm is keyed to the eccentric shaft and carries a set of Leaf Springs

The longest leaf spring has a chamfered edge at one end and is deflected inwards to engage the safety shoe which is secured by two studs to the flywheel rim

The safety shoe recess has a taper face corresponding to the leaf spring and allows the leaf spring to disengage under shock load

The release torque can be adjusted by adding or removing the spacer washers between the safety shoe and flywheel

When the safety device disengages the long leaf spring moves back to the vertical position and allows the flywheel to rotate freely on the eccentric shaft

The eccentric shaft directly drives the oil lubrication pump, therefore with the eccentric shaft disengaged from the drive the oil flow switch will trip out the drive motor to prevent continuous free-wheeling of the flywheel.

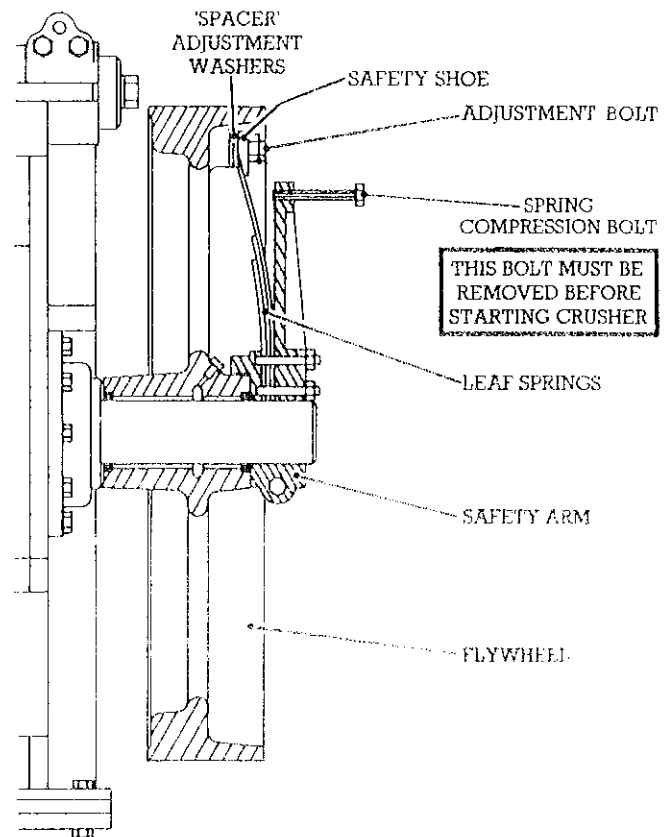


FIG. 1

Section 2. Safety Arm Assembly

The Leaf Spring is pre-tensioned at the factory by a number of spacer washers (Fig. 1) fitted behind the safety shoe.

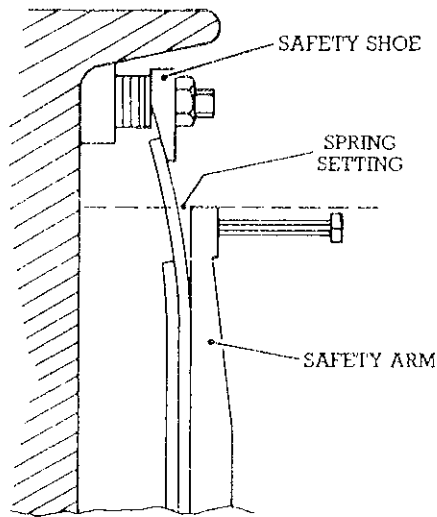
It is important that these washers are replaced if at any time the safety shoe has been removed.

In the event of the safety arm frequently disengaging, the tapered locating faces of the leaf spring and safety shoe should be examined for wear and if necessary replaced.

If these faces are in good condition and correct seating is achieved then one washer should be removed from each of the studs holding the safety shoe.

If tripping still occurs consult your local Brown Lenox Agent/Distributor.

The recommended spring setting is shown in Fig. 2.



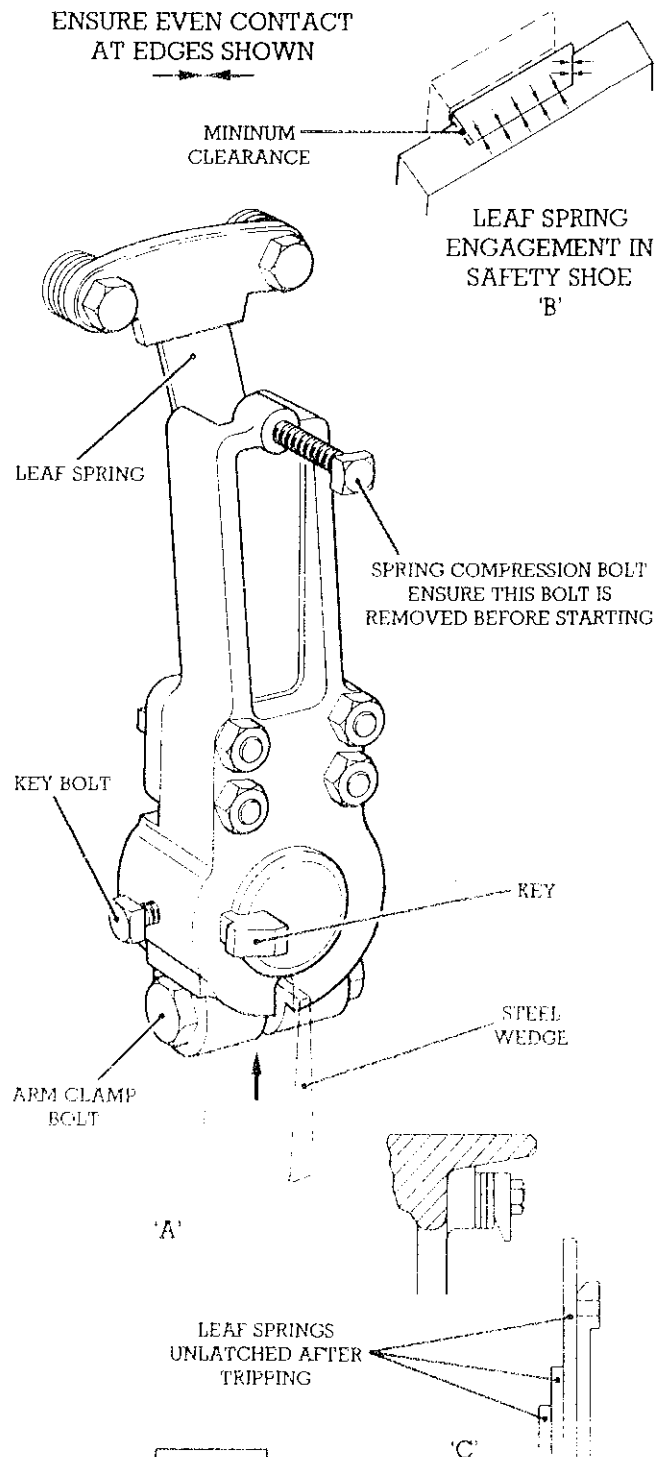
Section 2A. Resetting

In the event of the safety arm tripping out it can be re-set as follows -

1. Insert the spring compression bolt into the safety arm and screw in to deflect the leaf springs sufficiently to clear the inside face of the safety shoe. Rotate the flywheel and align the spring with the safety shoe recess. Gradually screw out the leaf spring compression bolts ensuring that the tapered edge of the leaf spring seats correctly onto the tapered face of the safety shoe. (Fig. 3 'B')

IMPORTANT

REMOVE THE SPRING COMPRESSION BOLT BEFORE THE CRUSHER IS RE-STARTED



SAFETY LEAF SPRING SETTINGS FOR JAW CRUSHERS (25° SHOE)		
MACHINES	SPRING DEFLECTION AT END OF SAFETY ARM	
	ins	mm
24 x 8/12	7/8"	22
24 x 15	1"	25
30 x 20	1"	25
36 x 8/12	11/16"	17
36 x 24	7/8"	22
42 x 8/16	1"	25
42 x 27/36	13/16"	21

FIG. 2

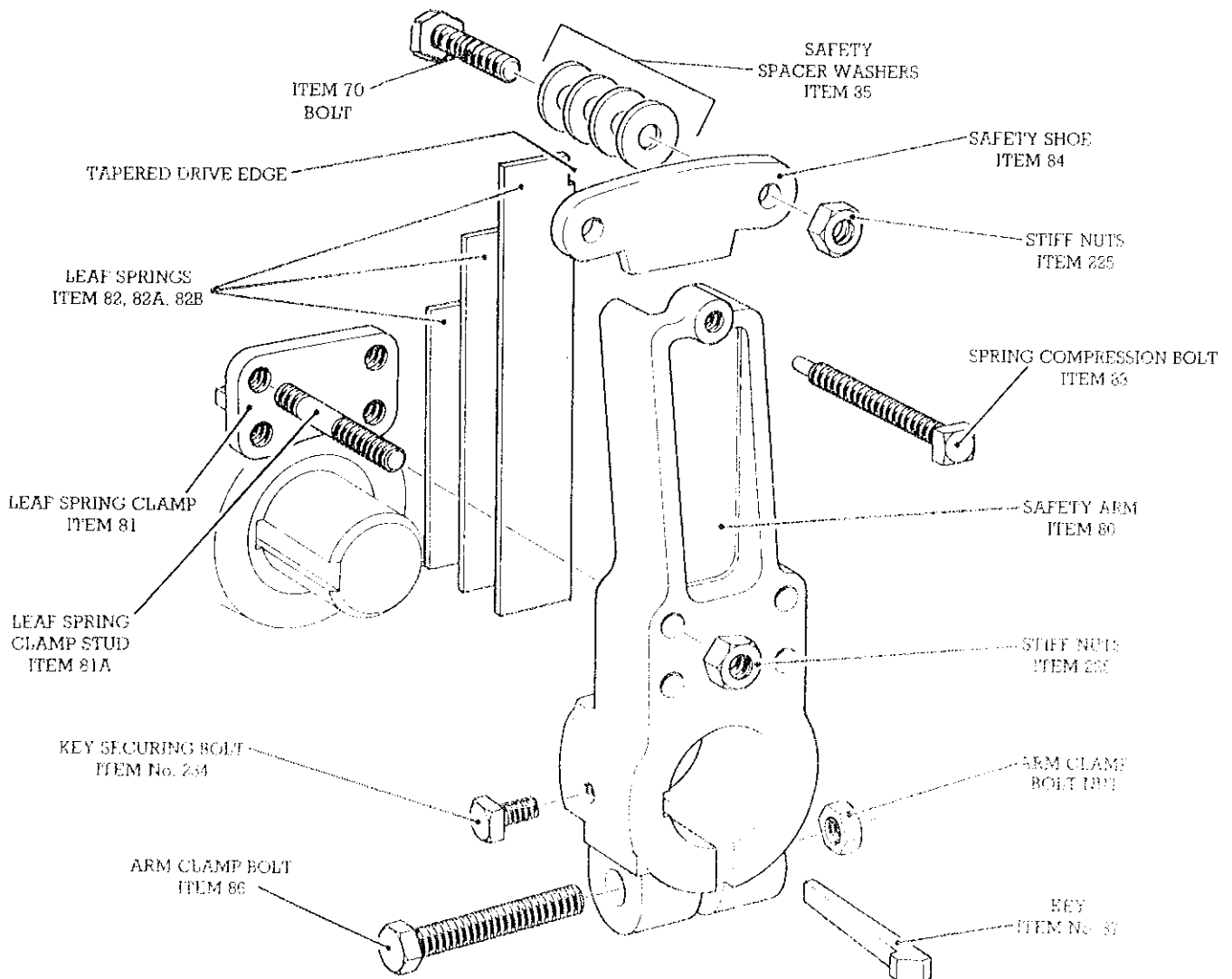
FIG. 3

Section 2B. Removal and Replacement

2. Insert the spring compression bolt into the safety arm and screw in to deflect the leaf springs sufficiently to disengage the spring from the safety shoe. (Fig. 3 'B'). Turn the flywheel until the leaf spring is clear of the safety shoe.
3. Remove the spring compression bolt (Fig. 3 'A').
4. Remove safety arm clamp bolt. (Fig. 3 'A').
5. Remove the key securing bolt (Fig. 3 'A').
6. Drive a steel wedge into the clamp split to slacken the safety arm on the eccentric shaft (Fig. 3 'A').
7. Remove safety Arm key.
8. Remove the safety arm assembly from the eccentric shaft.
9. Replace in reverse order, resetting the leaf spring into the safety shoe.
10. **REMOVE THE SPRING COMPRESSION BOLT.** (Fig. 3 'A').

FITTING NEW LEAF SPRINGS.

11. Disengage Leaf Spring from safety shoe and screw out the compression bolt
12. Remove the four leaf springs clamp nuts Item 225 (FIG. 4) and release clamp (Do not remove)
13. Remove existing leaf springs.
14. Check fit of new leaf springs in safety arm recess. A close fit should be obtained. **Maintaining Free Movement.**
15. The tapered drive end of the long leaf spring should be checked for fit in the safety shoe recess. The spring should seat against the bottom of the shoe recess with the tapered drive faces in contact, and a minimum amount of clearance at the non-drive edge. See Fig. 3 'B'.
16. The set of springs should now be inserted into the safety arm recess behind the clamp and assembled as shown in Fig. 4. Ensure the tapered drive edge is positioned correctly as shown. Initially tighten clamp nuts and rotate flywheel to ensure the top edge of the long leaf spring passes under the safety shoe nuts and washers with clearance.
17. The Clamp can now be fully tightened
18. Re-set the safety arm as Section 2A



SAFETY ARM COMPONENTS

FIG. 4

Section 3. Flywheel.

REMOVAL AND REPLACEMENT

The flywheel is fitted with a bronze bushing and grease seals as shown in Fig. 5.

Extensive Wear of the bush is indicated by a noticeable 'Wobble' of the Flywheel.

REMOVAL

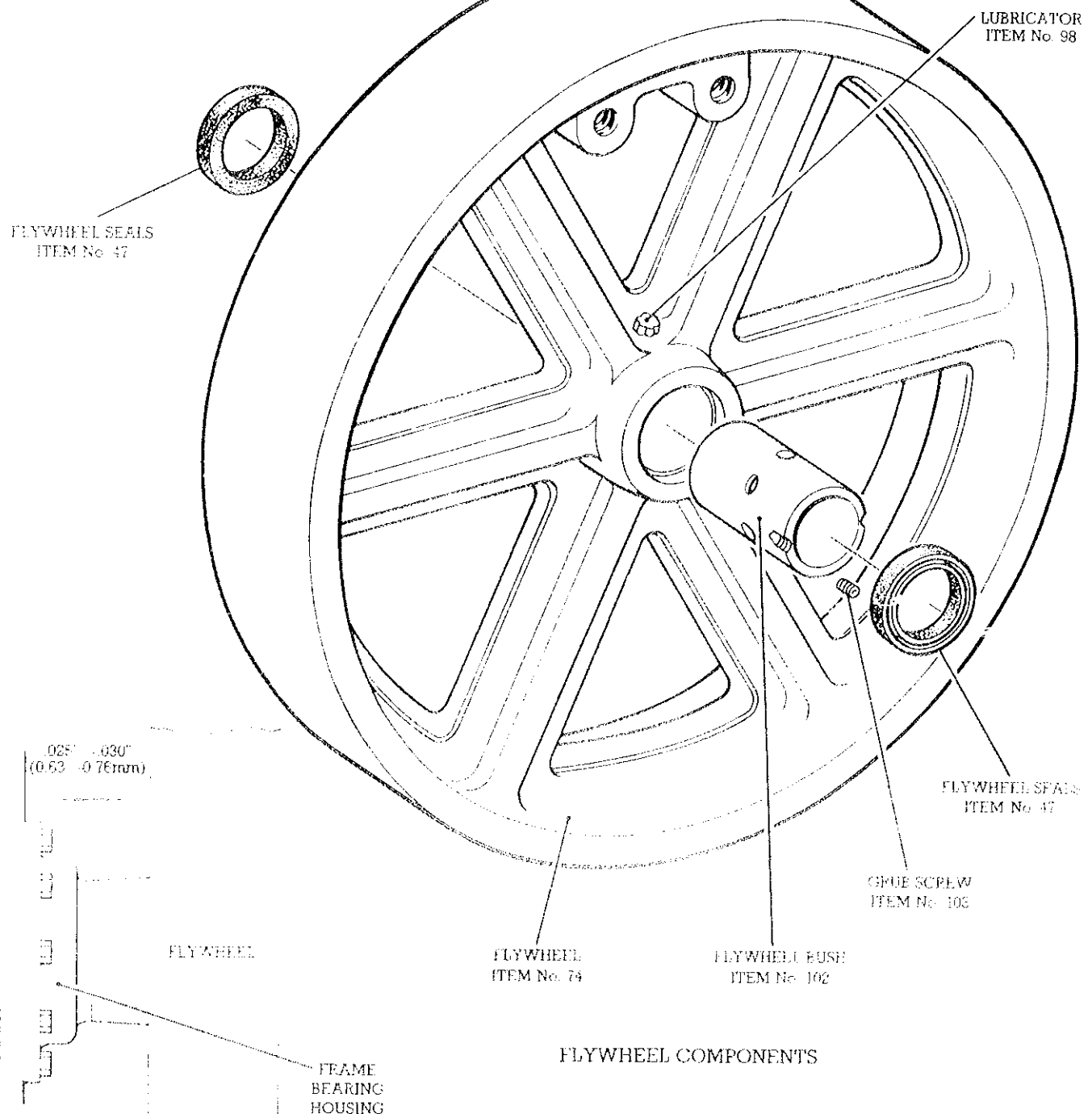
- 1 Remove the safety arm (Refer to Section 2B)
- 2 Attach a lifting sling to the flywheel and support the weight of the flywheel.
- 3 Slowly withdraw the flywheel from the eccentric shaft taking care not to damage the flywheel seals.
- 4 Inspect Seals and Bush
- 5 To fit a new bush, remove seals and bush securing screw (Item 103, Fig. 5) and press out bush.

Press in new bush, drill and tap bush and flywheel for the bush securing screw.

N.B. Replace seals as shown Fig. 6, to allow release of grease from bush.

