

WICKMAN 2.1/4 in (57mm) & 2 in (51mm) SIX SPINDLE
BAR AUTOMATIC OPERATOR'S HANDBOOK

W163

REVISED 1972

REVISED 1977



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We at Wickman Machine Tool are always working on improving our customer service. We want you, our customer, to feel confident that we are doing everything that we can to give you the best service possible.

Firstly, in order to improve our service; we need to improve the communication system between us and our customers. We have listed below a number of important contacts for you to reach the people you need to speak to directly with ease.

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Customer service is our priority. We want to build strong relationships with all of you. Therefore, if you ever want to call up to negotiate availability, quality, price, turnaround times, responsiveness to your inquiries or any other factor that will affect your decision to buy from us, please feel free to do so and we will do whatever it takes to try and meet your requirements.

Kind regards
The Wickman Team



CONTENTS

	Page Nos.		Page Nos.
INSTALLATION & FOUNDATION PLAN	6 & 9	SPEED & FEED CHART	31
STARTING UP	17	STOCK CARRIAGE	80 & 81
BAR FEED		SWARF CONVEYOR & CHUTES	11 & 83
Auto Stop Mechanism	33,75 & 77	TIMING DIAGRAM	47
Bar Feed Mechanism	72 & 73	TIMING SWITCH SETTING	43
Bar Stop	78 & 79	WORKSPINDLES	33
CAMSHAFTS		Workspindle Arrangement	69
Main	44 & 45	Spindle Drum	32
Upper	46 & 49	Drum Indexing & Locking	48 & 51
CAPACITY CHARTS	61 & 63	Indexing Clutch	21
CONTROLS	18 & 19	Collet Operating Mechanism	68 & 73
COOLANT SYSTEM	13 & 82	PICK-UP ATTACHMENT	87
CUTTING SPEEDS TABLE	85	Assembly	92
DRIVE		Collet Operating Mechanism	92
Main Drive	20	Combined Bar Stop and Back Machining Mechanisms	94
Motor Drive	23	Setting of Bar Stop Arm	94
Gearing & Camshaft layout	25	Setting of Attachments	94
End View Speed & Feed Gears	37	Lubrication	98
Speed Gearing	27	Timken Taper Roller Bearings	100
Feed Drive	35	ATTACHMENTS	105
Feed Gearing	29	Slow Speed Reaming	107
Feed Trip Mechanism	39 & 41	Threading Clutch Drive	109
ELECTRICAL EQUIPMENT	12	Threading Attachments	109A- 113
LUBRICATION & OILING	13 & 15	Threading Cam Stations	115
LUBRICATION SYSTEM	82	Threading Attachment	117
SLIDES		Setting Threading Attachments	117A
Centre Block & Longitudinal Slides	50 & 55	Auxiliary Longitudinal Slides Operation	119
Centre Block & Longitudinal Mechanism	53	Fitting Threading Units	121
Longitudinal Slides Operation	59	Calculating Scale Settings	123
Cross Slides	57	Attachment Body and Slide	125
Cross Slide Operating Mechanism	64 & 65	Auxiliary Longitudinal Motion	127
Auxiliary Cross Slide Operation	66 & 67	High Speed Drilling Unit	129
		Auxiliary Cross Slide Motion	131
		Synchronous Drive Attachment	133- 135
		Chasing Attachment	135A- 143

TECHNICAL DATA

Bar capacity, round	2.1/4"	57mm.
hexagon across flats	1.15/16"	49mm.
square across flats	1.9/16"	40mm.
Bar feed stroke	1/2 – 10°	12 – 254mm.
Feed stroke on main tool block	0 – 5"	0 – 127mm.
Feed stroke on Independent slides	0 – 5"	0 – 127mm.
Approach stroke on main tool block, standard ...	4"	102mm.
special ...	3.1/2"	90mm.
Approach stroke on Independent slides, standard	4.1/4"	108mm.
special ...	3.3/4"	95mm.
Feed stroke on lower cross slides	0 – 1.3/8"	0 – 35mm.
Feed stroke on upper cross slides	0 – 2.1/8"	0 – 54mm.
Feed stroke on Intermediate cross slides	0 – 1.3/16"	0 – 30mm.
Spindle speed range r.p.m.	111 – 1302	
number of steps	24	
Feed range at maximum stroke	0.0048 – 0.0543"	0.12 – 1.38mm.
	(at 5")	(127)
Feed range, number of steps	23	
Range of cycle times in seconds	7 – 602	
Idle time in seconds	2.1/2	
Motor kW, standard	18.5	
Approx. net weight in lbs./Kgs. (including electrics)	22,400lbs.	10,150Kgs.

COMMENCING ON INSPECTION NO. 15753 THIS MACHINE
IS FITTED WITH AN ELECTRO-MAGNETIC FEED CLUTCH & BRAKE
DETAILS OF WHICH ARE COVERED IN AN APPENDIX.
THIS CHANGE AFFECTS THE FOLLOWING PAGES AND SUBJECTS.

PAGE	
18	CONTROLS
25	GEARING & CAMSHAFT LAYOUT
29	FEED GEARING
35	FEED DRIVE
39-41	FEED TRIP MECHANISM

YOUR SPECIAL ATTENTION PLEASE

There are a number of simple instructions worthy of special mention which operators in general are most liable to overlook. These are listed below and are well worth studying.

Concerning Lubrication

1. Check the oil level in the sump. This level must not fall below the level indicated on the dip - stick.
2. Regular and frequent checks of the spindle bearing and spindle gear sight feeds are necessary. Also check pressure gauge reading and various drip-points and regulators throughout the machine.
3. Turn the Purolator knob daily and apply oil gun to all nipples (including internal nipples indicated by instruction plates) and use the oil can liberally.

Concerning Controls

1. The stop button is the stop-lock type. Whenever the machine is stopped for adjustment, or for adjustments to tooling or attachments, the stop button should be locked in the off position as a safety measure.
2. Start the motor before engaging the feed clutch. Allow the control gear to change from "star" to "delta" before engaging the clutch. When starting from cold use the "inch" button to allow the oil to circulate before running the machine.
3. Should it be necessary to engage the clutch before starting the motor, start the motor on the "inch" button.
4. Ensure that tools are clear of work before using the fast motion lever.
5. If a slipping clutch disengages, locate the cause of overload before re-engaging the clutch and restarting the machine. Additional plungers and springs can be fitted to the slipping clutch

to increase torque, and spares are included in the machine equipment kit for this purpose. They should only be applied in exceptional circumstances.

6. Do not handwind the machine through the feed part of the cycle when threading attachments are in use, unless the diehead is opened.
7. Regularly check adjustment of all mechanical multiple plate clutches by hand. They should be neither so slack as to cause slip, nor so tight that excessive pressure is required to engage them. Clutches should just "bite" when engaged. Check air gap of electro-magnetic feed/brake clutch if fitted.

Concerning Tool Slides

1. Remember to release the slide stop before changing stroke or slide adjustments and to reset afterwards.
2. After adjusting cross slides by means of the micrometer knob, remember to clamp the locking screw.
3. Gib strip adjustment needs great care. Strips should not be so tight as to bind, or allowed to become too slack.

Concerning Coolant

1. Avoid whenever possible the use of soluble oils which cause rust.
2. Keep the coolant level as high as possible.
3. Clean the tray of swarf and sediment at regular intervals.
4. Keep the strainer over the coolant intake. If a swarf conveyor is in use keep the additional strainer in place below the coolant discharge from the conveyor chute.

NOTE! SEE APPENDIX FOR MACHINES FITTED WITH ELECTRO-MAGNETIC FEED CLUTCH AND BRAKE COMMENCING ON INSPECTION NO. 15753.

INSTALLATION

Continuous machined surfaces are provided on the underside of the machine tray so that the machine may be rolled into position. Fig. 2, Page 9 shows the position of wedges used to level the machine accurately. Longitudinal and lateral levels can be checked by use of a precision level on facings provided on the lips at both ends of the tray and on the top of the drum housing.

When levelled, the machine base should be cemented to retain the wedges and prevent movement.

The stock carriage stand should be placed roughly in position and the carriage then connected to the machine. Initial alignment can be carried out by sighting through the tubes and spindles and then more accurately by using a level. Steel plates should be placed under the levelling screws in the stock carriage stand and the holding-down bolts should be cemented in.

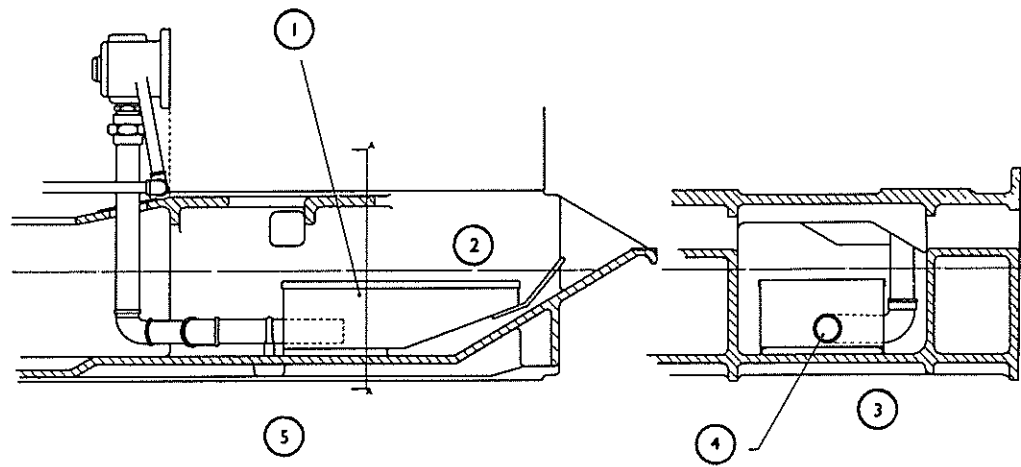
All protective grease should then be removed from both external and internal parts with paraffin or white spirit.

Coolant strainers, work baskets, chutes, and side, upper and lower splash guards can be placed in position, see Fig. 1, Page 7.

If a swarf conveyor is supplied this can now be fitted. Fig. 3 Page 11 shows the arrangement and position of all sheet steel parts.

1. STRAINER BOX
2. COOLANT LEVEL
3. SECTION " AA "
4. PUMP INTAKE PIPE
5. MOTOR END OF MACHINE

Fig. 1 COOLANT STRAINER BOX ASSEMBLY 300 Y 55



1. USE LEVEL ON MACHINES PADS ON END OF TRAY
2. 19" (483mm) DIMENSIONS OF SWARF APERTURE IN BOTTOM OF TRAY STANDARD MACHINE SUPPLIED WITH FITTED COVER PLATE.
3. USE LEVEL ON MACHINED PADS ON END OF TRAY
4. 5' 1" OVER OPEN DOOR (1549mm)
5. 4' 7" (1397 mm) WIDTH OVER SPLASH GUARDS
6. WEDGE
7. 7' 4" (2235mm) WIDTH OVER OPEN DOORS
8. LIFTING BAR HOLES
9. USE LEVEL ON TOP OF MACHINED DRUM HOUSING
10. PANEL 0.75kW
11. 7' 10" (2387mm) HEIGHT OVER RAISED COVER
12. CABLE ENTRY
13. MOTOR 18.5kW
14. LIFTING BAR HOLES
15. COOLANT CAPACITY 160 GALL. - 727 LITRES
16. SWARF APERTURE
17. LEVELLING PAD
18. SWARF CONVEYOR
19. OPTIONAL EXTRA MOTOR 0.25kW
20. ALLOW 12' 6" FOR LOADING BARS
21. LEVEL THE MACHINE WITH THE SCREWS PROVIDED. USE WEDGES WHERE SHOWN. GROUT OR BOLT IN POSITION. MACHINE SHOULD REST ON CONCRETE NOT LESS THAN 6" 152mm THICK.
22. WEIGHTS
M/C WEIGHT 22960 lbs 10 ton 5 cwt.
STOCK CARRIAGE & STAND 1680 lbs 15 cwt.
SWARF CONVEYOR 616 lbs 5½ cwt.
23. TWO COLLARS 6" DIA. AT EACH END. SECURE BY SET SCREWS
24. OR
24. TWO PINS ½ DIA. X 6" LONG AT EACH END PUSH FIT ONE END AND DRIVE FIT OTHER END
25. 4 HOLDING DOWN BOLTS ¾" (20mm) DIA. BOLTS, NUTS AND WASHERS TO BE SUPPLIED BY CUSTOMER
26. PLAN VIEW OF STOCK CARRIAGE STAND
27. VIEWS OF STOCK CARRIAGE BASE
28. IT IS RECOMMENDED THAT PLATES BE FITTED UNDER THE LEVELLING SCREWS. PLATES TO BE SUPPLIED BY CUSTOMER.
29. NOTE: BOLT CENTRES ACROSS MACHINE = 4' 9.7/16" (1259mm)
- 30 LIFTING BAR (SUGGESTED DIMENSIONS)

Fig. 2 FOUNDATION PLAN & LIFTING DETAILS 300 Y 50A

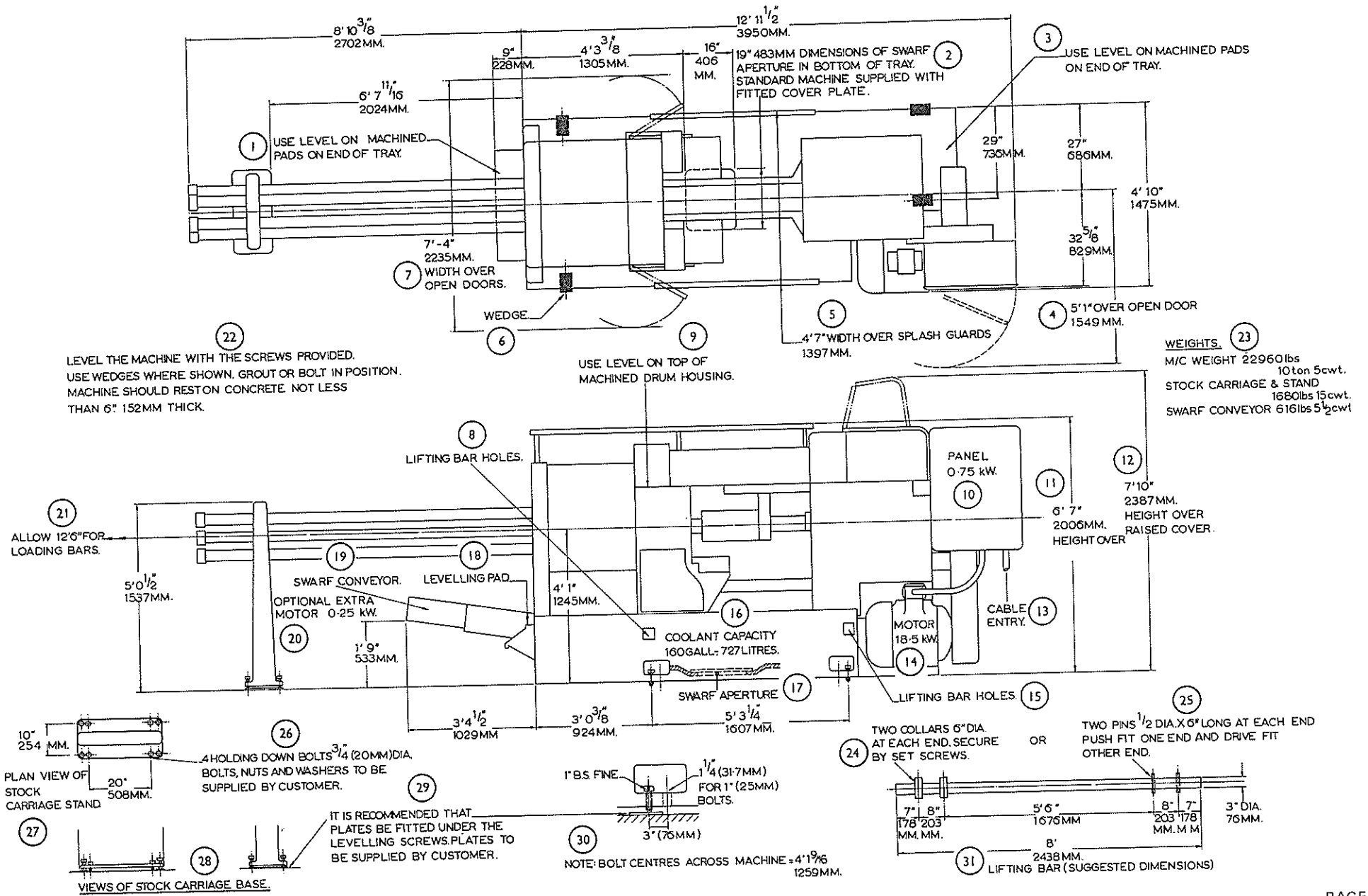
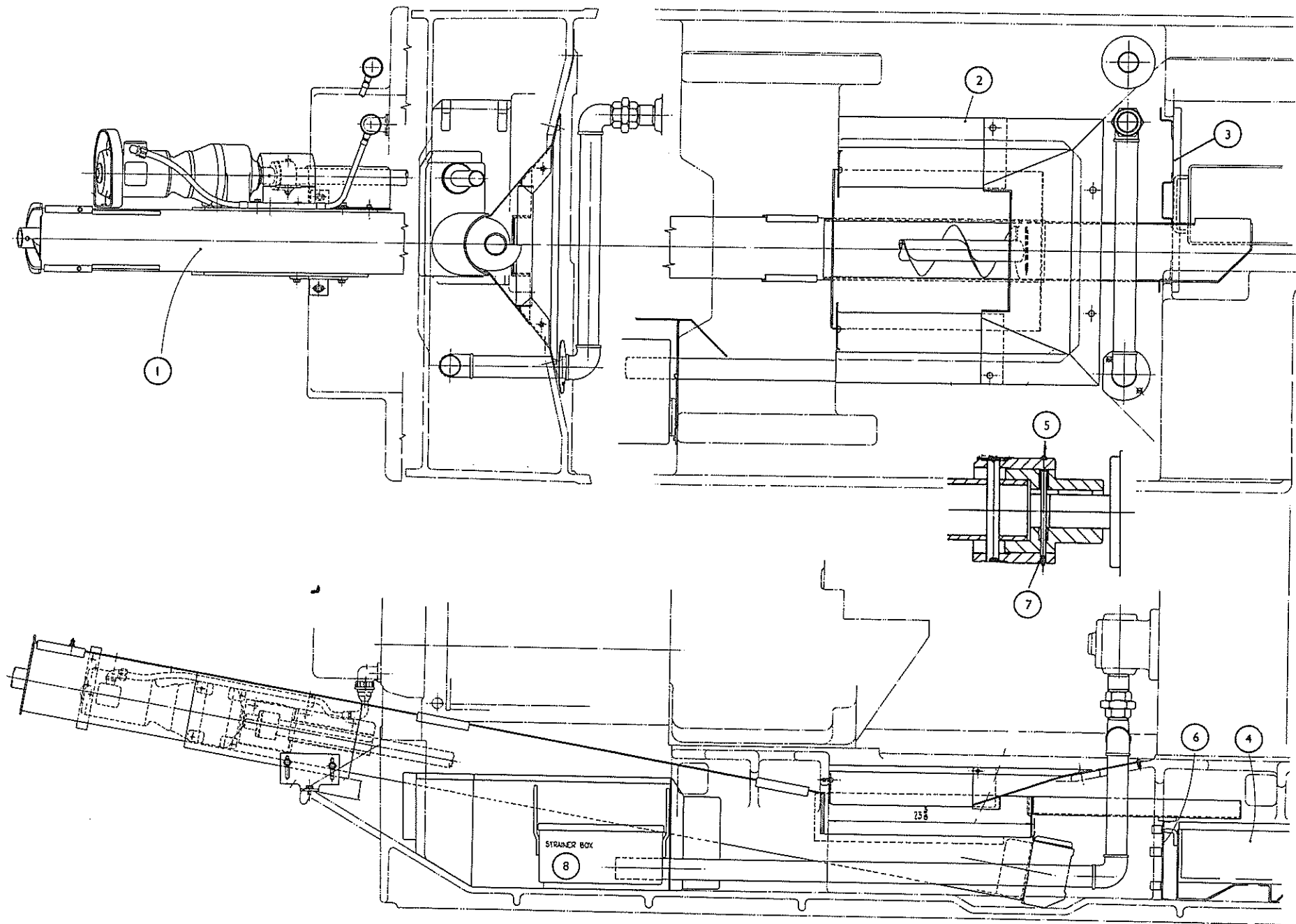


Fig. 3 ARRANGEMENT SWarf CONVEYOR & CHUTES 363 Z 1C



ELECTRICAL EQUIPMENT

Fig. 2, Page 9 shows the position of the incoming conduit. The standard control panel includes an isolator and main fuses. It is only necessary to connect the line and earth. Direction of main motor rotation should be clockwise looking at pulley.

Careful attention should be given to see that all main and control fuses, overload heaters and transformer primary and secondary (work lighting) tapplings are correct for the customer's electrical supply. These details are checked before despatch by Wickman Ltd., but should be rechecked in case of any change in the customer's supply. Wiring diagram, spare parts and instruction sheets are included in the pocket inside the control panel door. Also attached to the inside of the door is a list of fuses and overload heaters for main and auxiliary motor. On star-delta equipment, operation of the timer should be checked for a time-lag of approximately 15 secs. and all starters should be checked for freedom of operation.

On standard equipment the control circuit for all motor control and auxiliary circuits is 110 volts. Work lighting voltage is at 110V, 50V or 25V according to transformer tapplings. These details should be verified by reference to the actual wiring diagram forwarded with the machine.