REPLACEMENT

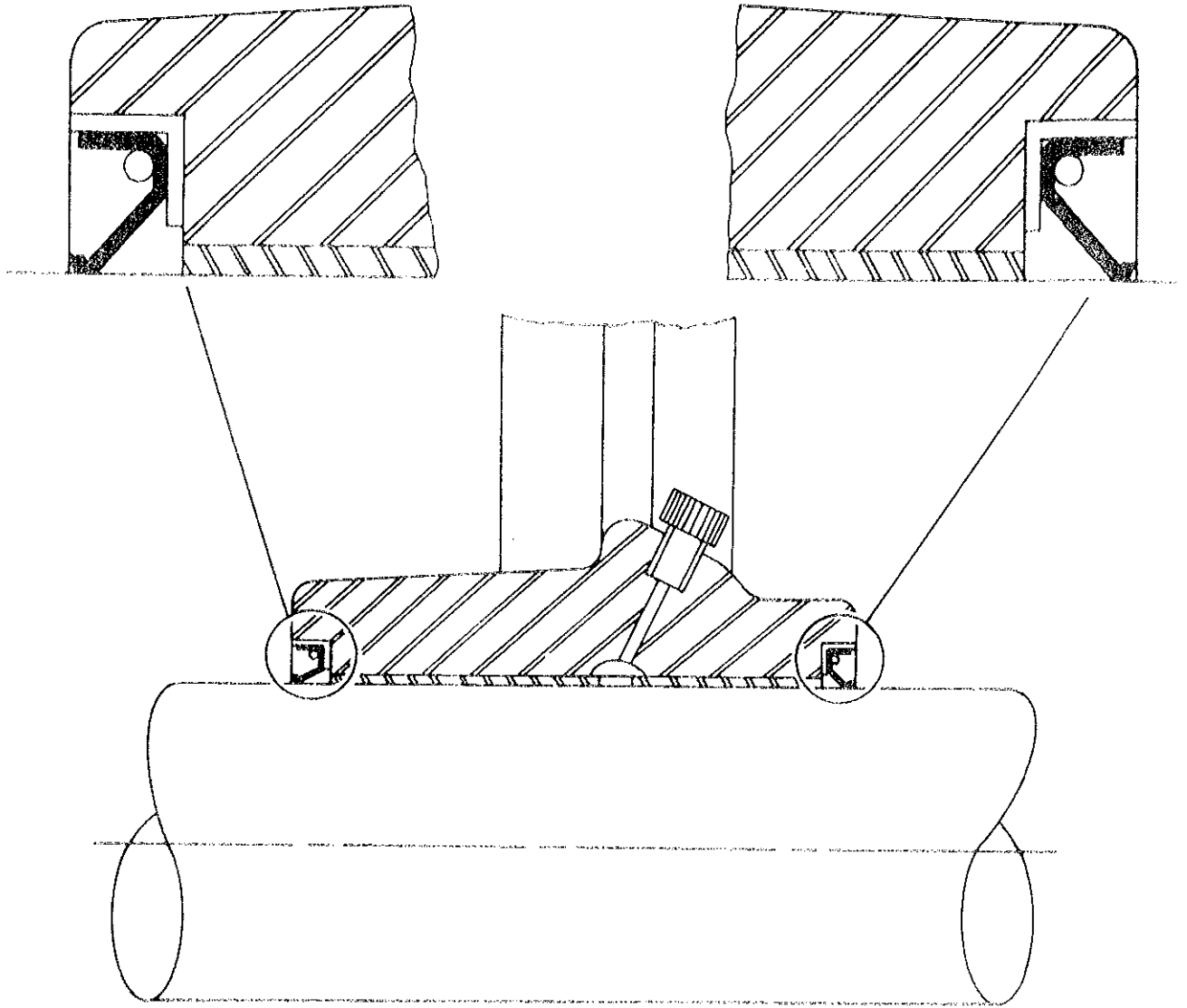
- 6 Smear the bore of the flywheel bush with molybdenum disulphide grease.
- 7 Attach lifting sling to the flywheel and line up with the eccentric shaft. Slide the flywheel onto the eccentric shaft taking care not to damage the seals.
- 8 Position the flywheel on the eccentric shaft to give a clearance of .025" - .030" (0.63 - 0.76mm) between the face of the flywheel boss and the face of the bearing housing. (Fig. 5A)
- 9 Replace safety arm (Section 2B)



FLYWHEEL COMPONENTS

FIG. 5

FIG. 5A



FIT SEALS AS SHOWN TO ALLOW
RELEASE OF EXCESS GREASE

FIG. 10.

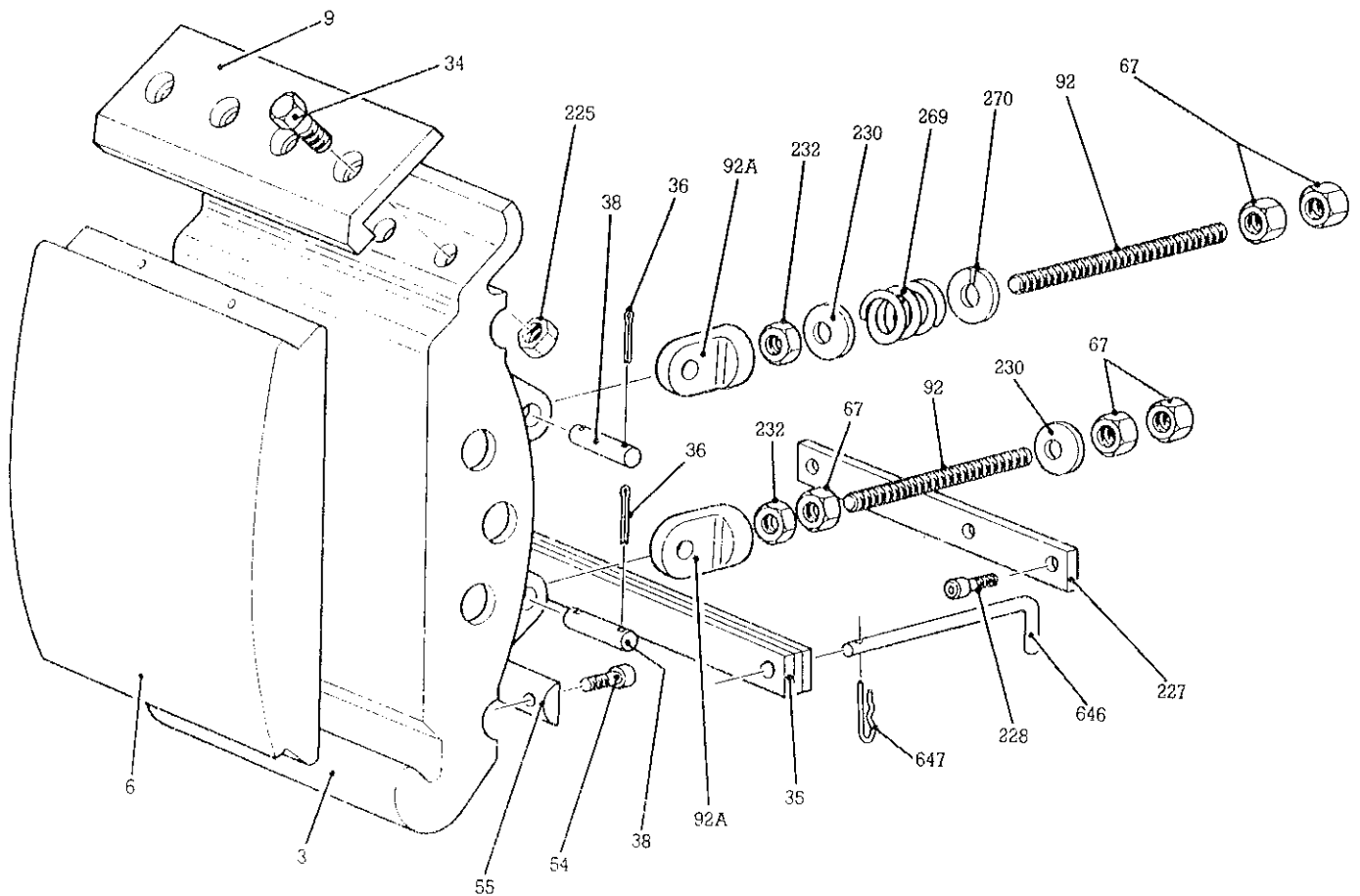
STATIONARY JAW ASSEMBLY

CHAPTER

10

SECTION.

1. DESCRIPTION
2. STATIONARY JAW ADJUSTMENT
3. STATIONARY JAW Removal and Replacement.

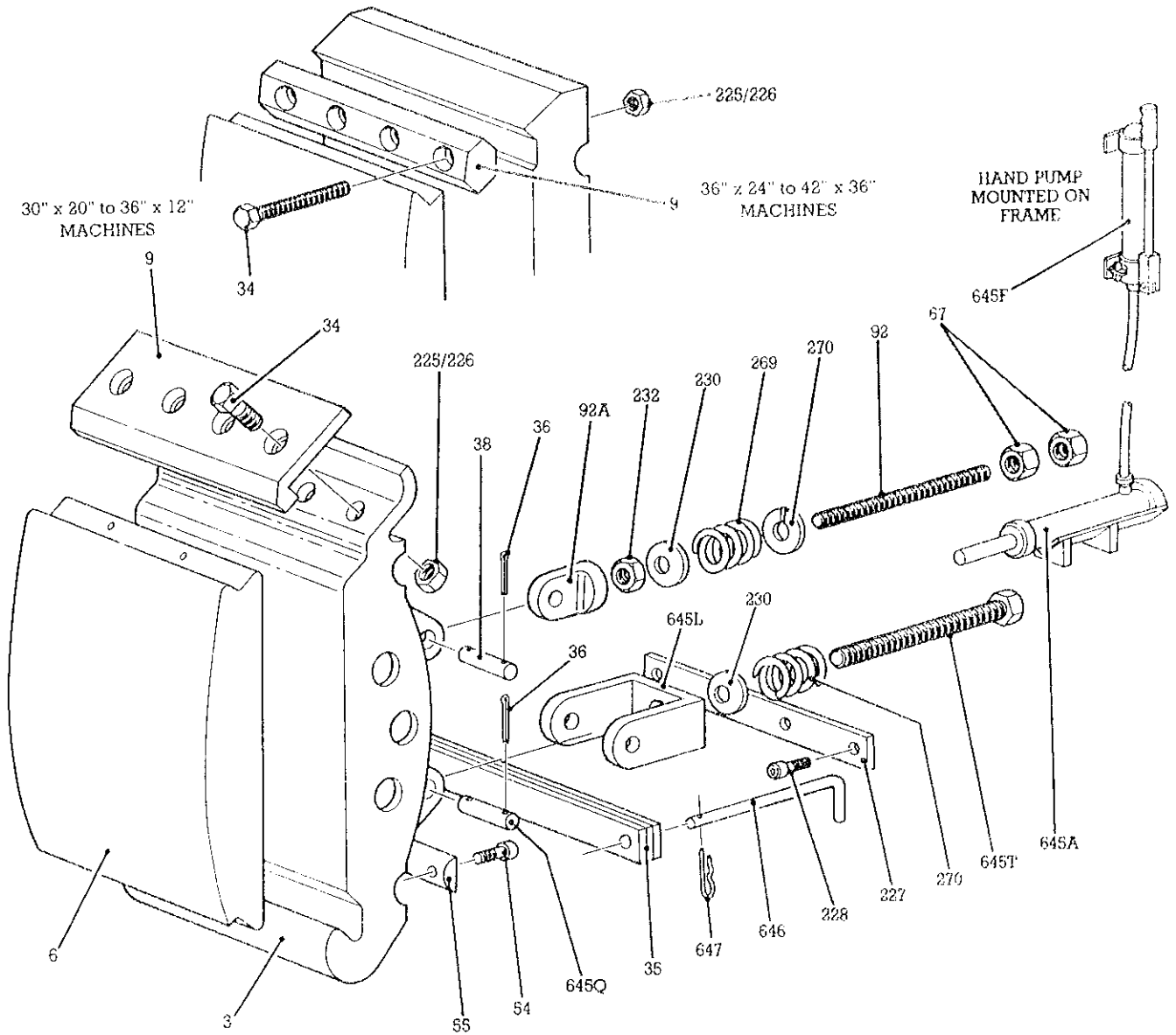


MACHINES 24" x 8" to 24" x 15"

ITEM No.	DESCRIPTION	ITEM No.	DESCRIPTION	ITEM No.	DESCRIPTION
3	Stationary Jaw	54	Hex. Skt. Capscrew	230	Spherical Washer
6	Jaw Plate	55	Self Aligning Shim	232	Locknut (Thin)
9	Stationary Keeper Plate	67	Hex. Nut	269	Holding Bolt Spring
34	Keeper Bolt	92	Upper Holding Bolt	270	Spring Washer
35	Jaw Adjusting Shims	92A	Holding Bolt Eye	646	Shim Lockbar
36	Split Pin	227	Compensating Plate	647	Spring Clip
38	Holding Bolt Pin	228	C'sk Set Screw		

STATIONARY JAW ASSEMBLY COMPONENTS

FIG. 1.



MACHINES 30" x 20" to 36" x 12" and 36" x 24" to 42" x 36"

ITEM No.	DESCRIPTION	ITEM No.	DESCRIPTION	ITEM No.	DESCRIPTION
3	Stationary Jaw	67	Hex. Nut	269	Holding Bolt Spring
6	Jaw Plate	92	Upper Holding Bolt	270	Spring Washer
9	Stationary Keeper Plate	92A	Holding Bolt Eye	645A	Hydraulic Ram
34	Keeper Bolt	225	Hex. Nut (Aerotite)	645F	Hand Pump and Hose
35	Jaw Adjusting Shims	226	Hex. Nut (Aerotite)	645L	Jaw Block
36	Split Pin	227	Compensating Plate	645Q	Jaw Block Pin
38	Holding Bolt Pin	228	C'sk Set Screw	645T	Holding Bolt
54	Hex. Skt. Capscrew	230	Spherical Washer	646	Shim Lockbar
55	Self Aligning Shim	232	Locknut (Thin)	647	Spring Clip

STATIONARY JAW
ASSEMBLY COMPONENTS

FIG. 1A

Section 1. Description

The components of the Stationery Jaw Assembly are Stationary Jaw - Jaw Plate and Keeper Plate - Upper and Lower Holding Bolts - Adjusting Shims - Self Aligning Shim, Adjusting Shim, Compensating Plate.

The Stationary Jaw complete with Jaw Plate is held in position in the Crusher frame by the Holding Bolts.

Adjustments to control the size of the crusher product is made to the Stationary Jaw by means of Shims. (Fig. 1) MACHINES 24" x 8" to 24" x 15"
(Fig. 1A) MACHINES 30" x 20" to 36" x 12" and 36" x 24" to 42" x 36"

Section 2. Stationary Jaw Adjustment.

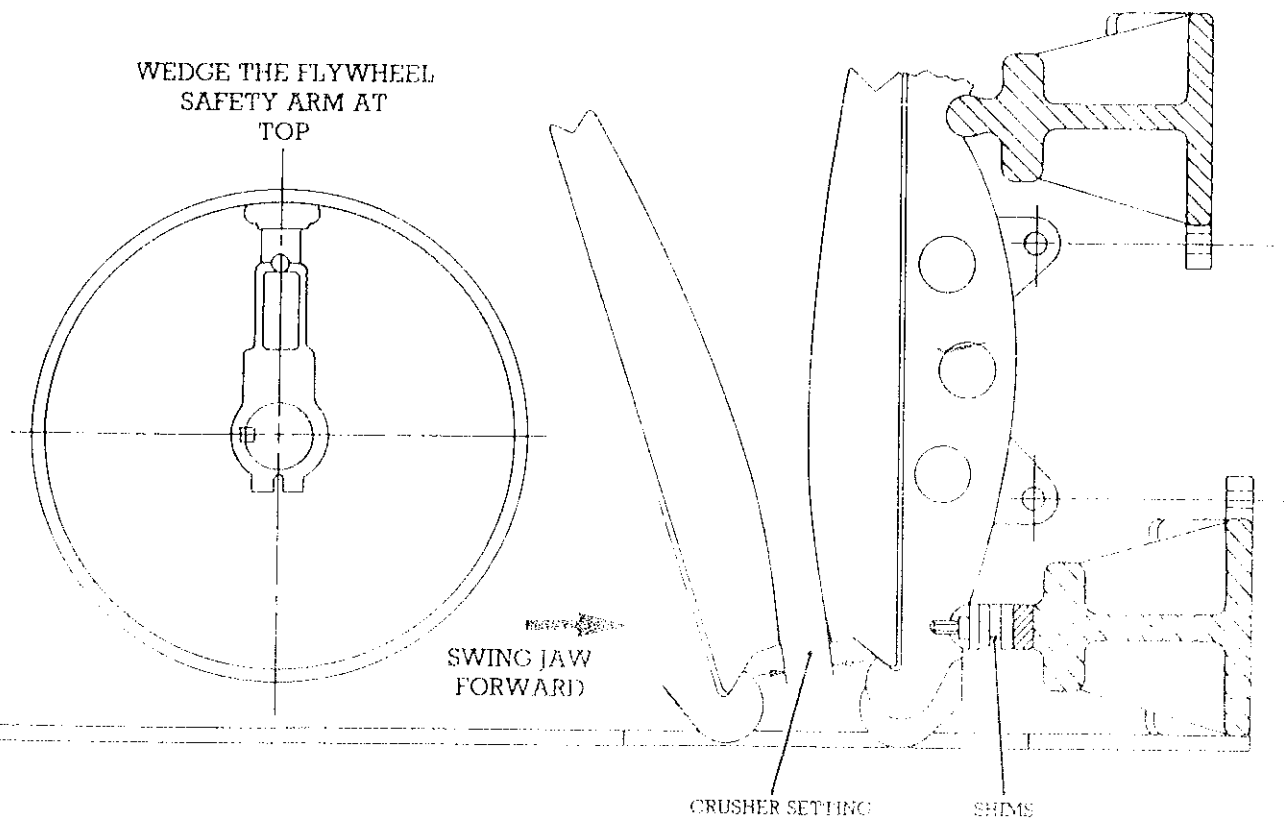
1. All adjustments of the discharge setting on the crusher are made by adjusting the bottom of the Stationary Jaw with Shims. The discharge setting is the distance when the nearest opposite points on the Swing Jaw Plate and the Stationary Jaw Plate are in their closest position with the Swing Jaw at its maximum forward position. This 'setting' is referred to as the 'Closed Side Setting'. The 'Closed Side Setting' is measured at, or near, the bottom of the Jaw Plates. (Fig. 2). To measure the 'Closed Side Setting' first turn the Flywheel until the safety arm is at top vertical

position thus ensuring the Swing Jaw is fully forward. **Wedge the Flywheel securely.**

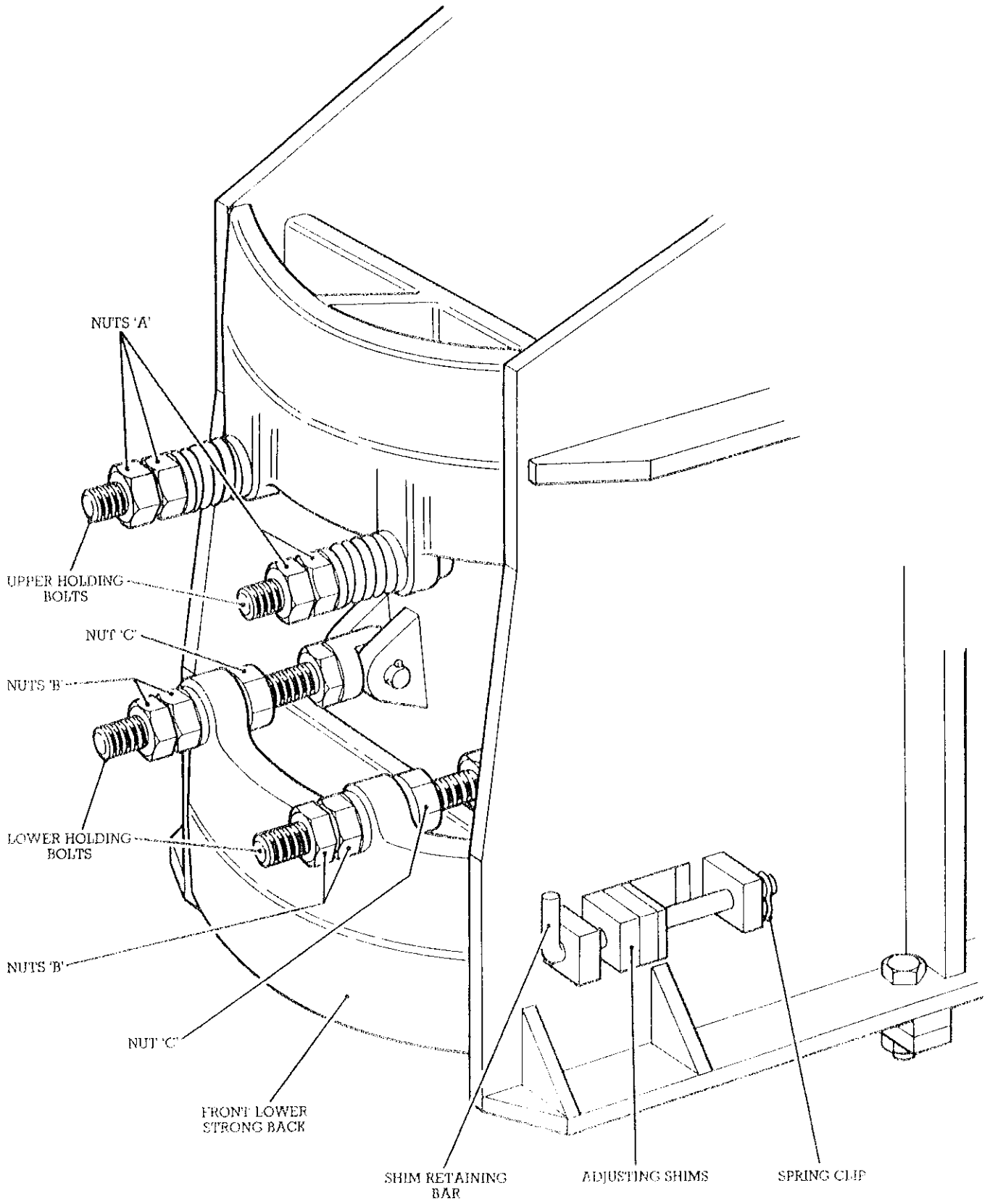
The 'setting' can now be measured using a piece of wood or board of the same thickness as the setting required.

METHOD OF ADJUSTING THE CLOSED SIDE SETTING.

2. Remove Spring Clip and withdraw shim retaining bar (Item 646)
3. Slacken off Nuts 'A' on the upper Holding Bolts about $\frac{3}{4}$ " (6mm). This will allow the Stationary Jaw to pivot about the upper strongback. Take Care not to slacken off too much as this could result in the Stationary Jaw being dislodged off the strongback.
4. Slacken back Nuts 'B' on the lower holding bolts as required. Nuts 'C' are Jacking Nuts. Tightening these nuts against the strongback lugs will cause the Stationary Jaw to move forward enabling adjusting shims to be removed or additional shims to be added.
5. When the Adjusting Shims have been adjusted to give the required Closed Side Setting, screw back Nut 'C' until well clear of the strongback lugs.
6. Tighten up nuts 'A' compressing springs to give $\frac{1}{16}$ " (1.5mm) space between coils.
7. Tighten Nuts 'B' firmly. Nut 'C' must remain clear of the lug by 1" (25mm)
8. Replace Shim Retaining Bar and Spring Clip



JAW SETTING



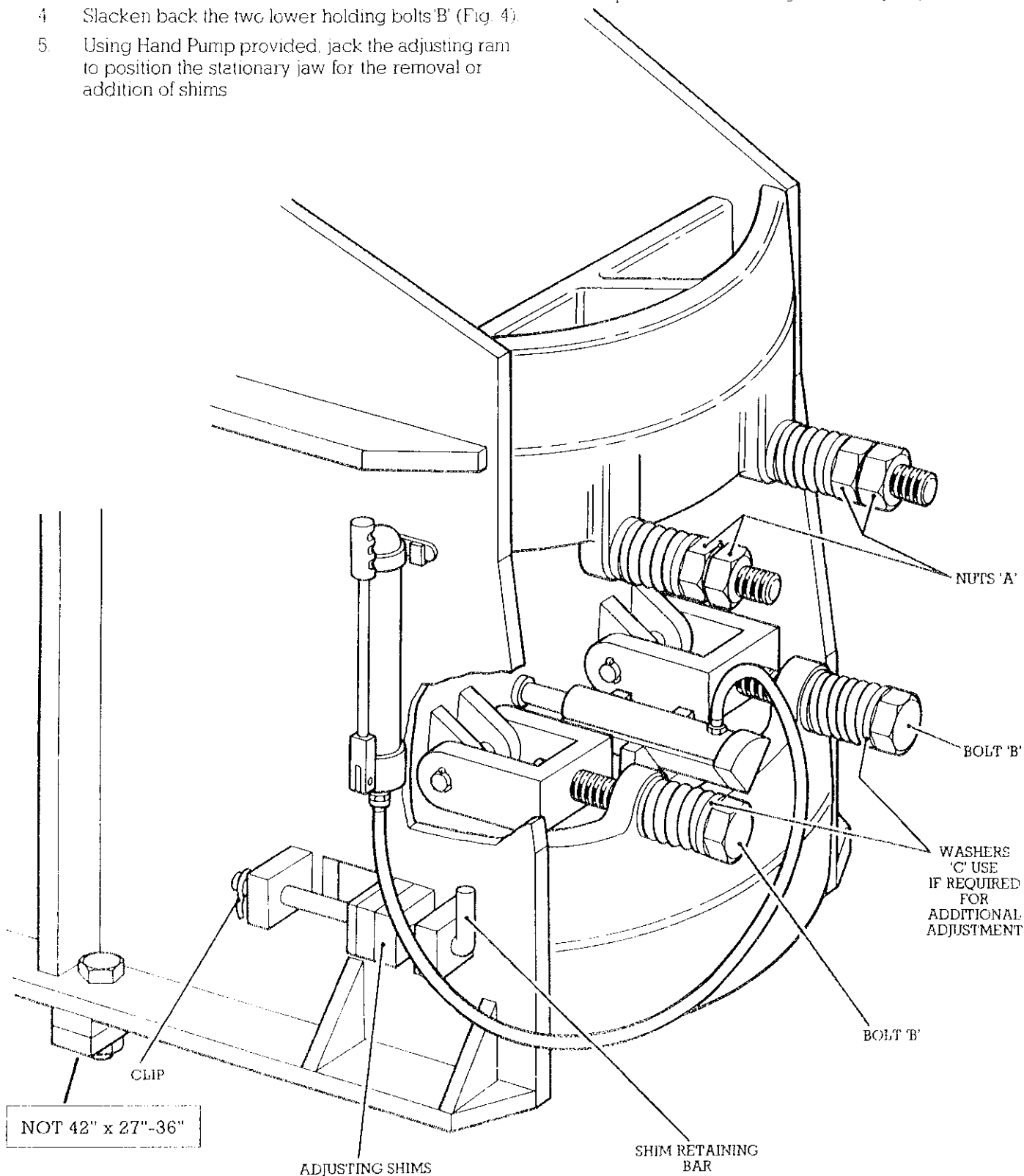
NOTE
 ENSURE NUT 'C' IS SET
 CLEAR FROM LUG AFTER
 ADJUSTING SETTING.

24 x 8 - 24 x 15

FIG. 3

METHOD OF ADJUSTING THE CLOSED SIDE SETTING

2. Remove spring clip and withdraw shim retaining bar Item 646.
3. Slacken off Nuts 'A' on the upper Holding Bolts about ¼" (6mm). This will allow the Stationary Jaw to pivot about the upper strongback. Take care not to slacken off too much as this could result in the Stationary Jaw being dislodged off the strongback.
4. Slacken back the two lower holding bolts 'B' (Fig. 4).
5. Using Hand Pump provided, jack the adjusting ram to position the stationary jaw for the removal or addition of shims
6. When the number of shims have been adjusted to give the required closed side setting, release the ram pressure and tighten the upper and lower bolts, compressing springs to give ¼" (1.5mm) between coils.
7. If sufficient adjustment cannot be made, further adjustment can be achieved by adding or removing washers 'C' on bolt 'B'.
8. Replace Shim Retaining Bar and Spring Clip.



30 x 20 - 42 x 36

FIG. 4

Section 3. Stationary Jaw

REMOVAL AND REPLACEMENT

REMOVAL

1. Remove Jaw Plate (Refer to Chapter 7 Section 2).
2. Attach lifting tackle to the keeper plate holes and support the weight of the stationary jaw
3. Slacken Back the Upper and Lower Holding Bolts (Fig. 3 or 4)
4. Remove split pins from the Holding Bolt Pins (Fig. 5). Remove Holding Bolt Pins.
5. Lift Stationary Jaw out of the crusher frame

REPLACEMENT

6. Attach lifting tackle as (2) above and lower jaw into frame. Position the upper radial seating of the jaw against the radial seating of the upper strongback

ensuring that a snug fit is obtained along the length of the seating and no dirt is allowed to be trapped between their faces (12) Fig. 5)