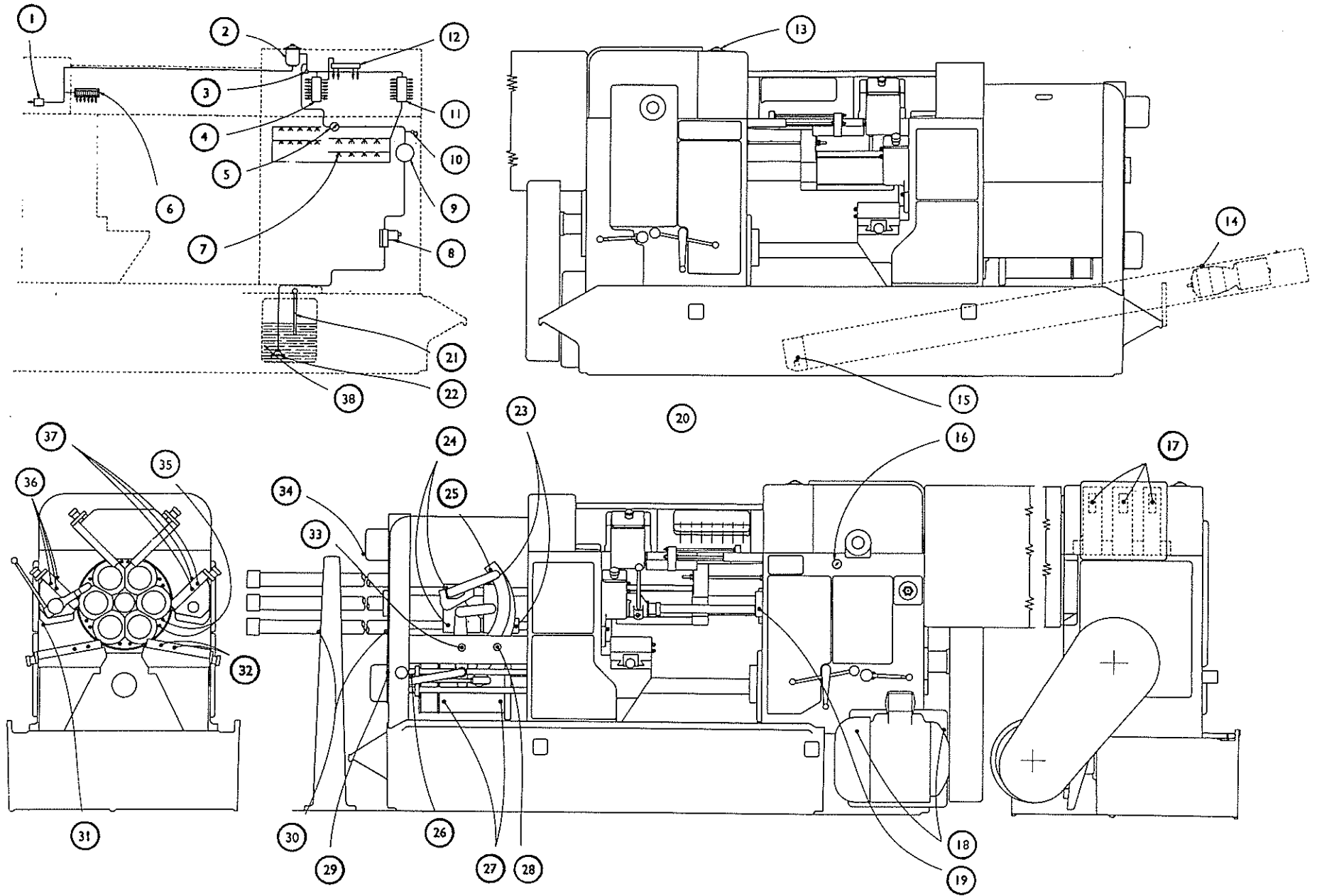
LUBRICATION

Lubrication Diagram Fig. 4, Page 15 gives full details of all points requiring attention. Special attention is drawn to the following when installing a new machine:

1. When removing protective grease, pay particular attention to cleaning oil holes and drip and spray pipes.
2. Fill the oil sump in the tray by pouring oil into the bottom of the main drive housing. Check the level in the sump by means of the dip-stick. Ensure oil baths below the main and upper camshaft worm-wheels are full. Fill the drip tray above the mechanism operating the end-working slides.
Use Wickman Oil Grade 4 (See Fig. 39, Page 103).
3. Apply the oil gun to all nipples as shown on Fig. 4, Page 15. Use Wickman Oil Grade 7 (See Fig. 39, Page 103) for slideways and Grade 5 for all other applications. See that stock carriage springs are well greased.
4. When the machine is despatched, the spring ring is removed from the coolant pump drive, Fig. 12, Page 37. This should not be fitted until it is intended to run the machine with coolant in the tray, as there is a danger of seizing the pump.

1. 9 POINT FEED BLOCK
2. MICRONIC FILTER
3. RELIEF VALVE
4. 14 POINT FEED BLOCK
5. PRESSURE GAUGE
6. 6 POINT SIGHT FEED
7. SPRAY PIPES
8. PUMP
9. PUROLATOR
10. RELIEF VALVE
11. 14 POINT FEED BLOCK
12. DRIP TRAY
13. MICRONIC FILTER. REMOVE TOP TO REPLACE ELEMENT
14. SEE INSTRUCTION PLATE ON UNIT
15. (D) SWARF CONVEYOR. FILL BEFORE INSTALLATION
16. PRESSURE GAUGE 20 LBS/SQ. INCH (1.4 KGS/CM²) NORMAL SETTING
17. (B) STROKE SETTING BLOCK
18. MOTOR. GREASE EVERY SIX MONTHS
19. (B) BAR STOP SHAFT
20. (A) GREASE NIPPLES, TWICE WEEKLY USE HEAVY OIL, GRADE 7
(B) GREASE NIPPLES, TWICE MONTHLY USE HEAVY OIL, GRADE 5
(C) GREASE NIPPLES, MONTHLY USE BALL BEARING GREASE, GRADE 1
(D) OIL, WICKMAN GRADE 4 OR 5
21. DIP STICK
22. STRAINER
23. (B) COLLET OPERATING SLIDE
24. (B) BAR FEED SLIDE
25. (B) BAR FEED ADJUSTING LINK
26. (C) CAM SHAFT
27. (B) CAM DRUM
28. (B) BAR FEED LEVER
29. (B) COLLET HAND OPERATING SHAFT
30. (B) ROLLER PIN
31. (B) SLIDE BASE
32. (A) LOWER CROSS SLIDES
33. (B) COLLET OPERATING LEVER
34. (B) TRIP SHAFT
35. (C) SPINDLE FRONT BEARING CAPS. (GREASE 1 NIPPLE PER SPINDLE)
36. (A) FRONT CUT-OFF SLIDE
37. (A) REAR FORMING SLIDE
38. OIL SUMP. 10 GALLONS (45 LITRES). DIPSTICK SHOWS HIGH & LOW LEVELS. FILL THROUGH ATTACHMENT COMPARTMENT IN HOUSING. (D)

FIG. 4 LUBRICATION & OILING DIAGRAM 368 Z 10



STARTING UP

It is desirable to check the functioning of the lubrication system, and also to see that all moving parts are free before running spindles and engaging power feed.

1. See that instructions under Lubrication Fig. 4, Page 15 have been carried out.
2. Note which speed range is engaged and set the range change gears in neutral, see Fig. 9, Page 27. Engage the feed brake, Fig. 13, Page 41 or, commencing on Inspection No. 15753 switch on isolator on main panel and press ' Feed Brake ' push button.
3. Press the motor ' Jog ' button to check the direction of rotation of the motor (clockwise looking on pulley).
4. Run the motor to check that the lubrication system (Fig. 4, Page 15) is working. Observe the pressure gauge, sight feeds for the spindle drum, and all drip points by removing covers. Regulate the oil feed where necessary.
5. Disengage the index clutch and hand wind the machine through a complete cycle into the slow feed period of the cycle to check that all parts operate freely.
6. Engage the index clutch, disengage the collet operating shoe, and handwind through index. If excessive pressure is required on the hand-crank, locate and correct the cause.
7. Engage the " low " range change gears and run the machine under power feed.

CONTROLS

Fig. 5, Page 19

Principal controls are the main motor push buttons, feed clutch lever, fast-slow clutch lever, handwind crank, index clutch lever, hand collet lever, collet shoe lever, bar feed shoe lever (bar feed plunger on early machines) and bar stop lever.

Subsidiary controls are auto-stop knob on the "auto-stop" (stock exhaustion) mechanism, the manual trip switch and conveyor push buttons.

Main Motor Push Buttons

"Stop" and "Start and Jog" push buttons and "Front" and "Rear" switches are provided at the front and rear of the machine.

To jog or start the machine the "Front" and "Rear" switches must both be set to "front" or both set to "rear".

As a safety precaution these "Front" and "Rear" switches should be set to be opposite, i.e., one at "Front" and one at "rear" every time the machine is stopped when making internal adjustments or adjustments to tooling.

Feed Clutch Levers are fitted at front and rear of the machine. They have three positions— "up" to engage the feed clutch, "down" to engage the feed brake (used to prevent over-run when disengaging the feed clutch) and a neutral position in which the handwind gear can be engaged.

Fast-Slow Clutch Levers are fitted at front and rear for use when setting-up. Each lever is free on the cross shaft and must be pulled outwards to engage the slot in the shaft end. These levers should be used with care, and only when all tools

are clear of the work. There are two positions, "up" to engage slow feed and "down" to engage fast motion. There is no effective neutral because a free wheel or roller over-running clutch is in the feed drive.

The Handwind Crank can be fitted to the handwind pinion shaft at either front or rear. Handwind can only be engaged with the feed clutch lever in neutral, as an interlock prevents the pinion being slid into mesh.

Index Clutch Levers (See Fig. 6, Page 21) are provided at front and rear of the machine and an interlock is provided so that the clutch can be disengaged only during part of the slow feed period of the cycle. Because the index clutch is spring loaded into engagement, latches are provided adjacent to the index clutch levers to hold the clutch out against the springs. These latches must be disengaged to allow the indexing clutch to be engaged.

The Hand Collet Lever is loose and is fitted into its boss for checking collet adjustment. It is preferable that this lever should be removed after use. The collet can be operated by hand only during a limited period of the cycle, where a space is provided in the cam track. The "auto-stop" mechanism timing cam should be set to trip the machine at this point, automatically when bar stock is exhausted or when the manual trip switch is operated.

The Collet Shoe Lever is a small lever in a large eccentric in the collet slide and is arranged to allow the collet shoe to operate the bobbin or to disengage the shoe for setting up.

The Bar Feed Shoe Lever operates the bar feed shoe so that the bar feed can be disengaged for setting up or engaged for normal operation (On early machines a spring loaded plunger is provided, in the bar feed slide, to hold the bar feed shoe in the disengaged position. The plunger can be turned to hold it out of engagement with the shoe for normal operation.)

The Bar Stop Lever is used to retract the bar stop against its operating spring, to allow the removal of bar ends from the collet.

The Auto-stop Knob is pulled out to release the latch holding the limit switch, after the latch has engaged when a bar is exhausted (see Pages 75 & 77). The knob may be held out to prevent the auto-stop mechanism from operating by turning the hexagon stop below it. This is used principally when setting up on short bars or when the machine is being run light.

The Manual Trip Switch on the main control panel is used when the operator wishes to stop the machine just before the next index for checking components or making adjustments. This avoids the operator having to stand by ready to disengage the feed clutch.

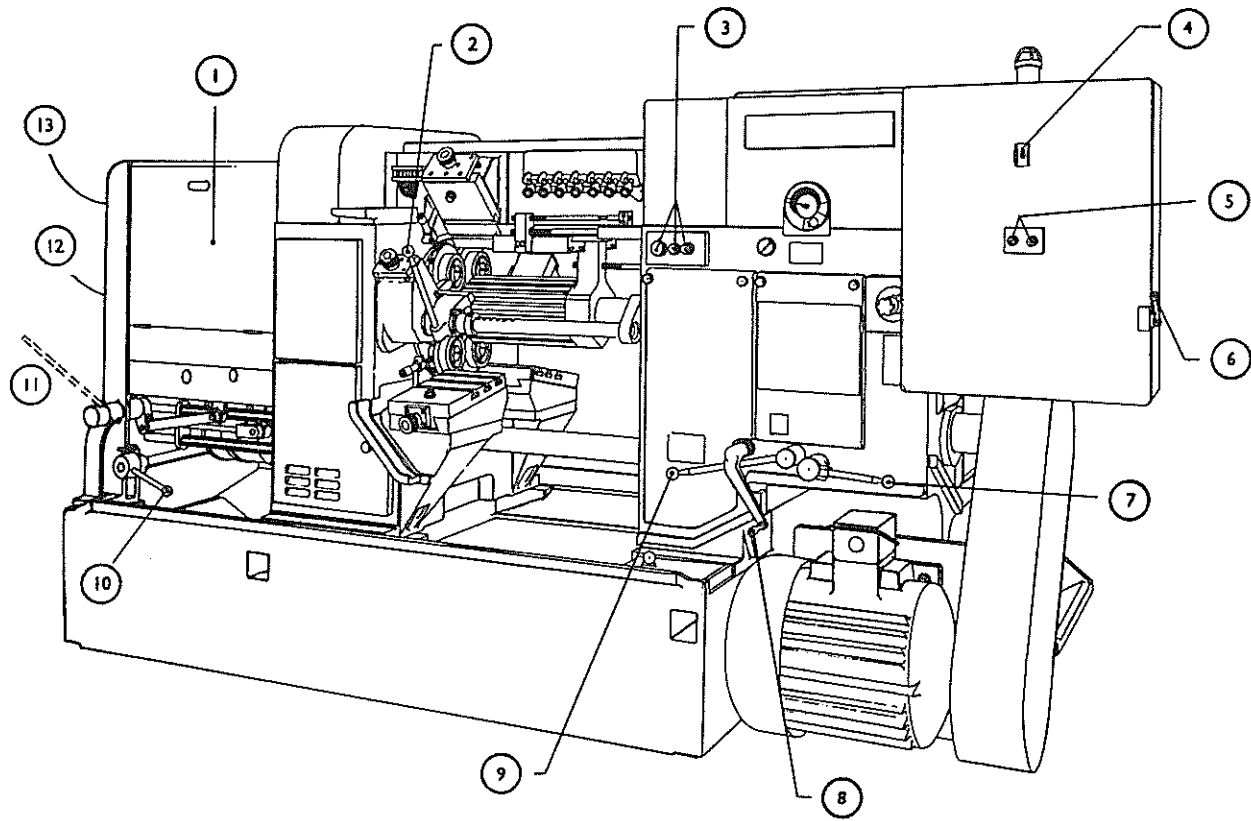
Conveyor Push Buttons are mounted in the control panel door and control the conveyor independently of the main motor. The conveyor can be run separately to evacuate swarf.

1. COLLET SHOE LEVER
2. BAR STOP LEVER
3. MAIN MOTOR PUSH BUTTONS
4. MANUAL TRIP SWITCH

5. SWARF CONVEYOR PUSH BUTTONS
6. ISOLATOR SWITCH
7. FAST-SLOW CLUTCH LEVER
8. HANDWIND CRANK

9. FEED CLUTCH LEVER
10. INDEX CLUTCH LEVER
11. HAND COLLET LEVER
12. BAR FEED SHOE LEVER
13. AUTO STOP KNOB

Fig. 5 CONTROLS



MAIN DRIVE

The motor, Fig. 7, Page 23 is mounted on a platform. This platform pivots on a shaft mounted in a bracket which is bolted to the side of the tray. Two screws are provided to adjust the platform for belt tension and should be adjusted to clamp the platform securely.

The constant speed pulley shaft Fig. 9, Page 27 drives the second shaft by means of the range change gears which provide high and low speed ranges. The sliding double gear is located on the second shaft by a spring loaded plunger engaging a V notch in one of the splines. A neutral position is also provided for running the oil pump independently. Access to the range change gears is obtained by removing the right-hand front cover and the gears are moved by levering with a bar against the housing. Speed pick-off gears give the different spindle speeds in each range and carry the drive from the second

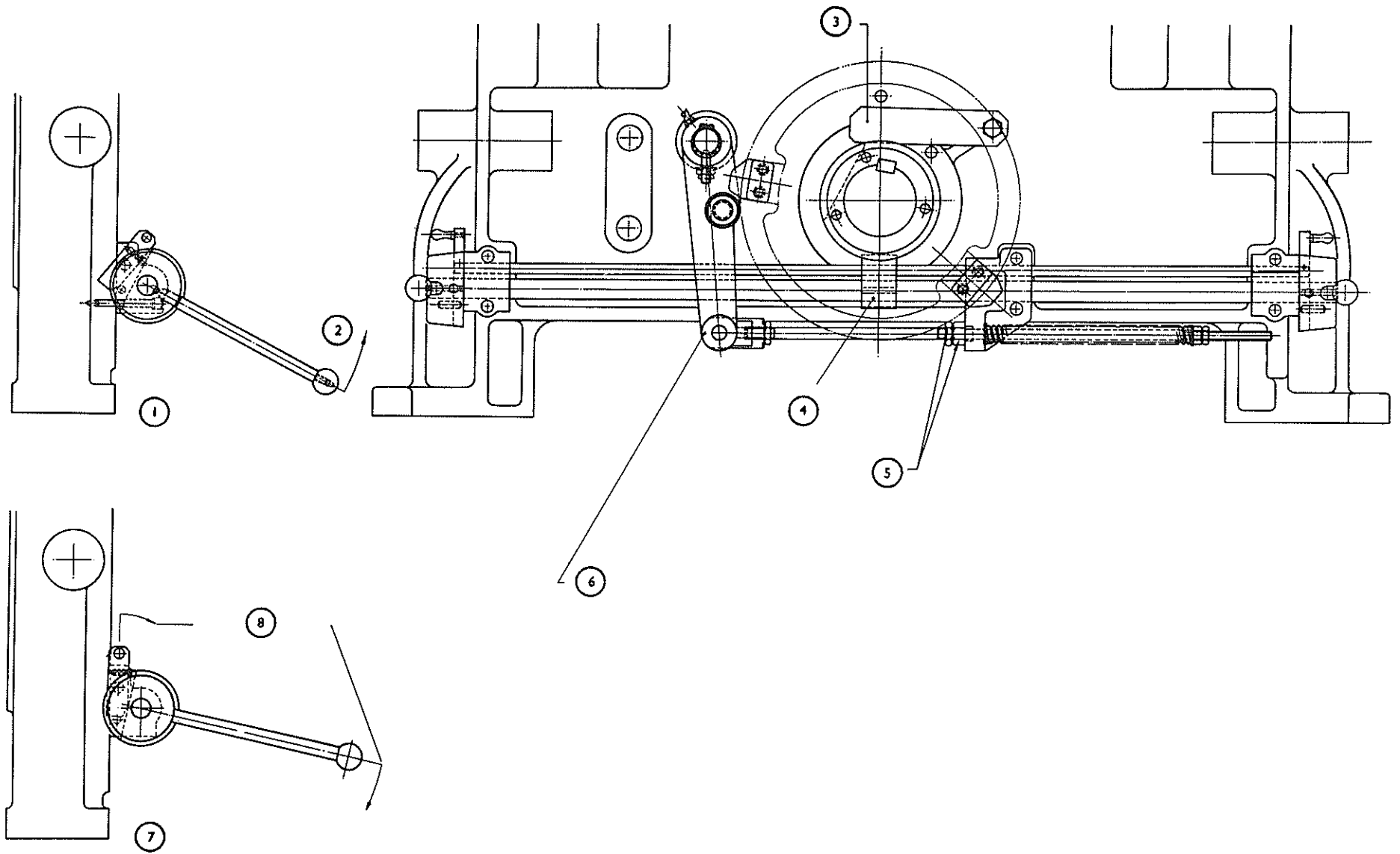
shaft to the centre drive shaft, which passes into a coupling in the attachment drive compartment. The centre shaft driving the spindles passes from this coupling through the centre guide to the spindle drum.

Access to the pick-off gears is through the cover on the end of the main drive housing. Gears are mounted on taper shafts and an extractor is provided in the tool kit. Gears and shaft should be cleaned before fitting. A list of pick-off gears is given on Fig. 9, Page 27 and Fig. 10, Page 29 and speeds obtainable are given on the Speed and Feed Chart, Fig. 11, Page 31.

Various spacers are fitted as standard on the centre shaft in the attachment drive compartment and drive gears for standard attachments can be fitted according to the type of attachments in use.