7. Fit Holding bolt pins and split pins

24 x 8 - 24 x 15 MACHINES

8. Tighten up nuts A compressing springs to give $\frac{1}{16}$ " (1.5mm) space between coils (Fig. 2)

9. Tighten Nuts B firmly. Nut C must remain clear of the lag

28 x 20 - 42 x 36 MACHINES

10. Tighten upper and lower bolts to give $\frac{1}{16}$ " (1.5mm) clearance between spring coils

11. Remove lifting tackle

12. Fit jaw plate and keeper plate as Chapter 7 Section 2

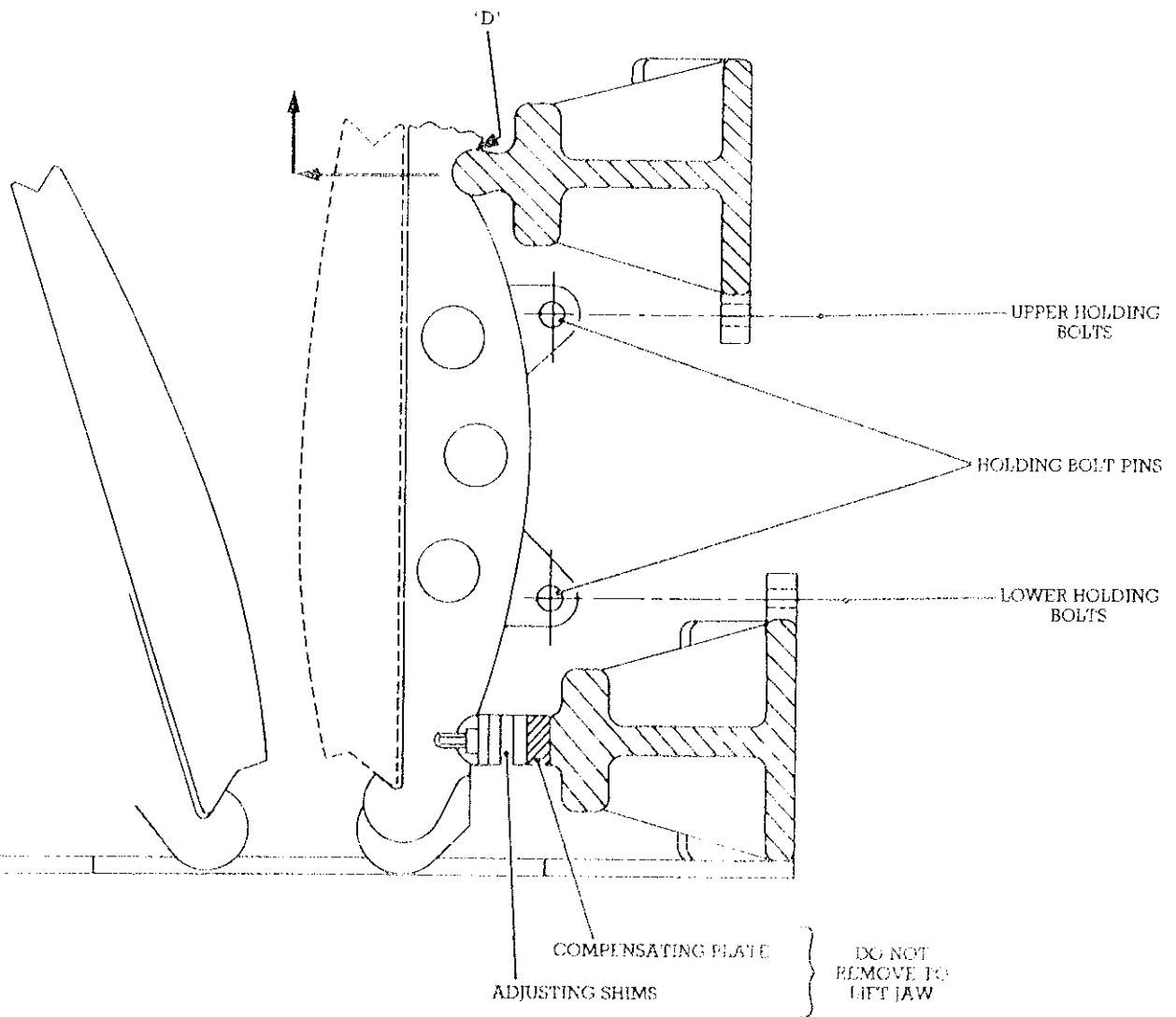


FIG. 5

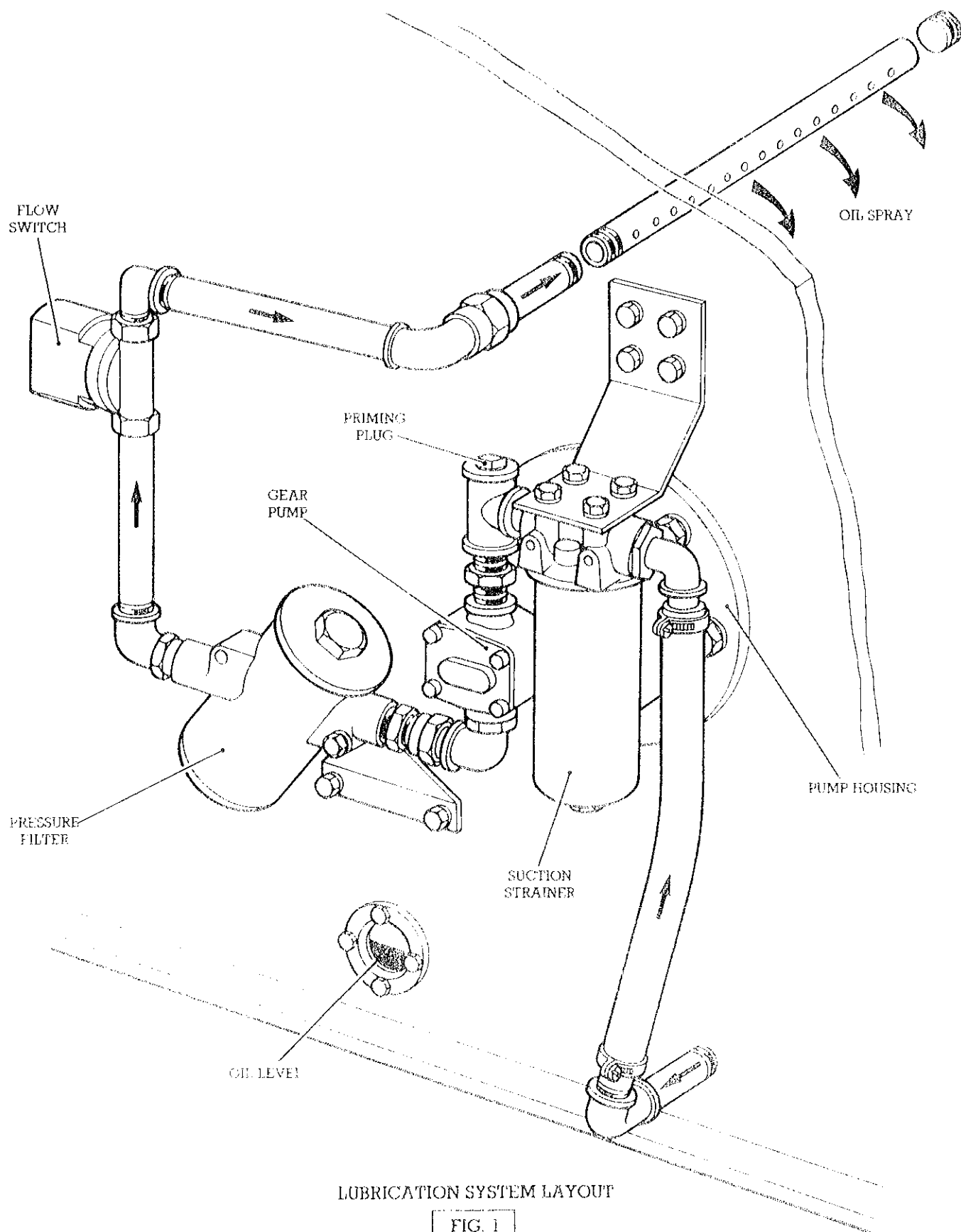
SECTION

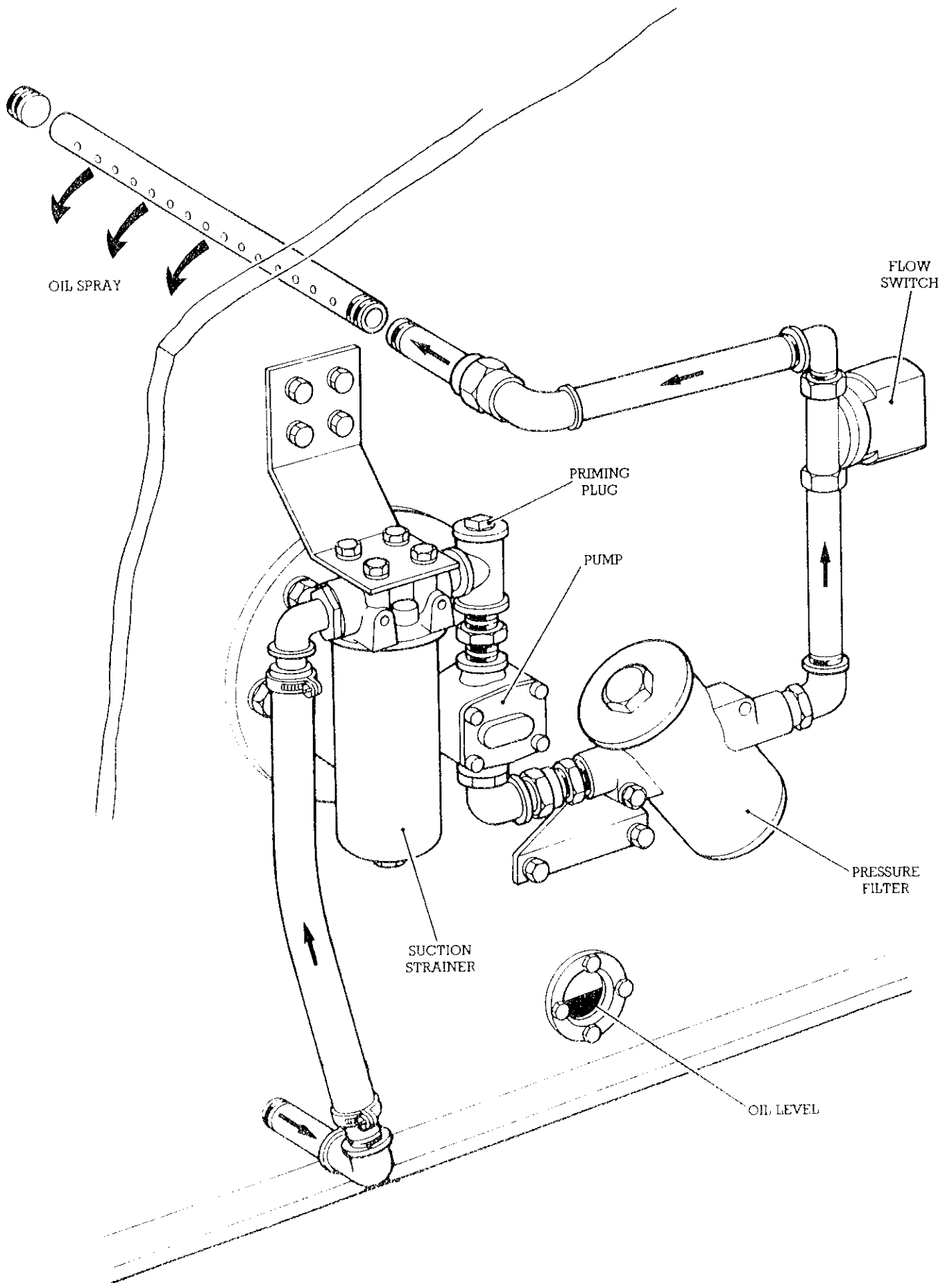
1. DESCRIPTION
 2. OIL PUMP
Removal and Replacement.
 3. OIL STRAINER
Changing or cleaning the Element.
 4. OIL FILTER
Changing or cleaning the Element.
 5. OIL FLOW SWITCH
Operation.
 - 5A. OIL FLOW SWITCH
Electrical Circuits and Switch Connections.
 - 5B. OIL FLOW SWITCH
Removal and Replacement.
 6. OIL CHAMBER
Cover Removal, Draining & Changing Oil.
 7. OILS AND GREASES
Recommended Grades & Quantity.
 8. MAINTENANCE & LUBRICATION CHART.
-

Section 1. Description

The Crusher has a fully enclosed oil lubrication system, lubricating the eccentric shaft bearings, pitman and toggles. An oil pump, driven by the eccentric shaft, is mounted outside the crusher frame together with an oil strainer, filter and an oil flow switch.

The oil flow switch is a safety device to prevent damage to the crusher in the event of an oil flow failure.



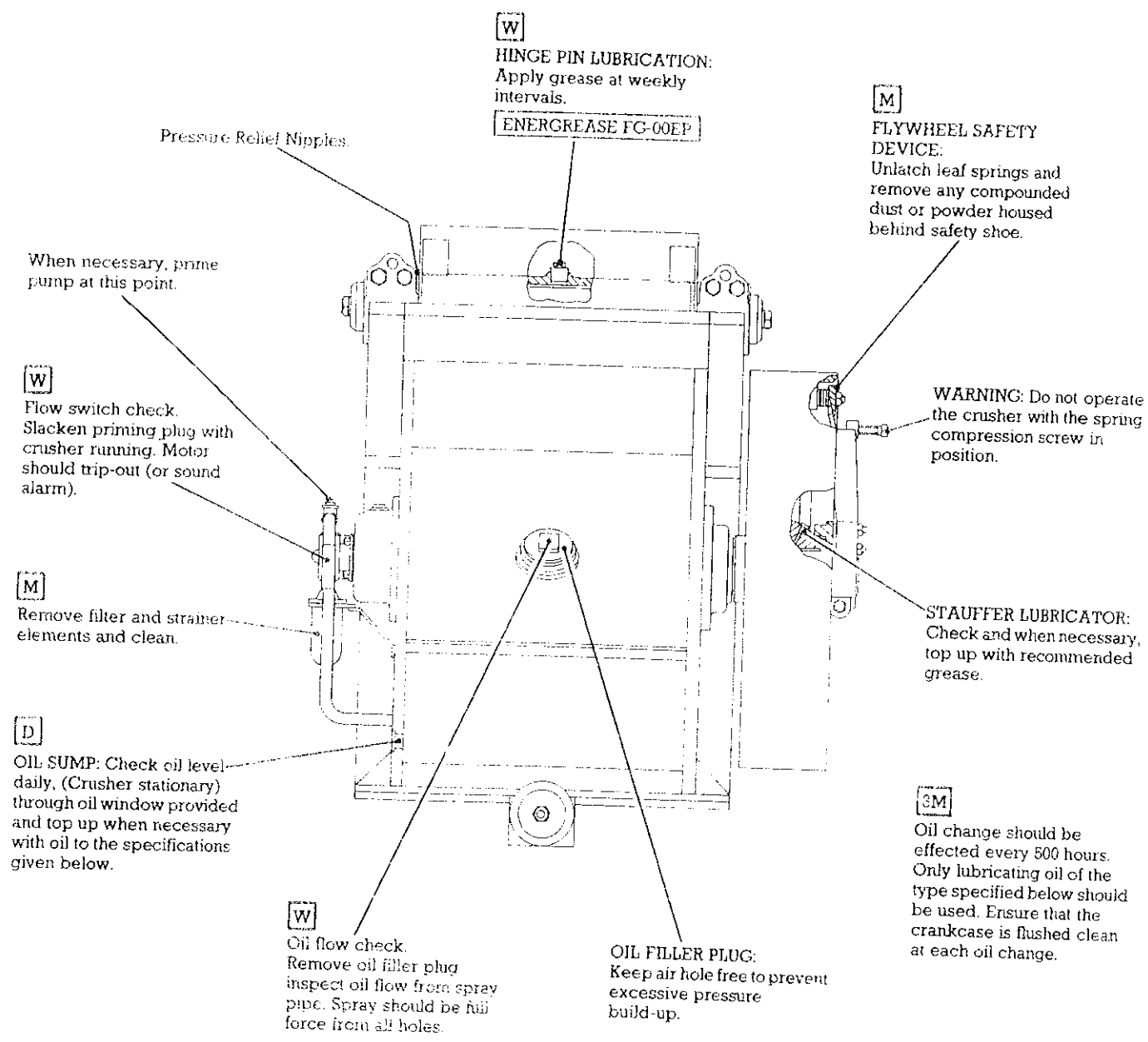


30 x 20, 36 x 24 & 42 x 32/36 MACHINES ONLY

LUBRICATION SYSTEM LAYOUT

FIG. 1A

Section 8. Maintenance & Lubrication Chart



RECOMMENDED OILS

BELOW 40°C SHELL MACOMA R150
 ABOVE 40°C SHELL MACOMA R220

(See Manual For Alternatives)
 (Chapter 1) Section 7).

- [D]** DAILY CHECK
- [W]** WEEKLY CHECK
- [M]** MONTHLY CHECK

Section 7. Oil and Greases RECOMMENDED GRADES & QUANTITY

JAW CRUSHER LUBRICANTS - APPROVED OILS

	LUBRICATION OIL FOR TEMPERATURES	
	BELOW 40°C	ABOVE 40°C
BP	Energol GR-EP 150	Energol GP-EP 220
Castrol	Alpha SP 150	Alpha SP 220
Duckhams	Galrex EP 8	Galrex EP 8/9
Shell	Omala 150	Omala 220
Shell U.K.	Macoma R150	Macoma R220
Gulf	EP HD 150	EP HD 220
Mobil	Mobilgear 629	Mobilgear 630
Esso	Spartan EP 150	Spartan EP 220
Texaco	Meropa 150	Meropa 220
Total	Carter VG EP 100	Carter VG EP 220

ALTERNATIVE OILS

If other oils are used, they must be equal to the above in service characteristics and meet the following specifications

TEMPERATURE	VISCOSITY AT 40°C
Below 40°C	135/165 Centistokes
Above 40°C	198/242 Centistokes

Timken OK value 50 lbs/mm
Extreme pressure additive to be included to give high load carrying capability

Please consult us for approval before using any oil that is not on our approved list

Warranty is void if non-approved oils are used

APPROVED GREASES

Flywheel Bush

Esso --- Beacon EP2
Gulf Oil --- Gulfrown EP2
BP --- Energrease LS-EP2
Castrol --- Sphero-Grease
Shell --- Alvania No. 2

Hinge Pin

BP --- Energrease F300-EP
(Semi fluid extreme pressure)

Shell Equip. --- Sylvania Grease O'

OIL AND GREASE CAPACITIES

Mch. No.	Oil Quantity Mechanism Chamber		Grease Quantity Hinge Pin Housing	
	Gallons	Litres	Gallons	Litres
24 x 8 24 x 12	8	36	1½	7
24 x 15 36 x 24	9	41	1¼	5.5
	17	77		
	16	73		
	16	73		
	21	95		
12 x 8 42 x 36	12	145	2	9

These quantities are approximate. Check correct oil level by oil level window on frame.

Section 6. Oil Chamber COVER REMOVAL, DRAINING & CHANGING OIL

The Oil Chamber, built integral with the crusher frame, houses the Eccentric Shaft, Pitman and Toggles.

The Oil Chamber Cover is fitted with a Filler Plug in which there is a Breather Hole (Fig. 14).

The Breather Hole should always be kept clear.

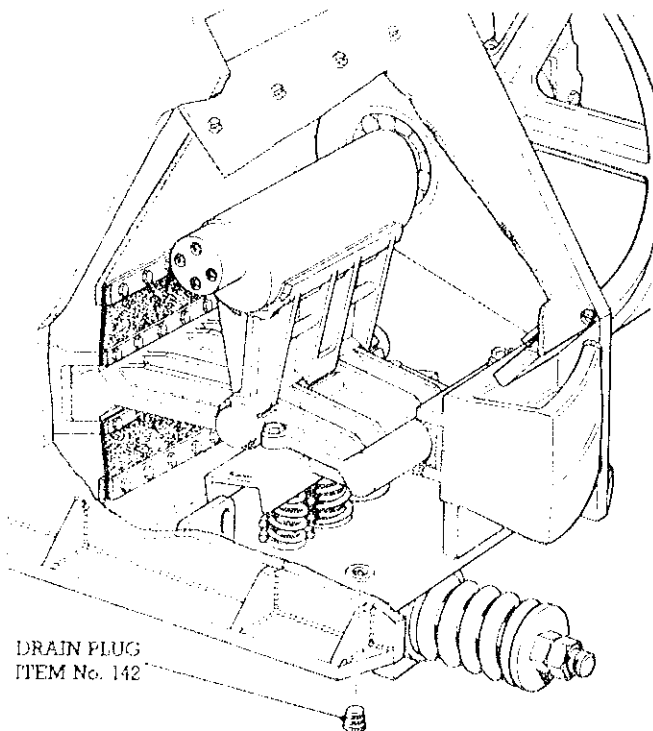
Level of oil in the Chamber should be kept up to the level indicator in the front window. (See Fig. 1)

REMOVAL AND REPLACEMENT OF THE OIL CHAMBER COVER

1. Thoroughly clean away all dust and dirt from outside of the oil chamber
2. Remove the screws and the cover. Take care not to damage the rubber Oil Chamber Gasket.
3. Remove the Filler Plug only when filling or topping up the Oil Chamber. To clean the Plug wash in paraffin or diesel oil and ensure that the breather is not blocked.

DRAINING AND CHANGING THE OIL

1. To drain the oil, remove the oil chamber drain plug, using a suitable receptacle to catch the oil.
2. Flush out the Oil Chamber with diesel and remove any sludge.
3. Replace the Drain Plug and refill with the recommended oil grade to the correct level (SEE SECTION 7)



OIL CHAMBER COVER PLATE ASSEMBLY

FIG. 14

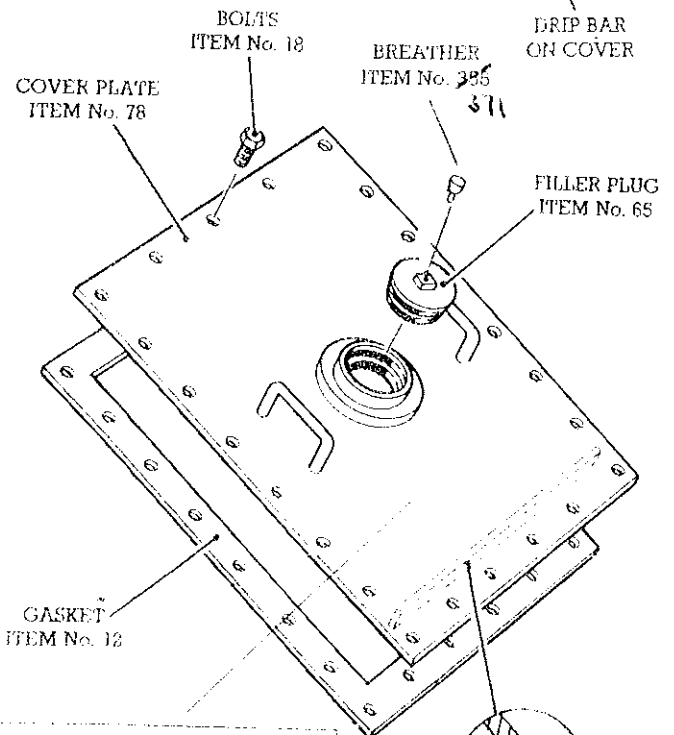
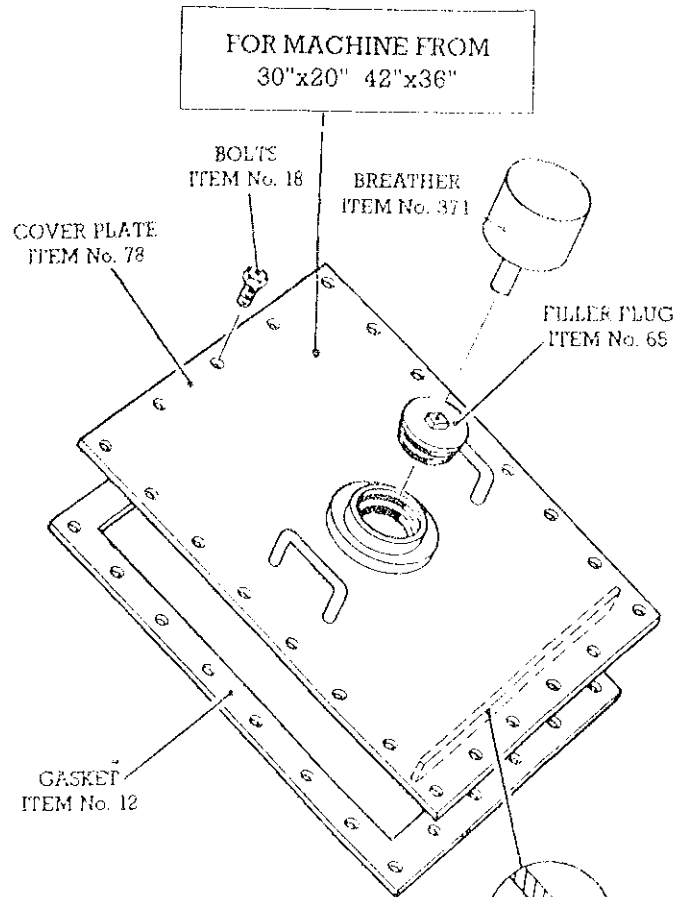
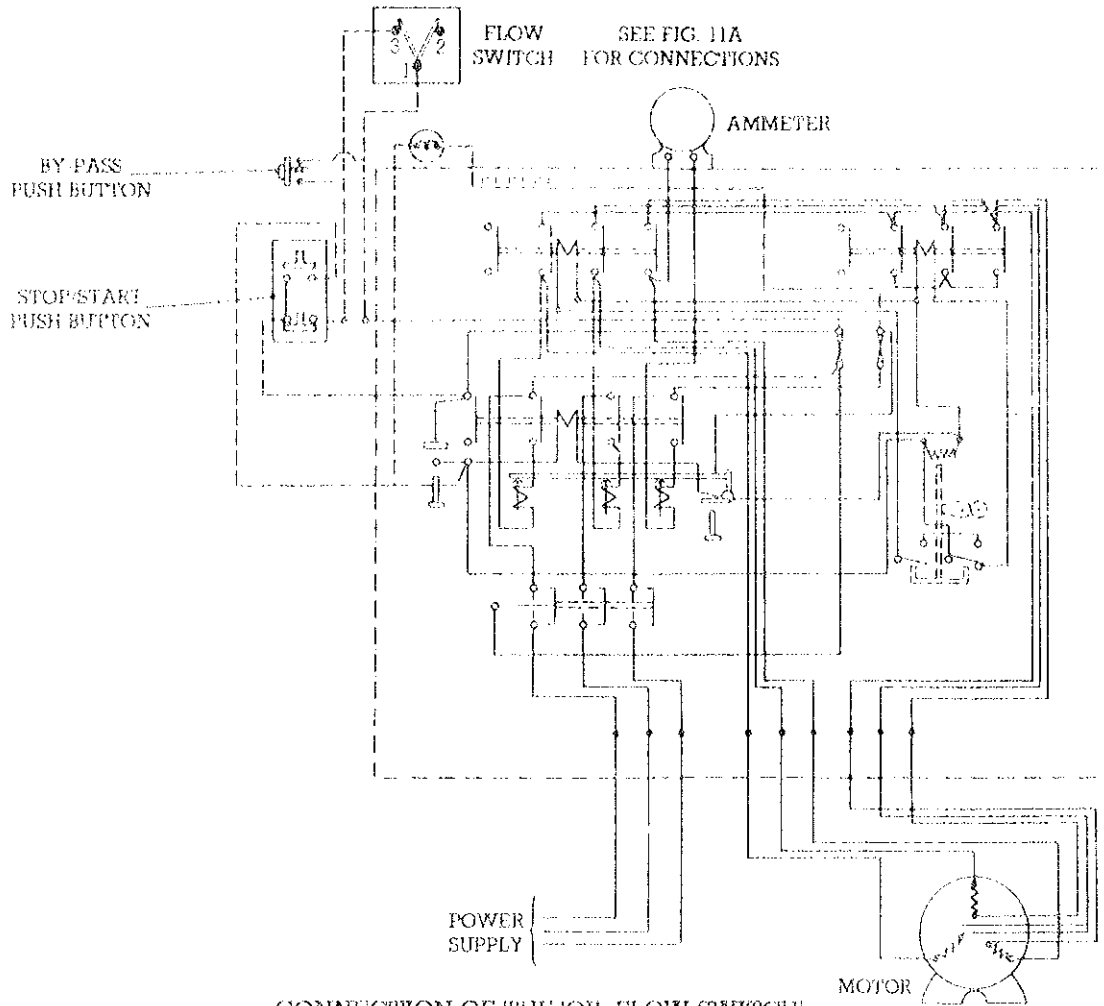


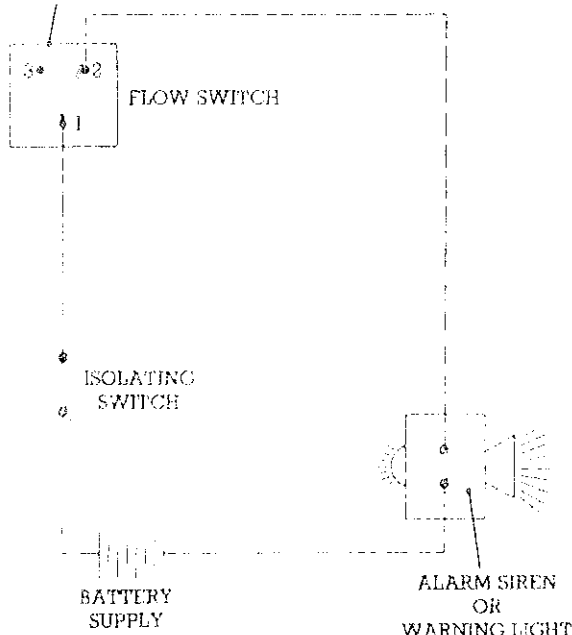
FIG. 14A



CONNECTION OF THE 'OIL FLOW SWITCH' AND 'BY-PASS PUSH BUTTON' INTO A "TYPICAL" STAR DELTA STARTER

FIG. 12

SEE FIG. 11B SWITCH CONNECTIONS



FLOW SWITCH CONNECTION FOR ALARM SIREN CIRCUIT

FIG. 13

Section 5B. Oil Flow Switch REMOVAL AND REPLACEMENT

1. Isolate the electrical power supply to the switch.
2. Remove the cover plate and disconnect the electrical wires.
(Note location of each lead) (FIG. 10)
3. Unscrew pipe fitting connections at 'B' and 'C' (FIG. 4).
Remove switch, filter and section of pipe work.
4. Unscrew pipe work from the flow switch.
5. *Note:* Flow switches are supplied complete.
Replacement parts to the size found are not available.
6. Re-fit the flow switch in reverse order. Take care to fit the switch with the arrow (marked on the switch casing) facing in the direction of oil flow (i.e. pointing upward).
7. Reconnect the electrical wires and replace the cover.
8. Restore electrical power.
9. Prime the oil system, start up the crusher, check switch is operating correctly.

Section 5A.

Oil Flow Switch

ELECTRICAL CIRCUITS AND SWITCH CONNECTION

The following circuits shown are typical only and it is strongly recommended that an Electrician is consulted on the circuit to suit your particular electrical equipment.

IMPORTANT:

Power supply must be isolated before commencing on any connections.

1. Prior to start up of the crusher there will be no oil flow and the flow switch will be in the OPEN position ('A' - FIG. 11A). At this stage it will not be possible to start the electric motor as the flow switch, in the OPEN position, has not closed the circuit to the motor starter.

To overcome this condition it will be necessary to introduce a by-pass push button into the starter circuit to by-pass the flow switch.

By pressing the by-pass push button, and the starter button in the normal way, the crusher motor will now operate.

It will be necessary to keep pressing the by-pass push button until sufficient oil is flowing, changing the flow switch into the CLOSED position ('B' - FIG. 11A).

The time normally required for this change is approximately 10 seconds. The by-pass push button can then be released. A typical circuit is shown in Fig. 12. This circuit will automatically trip out the motor in the event of low oil flow. (Circuits can interlock the crusher motor and the crusher feeder

motor, stopping the crusher and the feed simultaneously).

As an alternative circuit the flow switch can be connected to sound a continuously rated alarm siren, or be connected to a warning light. This Circuit would not automatically trip out the motor and would rely on the operator to stop the Crusher. (Fig. 13 Circuit, Fig. 11B Switch Connection).

Using this circuit the by-pass push button will not be required as the flow switch is not connected to the motor starter circuit. As the flow switch is now connected in the closed position at crusher start up ('C' - Fig. 11B) the alarm or light will operate for approximately 10 seconds until the oil flow changes the flow switch into the open position ('D' - Fig. 11B).

In the event of no oil flow, the flow switch will change to the closed position operating the alarm or light.

TO CHECK SWITCH OPERATION

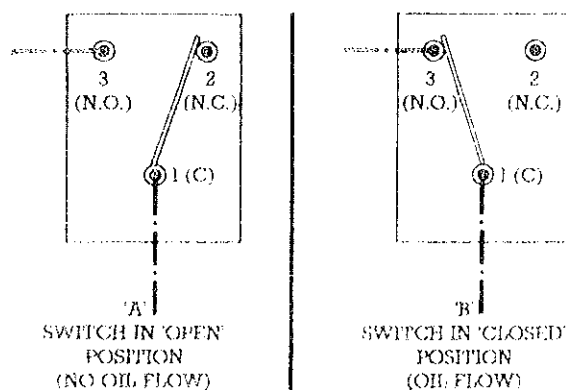
When the Switch is connected as Fig. 11A for Connection into the Motor Starter, the operation of the Switch can be checked by causing an oil failure while the crusher is running light (i.e. NOT CRUSHING). Removing the Pump Oil Priming Plug will cause oil starvation and the flow switch should trip out the crusher motor.

N.B. Refit the Priming Plug in the Pump securely after carrying out this test.

C - COMMON

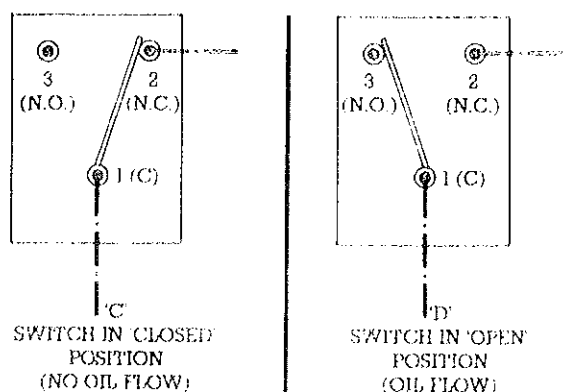
N.O. - NORMALLY OPEN

N.C. - NORMALLY CLOSED



FLOW SWITCH CONNECTIONS
TO TERMINALS **[3 AND 1]** FOR CONNECTION TO
MOTOR STARTER

FIG. 11A



FLOW SWITCH CONNECTIONS
TO TERMINALS **[2 AND 1]** FOR CONNECTION TO
ALARM SIREN

FIG. 11B

Section 5. Oil Flow Switch

OPERATION

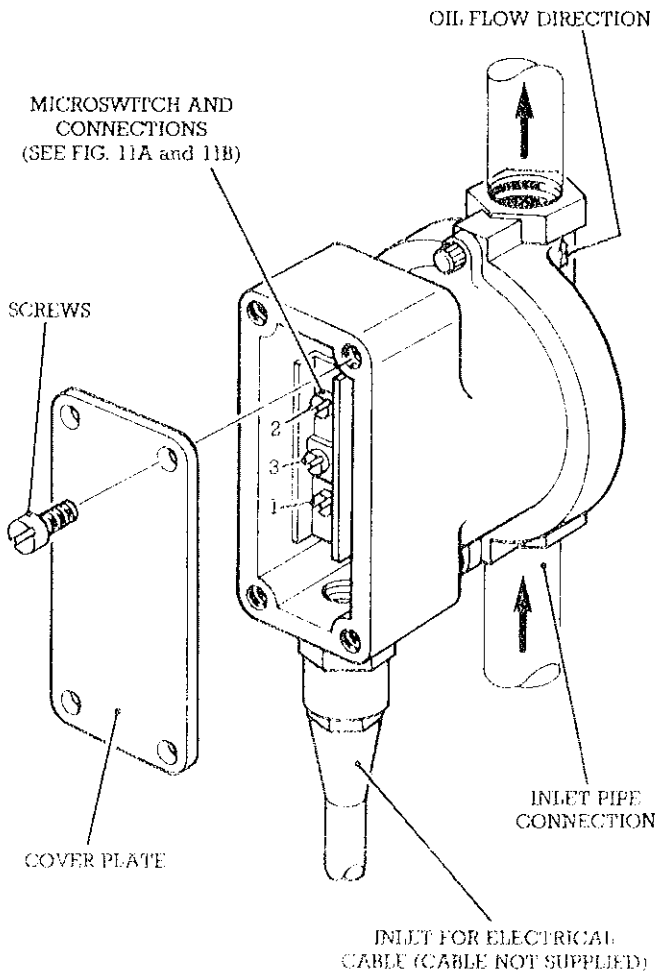
The oil flow switch functions by a diaphragm action brought about by change in differential pressure created by a flow through a calibrated nozzle. The movement of the diaphragm is used to operate a microswitch (FIG. 10).

With no oil flowing the micro switch is in the 'open circuit' position as shown in 'A' FIG. 11A. When the oil pump is started and sufficient oil is flowing the switch is actuated and takes position 'B' FIG. 11A.

The flow switch is preset at works to actuate when the rising flow reaches 1.4 G.P.M. (6.4 litres/min) (switching from Position A to Position B) and to reverse when the flow falls to 1.2 G.P.M. (5.5 litres/min) (switching from position B to Position A).

Access to the switch Terminals is made by removing the cover as shown in FIG. 10.

ENSURE NO POWER IS CONNECTED TO THE SWITCH BEFORE REMOVING THIS COVER.



OIL FLOW SWITCH

FIG. 10

Section 4. Oil Filter

CHANGING OR CLEANING THE ELEMENT

The Oil Filter is located at the delivery side of the Oil pump and is fitted with a by-pass. This by-pass will operate when the oil cannot pass through the element caused by excess contamination of the element or at cold start-up. (See Fig 9A)

The centre column in the element is magnetic to remove ferrous particles from the oil.

The element fitted is 120 micron (.005") (See FIG. 9)

Removal and Replacement when Changing or Cleaning the Filter Element.

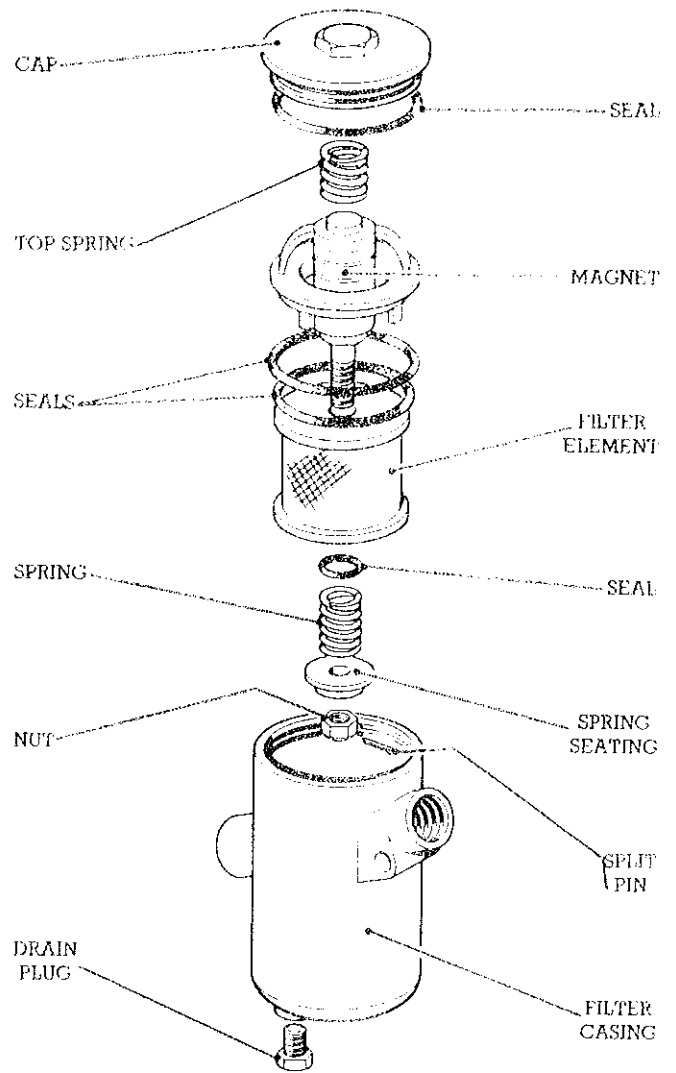
1. Open Drain Plug and drain off oil in the filter
2. Remove the Filter Cap and Top Spring.
3. Carefully remove the Filter Assembly.
4. Remove the Split Pin, Nut, Spring Seating, Spring Element and seals, including the 'O' ring seal in the bottom of the Element.

Cleaning the Filter Element.

Immerse and thoroughly wash the Element in paraffin.

Any remaining particles must be washed out from outside to inside. The Element can be blown through with compressed air from the outside. Insert a roll of paper into the element when carrying out this operation to prevent the cross blow of particles across the Element.

Inspect the Element and Seals for damage and replace if necessary. Replace components in reverse order making sure that the Element and Seals are seating correctly.