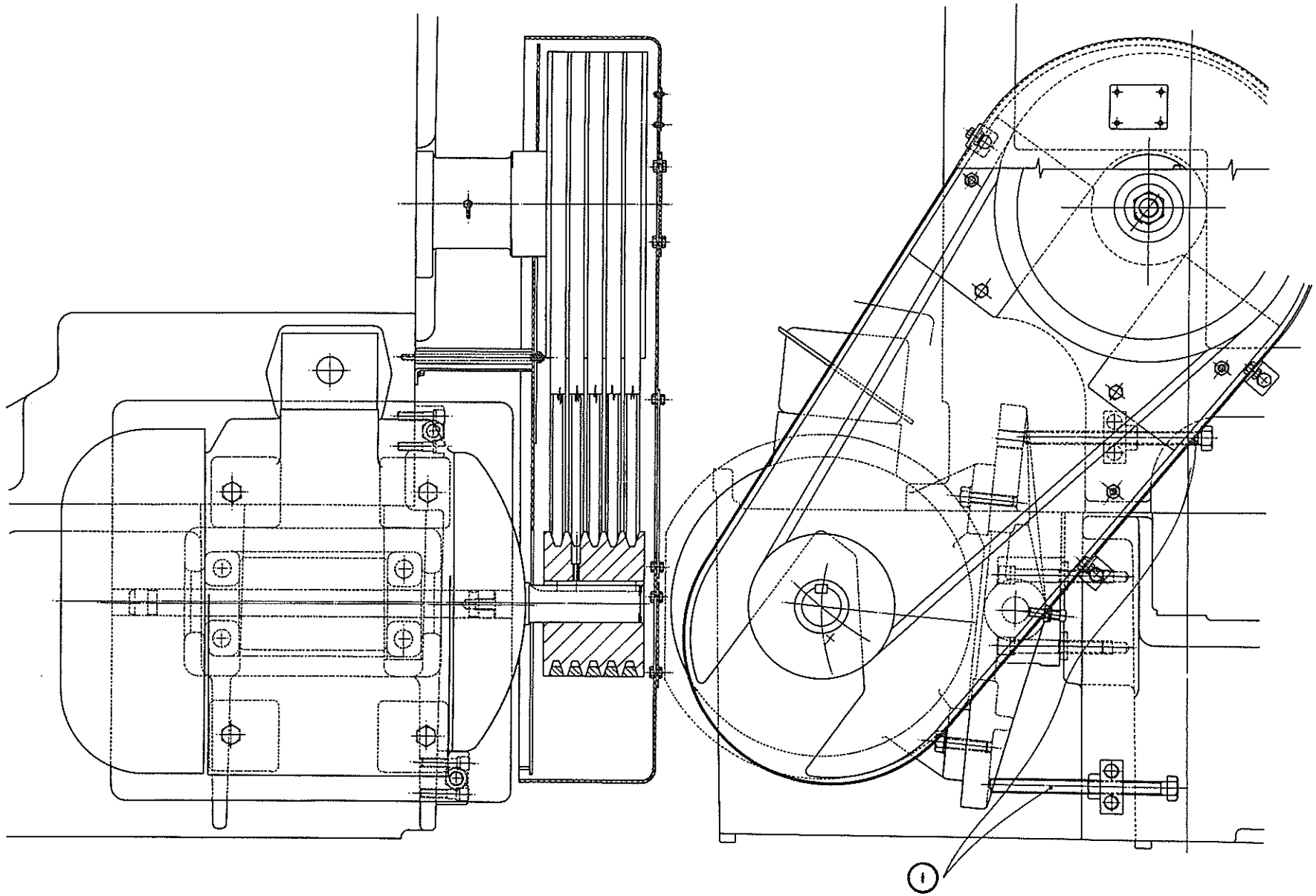
1. CLUTCH ENGAGED
2. TO DISENGAGE CLUTCH
3. INTERLOCK
4. CLUTCH LEVER
5. SET NUTS TO KEEP ROLLER 1/16" CLEAR OF CAM DRUM (1.5 mm)
6. CAM DRUM DETENT LEVER
7. CLUTCH DISENGAGED
8. TO ENGAGE CLUTCH

Fig. 6 INDEXING CLUTCH 300 Z 76



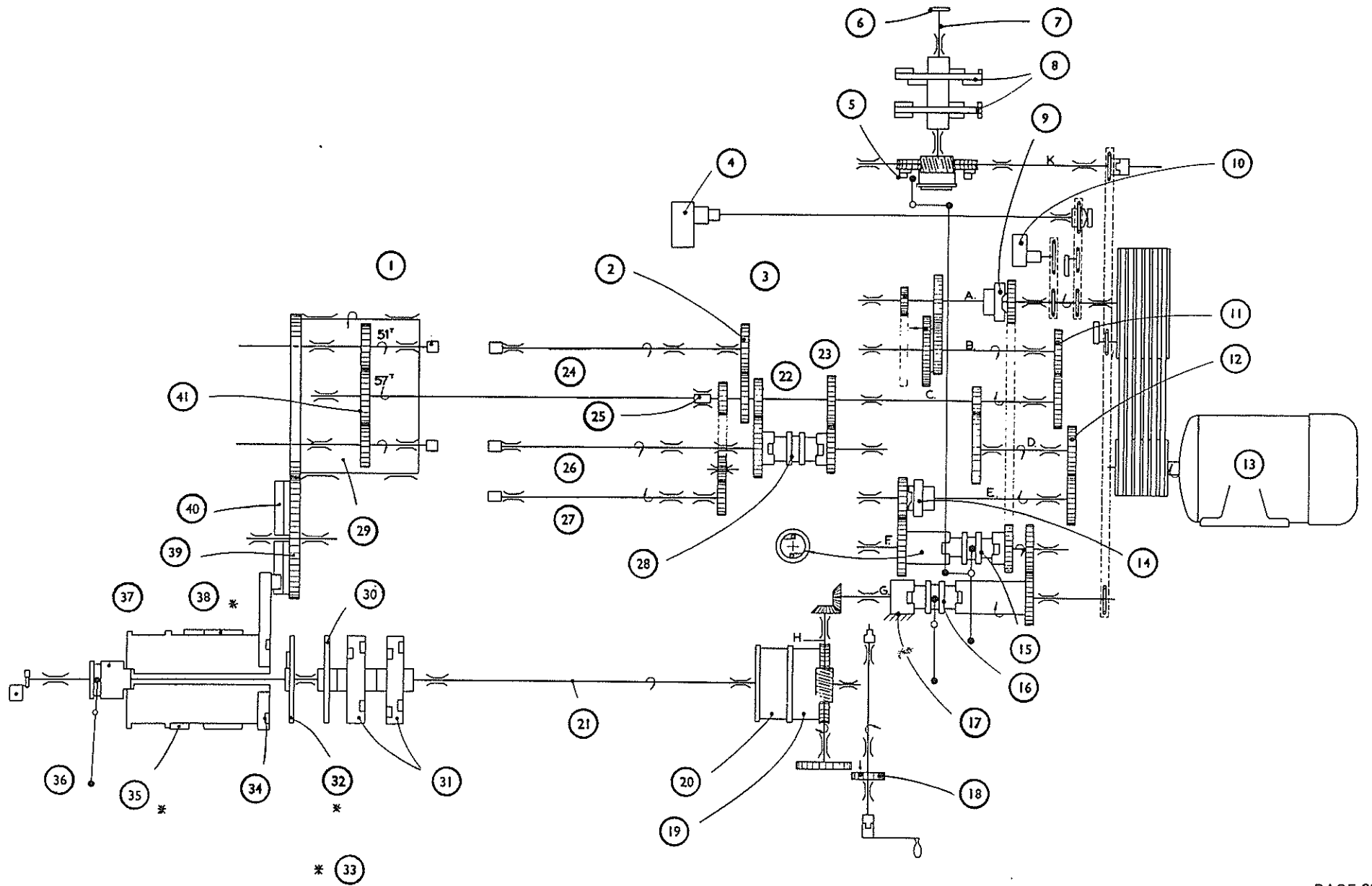
1. THESE SCREWS ARE PROVIDED TO ADJUST THE PLATFORM FOR BELT TENSION, CHECK THAT THE PLATFORM IS SECURELY CLAMPED.

Fig. 7 MOTOR DRIVE 300 Z 69



1. WORK SPINDLES
2. DIEHEAD DRIVE SEC. 382
3. RANGE CHANGE GEARS
4. COOLANT PUMP
5. FAST & SLOW DOGS
6. TIMING DIAL
7. UPPER CAMSHAFT
8. CAMS FOR LONGITUDINAL SLIDES
9. FAST MOTION SLIPPING CLUTCH
10. LUBRICATION PUMP
11. SPEED PICK-OFF GEARS
12. FEED PICK-OFF GEARS
13. MOTOR
14. FEED SLIPPING CLUTCH
15. FAST MOTION CLUTCH
16. FEED - CLUTCH
17. BRAKE
18. HANDWIND GEARS
19. DRUM FOR STATION 6 CAMS
20. DRUM FOR STATION 3 CAMS
21. MAIN CAMSHAFT
22. OFF
23. ON
24. THREADING ATTACHMENT SEC. 386
25. COUPLING
26. THREADING ATTACHMENT
27. HIGH SPEED DRILL SEC. 390A, 390B, 13K
28. THREADING CLUTCH SEC. 381
29. SPINDLE DRUM
30. AUXILIARY CAM DISC
31. CROSS SLIDE CAMS
32. BAR STOP CAM *
33. BAR M/CS. ONLY *
34. DRUM LOCKING CAM
35. COLLET OPERATION CAMS *
36. CAM-OPERATED TIMING SWITCH
37. INDEX CLUTCH
38. BAR FEED CAMS *
39. INDEX GEARS
40. GENEVA WHEEL
41. CENTRE GEAR

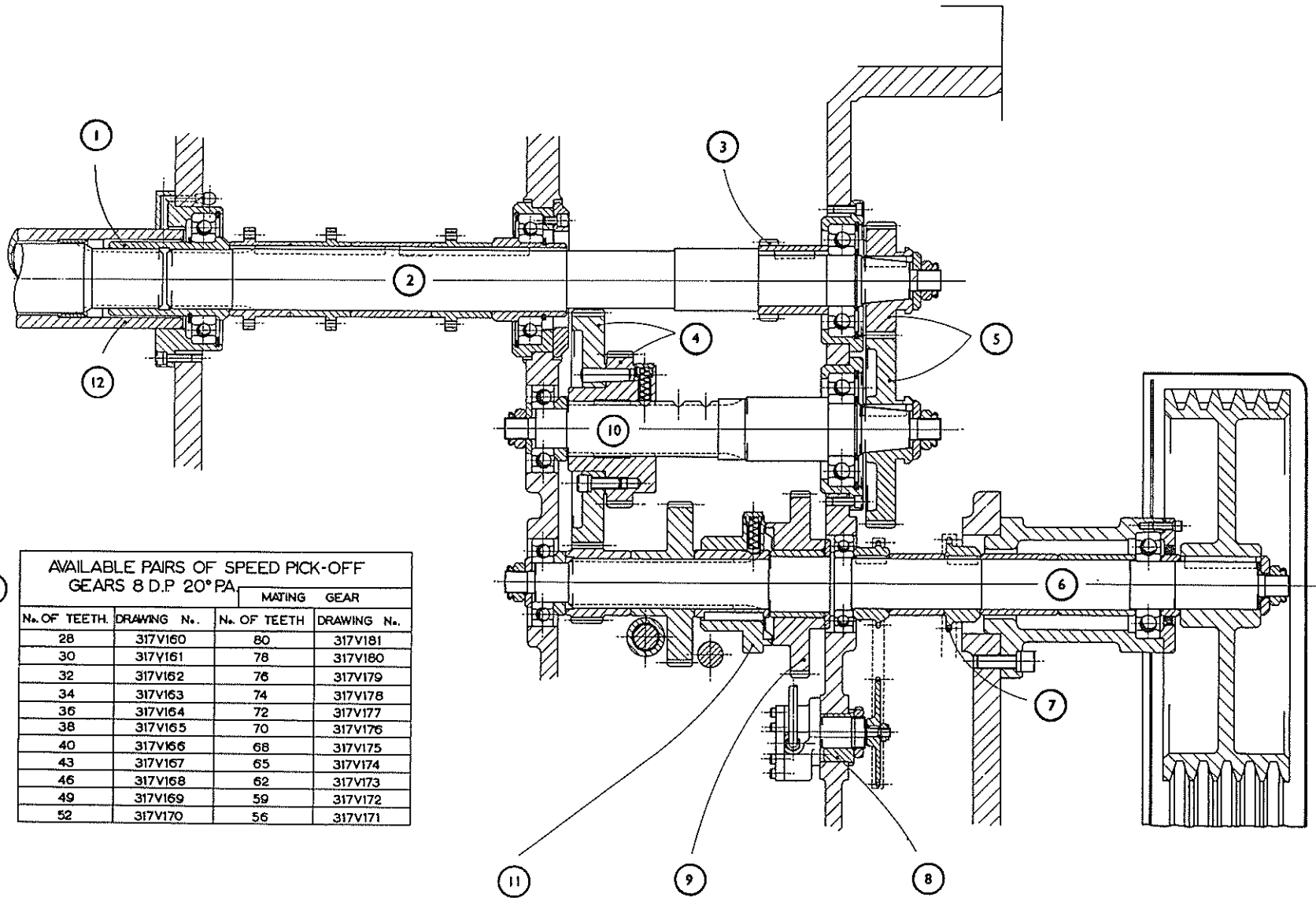
Fig. 8 GEARING & CAMSHAFT LAYOUT 300 Z 54



1. COUPLING
2. CENTRE DRIVE SHAFT ' C '
3. FEED DRIVE GEAR
4. RANGE CHANGE GEARS
5. SPEED PICK-OFF GEARS
6. PULLEY SHAFT
7. DRIVE TO COOLANT PUMP
8. ECCENTRIC SLEEVE
9. FAST MOTION DRIVE GEAR
10. SECOND SHAFT ' B '
11. FAST MOTION SLIPPING CLUTCH
12. CENTRE GUIDE
13. **AVAILABLE PAIRS OF SPEED PICK-OFF
GEARS 8 D.P. 20° P.A.**

No. OF TEETH	DRAWING No.	MATING No. OF TEETH	GEAR DRAWING No.
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Fig. 9 SPEED GEARING 300 Z 67



13

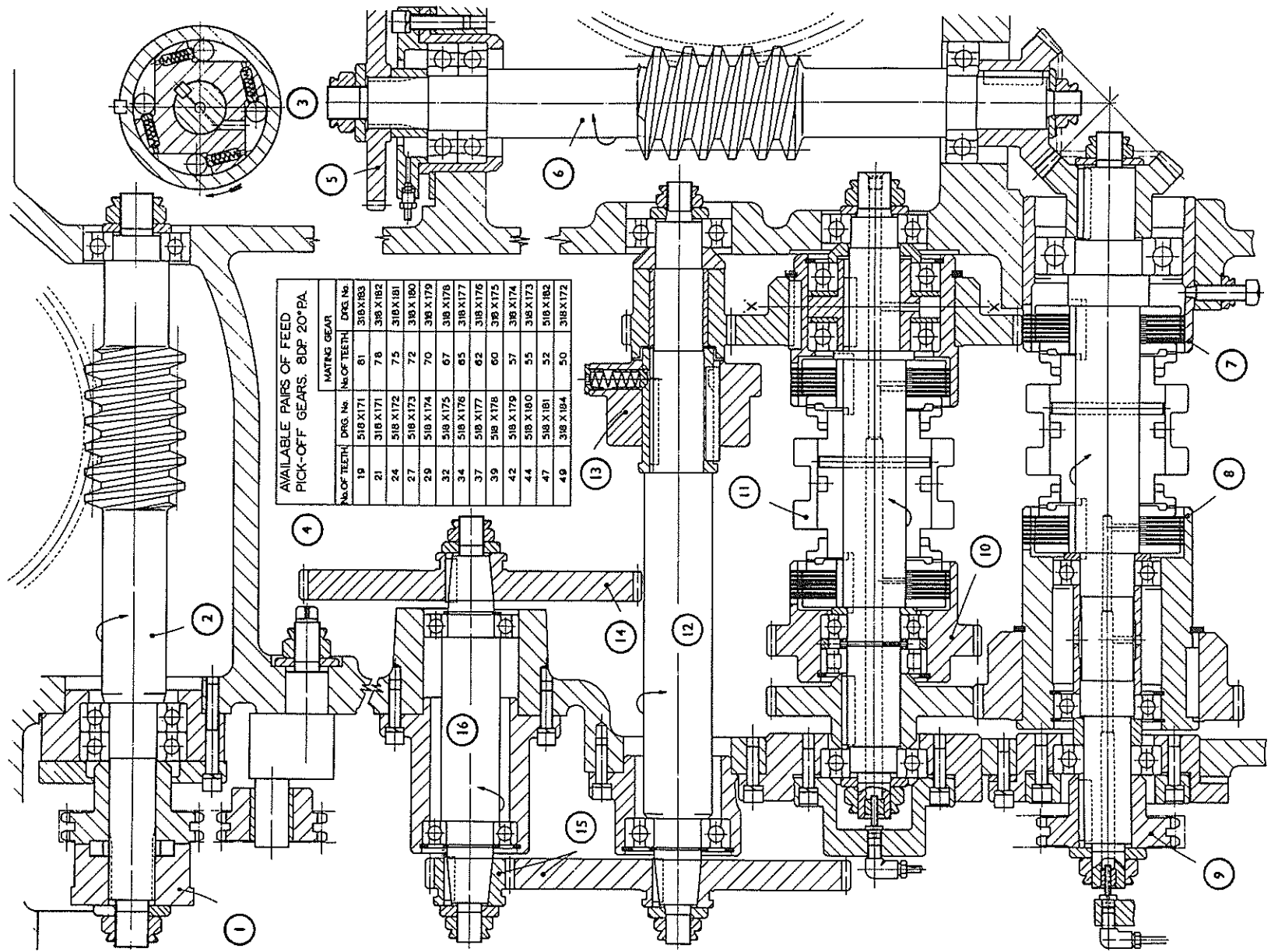
AVAILABLE PAIRS OF SPEED PICK-OFF GEARS 8 D.P 20° PA			
		MATING GEAR	
N _a OF TEETH.	DRAWING N _a .	N _a OF TEETH	DRAWING N _a .
28	317V160	80	317V181
30	317V161	78	317V180
32	317V162	76	317V179
34	317V163	74	317V178
36	317V164	72	317V177
38	317V165	70	317V176
40	317V166	68	317V175
43	317V167	65	317V174
46	317V168	62	317V173
49	317V169	59	317V172
52	317V170	56	317V171

300 Z 67

1. DOG CLUTCH
2. UPPER WORMSHAFT ' K ' .
3. SECTION ' XX ' .OVER RUNNING CLUTCH
4. AVAILABLE PAIRS OF FEED
PICK-OFF GEARS. 8DP 20 °PA.

	MATING GEAR	
No. OF TEETH	DRG. No.	No. OF TEETH DRG.No .
5. HANDWIND DRIVEN GEAR		
6. LOWER WORMSHAFT ' H '		
7. BRAKE		
8. FEED CLUTCH		
9. CHAIN DRIVE TO UPPER WORMSHAFT		
10. FAST MOTION DRIVE FROM PULLEY SHAFT		
11. FAST-SLOW CLUTCH		
12. SECOND PICK-OFF GEAR SHAFT ' E '		
13. FEED SLIPPING CLUTCH		
14. DRIVEN FROM CENTRE SHAFT		
15. FEED PICK-OFF GEARS		
16. FIRST PICK-OFF GEAR SHAFT ' D '		

Fig. 10 FEED GEARING 300 Z 68



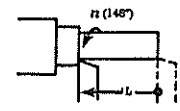
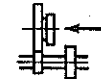
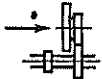
AVAILABLE PAIRS OF FEED
PICK-OFF GEARS. 8DP 20°PA.

MATING GEAR	
DRG. No.	DRG. No.
19	81
21	78
24	75
27	72
29	70
32	67
34	65
37	62
39	60
42	57
44	55
47	52
49	50

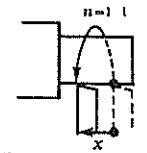
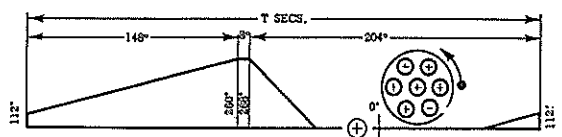
WICKMAN 2¼"-6

Fig. 11 SPEED & FEED CHART 372 Y 148

Wickman 2 1/4"-6



A	63	65	62	69	68	62	49	46	43	40	38	36	68	68	62	69	68	62	49	46	43	40	38	36	68	68	62	69	68	62	49	46	43	40	38	36
B	40	43	46	49	52	55	58	62	65	68	70	72	40	43	46	49	52	55	58	62	65	68	70	72	40	43	46	49	52	55	58	62	65	68	70	72
N/MIN.	1002	1108	1002	922	828	711	608	508	407	307	207	107	1002	1108	1002	922	828	711	608	508	407	307	207	107	1002	1108	1002	922	828	711	608	508	407	307	207	107
+	L																																			
	2-3	4	5	6	7-8	10	20	30	40	50	125	MM.																	INS.							
72	27	7-0	7-6	8-2	8-9	9-6	10-3	11-7	12-8	14-1	15-5	16-6	17-9	18	20	22	24	27	31	34	38	42	47	51	55	63	5-0	5-7	6-4	8-1	10-6	22	32	43	54	138
70	29	7-5	8-1	8-8	9-4	10-4	11-6	12-7	13-8	15-3	16-9	18-1	19-4	20	22	24	27	30	34	38	42	47	52	56	61	102	8-5	2-8	4-9	7-3	9-8	10-8	29	39	49	122
67	32	8-3	8-0	8-6	10-6	11-6	13-0	14-3	15-7	17-3	19-1	20	22	23	28	27	30	34	38	43	48	53	60	64	70	118	8-4	2-1	4-2	8-4	8-5	17-0	25	34	42	106
65	34	8-8	8-6	10-8	11-4	12-4	14-0	15-4	16-9	18-7	21	22	24	24	27	30	33	37	42	47	52	58	63	70	76	129	7-0	1-9	3-9	8-8	7-8	15-8	23	31	39	97
62	37	9-7	10-6	11-6	12-6	13-6	15-6	17-2	18-9	21	23	25	27	27	30	34	37	41	48	53	58	66	74	80	86	147	6-0	1-7	3-4	8-1	8-6	13-6	20	27	34	88
60	39	10-3	11-3	12-4	13-5	14-6	16-8	18-5	20	23	25	27	29	29	33	38	40	48	52	58	64	72	80	87	94	160	8-7	1-4	3-1	4-7	8-2	12-8	18-7	25	31	78
57	42	11-4	12-4	13-7	15-0	16-9	18-7	21	23	25	28	30	33	33	37	41	48	51	58	63	72	81	91	98	108	182	9-9	1-4	2-8	4-1	8-5	11-0	16-8	23	28	69
55	44	12-1	13-3	14-6	16-1	17-7	20	22	23	27	30	33	35	36	40	44	49	55	63	70	78	88	98	108	118	197	11	1-3	2-8	3-8	8-1	10-1	15-2	20	25	63
52	47	13-4	14-7	16-2	17-8	19-6	22	25	27	30	34	38	39	40	45	50	55	62	71	79	88	99	111	120	130	223	12	1-1	2-2	3-4	4-6	9-0	13-8	17-8	22	58
60	49	14-3	16-8	17-4	19-1	21	24	27	29	33	38	39	42	43	48	54	60	67	77	85	95	107	120	129	140	242	13	1-0	2-1	3-1	4-1	8-3	12-4	16-6	21	52
49	50	14-8	16-3	18-0	19-8	22	25	28	31	34	38	41	44	45	50	56	62	69	80	89	99	111	124	135	148	252	14	8-9	2-0	3-0	4-0	7-8	11-9	16-9	19-0	50
47	52	15-6	17-3	19-3	21	23	27	30	33	37	41	44	48	48	54	60	67	78	88	102	110	124	135	148	257	18	9-2	1-8	2-6	3-7	7-3	11-0	14-7	18-3	48	
44	55	17-8	19-4	21	24	28	30	33	37	41	48	49	53	54	61	68	78	84	97	106	121	135	152	178	308	17	9-1	1-6	2-4	3-2	6-8	9-7	13-0	16-2	41	
42	57	18-8	21	23	28	32	36	40	44	50	53	58	59	68	73	82	91	103	117	131	147	165	178	183	335	18	7-8	1-5	2-3	3-0	6-0	9-0	12-0	14-9	37	
39	60	21	23	28	32	36	40	43	50	56	60	65	68	74	83	92	103	118	133	148	168	186	202	218	380	21	6-8	1-3	2-0	2-8	5-3	7-8	10-6	13-2	33	
37	62	23	25	28	31	34	38	44	49	54	61	65	71	72	80	90	100	112	128	144	161	181	203	220	338	23	6-1	1-2	1-8	2-4	4-9	7-3	9-7	12-1	30	
34	65	25	29	31	35	39	44	49	53	61	69	74	80	83	91	102	114	127	147	164	184	206	231	250	271	472	25	5-3	1-1	1-8	2-1	4-2	6-4	8-5	10-8	27
33	67	26	31	34	38	42	48	54	60	67	78	81	88	89	100	112	123	139	161	180	201	225	253	274	297	518	28	4-8	9-7	1-6	1-8	3-8	5-8	7-7	9-7	24
29	70	31	35	39	43	48	55	62	69	77	88	93	101	102	115	128	143	160	185	207	231	259	291	315	342	598	32	4-2	9-4	1-3	1-7	3-4	5-0	8-7	8-4	21
27	72	34	38	43	48	53	61	69	78	89	99	103	111	113	127	142	158	177	204	228	255	288	321	348	377	638	38	3-8	7-8	1-1	1-8	3-0	4-6	8-1	7-8	19-0
24	78	40	45	50	55	62	71	79	88	99	111	120	130	132	148	166	183	207	238	287	299	339	378	407	442	771	42	3-2	8-5	9-7	1-3	2-6	3-8	5-2	8-5	16-2
21	78	47	53	59	65	73	84	84	105	117	131	142	154	168	178	198	219	243	284	317	354	397	446	483	825	50	27	5-5	8-2	1-1	2-2	3-3	4-4	5-5	13-5	
19	81	54	60	67	75	83	98	107	130	134	150	162	176	179	201	225	251	281	329	363	406	439	612	555	602	1062	57	24	4-8	7-1	6-5	1-9	2-9	3-8	4-8	11-9



372Y148

SPINDLE DRUM

The Spindle Drum carries the work spindles and the centre guide on which the centre tool block slides. This arrangement ensures consistent alignment of work spindles with the centre block.