OIL FILTER ASSEMBLY
ITEM 63
FIG. 9

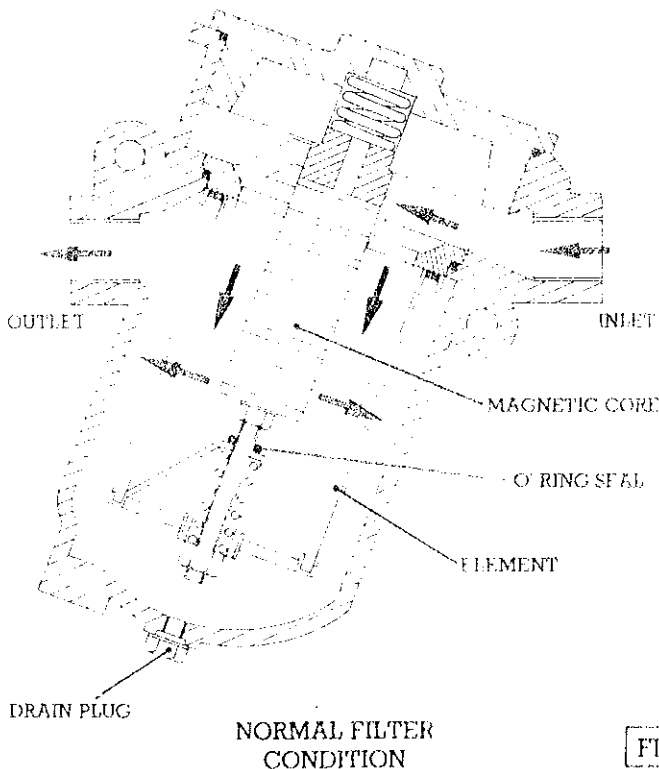


FIG. 9A

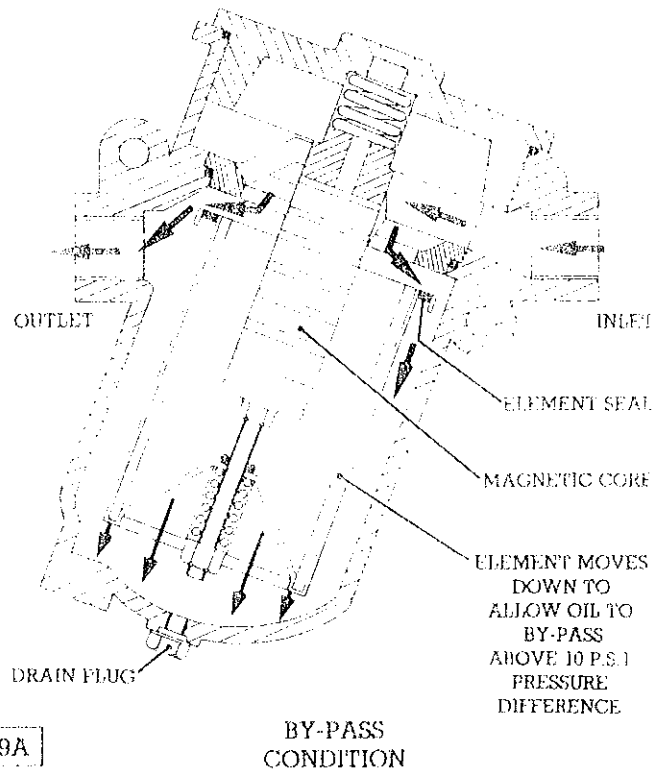


FIG. 9A

Section 3. Oil Strainer CHANGING OR CLEANING THE ELEMENT

The Oil strainer is located at the suction side of the oil pump and will prevent any foreign matter from entering the pump causing excessive wear or damage. The Oil strainer is fitted with a 250 micron (0.010") Filter Element (FIG. 8).

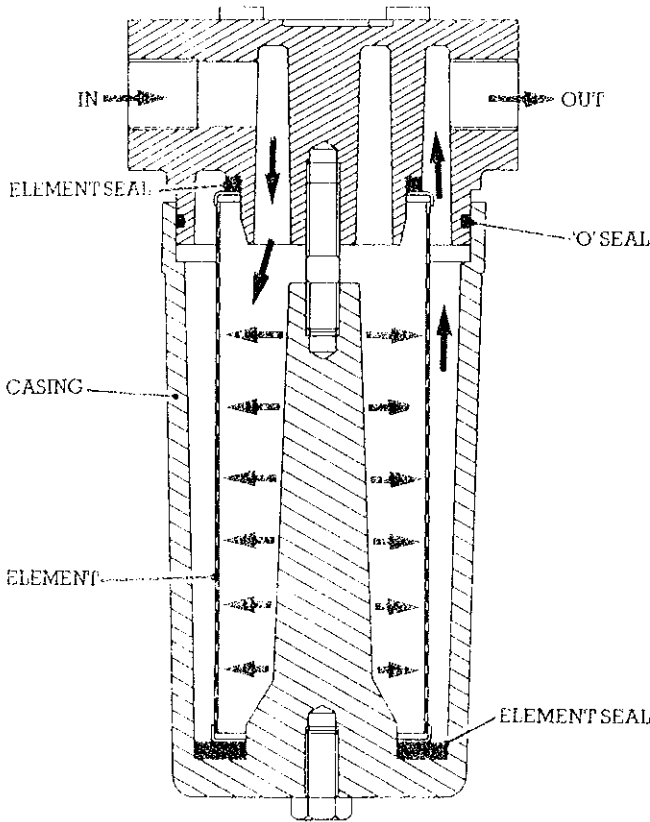


FIG. 8

Charging or cleaning the Element.

- 1 Unscrew and withdraw the Strainer Casing and Element
- 2 Remove the Element from the Strainer Casing
- 3 Wash out the Strainer Casing in paraffin.
- 4 Carefully wash the Element in paraffin.
- 5 Inspect the Seals and Element for damage and renew if necessary
- 6 Replace components in reverse order making sure that the Element and Seals are seating correctly

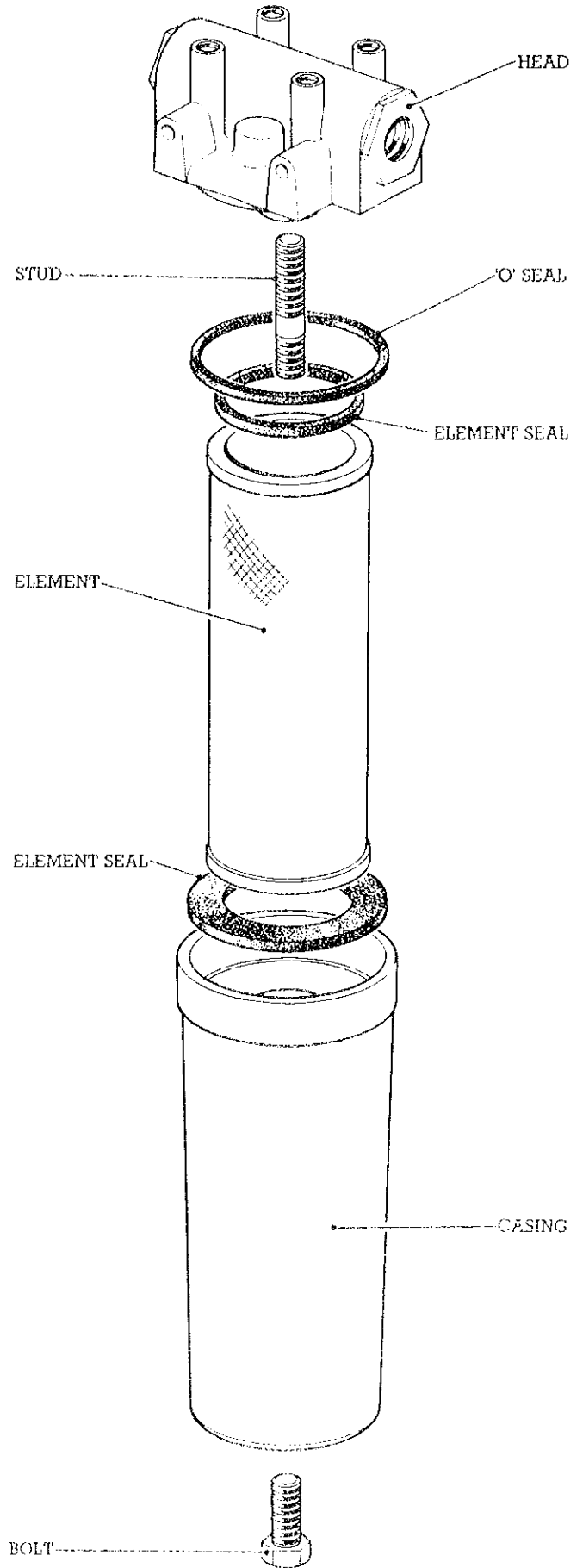


Fig. 8A.

REMOVAL AND REPLACEMENT

1. Remove priming plug from pump (Fig. 4).
2. Unscrew pipe fitting connections 'A' and 'B' Fig. 4 and remove the four flange nuts 'C'. (Fig. 5).
3. Withdraw pump complete with the pump drive hub from the pump housing (Fig. 5).
4. Unscrew the pipe connections out of the top and bottom of the Oil Pump (Fig. 5)
5. Remove the pump drive hub from the pump shaft by slackening the key securing screw and pressing off. (Fig. 6).
6. **Note:** Spare pumps are supplied complete.
Replacement parts for the pumps are NOT available.
7. Inspect the pump gasket and renew if necessary. Fit the driving hub onto the pump shaft so that the end of the shaft protrudes approx. $\frac{1}{16}$ " (1.5mm) (bottom of chamfer), and secure and lock screw. (FIG. 7).
Remove the inspection plug from the pump housing. (FIG. 5).
Refit the pump and pipe connections in reverse order ensuring that the driving dowels in pump drive hub engage correctly into the locating holes in the Thrust Plate (See Fig. 8).
Note: View the driving hub through the inspection hole in pump housing to ensure that the face of the driving hub is clear of the thrust plate and its securing bolts by approx. $\frac{1}{8}$ " (3mm). Adjust position of hub on the shaft if necessary. See FIG. 7.
8. Prime the oil pump and refit plug (Fig. 4).
Start and run Crusher

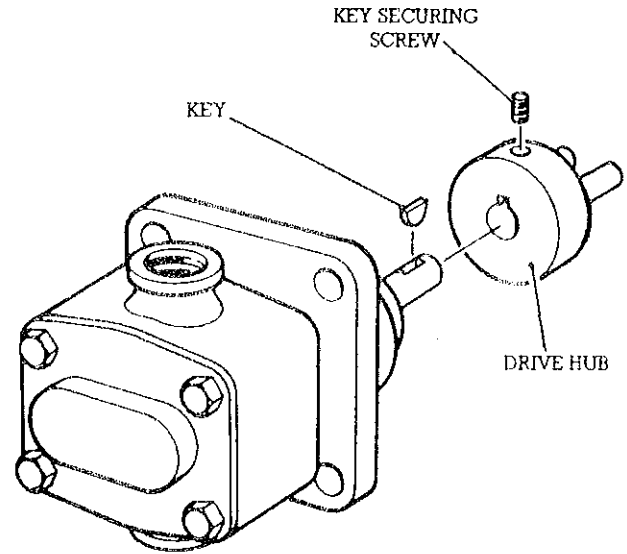


FIG. 6

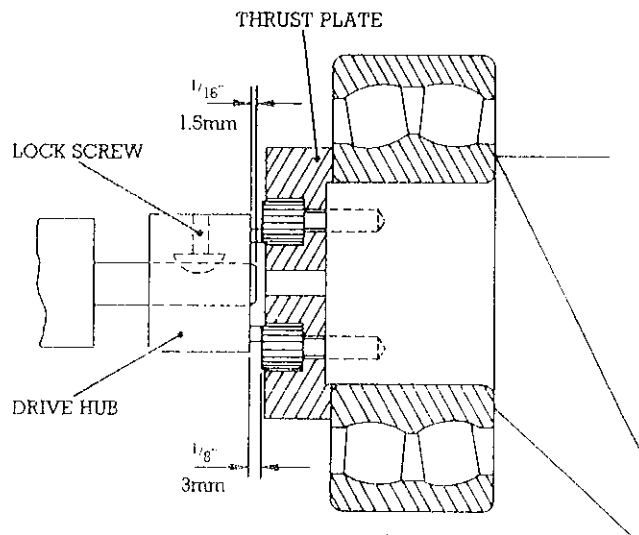


FIG. 7

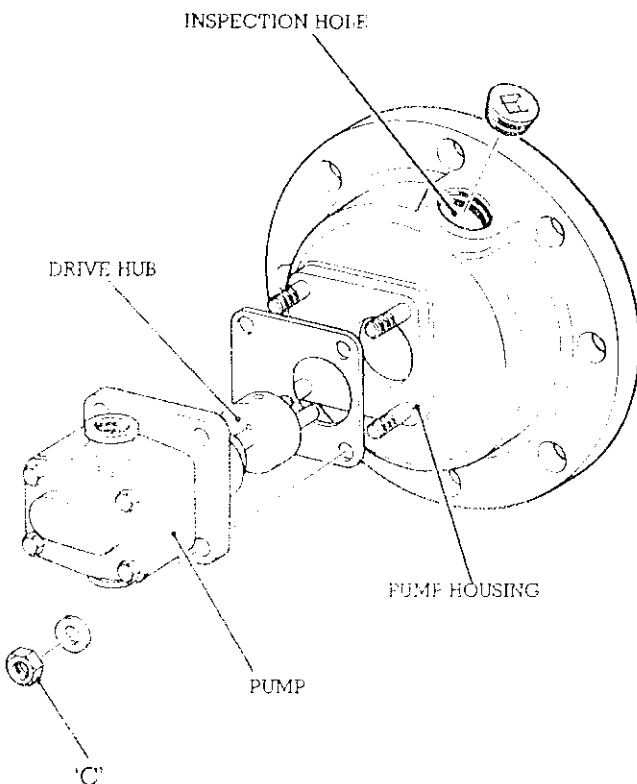


FIG. 5

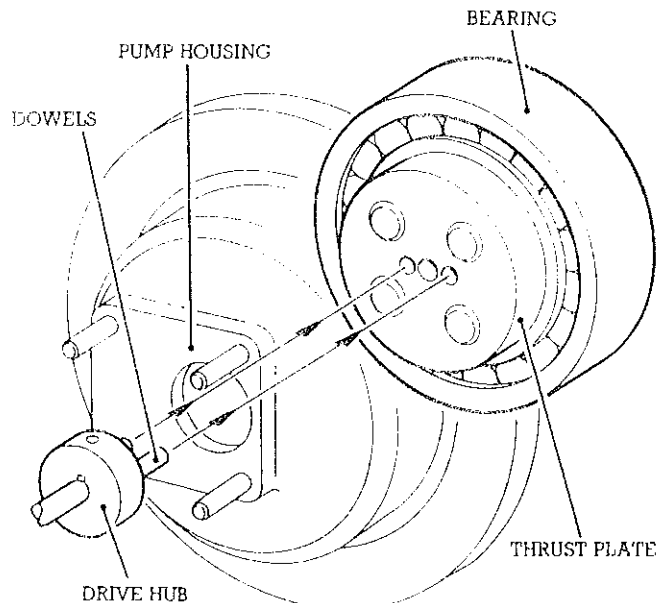


FIG. 8

Section 2. Oil Pump REMOVAL AND REPLACEMENT

The oil pump is a flange mounted 'gear' type pump driven by the eccentric shaft through the pump drive hub. The pump is capable of delivering approximately 2¼ gallons (10 litres) per min.