The end thrust of the tools on the spindle drum is taken by the flange of the drum on thrust blocks bolted to the rear face of the drum housing. Should end float develop, the blocks should be removed and their faces adjusted by grinding or scraping so that a 0.002" (0.05mm) feeler gauge can just be inserted.

The spindle drum is geared to the four-slot Geneva wheel and is indexed by the Geneva arm on the main camshaft. At each cycle it is indexed approximately .050" (1.25mm.) past the final position, to allow the drum latch to drop into position, and is then drawn back against the

accurately ground locators by the toggle-operated drum locking mechanism. See Fig. 18, Page 51 and Page 48.

A large seal is fitted into a recess at the front of the drum housing and prevents coolant and swarf entering around the periphery of the spindle drum.

A flanged stem bolted and dowelled to the back of the spindle drum drives the stock carriage and carries a disc supported by rollers in the end bracket. The stem also carries an adjustable guide on the back of which is a star-shaped stop disc retained by a circlip. The disc can be indexed into two positions and has a spring plunger to locate it—one position limits the travel of the feed tubes and the other allows the feed tubes to be withdrawn for replacement of the feed fingers.

WORKSPINDLE

Prior to Inspection Number 14705

The work spindles are each mounted in a pair of Timken Precision 3A taper roller bearings at the front and a pair of extra precision parallel roller bearings at the rear. See Fig. 25, Page 69.

The TIMKEN bearings are adjusted by means of a split and clamped notched locknut which is accessible by removing the front-upper cover on the drum housing. It is desirable when adjusting these bearings not only to check the end-float by means of an indicator, but also to be able to rotate the spindle to check the "feel", and to give a true reading. For this purpose the drive gear on each spindle is mounted on a hub. Drive pins take the drive and the gear is secured by a slotted locknut. Tapped extraction holes are provided to assist in pulling the gear off the hub. When this gear is removed the spindle can be rotated by hand. End float is normally 0.0007" — 0.0010" (0.018 — 0.025mm.) according to speed and should be checked while a bar is gripped in the collet.

The front bearings are protected against ingress of coolant and swarf by means of a piston ring and labyrinth seal. The front bearing end cap can be removed to inspect or replace the piston ring and is also provided with grease nipples so that the seal assembly can be filled with grease to help in excluding foreign matter.

The front bearing end caps also carry the cross slide stop screws which are used to cancel out slight variations in spindle position and drum indexing.

The bearings are lubricated in the two upper (4th and 5th) stations by oil from the beam casting above the drum housing. Sight feeds are provided for checking oil flow. Spacing rings are arranged to retain lubricant up to a suitable level.

Collets are of drawback type with internal thread and are screwed up to the shoulder on the collet tube. Adjustment is made by turning the adjusting ring (L.H. thread) at the rear. The ring is locked by allowing the spring plunger to engage one of the notches in it. *Collets are removed* complete with tubes from the front of the spindle after unscrewing the adjusting ring assembly in the 6th station. Spindles and collet seats should be cleaned each time collets are changed.

Collets are closed by means of bobbin and toggles which thrust against pre-loaded compensating rings and pull the tube and collet into its seating. Compensators are intended to accommodate variations in diameter and roundness throughout the length of bars. Collet tension should be checked by hand each time a new bar is loaded.

Feed Fingers are screwed into the feed tube up to the shoulder (L.H. thread).

Steady Bushes are retained at the rear end of the feed tube by a notched threaded sleeve and lock ring. When no steady bush is in use the threaded sleeves can be screwed against the shoulder and locked by the lock ring. Steady bushes can also be fitted in the machine end of the 2¼" —6 (2" —6) stock carriage tubes using special adaptor bushes.

Feed finger tube assemblies are fitted by sliding back in turn, in the loading (6th) station, each of the stock carriage tubes and indexing the centre star-shaped stop disc. When all feed tubes are in position the centre stop disc should be turned and located by its spring plunger to act as a stop—see Page 75, Fig. 28, Page 77. The bar feed shoe should also be released to allow the shoe to push the feed tube ball journal.

Continued.....

WORKSPINDLES

Commencing on Inspection No. 14705

The work spindles are mounted at the front in extra-precision preloaded, angular contact ball bearings, and at the rear in a pair of extra-precision parallel roller bearings. See Fig. 26, Page 71.

The front bearings are protected against ingress of coolant and swarf by piston-ring seals, a labyrinth and a coolant thrower mounted on the front of the spindle.

The front bearing end cap can be removed to inspect or replace the piston-ring seals, and is also provided with grease nipples so that the seal assembly can be filled with grease to help exclude foreign matter.

The front bearing caps also carry the cross-slide stop screws which can be adjusted so that slight variations in spindle position and drum indexing can be eliminated by the stop pressure.

The bearings are lubricated in the two upper (4th & 5th) stations by oil from the beam casting above the drum housing. Sight feeds are provided for checking oil flow. Spacing rings are arranged to retain lubricant up to a suitable level.

COLLETS are of draw back type with internal thread and are screwed up to the shoulder on the collet tube. Adjustment is made by turning the adjusting ring (L.H. thread) at the rear. The ring is locked by allowing the spring plunger to engage one of the notches in it. Collets are removed complete with tubes from the front of the spindle after unscrewing the adjusting ring assembly in the 6th station. Spindles and collet seats should be cleaned each time collets are changed.

Collets are closed by means of bobbin and toggles which thrust against pre-loaded compensating rings and pull the tube and collet into its seating. Compensators are intended to accommodate variations in diameter and roundness throughout the length of bars. Collet tension should be checked by hand each time a new bar is loaded.

FEED FINGERS are screwed into the feed tube up to the shoulder (L.H. thread).

STEADY BUSHES are retained at the rear end of the feed tube by a notched threaded sleeve and lock ring. When no steady bush is in use the threaded sleeves can be screwed against the shoulder and locked by the lock ring. Steady bushes can also be fitted in the machine end of the 2¼"-6 (not 2"-6) stock carriage tubes using special adaptor bushes.

Feed finger tube assemblies are fitted by sliding back in turn, in the loading (6th) station, each of the stock carriage tubes and indexing the centre star-shaped stop-disc. When all feed tubes are in position the centre stop disc should be turned and located by its spring plunger to act as a stop — see Page 75, Fig. 28, Page 77. The bar feed shoe should also be released to allow the shoe to push the feed tube ball journal.

FEED DRIVE PRIOR TO INSPECTION NO. 15753

The feed drive Fig. 10, Page 29 is taken from the centre shaft by gears to the first feed pick-off gear shaft and then through the pick-off gears to the second pick-off gear shaft. Feed pick-off gears are mounted on taper shafts and an extractor is supplied in the tool kit.

The second pick-off gear shaft carries the feed slipping clutch which is provided to protect the machine from excessive overload during the feed period of the cycle. The slipping clutch is arranged to disengage completely and operate the adjacent limit switch to trip the feed trip mechanism. Before re-engaging the slipping clutch the cause of overload must be located and corrected.

Slipping Clutches are assembled with the minimum number of springs and plungers necessary to transmit the torque. Spare plungers, springs and screwed plugs are supplied in the equipment kit and can be fitted if necessary. It is strongly recommended that the number of plungers in use is kept at a minimum, so that the clutch will slip when necessary.

The gear on the slipping clutch drives a gear on the "slow" side of the fast-slow clutch. A roller over-running clutch is built into the boss of the gear to take up the drive when the clutch is in neutral as it shifts from "slow" to "fast".

The gear on the fast side of the fast-slow clutch is driven from the constant speed pulley shaft through the fast motion slipping clutch. The number of plungers and springs used in this clutch is also varied to suit requirements. When the fast motion

slipping clutch disengages due to overload, the drive is taken up by the over-running clutch and the feed slipping clutch, which in turn disengages and operates the limit switch and trip mechanism.

At one end of the fast motion clutch shaft a gear transmits the fast or slow drive to the feed clutch gear. The feed clutch transmits the drive via bevels at the front end to the main camshaft worm and wheel and via chain at the rear end to the upper camshaft worm and wheel. The brake side of the feed-brake clutch serves to brake the drive to the camshaft when the feed clutch is disengaged manually or by the trip mechanism.

Oil is fed through the hollow clutch shafts direct to all loose running bearings and clutch plates.

The fast-slow clutch is operated by dogs fitted in the T-slot of the upper camshaft wormwheel. The timing of the dogs is set according to requirements, normally shifting the clutch at start of feed period (112°) and at the end of the dwell (268°) as shown on the timing dials located at front and rear of the machine. Hand operation of the clutch, which should be used judiciously, is provided at front and rear by the fast-slow clutch levers. See Page 39. Adjustment of the shifting mechanism should be in accordance with Fig. 13, Page 41.

The feed-brake clutch is operated from front or rear by the feed clutch levers, see Page 39.

Clutch adjustment is made in each case by tapping round the serrated disc, a serration at a

time, with the clutch disengaged. Adjustment should give a nice "bite" to the feel of the lever.

The feed-brake should, however, be adjusted fairly slack so that when the trip mechanism operates it will be engaged fully, but the shock of braking will not be severe.

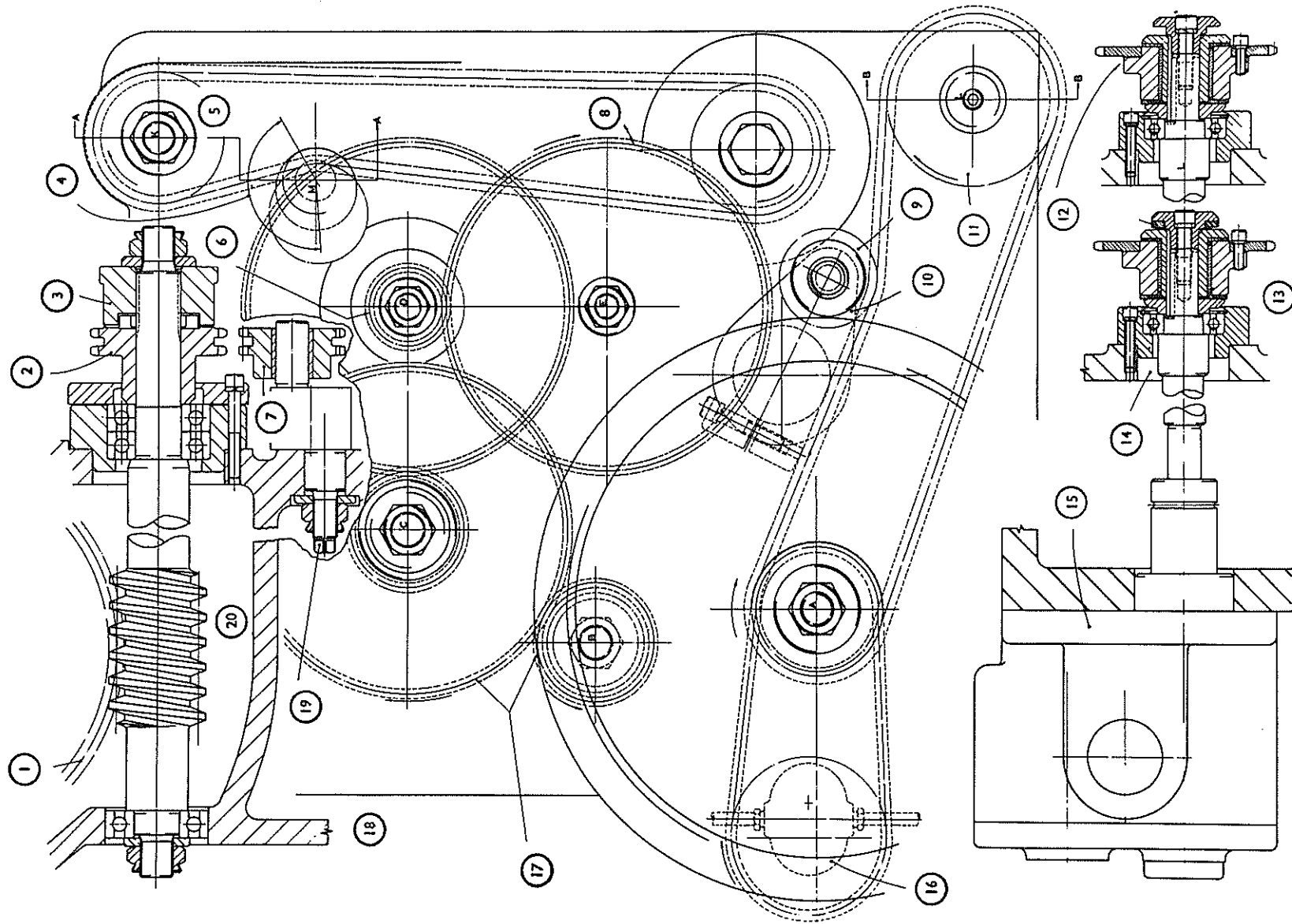
The upper camshaft drive chain tension is adjusted by means of a jockey wheel on an eccentric stud. This wheel should be adjusted to "trail" on the chain, see Fig. 12, Page 37.

Timing of main and upper camshafts in relation to each other is carried out by handwinding the upper camshaft to 0° (V notches on the periphery of cam discs vertically above the centre of the shaft), disengaging the dog clutch on the rear end of the upper wormshaft (by slackening the hexagon nut and sliding the dog clutch). Handwind the main camshaft to 0° (keyway and V notches in discs and drums horizontal to the front of the shaft centre) and re-engage the dogs, see Fig. 12, Page 37. Either camshaft may be advanced in relation to the other by this means where it is possible or desirable for tooling purposes.

The handwind pinion on the handwind crankshaft is engaged with the gear on the front end of the main camshaft wormshaft by sliding the handwind shaft endwise with the feed-brake clutch in neutral. An interlock lever on the feed-brake lever shaft prevents engagement of the handwind pinion if the clutch or brake is engaged, and also engagement of the clutch or brake if handwind is engaged.

1. UPPER WORMWHEEL
2. DRIVEN SPROCKET
3. DOG CLUTCH
4. ADJUST JOCKEY SPROCKET IN TRAILING POSITION AS SHOWN BY ARROW ARC THUS:-
5. UPPER WORMSHAFT
6. FEED PICK-OFF GEARS
7. JOCKEY SPROCKET
8. FEED PICK-OFF
9. JOCKEY SPROCKET
10. JOCKEY ARM
11. COOLANT PUMP DRIVE
12. DRIVE WITH SPRING RING TAKEN OUT. SPROCKET RUNS FREE ON SHAFT
13. SECTION ' BB '
14. COOLANT PUMP DRIVE
15. COOLANT PUMP
16. LUBRICATION PUMP
17. SPINDLE SPEED PICK-OFF GEAR
18. TO ALTER TIMING OF UPPER CAMSHAFT RELATIVE TO LOWER CAMSHAFT, RELEASE DOG CLUTCH & HANDWIND
19. JOCKEY ECCENTRIC
20. SECTION ' AA '

Fig. 12 END VIEW SPEED & FEED GEARS 300 Z 72



FEED TRIP MECHANISM PRIOR TO INSPECTION NO. 15753

The Feed Trip Mechanism, Fig. 13, Page 41 is provided to disengage the feed clutch and engage the brake when the trip solenoid is energised by switches operated by:

- (a) disengagement of the feed slipping clutch.
- (b) hand (manual trip switch).
- (c) the auto-stop mechanism which operates when bar stock is exhausted in any spindle.
- (d) special tooling safety devices.

When the solenoid is de-energised, i.e., when one of the trip devices has not operated, the spring A holds the plunger assembly B in the raised position. When the clutch is engaged the hand lever shaft turns lever C keyed to it and this turns lever D (free on the clutch lever shaft) by the screw abutment E. The latch F on lever G is loaded by the spring A and holds lever D by the latch plate H and the spring J is extended. When the latch F and latch H are engaged, there should be 1/16" (1.5mm). clearance between the nuts K and the adjacent face of the sleeve.

When the solenoid is energised by operation of any of the switches outlined above, the plunger assembly B is pulled downwards sharply, taking up the clearance between the slot in the plunger B and the pin in lever G and disengaging the latch F from latch plate H, thereby allowing spring J to disengage the clutch. The clearance between the slot in plunger B and the pin in lever G and also between the hole in lever C and the pin L ensure a sharp jerk to disengage the latch and clutch.

When the clutch is engaged fully by hand, the adjust-

ment of the screw E should be such as to give 1/32" (0.75mm.) between the engaged latch F and latch plate H. This ensures that the latch will engage freely.

When the solenoid is de-energised, the clutch engaged and the latch engaged, there should be 1/16" (1.5mm.) clearance between the nuts on the plunger and the adjacent face of the sleeve.

The solenoid bracket is adjustable up and down to give sufficient disengagement of the latch.

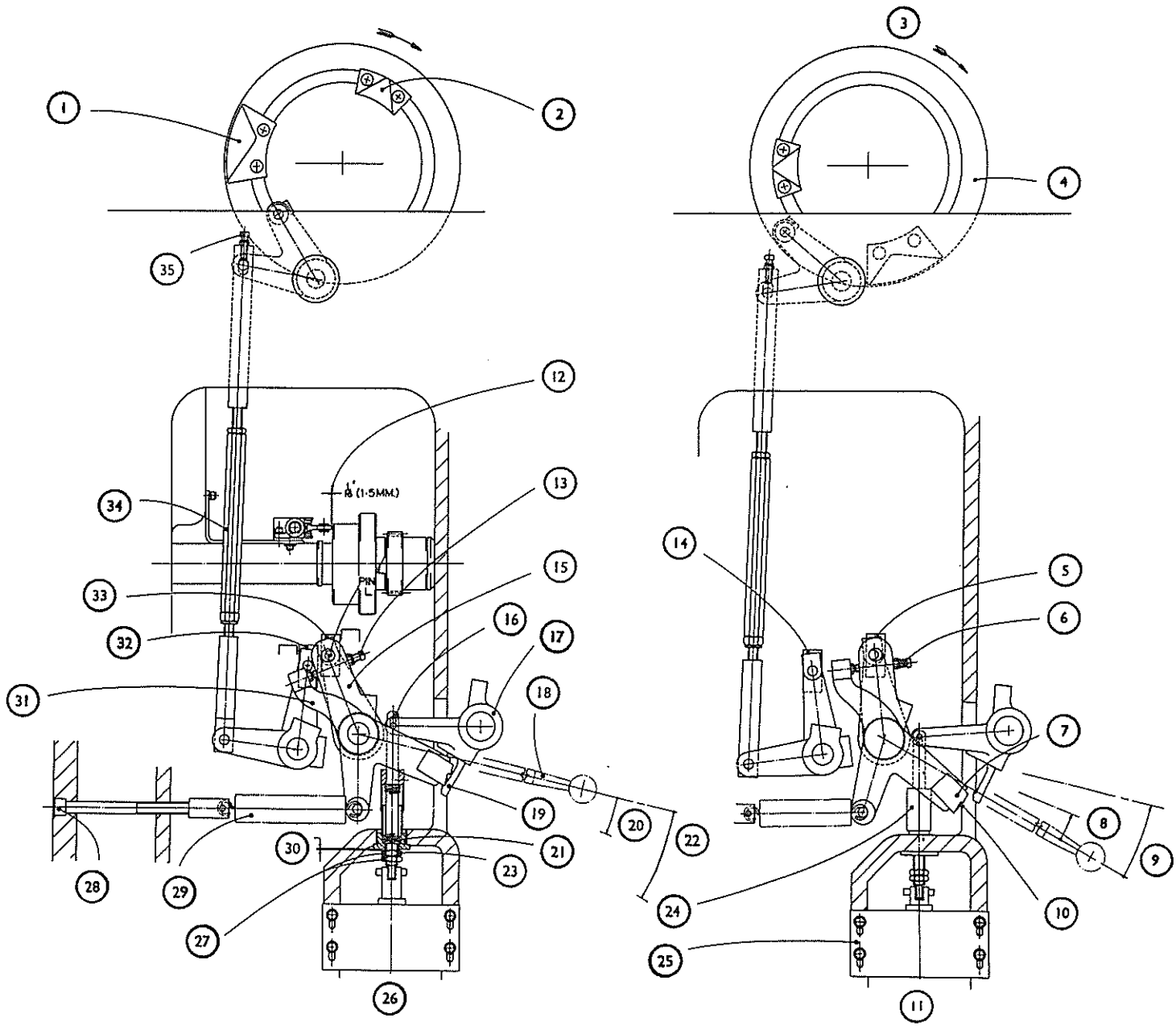
A second step is provided on the latch plate H to hold the system in the neutral position, so preventing the interlock lever from rubbing on the handwind pinion when this is rotated.