The Oil Pump is shown in Fig. 3

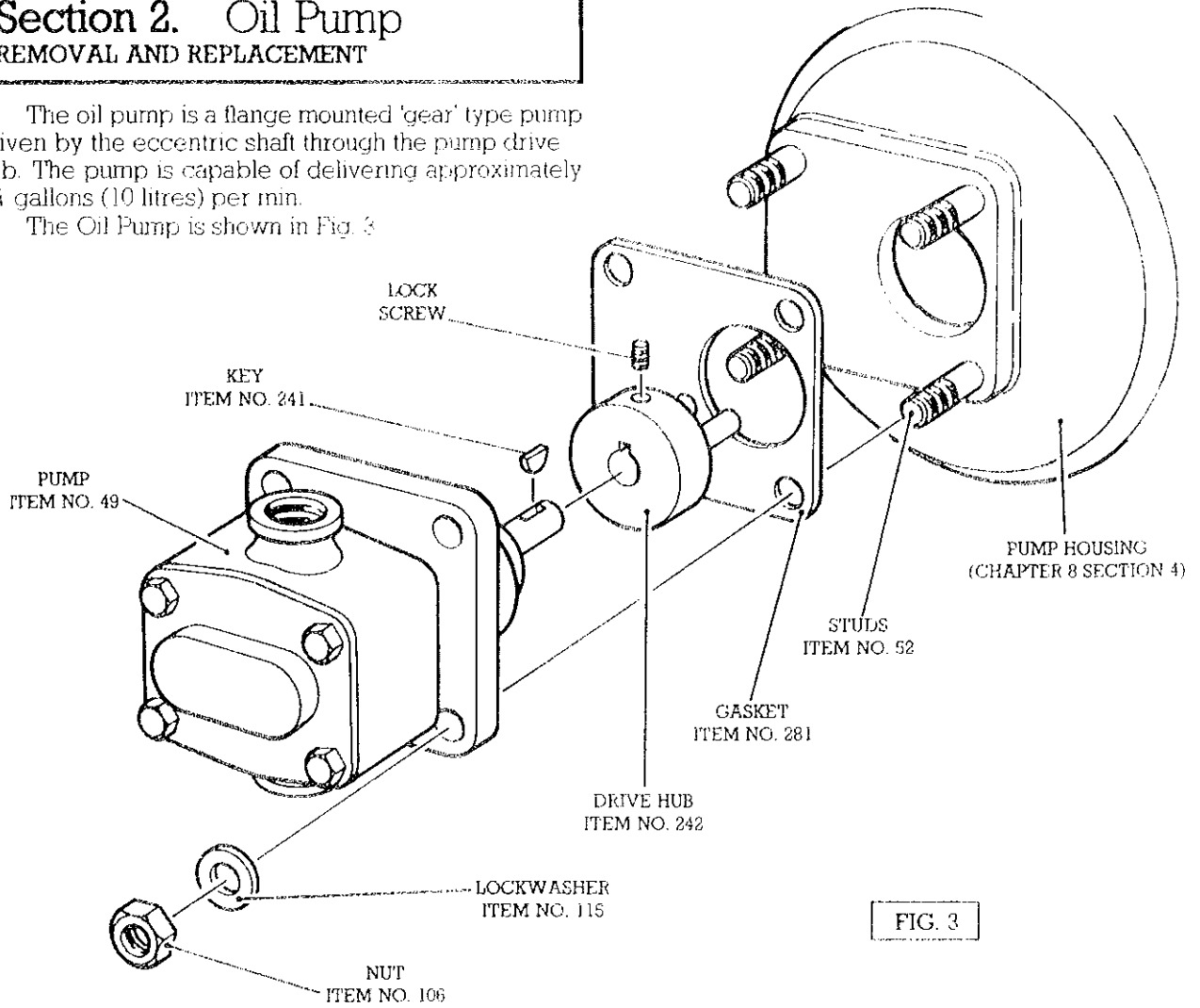


FIG. 3

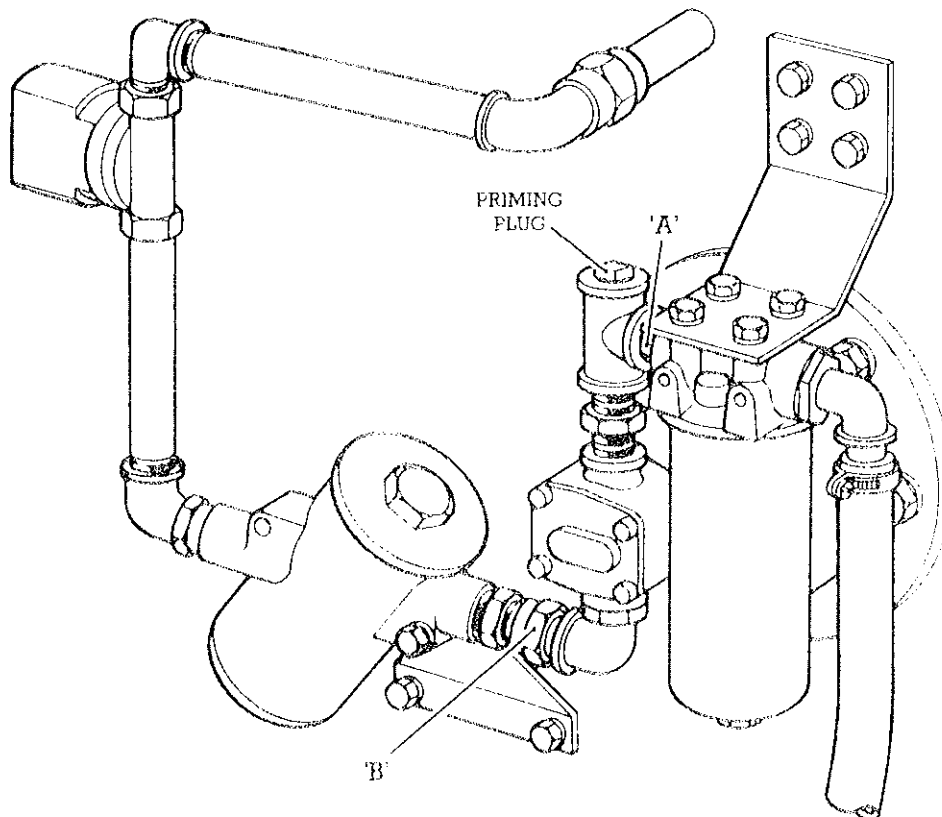
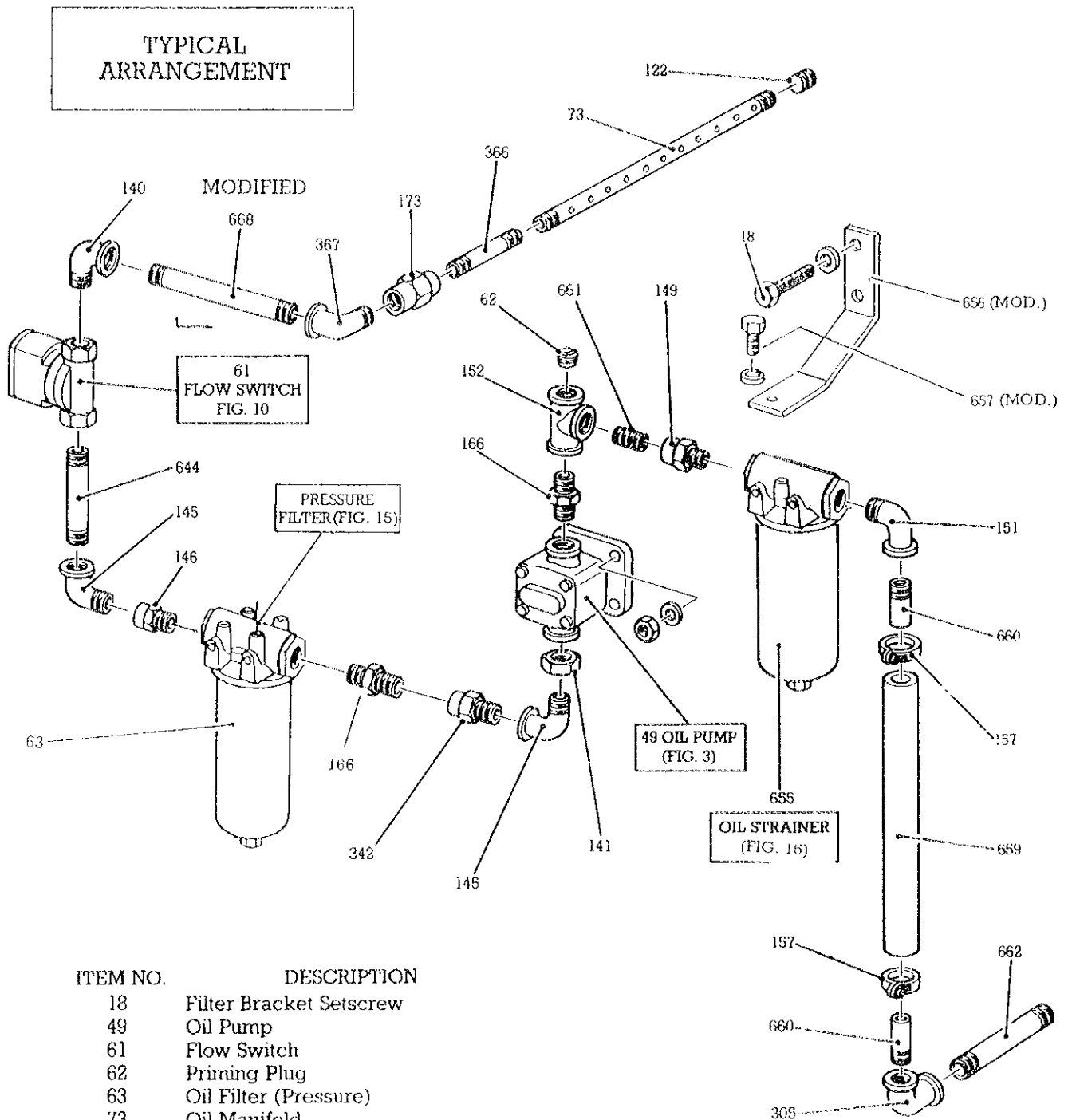


FIG. 4

AMENDED SPIN ON/SPIN OFF CARTRIDGE FILTERS



ITEM NO. DESCRIPTION

- 18 Filter Bracket Setscrew
- 49 Oil Pump
- 61 Flow Switch
- 62 Priming Plug
- 63 Oil Filter (Pressure)
- 73 Oil Manifold
- 122 Manifold Plug
- 140 Elbow
- 141 Back Nut
- 145 Elbow
- 146 Hex. Bush
- 149 Straight Union
- 151 Elbow
- 152 Tee Connection
- 157 Jubilee Clip
- 166 Hex. Reducing Nipple
- 173 Straight Union
- 305 Elbow (Excluding 95 Machine)
- 342 Straight Union
- 366 Screwed Pipe
- 367 90° Bend

ITEM NO. DESCRIPTION

- 644 Screwed Pipe
- 655 Oil Strainer (Suction)
- 656 Bracket
- 657 Setscrew
- 659 Flexible Pipe
- 660 Screwed Pipe
- 661 Nipple
- 662 Screwed Pipe (Excluding 36x24)
- 666 Elbow Union (36x24 only)
- 668 Screwed Pipe

AMENDED LUBRICATION SYSTEM COMPONENTS

FIG. 15

JAW CRUSHER AND ROCKEATER

GUIDE TO ROUTINE PREVENTIVE MAINTENANCE

TABLE II

WEEKLY CHECKS

1. All items on daily list.
2. Inspect for dirt and sludge in oil feed system.
3. Inspect all oil lines and joints for leaks.
4. Check oil pumps for wear and noise.
5. Check oil levels and fill as necessary.
Refill flywheel Stauffer grease lubricator.
6. Check flywheel and hinge pin seals for wear and damage.
7. Check jaw plates and keeper plates for tightness and wear.
8. Check crusher setting.
9. Clean away dust, dirt and grit.
10. Check and clean external filter.
11. Release flywheel overload release springs and check angle on spring and shoe.
12. Grease jaw adjustment bolts.
13. Check pullback rods for wear.
14. Check all springs for breakage.

JAW CRUSHER AND ROCKEATER

GUIDE TO ROUTINE PREVENTIVE MAINTENANCE

TABLE I

DAILY CHECKS

1. Check oil level in oil chamber and fill up to oil level mark on window.
2. Check oil pipes and connections.
3. Check behind diaphragm area for any build up of material.
4. Check key and bolt in Safety drive arm for tightness.
5. Check mechanical shockload trip safety device - by enduring that leaf spring is located correctly in safety shoe and is free from any build up of dust or packed material which could stop safety device operating.
6. Turn Stauffer Lubricator to grease flywheel bush.
7. Check for any loose bolts.
8. Check wear of jawplates and wearing plates. (Over-use of worn plates indicate danger when electric motor ammeter readings are higher than usual when crusher is operating under load, or oversize material will pass down sides of wearing plates when crusher is set at minimum recommended closed side setting).
9. Check 'V' belts for tension, wear, turning and breaks.
10. Check that ammeter reading is normal when crusher is running light and also under full load conditions.
11. Check electrical oil flow cut in and out switch, alarm or warning light.
12. Check oil flow by removing plug from oil sump cover plate.
13. Check feed is correctly graded and evenly distributed across crusher feed opening.
14. Check for free and clear discharge of crushed material.
15. Check for excessive vibration, noise or rough running.

1. See chart for lubrication checks. (Chapter 11 Section 8).
2. **Weekly Schedule**

Check the area between the Swing Jaw and the rubber diaphragm for any build up of material. Clean out if necessary. Access to this area is provided by holes in the crusher frame. General clean away dust, dirt and grit.
3. **Monthly Schedule**
 - a. When oil change is made (3 months or 500 hrs.)
Visually examine the toggle mechanism for signs of excessive wear or damage.
Replace when necessary.
(See Chapter 6 Section 2)
 - b. Check all bolts are securely tight.
 - c. Inspect V-belt drive for tension and wear.
(Refer to Chapter 12 Section 4)
 - d. Grease the upper and lower stationary jaw adjustment bolts to prevent rusting and seizing.
 - e. Adjust Swing Jaw Guides (42x32/36 only).
(Refer to Chapter 6 Section 5)
4. **3 Monthly Schedule**
 - a. Release the safety Arm Leaf Spring from the Safety Shoe.
(Refer to Chapter 9)
 - b. Check flywheel rotates freely on shaft.
 - c. Inspect the angle on the Safety Arm Leaf Spring and the Safety Shoe for signs of wear.
Replace if necessary.
Reset the Safety Arm Leaf Spring.
(Refer to Chapter 9)
 - d. Inspect the pullback rod assembly for wear.
Replace parts as necessary.
(Refer to Chapter 6 Section 2)

Section 4. 'V'-Belts

The number and size of 'V'-Belts is given in (Table 1). Data given is based on using Fenner Standard Industrial 'V'-Belts. The Belts should always be correctly tensioned as shown in (Fig. 4)

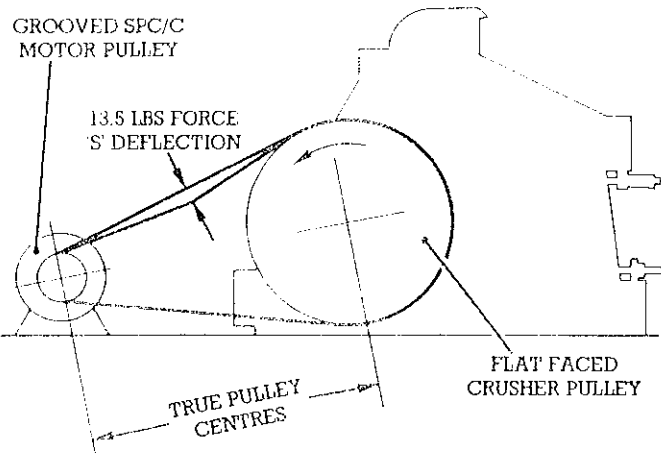
A new drive should be tensioned to the Loading and deflection 'S' given in table 1. After the drive has been running for a few hours the tension should be checked and adjusted if necessary. Do not over tension as this could shorten the life of the Belts and the Motor Bearings.

Adequate provision must be made for subsequent tensioning during the life of the Belts and take-up allowance is shown in (Fig. 5). Never force the Belts over the Motor Pulley but always slacken off the motor on the Slide Rails to reduce the centre distance between the Flywheel and Motor Pulley.

A matched set of belts should always be used and old and new belts should never be mixed.

When fitting Belts always check that the Flywheel face and the Motor Pulley grooves are clean and free from oil, grease and rust.

It is important that the Crusher Flywheel and the Motor Pulley are installed correctly so that both Shafts are parallel and aligned.

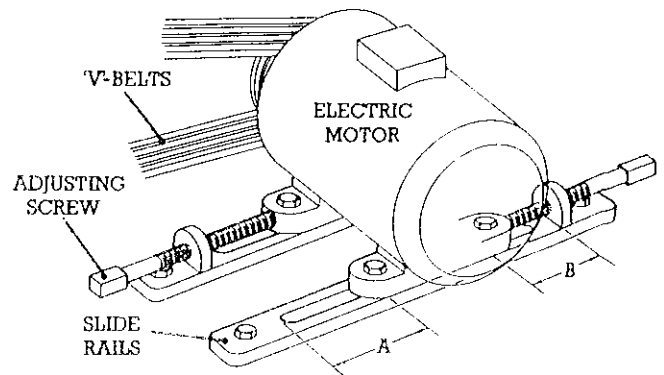


SEE TABLE 1 FOR DRIVE DETAILS

FIG. 4



As the Drive is 'V' to FLAT Pulley the belts must be 'C' Section having a flat bottom and NOT SPC Type which has a rounded bottom



MCH	24x8/15	30x20 upwards
'A' mm	50	50
'B' mm	60	85

'A' - Allowance to move motor forward when removing 'V' Belts fitting or

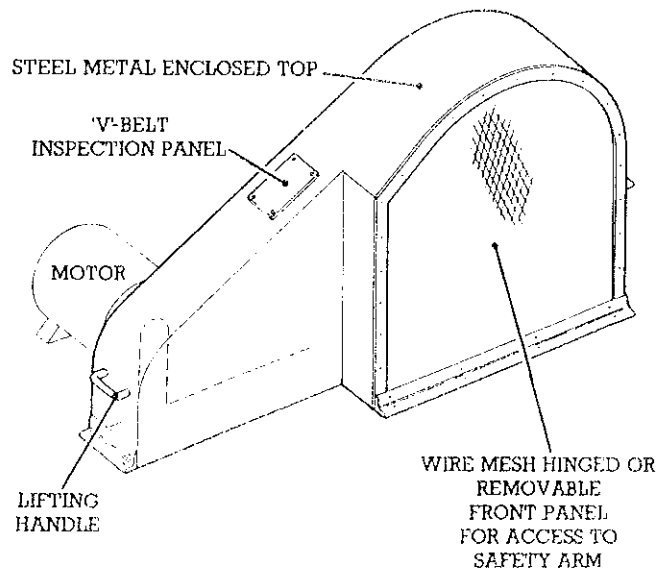
'B' - Allowance for Belt Tensioning.

FIG. 5

Section 5. Drive Guard

The Crusher Drive must always be adequately covered by a Guard. Preferably the Guard should be constructed from open mesh to allow ventilation to the 'V' Belts. The life of the Belts can be reduced if subjected to excess heat.

A hinged or removable panel should be positioned in the Guard to allow easy access to the Crusher Safety Arm (Fig. 6).



TYPICAL DRIVE GUARD FOR INBOARD MOTOR

FIG. 6

CRUSHER SERIES		24 x 8 - 24 x 12	24 x 15	30 x 20	36 x 8 - 36 x 12	36 x 24	42 x 8 - 42 x 16	42 x 27	42 x 32 - 42 x 36
SPEED RANGE R.P.M.		365 - 400	350 - 385	350 - 375	350 - 385	325 - 360	300 - 350	300 - 350	300 - 325
HORSE POWER		40	40	50	50	60	75	100	100
KILO WATTS		30	30	37	37	45	55	75	75
MOTOR FRAME SIZE		D200LX	D200L	D225M	D225M	D250S	D250M	D280S	D280S
MOTOR SPEED R.P.M.		960	960	970	970	975	975	980	980
FLYWHEEL DIAMETER & WIDTH	INS	36" x 8½"	36" x 8½"	44" x 10"	44" x 12"	44" x 14"	44" x 10¾"	44" x 14"	44" x 14"
	MM	915 x 216	915 x 216	1118 x 254	1118 x 305	1118 x 355	1118 x 260	1118 x 355	1118 x 355
NUMBER OF BELTS		4	4	6	6	6	8	8	8
BELT SECTIONS		C	C	C	C	C	C	C	C
BELT REFERENCE		C4060	C4060	C5380	C5380	C5380	C5380	C5380	C5380
MOTOR PULLEY P.C.D.		375	355	425	450	400	400	400	385
PULLEY CENTRES	INS	37.75"	38.7"	55.8"	54.5"	56.25"	56.25"	56.25"	57.8"
	MM	959	983	1417	1384	1429	1429	1429	1468
CRUSHER SPEED R.P.M.		385	364	362	383	342	342	344	305
BELT DEFLECTION 'S'		5/8" (16mm)			29/32" (23mm)				5/16" (24mm)
SHAFT END LOADS (lbs)	RUNNING	1174	1195	1663	1614	1706	2275	2270	2375
	STATIC	1382	1382	2074	2074	2074	2765	2765	2765

JAW CRUSHER STANDARD BELT DRIVE FOR MOTOR SPEEDS 960/980 R.P.M. (6 POLE MOTOR 50HZ)

TABLE 1

MOTOR SPEED

The motor speed is important as this factor could be detrimental to the motor bearings.

Generally, with standard motors, the bearing load capacity is greater for a motor running at a lower speed than at a higher speed. It is therefore strongly recommended that a motor of 960 RPM be used rather than a 1440 RPM motor.