The relay in the control panel which controls the solenoid and at the same time controls the signal lamp is operated in two principal ways:

- (1) In the event of an emergency demanding immediate tripping of the clutch, such as a slipping clutch disengaging or a special safety device on tooling equipment operating a limit switch. See Fig. 13, Page 41 for setting of feed slipping clutch limit switch.
- (2) Operation on the closing of the cam operated timing switch contacts (see Fig. 14, Page 43 for setting of cam operated timing switch) at a pre-determined point in the cycle following:
 - (a) closing of the manual trip switch contacts at any point in the cycle.
 - (b) Operation of "auto-stop" device when bar stock in any spindle is exhausted, closing the micro switch contacts, see Page 75 and Fig. 28, Page 77.

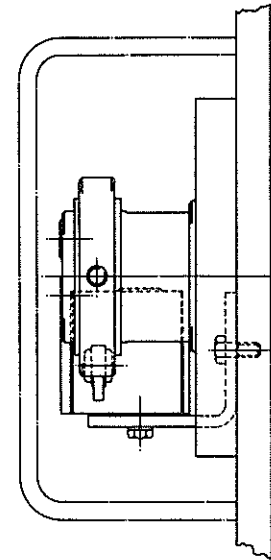
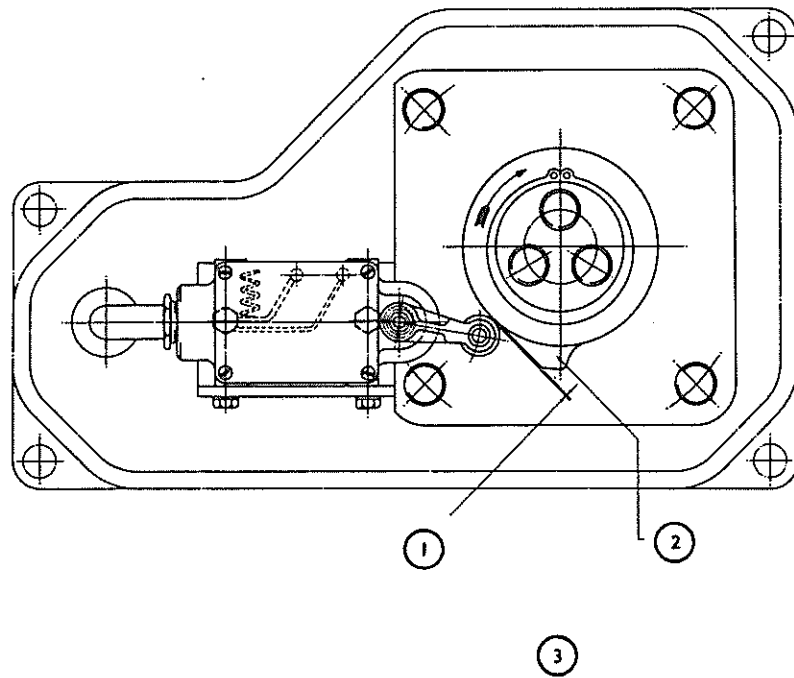
1. FEED MOTION CAM
2. FAST MOTION CAM
3. DIRECTION OF ROTATION
4. UPPER WORMWHEEL
5. FEED CLUTCH IN BRAKE
6. SCREW E
7. LATCH PLATE H
8. HANDWIND
9. FEED
10. DETENT TO RETAIN SPRING J WHEN IN NEUTRAL
11. MECHANISM TRIPPED
12. SET LIMIT SWITCH ROLLER 1/16" CLEAR OF SLIPPING CLUTCH AS SHOWN
13. ADJUST SCREW TO GIVE 1/32" (0.75mm.) CLEARANCE BETWEEN LATCH AND LATCH PLATE WHEN CLUTCH IS FULLY ENGAGED
14. FAST MOTION CLUTCH IN 'FAST'
15. LEVER C
16. PLUNGER B
17. LEVER G
18. FEED ENGAGEMENT LEVER
19. LATCH F
20. HANDWIND
21. SPRING A
22. BRAKE
23. SET NUTS AS SHOWN, SO THAT LATCH IS ENGAGED BY SPRING A
24. SOLENOID SPRING BOX
25. ADJUST SOLENOID BRACKET SO THAT WHEN SOLENOID IS FULLY DOWN, THE LATCH IS CLEAR OF LATCH PLATE
26. MECHANISM SET
27. NUTS K
28. SET SPRING TENSION BY TURNING THIS SCREW
29. SPRING J
30. 1/16" (1.5mm.) CLEARANCE
31. LEVER D
32. FAST MOTION CLUTCH IN 'FEED'
33. FEED CLUTCH IN 'FEED'
34. FAST MOTION CLUTCH LINK MAY BE ADJUSTED FOR LENGTH BY RELEASING LOCKNUTS AND TURNING ROUND
35. ADJUST SCREW TO GIVE CORRECT AMOUNT OF TRAVEL TO CLUTCH GLUT (CHECK ON PEAK OF CAMS)

Fig. 13 FEED TRIP MECHANISM 300 Z 63



1. SET SWITCH SO THAT ROLLER IS 1/32" (.75mm.) CLEAR OF CAM
2. DIRECTION OF CAM SLOPE TO BE AS SHOWN
3. SET CAM TO STOP MACHINE WITH COLLET OPEN AND COLLET CAM ROLLER IN GAP BETWEEN COLLET CAMS

Fig. 14 TIMING SWITCH SETTING 300 Y 75



MAIN CAMSHAFT

Fig. 15, Page 45

The main camshaft extends from the wormwheel in the main drive housing through the drum housing and the end bracket. In the drum housing it carries the cross slide front and rear feed cams, cross slide front and rear approach stroke cams and the auxiliary cam disc for cams used for special purposes. See Page 45. Filling pieces are fitted in the slots of certain cam discs. A piston ring seal fitted on the camshaft and external to the drum housing prevents the ingress of coolant to the housing and subsequent contamination of the lubricant.

Between the drum housing and end bracket are the bar stop cam, the cam drum carrying spindle drum locking, collet operation and bar feed cams, the Geneva arm and roller and the index clutch. Also attached to the cam drum are small cams to restrain the drum rotating past certain points when the index clutch is disengaged.

Beyond the end bracket an extension is fitted to the camshaft to carry the timing cam operating the timing switch for the trip mechanism.

In the main drive housing cam drums are fitted to carry standard and special cams when required. These cams normally operate reaming and threading attachments in Stations 3 and 6 by means of the Auxiliary Longitudinal Motions Sections 389A (Station 6) and 389B (Station 3). Special attachments can be operated by the same mechanisms.

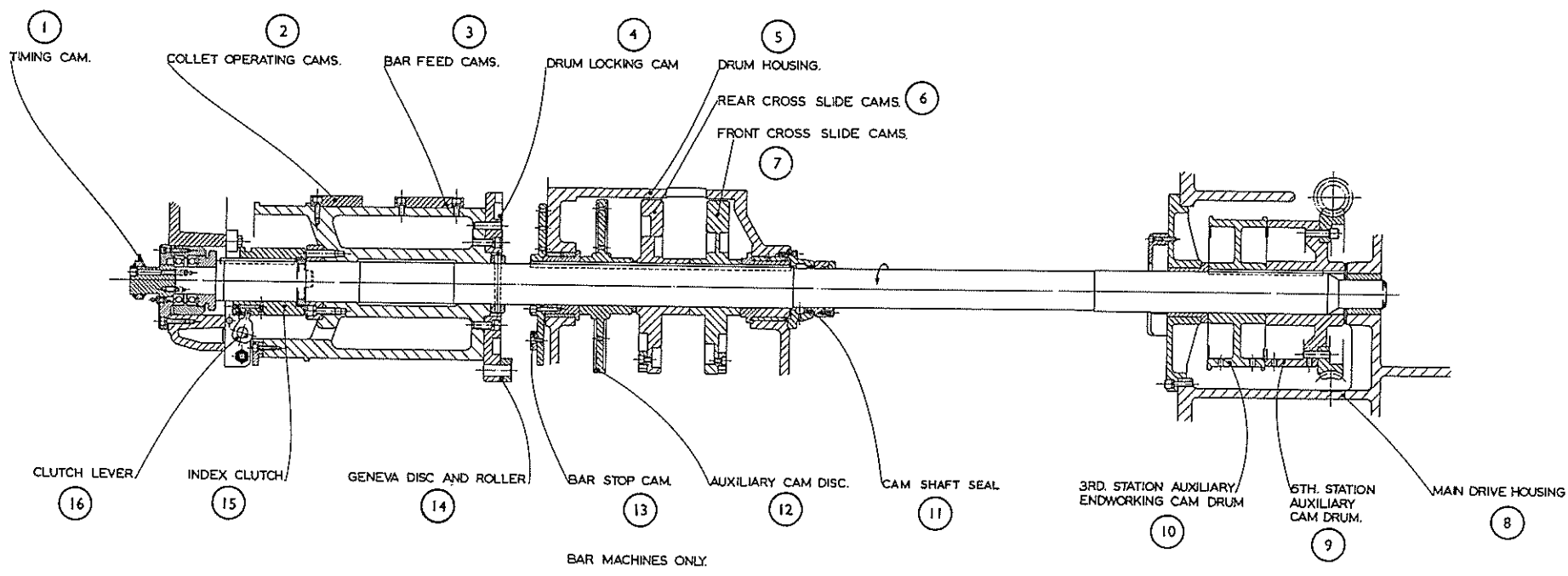
A keyway is also provided in the camshaft in front of the drive housing for mounting special split cam discs or drums.

End thrusts on the camshaft are taken by angular contact ball bearings in a housing in the end bracket.

At 0° timing (see Timing Dials and Timing Diagram Fig. 16, Page 47) the keyway and the notches in the periphery of cam discs and drums are horizontal to the front of the camshaft centre.

1. TIMING CAM
2. COLLET OPERATING CAMS
3. BAR FEED CAMS
4. DRUM LOCKING CAM
5. DRUM HOUSING
6. REAR CROSS SLIDE CAMS
7. FRONT CROSS SLIDE CAMS
8. MAIN DRIVE HOUSING
9. 6TH STATION AUXILIARY CAM DRUM
10. 3RD STATION AUXILIARY ENDWORKING CAM DRUM
11. CAM SHAFT SEAL
12. AUXILIARY CAM DISC
13. BAR STOP CAM
14. GENEVA DISC AND ROLLER
15. INDEX CLUTCH
16. CLUTCH LEVER

Fig. 15 MAIN CAMSHAFT 300 Z 77



UPPER CAMSHAFT

Fig. 17, Page 49

The upper camshaft is transversely mounted in two brackets across the top of the main drive housing. It carries discs to which are bolted and dowelled cams operating the feed and approach strokes to the centre tool block and the longitudinal slides. The shaft is driven by the wormwheel at the rear. Dogs operating the fast-slow clutch are mounted in a T-slot in the wormwheel face. The dogs are adjustable for timing, which should normally agree with the timing dials.

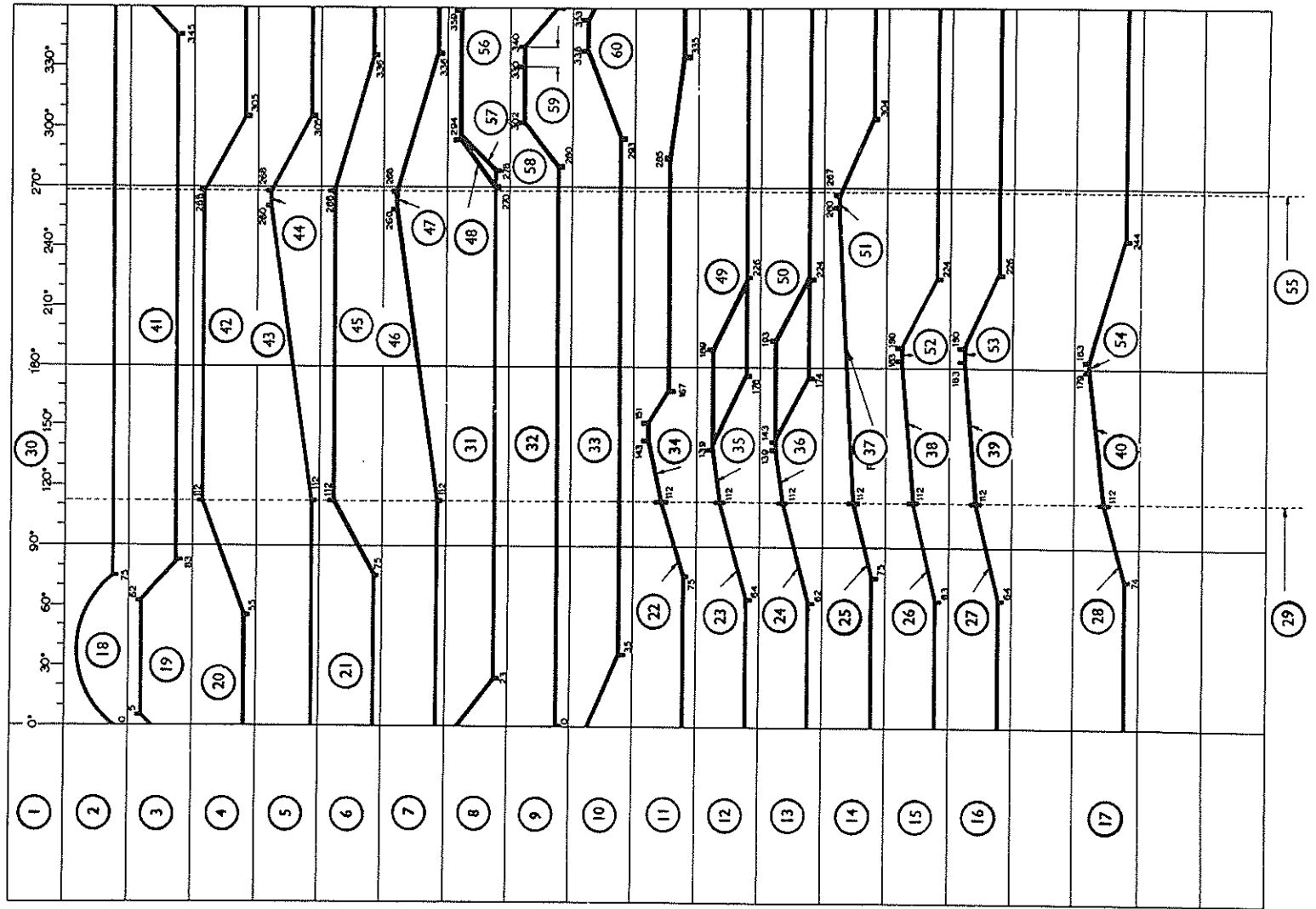
Timing Dials are provided externally on covers near each end of the shaft and the pointers relating to them are carried on the shaft, and are easily set for correct timing. They assist the operator in observing the cycle of operations from both sides of the machine.

The upper camshaft can be advanced or retarded in relation to the main camshaft, see Page 35.

V notches in the periphery of the cam discs should be vertically above the centre of the camshaft and the line across the face of the wormwheel should be level with the top of the drive housing at 0° time.

- | | | |
|---|------------------------|------------------------|
| 1. MOVEMENT | 21. WITHDRAWN | 41. LOCKED |
| 2. DRUM INDEXING | 22. ADVANCE | 42. ADVANCED |
| 3. DRUM LOCKING | 23. ADVANCE | 43. FEED |
| 4. CROSS-SLIDE IDLE | 24. ADVANCE | 44. DWELL |
| 5. CROSS-SLIDE FEED | 25. ADVANCE | 45. ADVANCED |
| 6. LONGITUDINAL SLIDES IDLE | 26. ADVANCE | 46. FEED |
| 7. LONGITUDINAL SLIDES FEED | 27. ADVANCE | 47. DWELL |
| 8. BAR STOP | 28. ADVANCE | 48. REAR |
| 9. COLLET | 29. FEED MOTION STARTS | 49. RETURN |
| 10. BAR FEED | 30. TIMING ANGLE | 50. RETURN |
| 11. THREADING STATIONS 4 & 5, 2.1/4"-6, STATION 3, 2.5/8"-4 | 31. WITHDRAWN | 51. DWELL |
| 12. THREADING STATION 3, 2.1/4"-6 | 32. CLOSED | 52. DWELL |
| 13. THREADING STATION 6, 2.1/4"-6 | 33. DWELL | 53. DWELL |
| 14. REAMING STATION 3, 2.1/4"-6 | 34. FEED | 54. DWELL |
| 15. REAMING STATION 6, 2.1/4"-6 | 35. FEED | 55. IDLE MOTION STARTS |
| 16. REAMING, ACCELERATED STATION 3, 2.1/4"-6 | 36. FEED | 56. ADVANCED |
| 17. REAMING STATION 4, 2.5/8"-4 | 37. FEED | 57. FRONT |
| 18. INDEXING | 38. FEED | 58. OPEN |
| 19. UNLOCKED | 39. FEED | 59. HAND OPERATION |
| 20. WITHDRAWN | 40. FEED | 60. BAR FEED |

Fig. 16 TIMING DIAGRAM 300 Y 29



DRUM INDEXING & LOCKING

Fig. 18, Page 51.

The spindle drum is indexed anti-clockwise, looking at the collets, by gearing from the 4-slot Geneva wheel. The wheel is driven by the Geneva arm bolted and dowelled to the face of the cam drum on the main camshaft. The timing of the gears and the length of the Geneva arm are so arranged that, as the roller leaves the Geneva slot, the spindle drum is "over indexed" past the true position. This allows the spring-loaded latch to drop into position before the drum locking mechanism draws the drum into position against the hardened and ground locators.

The Latch also serves to resist the torque of the centre shaft required to drive the spindles against the cut.

The nuts on the latch spring rod should be adjusted and locked so that, when the latch sits on the locator, there is clearance as shown.

The drum locking mechanism at the rear of the machine is essentially a toggle mechanism arranged to lock the spindle drum very near the dead centre position of the toggle. The amount of offset by which the toggle does not reach the dead-centre position is adjusted during manufacture at the abutment between the upper toggle lever and the toggle link. The toggle link is attached to the lower lever. The lower lever carries the locking pad and pivots freely about the operating shaft, whose position is designed so that the path of the locking pad during the locking and unlocking movement results in the minimum sliding

contact and wear between the locking pad and the locator in the spindle drum.

The upper toggle lever pivots freely on its journal on the fulcrum pin, which is eccentric to the rest of the pin.

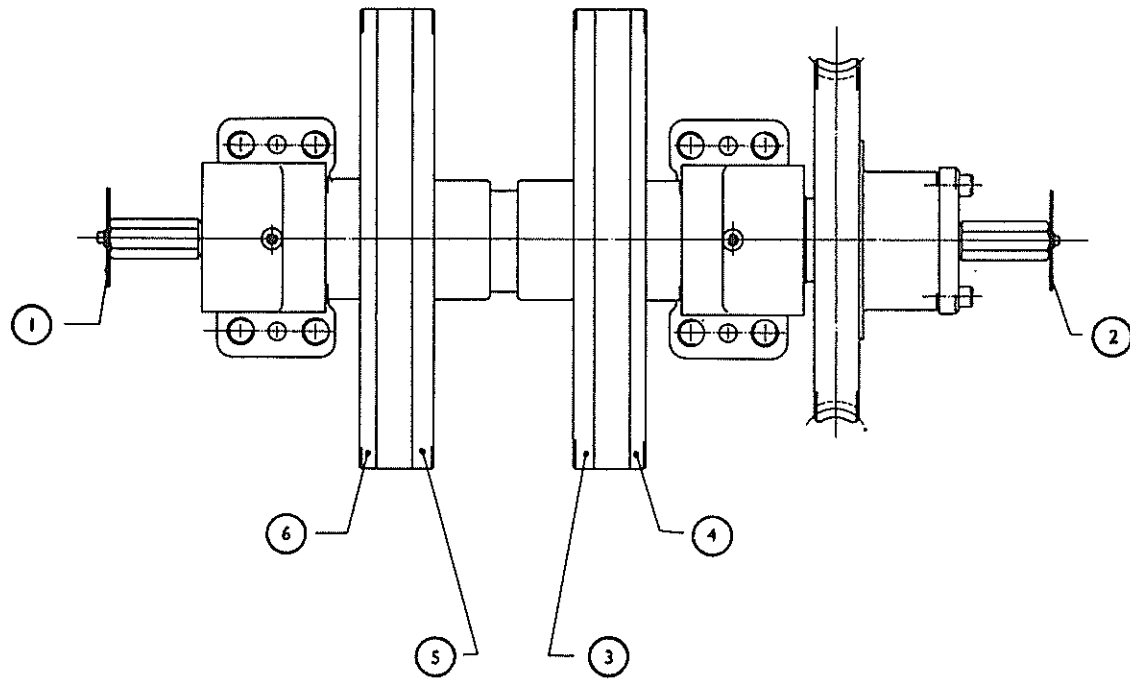
The eccentric fulcrum pin should be adjusted and locked so that, when operated lightly by hand with a tommy bar in the upper toggle lever, the locking mechanism just binds the spindle drum. This operation should preferably be done when the spindle bearings have reached their normal temperature for the speed and conditions prevailing, and with the long operating rod connecting the outer lever to the spring box disconnected. The high point of the eccentric is marked on the end of the shaft and should be adjusted to lie in the arc shown in Fig. 18, Page 51 when the mechanism is locked.

The toggle is operated by a link connected to a lever on the operating shaft and these form a second toggle to give a positive lock with a light operating load. In the locked position, the top of the link should be in line with the facing on the lever and there should be approximately 1/8" (3mm.) clearance between the lever and the stop screw.

The spring box in the link connecting the lever and the cam lever should be adjusted by turning it, with the nut slack, so that in the locked position there is 3/16" (5mm.) extension of the spring, measured as shown in Fig. 18, Page 51, the nut being securely locked afterwards.

1. TIMING INDICATOR FRONT
2. TIMING INDICATOR REAR
3. SLIDING BLOCK FAST MOTION CAM
4. 4TH. STATION LONGITUDINAL FEED CAM
5. CENTRE BLOCK FEED CAM
6. 5TH. STATION LONGITUDINAL FEED CAM

Fig. 17 UPPER CAMSHAFT (PLAN VIEW) 300 Y 70



CENTRE BLOCK & LONGITUDINAL SLIDES

Centre Block , Fig. 19, Page 55.

The centre block, fitted with bushes and swarf scraper rings, slides on the centre guide, which indexes with the spindle drum. Torque loads on the block are taken against the guide faces in the beam by the guide block on the top of the guide arm, adjustment for wear being provided by a gib strip. Care should be taken, when adjusting the gib strip, to check adjustment throughout the travel, as wear will tend to occur mainly on the portion covered by short strokes.

Oil is fed from drip points in the beam through a strainer on the guide block and down a pipe to the reservoir between the bushes in the centre block. Drain and filler plugs are provided for periodical draining and flushing out.

The block is pushed by the lower link of the longitudinal mechanism and no endwise adjustment is provided. The stop rod is provided to control length accurately. Stop nuts should be slackened off well clear before adjusting slide stroke, as the final position of the block is not constant for all strokes.

The faces and tenon slots are ground to close tolerances and the block positioned angularly so

that stock tool holders and attachments may be fitted to any face without selection for height or centrality and without requiring boring in position.

Longitudinal Slides, Fig. 19, Page 55.

The longitudinal slides are mounted on V guides fitted on the beam, which are accurately adjusted for alignment and centrality by the tenon blocks. The tool slides are accurately adjusted for height and gib strips are provided.

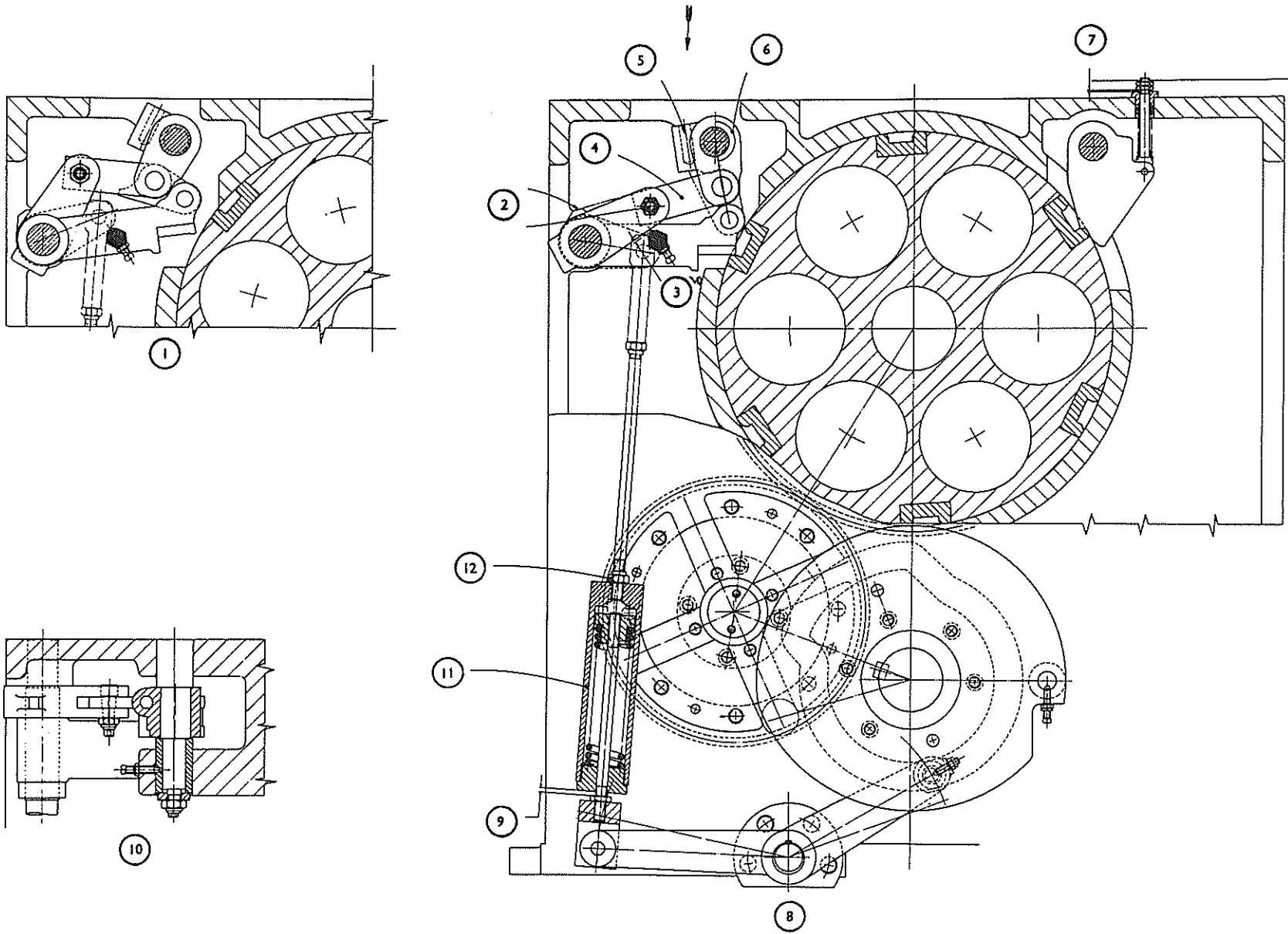
Note: Gib Strip adjustment is made in opposite directions, as front and rear slides are identical, and the thick end of the gib strips therefore face in opposite directions.

Each slide is pushed by a rod screwed into the pusher bar and is adjustable for position by means of nuts on the rod. A spacer between the nuts is slightly wider than the bracket on the side of the slide, thereby allowing for slight mis-alignment of the push rod.

A stop rod is provided to control accurate lengths from each slide and is necked so that it will break in the event of overload. The stop nuts should be slackened well clear before adjusting slide stroke as the final position of the slide is not constant for all strokes.

1. DRUM UNLOCKED
2. AFTER ADJUSTING DRUM LOCKING PRESSURE, ALIGN TOP FACE OF LINK WITH THIS FACE BY ROTATING SMALL ECCENTRIC PIN
3. 1/8" (3 mm) CLEAR
4. LINK
5. HOLE FOR TOMMY BAR FOR TESTING CLAMPING PRESSURE
6. WHEN SETTING DRUM LOCKING PRESSURE, SET SHAFT FOR TOGGLE LEVER WITH HIGH POINT OF ECCENTRIC ON ARC SHOWN. NOTE: LINE ON END OF SHAFT SHOWS HIGH POINT OF ECCENTRICITY
7. SET LOCKNUTS 1/16" (1.5mm) CLEAR IN LOCKED POSITION
8. DRUM LOCKED
9. 3/16" (5 mm) EXTENSION IN FULLY LOCKED POSITION
10. VIEW IN DIRECTION OF ARROW
11. SPRING BOX
12. TO ADJUST ROD LOOSEN LOCKNUT & TURN SPRING BOX.

Fig. 18 DRUM LOCKING MECHANISM 300 Z 57



CENTRE BLOCK & LONGITUDINAL SLIDES MECHANISM

Fig. 20, Page 59.

The centre block link and the longitudinal slide pusher bars are operated by levers carried on a common fulcrum pin in the fast motion sliding block. The top ends of these levers are connected by links to stroke setting blocks in the feed operating levers which are each operated by a feed cam bolted and dowelled to the cam discs on the upper camshaft (see Fig. 17, Page 49).

The fast motion sliding block is guided in a narrow guide in the top of the main drive housing and restrained vertically by keep strips at each side. It is operated from the fast motion cam by a toggle and at the end of the fast approach stroke is locked against the transverse spring stop bar "A", so that it is held rigid during the slow feed cycle. The head of the stop screw is adjusted on assembly so that the stop bar is bent .020" (0.5mm.). When the sliding block is fully drawn back at the end of the fast return stroke, the stop screw "C" is adjusted to be .015" (.4mm.) clear of the toggle cam lever.

The fast motion cam gives constant approach strokes shown on Fig. 22, Page 63. An optional approach stroke cam can be fitted to give the alternative strokes shown, Fig. 22, Page 63, but this entails dismantling the upper camshaft.

The feed stroke for each slide is set by sliding the stroke setting block up or down the slot in the feed operating lever to the position required, as indicated on the adjacent scale. **Dead stops** for the centre block and longitudinal slides must be slackened off before altering the stroke adjustment setting, as the fully forward position of the slides is not constant for all strokes because the face of the feed operating lever is straight.

The timing of the different movements is shown on the **Timing Diagram** Fig. 16, Page 47 and Fig. 20, Page 59 and is as follows:

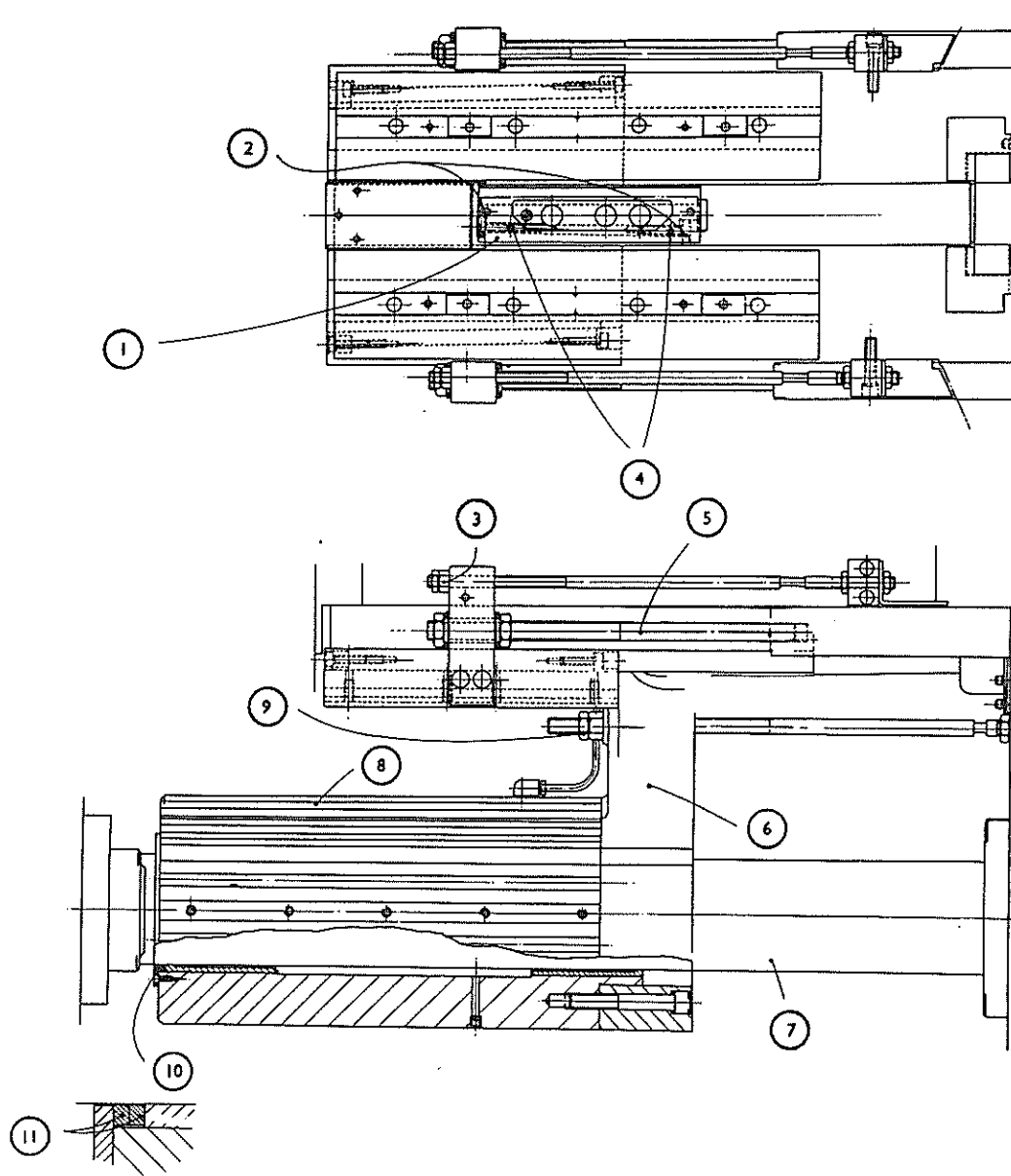
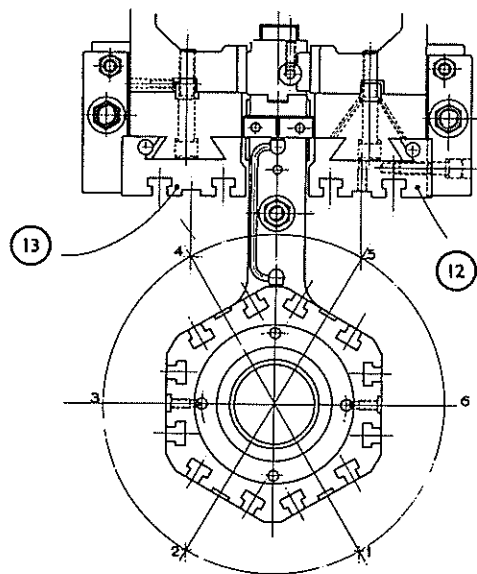
1. From 336° to 75°, *i.e.*, mainly during indexing, the mechanism is in the position shown in Fig. 20, Page 59—A.
2. As drum indexing and locking is completed, the fast motion cam moves the fast motion sliding block forward rapidly from 75° to 112° against the stop bar A, the feed operating levers meanwhile remaining in the fully returned position.
3. On the completion of fast approach stroke at 112° the mechanism is in the position shown in Fig. 20, Page 59—B and the feed motion clutch is engaged. The feed operating levers then commence their slow feed movement from 112° to 268°. The position of the stroke setting blocks determine the feed stroke which results.
4. At the end of slow feed the mechanism is in the position shown in Fig. 20, Page 59—C and there is a "dwell", at the end of which (268°) the fast motion clutch is engaged.
5. The fast motion sliding block and the feed operating levers and their associated links, levers and slides return together (from 268° to 336°) to the fully returned position.

When threading in Stations 4 or 5, the feed cams are changed for standard threading cams, which have different timing and give different strokes.

For special purposes flanged fulcrum studs can be mounted in the bored holes in the beam casting. Special levers can then be mounted on the studs to operate the independent slide pusher bars direct from the feed lever links and levers which are operated by special cams. With this arrangement there is no constant fast motion, but the ratio of levers can be so arranged to give long strokes independent of all other movements.

1. GIB STRIP
2. ADJUSTING SCREWS
3. INDEPENDENT SLIDE STOP
4. LOCKING SCREWS
5. SCREWED PUSH-ROD
6. GUIDE ARM
7. CENTRE GUIDE
8. CENTRE BLOCK
9. CENTRE BLOCK STOP
10. SCRAPER RINGS
11. ENLARGED VIEW SHOWING SCRAPER RINGS
12. 5TH. STATION LONGITUDINAL SLIDE
13. 4TH. STATION LONGITUDINAL SLIDE

Fig. 19 CENTRE BLOCK & LONGITUDINAL SLIDES 300 Z 61



CROSS SLIDES

Fig. 21, Page 61

Four main cross slides and the 6th station cut-off slide are fitted as standard, with the auxiliary 3rd Forming Slide available as optional equipment.

The two lower cross slides in Stations 1 (front) and 2 (rear) are used principally for rough-forming operations and are wide and robust and operated by exceptionally heavy mechanism. They are steel and slide in dovetail ways in detachable guideways bolted and dowelled to the drum housing. The slideways are at an angle of 10° to the horizontal plans to give ample clearance for the work chute below the 6th (Cut-off) station and to give less interference of toolholders with indexing.

The two upper cross slides in Stations 4 (rear) and 5 (front) are used for all kinds of finish forming, chamfering, undercutting, skiving and shaving operations as well as pushing recessing boxes, etc. They are steel and slide in dovetail ways in the beam at an angle of 45° to the vertical plane.

The cut-off slide in 6th Station and the optional 3rd Station Forming Slide are steel and slide in brackets spigoted and dowelled to the drum housing.

All cross slides are fitted with micrometer knobs for fine adjustment.

After every adjustment the locking nut should be clamped to avoid strain on the adjusting screw.

All cross slides except the cut-off slide are fitted with dead-stops bearing on selective stop screws in the spindle bearing end caps. At each

indexed position of the spindle drum, each slide dead-stop operates against a different stop screw, so that such small errors as may exist in the position of spindles in the drum and in the accuracy of drum locators and locking can be cancelled out. The 3rd Station Forming Slide dead-stop bears on the stop screw which is also used for Station 2.

Cross Slide Stop Barrels are clamped in the stop brackets by pad bolts. If excessive stop pressure is used the pad bolts will slip. (On earlier machines threaded stop barrels were used having transverse shear pins to protect the mechanism against overload). Each time cross slides are adjusted by the micrometer knob, the dead-stop should be re-set. With an adjustable stroke mechanism of the type used it is impossible to arrange that the final position of each slide on the "dwell" portion of the cam is absolutely constant for all strokes in the range. This position is, however, substantially constant apart from the micrometer adjustment, so that, with a particular type of tool holder in use on any slide, the micrometer needs only slight adjustment with a change in the slide stroke and a compensating adjustment of the stop should be made.

During building of the machine the selective stop screws are set so that all slides repeat on all positions of the spindle drum. However, it may be found that a small consistent error is produced on certain spindles in certain stations due to faulty setting and in this case the selective stop-screws can be carefully adjusted using the special ring spanner provided in the tool kit.

Each cross slide is fitted with a taper gib strip

with an adjusting screw at each end, both screws should be locked against the gib strip.

The front and rear lower slides are identical and the gib strips are, therefore, on opposite sides relative to the spindle nose. The same applies to the upper cross slides.

The lower slide guideways are protected from swarf by a leather apron which should be replaced should it become damaged.

Cross Slide T-slot dimensions are the same for all slides and therefore toolholders are, as far as possible, interchangeable. The top surfaces of slides are adjusted on assembly to bring the height of the spindle from the slide within the limits given on the Capacity Chart, Fig. 21, Page 61.

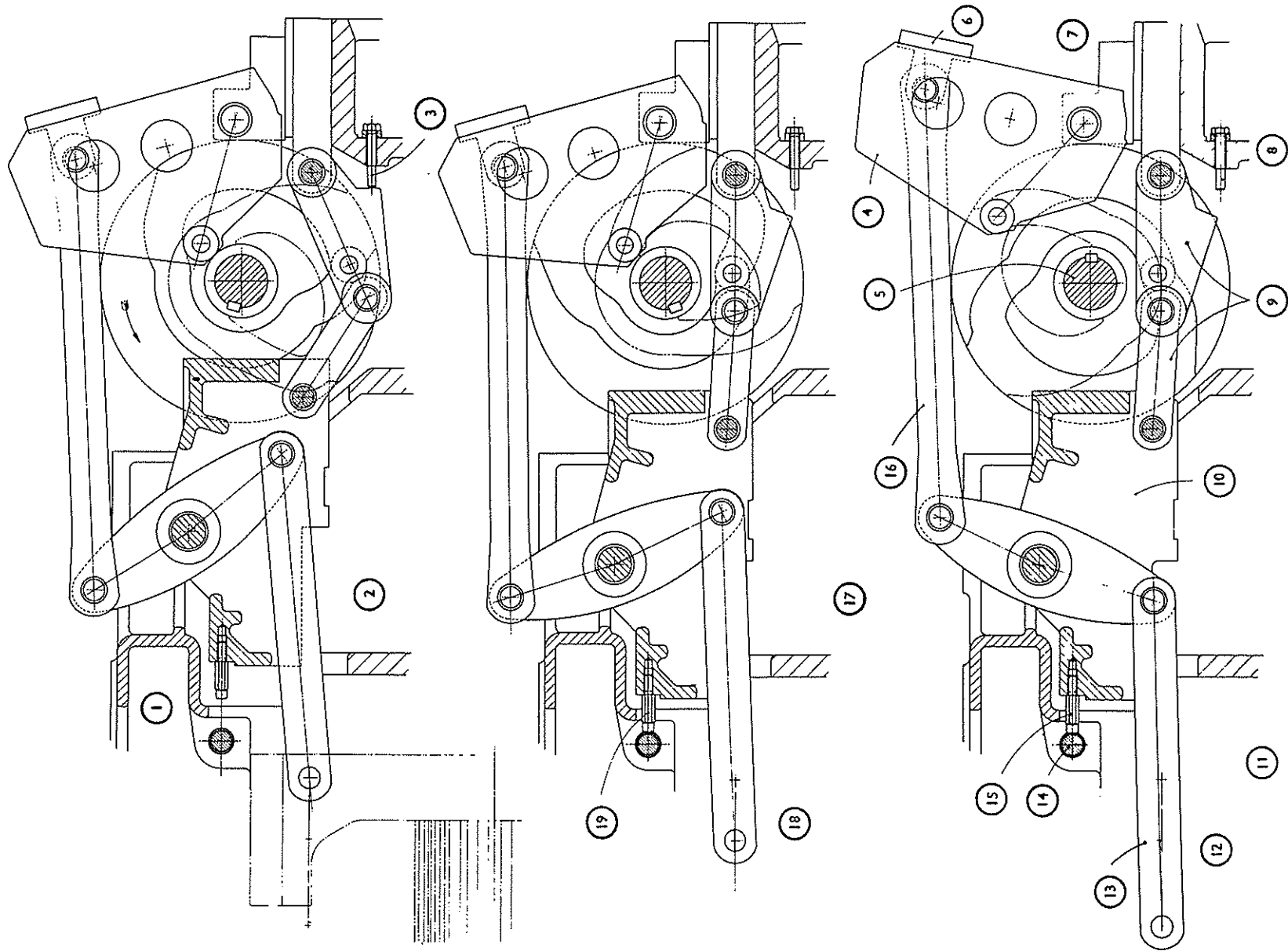
The Capacity dimensions are so arranged that, from the nominal dimensions given, there is considerable backward adjustment and a limited amount of forward adjustment. Special toolholders designed to these nominal dimensions should then have adequate adjustment from the cross slide micrometer knob.