The load transmitted by the V-Belts to the motor shaft is known as the Shaft End Load. The maximum permissible Shaft End Load can vary between motors of different manufacture and it is advisable to quote this figure to the motor supplier (Table 1).

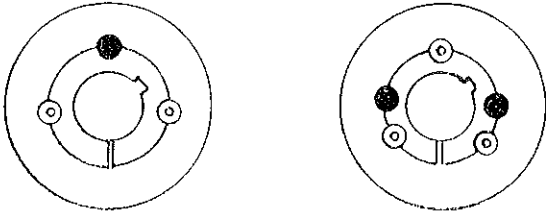
It is important that the Crusher runs at the correct speed as any deviation could seriously affect the

performance of the Crusher. The Crusher Speed, Motor Speed, and Motor Pulley Size recommended is given in (Table 1).

Section 3. Diesel Engine

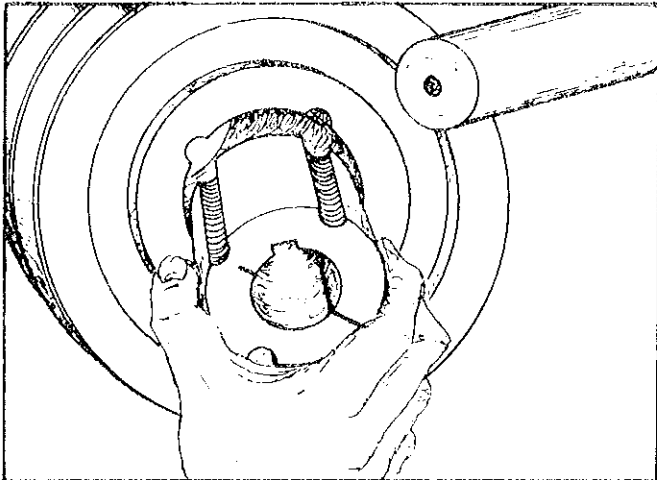
If it is intended to drive the Crusher from a diesel engine it is advisable to consult the engine supplier to determine the required Horsepower. Factors which can affect the rating of an engine are elevated Altitude, Temperature and Humidity.

Generally the Horsepower of the diesel engine will need to be approximately 20% greater than that of an equivalent Electric Motor.

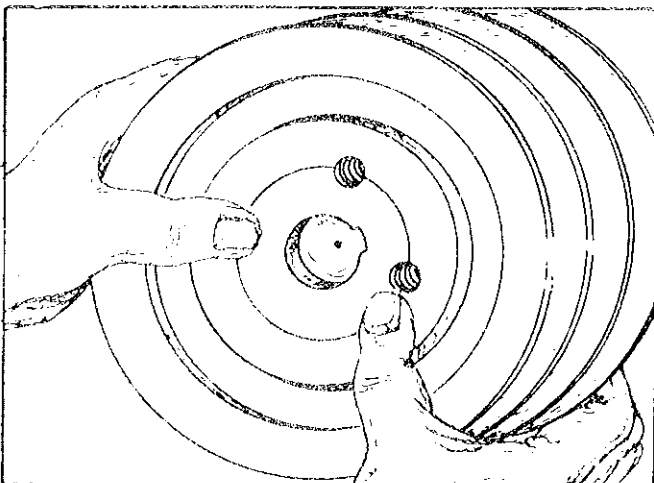


- 2 Sparingly oil the thread and point of grub screws, or thread and under head of cap screws. Place screws loosely in holes threaded in hub shown thus ● in diagram.
3. Clean shaft and fit hub and bush to shaft as one unit and locate in position desired, remembering that the bush will nip the shaft first and then the hub will be slightly drawn onto the bush.
4. Using a hexagon wrench tighten screws gradually and alternately until all are pulled up very tightly.
5. When a key is not used, hammer against large end of bush using block or sleeve to prevent damage. Screws will now turn a little more. Repeat this alternate hammering and screw tightening once or twice.
6. If a key is to be fitted use a parallel key that is side fitting with top clearance.
7. After drive has been running under load for a short time, stop and check tightness of screws.
8. Fill empty holes with grease to exclude dirt

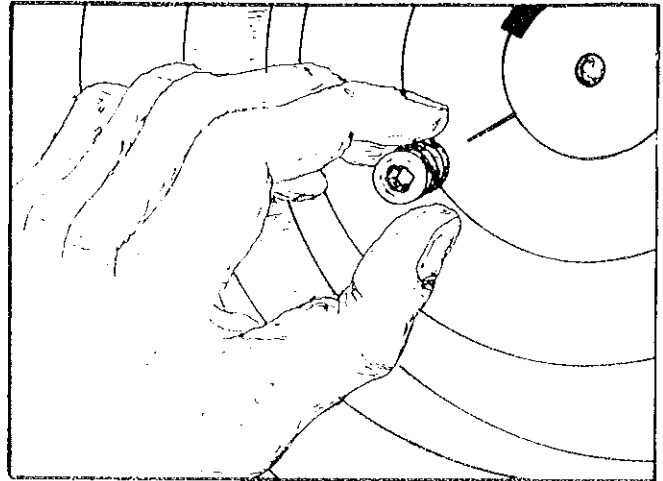
INSTALLATION INSTRUCTIONS



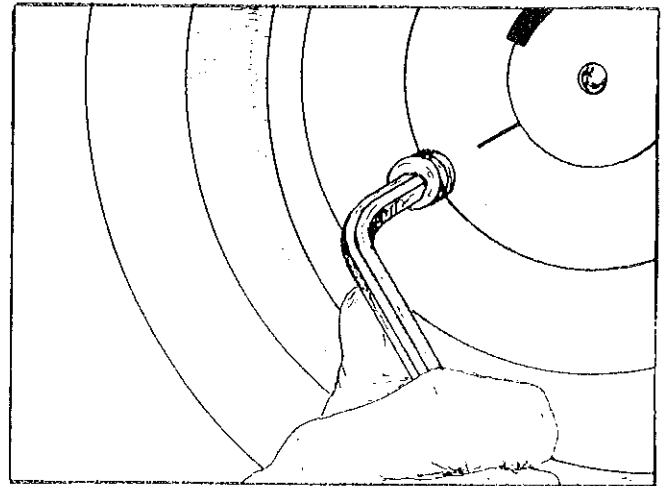
1. INSERT BUSH INTO FLANGE



2. INSERT SCREWS and LOCATE ON SHAFT



3. TIGHTEN SCREWS FINGER TIGHT



4. TIGHTEN SCREWS ALTERNATELY

TO REMOVE

1. Slacken all screws by several turns, remove one or two according to number of jacking off holes shown thus ● in diagram. Insert screws in jacking off holes after oiling thread and point of grub screws or thread and under head of cap screws
2. Tighten screws alternately until bush is loosened in hub and assembly is free on the shaft.
3. Remove assembly from shaft.

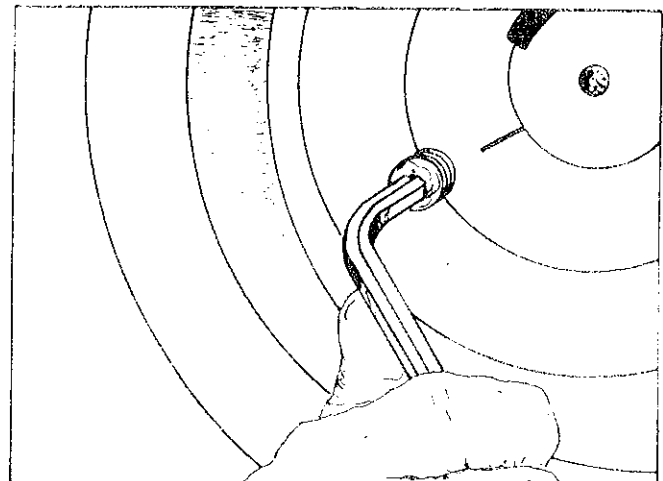


FIG. 3.

METHOD OF SECURING PULLEY TO MOTOR SHAFT.

SECTION

1. DESCRIPTION
2. ELECTRIC MOTOR AND STARTER
3. DIESEL ENGINE
4. 'V'- BELTS
5. DRIVE GUARD

Section 1. Description

The recommended method of driving the Crusher is by an Electric Motor and through a 'V'-Flat drive, where the Crusher Flywheel has a machined flat face and the motor drive pulley is grooved to suit the 'V'-Belts.

It is IMPORTANT that the Crusher Flywheel rotates in an ANTI-CLOCKWISE direction as viewed facing the Flywheel (STANDARD HAND MACHINES) SEE FIG 1

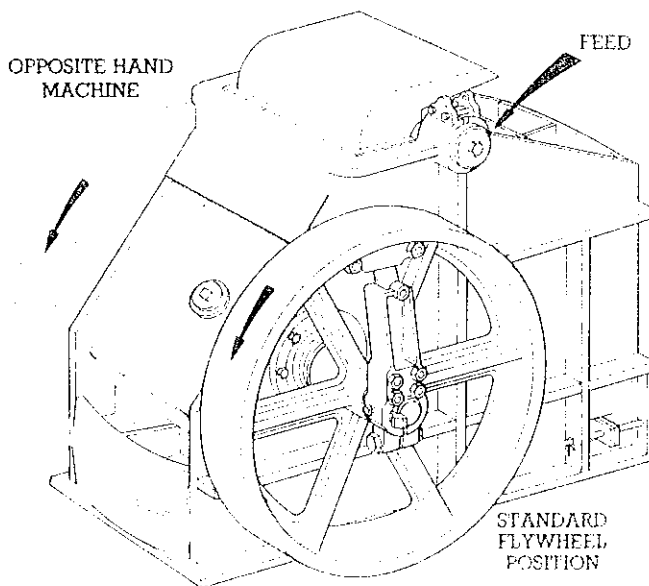


FIG. 1

'Class of Insulation' to B.S. 2615 - 1970 (or equivalent) is recommended.

For ambient temperatures NOT exceeding 40°C - CLASS 'B'

For ambient temperatures ABOVE 40°C - CLASS 'F'

These figures are for a MAXIMUM Altitude of 1000 metres.

Other regional conditions should be considered, for example, whether the motor windings should be termite proof, and it is therefore recommended that the motor supplier be consulted.

The motor shaft must be of sufficient length to accommodate the drive pulley and to give sufficient clearance between the pulley and motor casing (Fig. 2)

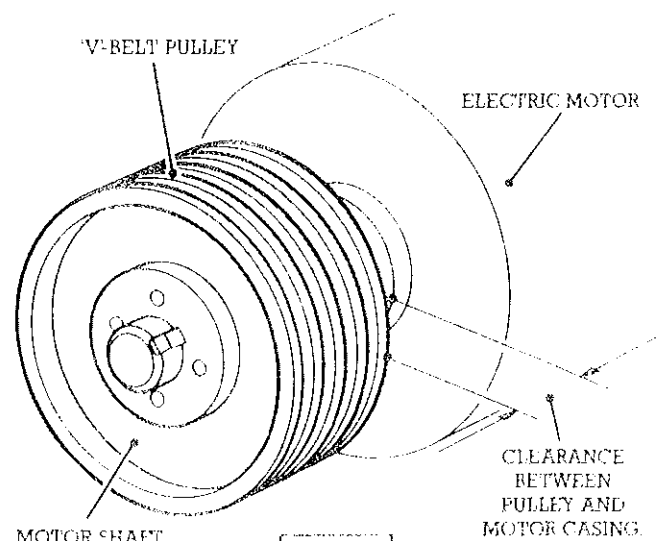


FIG. 2

Section 2. Electric Motor and Starter

Careful consideration must be given to the motor specification.

The crusher requires a Low Starting Torque and it is recommended that a Normal Duty Squirrel Cage Motor is used together with a Star Delta Starter.

The motor should be Totally Enclosed Fan Cooled having Dustproof and Weatherproof Enclosure.

For various ambient temperatures the following:

A method of fixing the 'V'-Belts pulley to the Motor shaft when using a tapered pin pulley is shown in Fig. 3

Taper-lock bushes

TO INSTALL.

1. Remove the protective covering to the cone and outside of bush and bore of hub. After ensuring that the mating tapered surfaces are completely clean and free from oil or fat, insert bush in hub so that the holes line up.

JAW CRUSHER AND ROCKEATER

GUIDE TO ROUTINE PREVENTIVE MAINTENANCE

TABLE III

MONTHLY CHECKS

1. All items on daily and weekly lists.
2. Check play of bearings and shafts.
3. Check foundations, bolts, clearances and levelling.
4. Check sump oil for dirt, metal chips or other evidence of parts wear.
5. Check toggle mechanism.
6. Check limit bar clearance.
7. Check pull back rod and spring for wear.
8. Clean oil strainers, filters.
Inspect for metal chips or flakes indicating excessive bearing pressures or bearing failure.
9. Check diaphragm for fatigue or perishing.
10. Check for oil leakage indicating seal wear or failure.
11. Oil change (toggle mechanism chamber) every 500 working hours.

At the end of 2000 working hours, dismantle, inspect and repair where necessary.

TROUBLE	CAUSE	CORRECTION
	Packing of material between upper strongback and stationary jaw.	Release packing to allow stationary jaw to swivel and reset.
	Jaw plate jamming against wearing plates.	Centralise jaw plate and check keeper plate locating tongue to jawplate and stationary jaw. Grind clearance on sides of jaw plates.
	Distorted adjusting shims. Item 35.	Replace with new and check alignment with self aligning shim and compensating on resetting.
	Self aligning shim jammed. Item 55.	Remove socket head cap screws. Item 54. Release jamming to allow self aligning shim to swivel and reset.
<u>Oil Failure or loss of Oil</u>	Blocked filter, oil strainer, oil pipes or manifold.	Remove and thoroughly clean.
	Too little or incorrect lubricant.	Top up with correct oil to oil level line indicated on window situated in crusher frame. Check drain plug for tightness.
	Dirty oil	Drain off, flush out oil sump with diesel or parafin oil (DO NOT USE RAG FOR CLEANING). Top up with new oil to required level.
	Fractured or perished diaphragm. Item 21 or 123.	Examine diaphragm for cuts, perishing, hole stretch. Replace with new if necessary. Hole stretch could indicate excessive wear in hinge pin bushes.
	Stone trapped between swing jaw and diaphragm fracture.	Clean out stone and keep area clean. Replace diaphragm.
	Loose or cracked oil pipes and joints.	Check and tighten all pipes and connections.

TROUBLE	CAUSE	CORRECTION
<u>White Metal</u>	Oil failure. Dirty oil. Too much or too little lubricant. Wrong lubricant. Oil flow.	Drain off oil. Flush oil chamber. Clean oil strainer, oil filter, oil pipes, oil pump. Remove any swarf or cuttings from oil chamber and examine Pitman, toggles, seats, bearings for any signs of damage. Fill oil chamber to correct level with correct type of lubricant.
	Failure of, or faulty oil flow switch to cut out drive motor following oil failure.	Check wiring of oil flow switch. (See Wiring diagram in Instruction Manual). Check Klaxon horn or warning light if diesel driven.
	Worn roller bearings due to long life. Incorrect roller bearing clearances.	Replace bearings, reset and check roller radial clearance and outer roller ring clearance on free end.
	Overloading of Toggle mechanism. Too tight closed side setting.	Check feed grading. Correct closed side setting.
<u>Toggles dropping in oil chamber</u>	Incorrect limit bar setting	Check limit bar clearance to be 1/8" between lugs on swing jaw and limit bar when swing jaw is on the forward compression stroke. Reset if necessary.
	Broken or fatigued toggle springs or pull-back spring.	Replace springs. Check limit bar.
	Broken pull-back rod, worn bush or pin.	Replace rod, bush and pin. Check limit bar.

TROUBLE	CAUSE	CORRECTION
	Worn oil pump gears.	Examine gears for wear. Examine pump drive shaft and connections. Replace if necessary.
<u>Toggle knock</u>	Swing jaw movement restricted.	Check for jaw plates fouling check and wearing plates. Check for stone jamming or wedged at sides and under swing jaw.
	Broken or fatigued toggle springs.	Replace springs.
	Broken or fatigued pullback spring.	Replace springs.
	Pull back rod, single eye and pin bent or damaged.	Re-align pull back rod or replace.
	Toggle mechanism.	Check toggle mechanism for damage or misalignment.
	Badly worn hinge pin bushes and hinge pin.	Inspect bushes and pin and replace.
<u>Cutting out of Crusher through oil flow safety switch (Electrical)</u>	Oil failure	Check oil pipes for cracks and loose connections.
	Lack of oil flow or dirty oil.	Check suction strainer and Purolator filter for blockages. Check oil level. Drain oil, flush and refill to correct level with correct grade of oil.
	Diaphragm failure.	Check for perished or cut diaphragm. Check for packing of material between swing jaw and diaphragm. Replace if necessary.
	Oil pump failure	Check oil pump gears and drive shaft.

TROUBLE	CAUSE	CORRECTION
	Oil flow switch incorrectly wired.	Check wiring from switch to starter drive motor (See wiring diagram in Instruction Manual). To check correct operation of switch - create man-made oil failure by the removal of priming plug from oil pipe above oil pump. The pump will then suck air and diaphragm in the oil flow switch should actuate the micro switch and cut-out drive motor through "starter" or sound Klaxon horn or light up "warning light" to indicate an oil failure when crusher should cease to run or should be stopped immediately.
<u>Tripping of Flywheel Overload Safety device (Mechanical)</u>	Tramp iron or non-crushable material entering crushing zone. Spring tension not set correctly.	Jack stationary jaw towards swing jaw and remove "adjusting shims Item 35". Remove tramp etc., and reset jaws to correct closed side setting. Reset leaf spring to correct tension (See Manual).
	Shock loads entering crushing zone.	Correct feed size and grading. Evenly distributed feed across crusher feed opening.
	Fines being fed at intermittent choke feed rate. Too large feed size and not graded.	Take out fines minus closed side settings. Make sure that feeder delivers material in an even flow. Grade feed is recommended.
	Worn trip angles on safety leaf spring and safety shoe.	Inspect angles and replace both shoe and spring if necessary. Reset safety arm spring to correct tension by removing required number of washers from between the safety shoe and the crusher flywheel.