When Double Bar Feed arrangement is fitted, to feed bar in Station 3, the cut-off slide then fitted in this station is similar to the 6th station cut-off slide, i.e., narrower than the normal 3rd Forming Slide.

Any cross slide can be removed from its guideway for cleaning, etc., by removing the adjustment clamp bolt or stud and winding the slide fully backwards until the micrometer knob disengages from the screw, and then finally drawing the slide from the guideway.

1. FAST RETURN STROKE COMPLETED 336° - 75°
FAST APPROACH STROKE COMMENCES 75°
2. FIG ' A '
3. STOP SCREW (C) TO GIVE .015 CLEARANCE WHEN TOGGLE
IS UNLOCKED. (.015 = .4mm.)
4. FEED OPERATING LEVER
5. UPPER CAMSHAFT
6. STROKE SETTING BLOCK
7. TOGGLE ANCHOR BLOCK
8. STOP SCREW (C)
9. TOGGLE LEVERS
10. FAST MOTION SETTING BLOCK
11. FIG ' C '
12. FEED STROKE COMPLETED) 268°
FAST RETURN STROKE COMMENCES.)
13. LINK TO CENTRE BLOCK
14. SPRING BAR (A)
15. STOP BOLT
16. OPERATING LINK
17. FIG ' B '
18. FAST APPROACH STROKE COMPLETED) 112°
FEED STROKE COMMENCES)
19. STOP BOLT TO DEFLECT THE SPRING BAR (A) .020 WHEN
FULLY FORWARD (.020 = .5mm.)

Fig. 20 LONGITUDINAL SLIDES OPERATION 300 Z 60

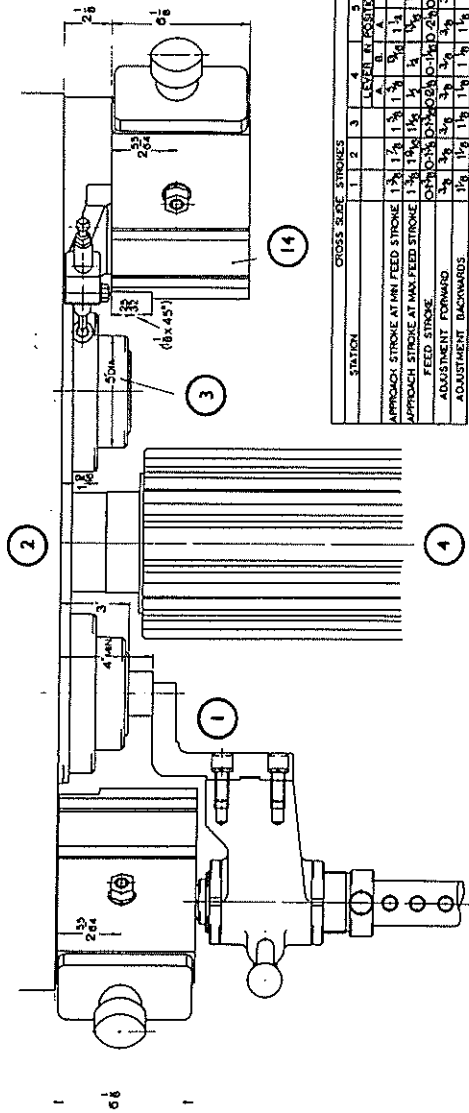


1. 10" MAXIMUM BAR FEED
2. DRUM HOUSING FACE
3. SPINDLE NOSE
4. PLAN VIEW OF INTERMEDIATE SLIDES & BAR STOP
- 5.

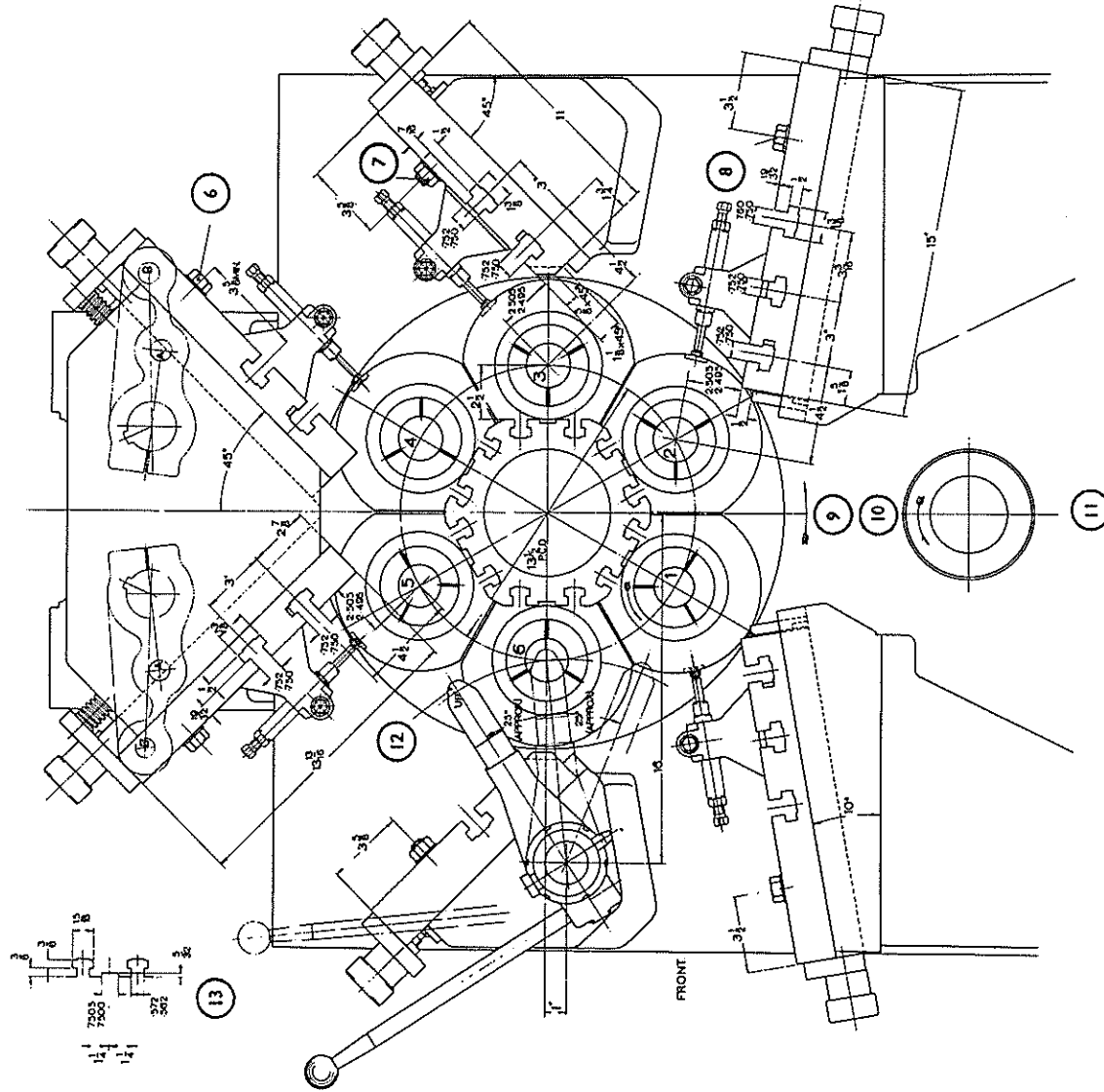
STATION	CROSS SLIDE STROKES							
	1	2	3	4		5		6
	LEVER IN POSITION							
				A	B	A	B	
APPROACH STROKE AT MIN FEED STROKE	1.3/8	1.7/8	1.5/8	1.5/8	13/16	1.1/4	5/8	1.3/16
APPROACH STROKE AT MAX FEED STROKE	1.3/8	1.9/16	1.1/16	1/2	1/4	13/16	13/32	1.1/16
FEED STROKE	0-1.3/8	0-1.3/8	0-1.3/16	0-2.1/8	0-1.1/16	0-2.1/8	0-1.1/16	0-13/16
ADJUSTMENT FORWARD	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8
ADJUSTMENT BACKWARDS	1.1/8	1.1/8	1.1/8	1.1/8	1.1/8	1.1/8	1.1/8	1.1/8

6. 5/8 BSF. BOLT
7. 5/8 BSF. NUT
8. 5/8 BSF. BOLT
9. INDEXING
10. CAMSHAFT
11. ALL SLIDES SHOWN AT END OF FEED
12. NOTE: BAR STOP SWINGS UP AS STANDARD
13. CENTRE BLOCK TEE SLOTS
14. FOR DOUBLE BAR FEED MACHINES A BAR STOP AND SLIDE ARE FITTED TO DIMENSIONS AS SHOWN IN STATION 6
15. FRONT

Fig. 21 CAPACITY CHART 300 Z 20

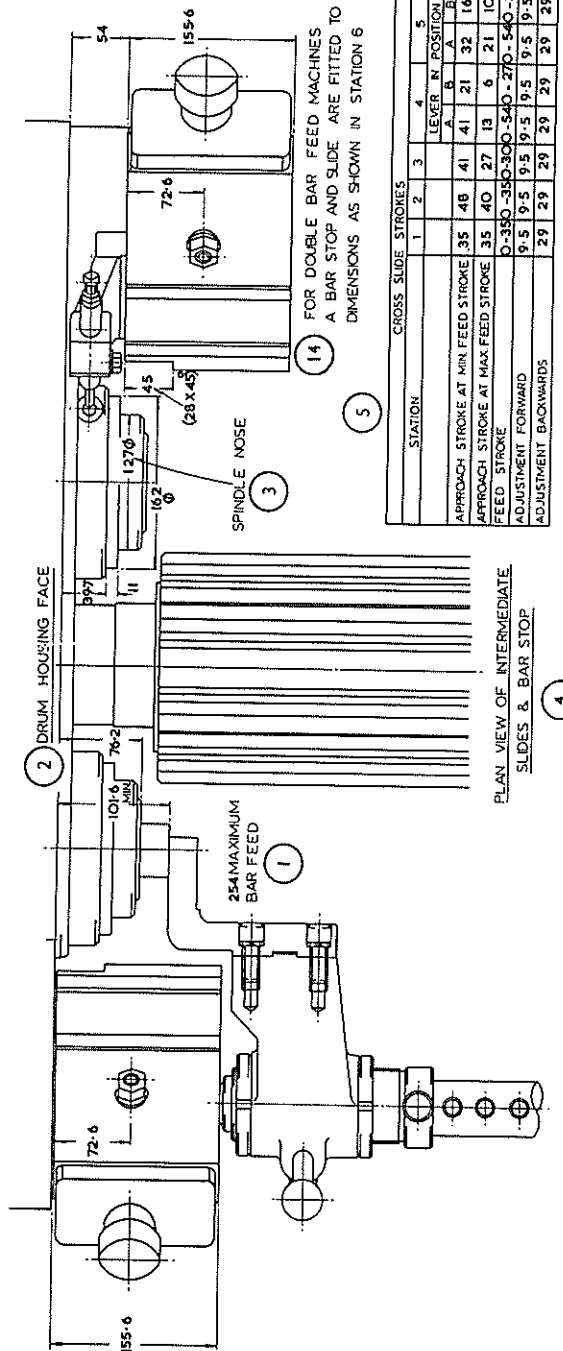


STATION	CROSS SIDE STROKES			LATERAL POSITIONS		0
	1	2	3	A	B	
APPROACH STROKE AT MIN FEED STROKE	1 3/4	1 3/8	1 3/4	0.04	1.1	5
APPROACH STROKE AT MAX FEED STROKE	1 3/4	1 3/8	1 3/4	0.04	1.1	11.25
FEED STROKE	CONSTANT THROUGHOUT					
ADJUSTMENT FORWARD	3/8	3/8	3/8	3/8	3/8	9
ADJUSTMENT BACKWARDS	1/8	1/8	1/8	1/8	1/8	1 1/8



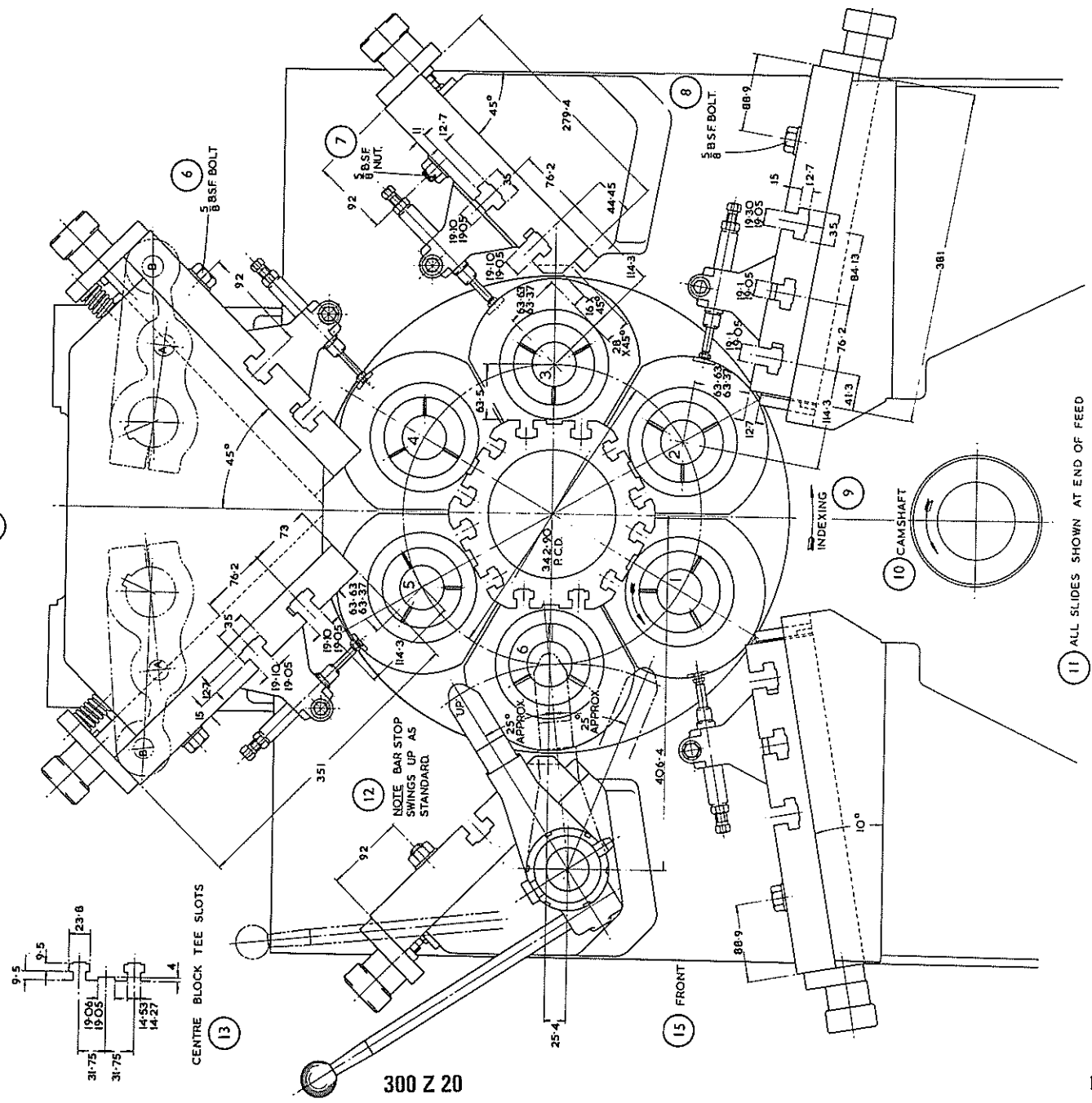
STATION	CROSS SLIDE STROKES							
	1	2	3		4		5	6
	LEVER IN POSITION							
		A	B	A	B			
1. 254 MAXIMUM BAR FEED								
2. DRUM HOUSING FACE								
3. SPINDLE NOSE								
4. PLAN VIEW OF INTERMEDIATE SLIDES & BAR STOP								
5.								
APPROACH STROKE AT MIN. FEED STROKE	35	48	41	41	21	32	16	30
APPROACH STROKE AT MAX. FEED STROKE	35	40	27	13	6	21	10	27
FEED STROKE	0-35	0-35	0-30	0-54	0-27	0-54	0-27	0-30
ADJUSTMENT FORWARD	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5
ADJUSTMENT BACKWARDS	29	29	29	29	29	29	29	29
6. 5/8 B.S.F. BOLT								
7. 5/8 B.S.F. NUT								
8. 5/8 B.S.F. BOLT								
9. INDEXING								
10. CAMSHAFT								
11. ALL SLIDES SHOWN AT END OF FEED								
12. NOTE: BAR STOP SWINGS UP AS STANDARD								
13. CENTRE BLOCK TEE SLOTS								
14. FOR DOUBLE BAR FEED MACHINES A BAR STOP AND SLIDE ARE FITTED TO DIMENSIONS AS SHOWN IN STATION 6								
15. FRONT								

Fig. 21 CAPACITY CHART 300 Z 20 (METRIC)



STATION	CROSS SLIDE STROKES					
	1	2	3	4	5	6
APPROACH STROKE AT MIN FEED STROKE	35	48	41	21	32	16
APPROACH STROKE AT MAX FEED STROKE	35	40	27	13	6	21
FEED STROKE	0-350	350-300	300-240	240-180	180-120	120-60
ADJUSTMENT FORWARD	9.5	9.5	19.5	19.5	9.5	9.5
ADJUSTMENT BACKWARDS	29	29	29	29	29	29

PLAN VIEW OF INTERMEDIATE SLIDES & BAR STOP



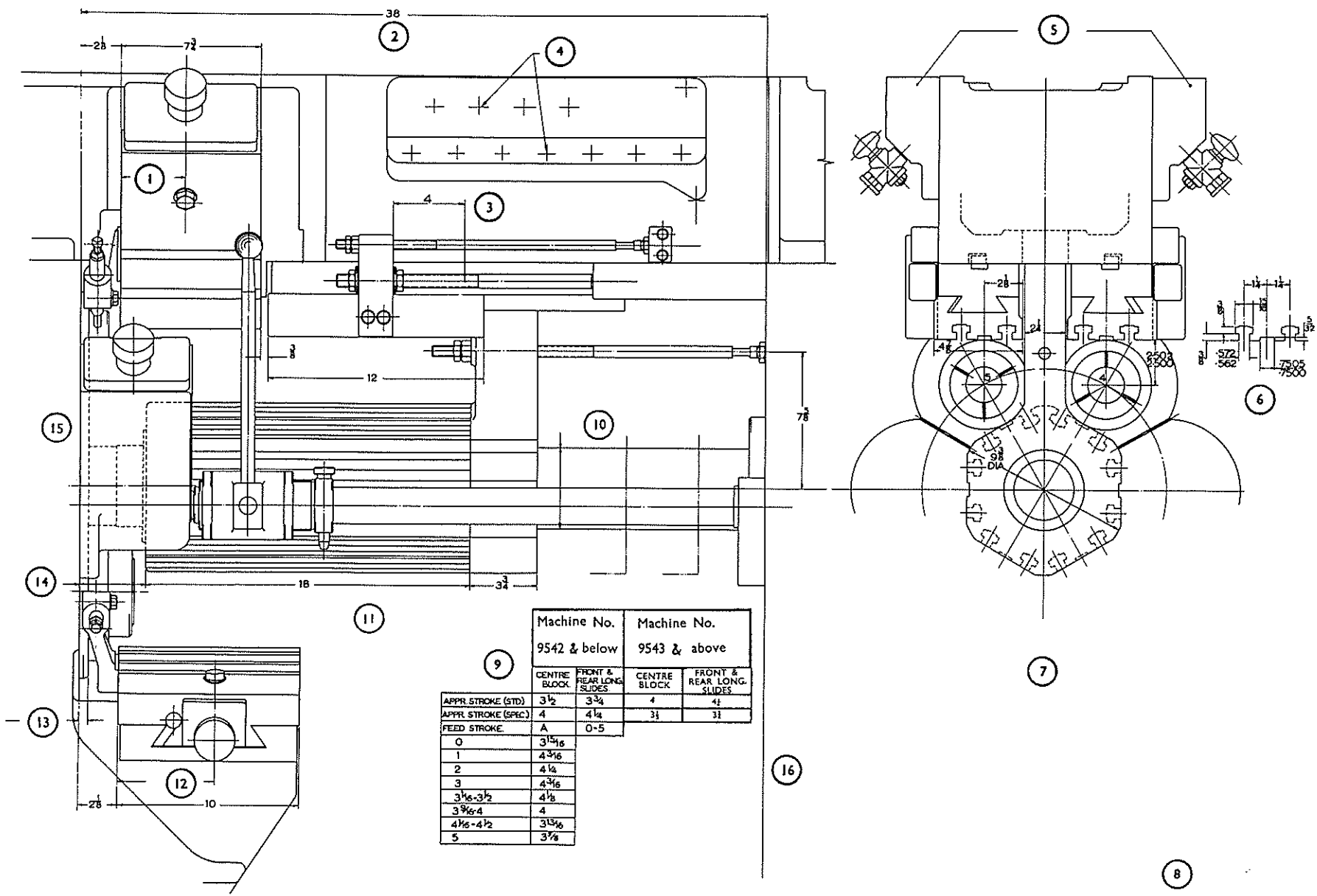
300 Z 20

ALL SLIDES SHOWN AT END OF FEED

1. 3.9/16 (REAR) 4.3/16 (FRONT)
 2. 38 BETWEEN HOUSING
 3. ADJUSTMENT
 4. COOLANT TAP CENTRES
 5. COOLANT HEADERS
 6. LONGITUDINAL SLIDES TEE SLOTS
 7. VIEW SHOWING LONGITUDINAL SLIDES AND CENTRE BLOCK PUSHER ARM
 8. SEE ALSO 300 Z 20
 9.

Machine No.	Machine No.
9542 & below	9542 & above
CENTRE FRONT & BLOCK REAR LONG. SLIDES	CENTRE FRONT & BLOCK REAR LONG. SLIDES
- APPR. STROKE (ST D.)
 APPR. STROKE (SPEC.)
 FEED STROKE
10. 4.1/2 DIA. CENTRE GUIDE
 11. NOTE: ALL SLIDES SHOWN IN FULLY FORWARD POSITION
 12. 5.5/16 (FRONT) 4.11/16 (REAR)
 13. 7/16 PROJECTION OF 2.1/12 DIA. DRUM
 14. 'A' MINIMUM
 15. DRUM HOUSING FACE
 16. ATTACHMENT FACE

Fig. 22 CAPACITY CHART 300 Z 21

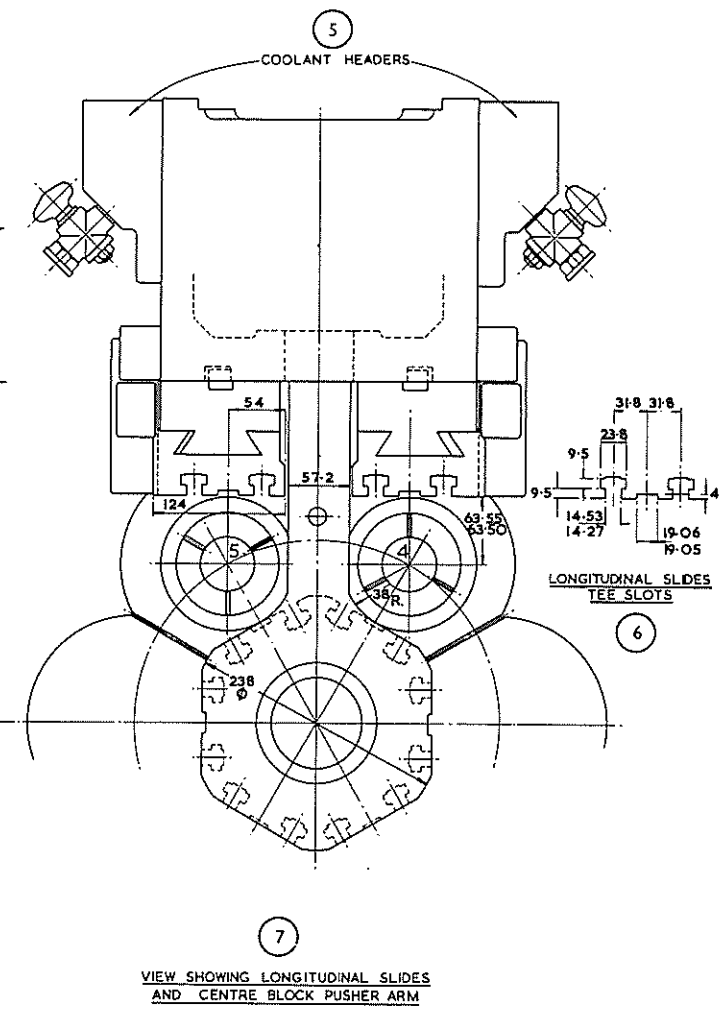
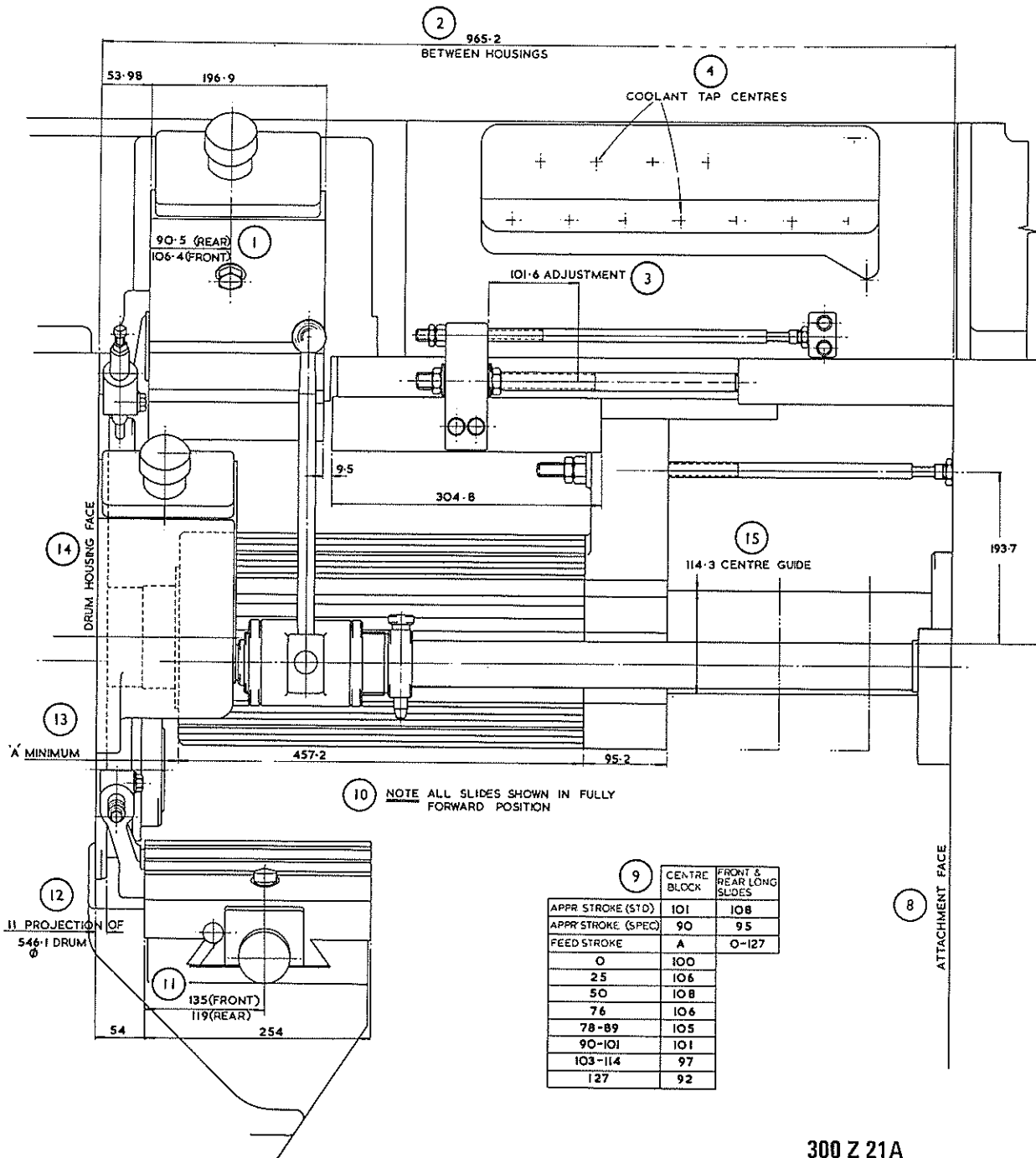


	Machine No. 9542 & below		Machine No. 9543 & above	
	CENTRE BLOCK	FRONT & REAR LONG SLIDES	CENTRE BLOCK	FRONT & REAR LONG SLIDES
APPR STROKE (STD)	3 1/2	3 3/4	4	4 1/4
APPR STROKE (SPEC)	4	4 1/4	3 1/2	3 1/2
FEED STROKE	A			
0	3 1/2			
1	4 3/16			
2	4 1/4			
3	4 3/16			
3 1/16 - 3 1/2	4 1/8			
3 9/16 - 4	4			
4 1/16 - 4 1/2	3 13/16			
5	3 7/8			

1. 90.5 (REAR) 106.4 (FRONT)
2. 965.2 BETWEEN HOUSINGS
3. 101.6 ADJUSTMENT
4. COOLANT TAP CENTRES
5. COOLANT HEADERS
6. LONGITUDINAL SLIDES TEE SLOTS
7. VIEW SHOWING LONGITUDINAL SLIDES AND CENTRE BLOCK
PUSHER ARM
8. ATTACHMENT FACE
9.

	CENTRE BLOCK	FRONT & REAR LONG SLIDES
APPR. STROKE (STD.)	101	108
APPR. STROKE (SPEC.)	90	95
FEED STROKE	A	,0-127
0	100	
25	106	
50	108	
76	106	
78-89	105	
90-101	101	
103-114	97	
127	92	
10. NOTE: ALL SLIDES SHOWN IN FULLY FORWARD POSITION
11. 135 (FRONT) 119 (REAR)
12. 11 PROJECTION OF 546.1 DRUM
 \emptyset
13. 'A' MINIMUM
14. DRUM HOUSING FACE
15. 114.3 CENTRE GUIDE

Fig. 22 CAPACITY CHART 300 Z 21 (METRIC)



9

	CENTRE BLOCK	FRONT & REAR LONG SLIDES
APPR STROKE (STD)	101	108
APPR STROKE (SPEC)	90	95
FEED STROKE	A	O-127
0	100	
25	106	
50	108	
76	106	
78-89	105	
90-101	101	
103-114	97	
127	92	

CROSS SLIDES OPERATING MECHANISM

Fig. 23, Page 65

Each lower cross slide is operated directly by a lever underneath it and this lever swivels about a pin carried in two bosses in the drum housing. The connection between the lever and the slide assembly is by a link, and the connection to the T-slot where stroke adjustment is made is by a further link.

A collar cast integrally with the lever is arranged so that, together with the position of a wall in the drum housing and the hole in the slide guide, any coolant entering the slideway is deflected and drained into the tray.

All bearings in the links are fitted with sintered oil-retaining bushes, which can be replaced when wear results after severe service.

Each upper cross slide is operated by a lever and link behind it. The bearings in the link are sintered oil-retaining bronze which can easily be replaced. The lever is keyed to and mounted on a large shaft carried in bushed bosses in the beam and the shaft in turn has a lever on its inner end. The inner lever is provided with two holes, "A" and "B" respectively, to which a stud is fitted for the link connecting the lever down to the T-slot where stroke adjustment is made. The alternative hole positions provide different ranges of stroke adjustment as indicated on the Capacity Chart, Fig. 21, Page 61 and the scales. Where the range of strokes provided is adequate, it is preferable to use the outer hole, as the mechanism is then less heavily loaded.

Each intermediate cross slide (6th Cut-off or 3rd Forming) is operated by a link and lever carried on a shaft through the slide bracket and the drum housing. A lever on this shaft is connected by a link down to the slide stroke adjusting mechanism.

The Feed Stroke for each cross slide is adjusted by sliding the appropriate stroke setting block along its slot to the position indicated by the scale and clamping it. As explained later, this should be done with the timing pointer at "dwell" on the dial.

The adjustment of stroke for front cross slides (lower, upper and cut-off) is made on the front feed rocking lever and the adjustment of stroke for rear cross slides (lower, upper and 3rd Forming) on the rear feed rocking lever. It is apparent which of the scales corresponds to various slides. Upper or lower slide stroke setting blocks are in T-slots, intermediate slide stroke setting blocks slide in a central slot and the adjustment is clamped by means of a ring spanner on the hexagon nuts on the four keep-strip studs.

The Feed and Fast Motion of each rocking lever is derived from two cams—the appropriate cross slide feed cam and the fast motion cam. This mechanism is arranged to give a substantially constant fast motion and a slow feed motion.

During indexing, the mechanism is in the position shown by Fig. 23, Page 65—A.

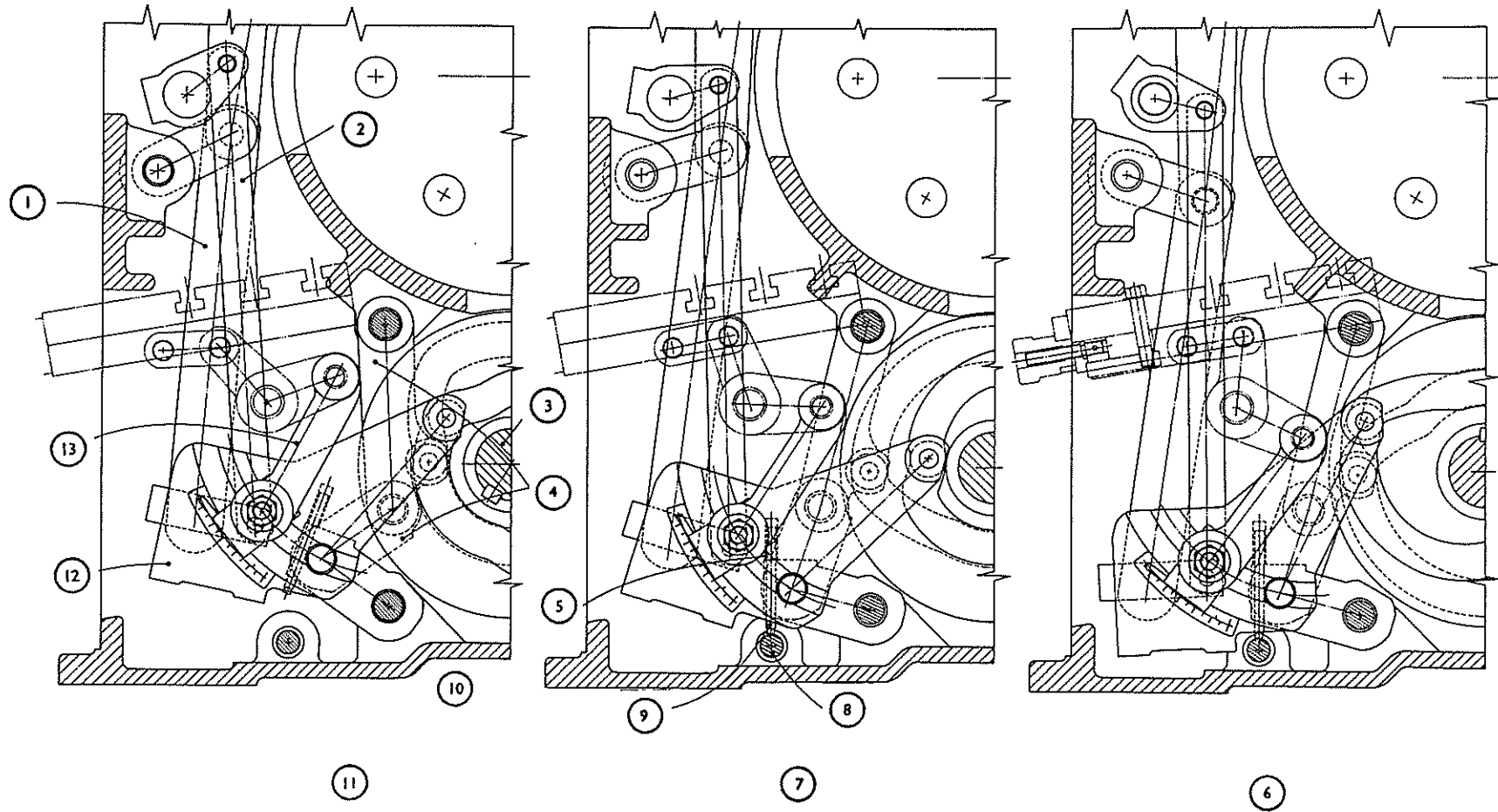
The Fast Approach Stroke is obtained from 55° to 112° by the fast motion cam operating the toggle mechanism, so that the upper toggle lever and the toggle link are almost straight and the toggle control lever stop screws come into contact with the spring stop bar which is deflected .040" (1mm.). The feed rocking lever cam roller meanwhile is merely held in the feed cam track, so that at the end of the fast approach stroke the mechanism is in the position shown by Fig. 23, Page 65—B.

The Feed Stroke is obtained from 112° to 260° by the feed rocking lever being swung about its pivot on the toggle control lever by the feed cam. The toggle mechanism meanwhile remains stationary and extremely rigid in the locked position. At the end of the 8° "dwell" which follows the feed stroke, the mechanism is in the position shown in Fig. 23, Page 65—C at 268° in which the T-slots in the feed rocking lever are arcuate about the upper joint pins of the appropriate links. Therefore, irrespective of the stroke adjustment, the cross slide position is substantially constant for a particular micrometer knob setting. For this reason it is easier to adjust the stroke in the "dwell" position, as indicated by the timing dial pointer, as the slides are not moved by adjusting the stroke. Access to the nuts locking the adjustments is also better in this position.

The Fast Return Stroke is obtained from 268° to 305° during which time the mechanism returns to the position shown in Fig. 23, Page 65—A.

- | | | |
|--|---|---|
| 1. LINK TO FRONT UPPER CROSS SLIDE STATION 5 | 6. FEED STROKE COMPLETED FAST RETURN STROKE) 268°
COMMENCES, FIG. C. | 10. ADJUST LENGTH OF DISTANCE PIECES SO THAT
STOP SCREWS DEFLECT STOP SHAFT .040". |
| 2. LINK TO FRONT CUT-OFF SLIDE STATION 6 | 7. FAST APPROACH STROKE COMPLETED FEED STROKE) 112°
COMMENCES, FIG. B. | 11. FAST RETURN STROKE COMPLETED 305° - 55°
FAST APPROACH STROKE COMMENCES 56° FIG. A |
| 3. MAIN CAMSHAFT | 8. STOP SHAFT | 12. ROCKING LEVER FOR FRONT CROSS-SLIDE OPERATION |
| 4. TOGGLE LEVERS | 9. STOP SCREW | 13. LINK TO FRONT LOWER CROSS SLIDE STATION 1 |

Fig. 23 CROSS SLIDE OPERATION 300 Z 65



AUXILIARY CROSS SLIDE OPERATION

Auxiliary Cross Slide Operation, Fig. 24, Page 67.

For special purposes, where the timing of standard cross slide cams and operating mechanism is unsuitable, the two upper and the two intermediate cross slides can be operated from Auxiliary Cross Slide Mechanisms, with limitations as outlined below.

The Auxiliary Cam Disc on the main camshaft in the drum housing is arranged so that cams can be mounted on either or both faces.

One Auxiliary Cam can operate the 3rd or 4th cross slide, but not both. On **Double Bar Feed** Machines, however, this cam is not available for auxiliary cross slide operation, as it is used for operation of the Rear Bar Stop. The other auxiliary cam can operate the 5th or 6th (Cut-off) cross slides, but not both.

A common cam lever assembly is available for operation by these cams and operates links which are used in place of the standard connections to the feed rocker levers. The identification of all parts required for the conversions is shown in the Fig. 24, Page 67.

The common cam lever assembly has a split cap for the fulcrum boss and this fits on the upper toggle lever pin between the bosses on either side of the machine, as selected. A limited amount of adjustment of the ratio of the cam throw and the actual slide travel is provided, and gives a ratio of slide travel/cam throw of from 0.8 to 1.15 according to the scale setting. This scale cannot be calibrated in actual travel because of variations in the type and throw of the cam used.

The link connecting to Stations 4 and 5 slides is connected in the line with the standard links.

The link connecting to Station 3 and 6 slides is out of line with the standard position of the lever on the slide operating tube, but an additional keyway is provided and the lever is moved over to this key in line with the link.

Information for design of Auxiliary Cross Slide Cams is given on Fig. 24, Page 67, and should be used in conjunction with the Timing Diagram Fig. 16, Page 47.

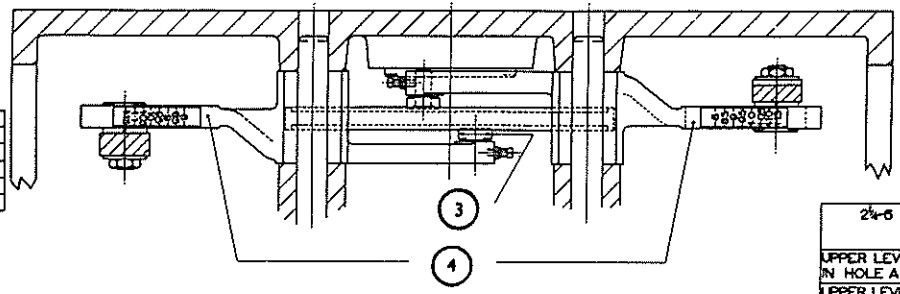
- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|-----------|------------------|----------|-------|----------|------|---------------|------|-----------|--|---|---|--|--|--|--|-----------|-----------|---|---|-----------|-----------|---|---|-----------|--|---|-----|---------|----------|------------------|---------------------------------|--|--|---|--|--|---------------------------------|--|--|---|--|--|---|--|--|---------|----------|------------------|---|--|--|--|
| <ol style="list-style-type: none"> 1. TWO AUXILIARY CROSS SLIDE MOTIONS CANNOT BE USED ON THE SAME SIDE OF M/C CONCURRENTLY. 2. <table border="0" style="display: inline-table; vertical-align: top;"> <tr> <td style="padding-right: 10px;">2.1/4-6</td> <td style="padding-right: 10px;">2.5/8"-4</td> <td style="padding-right: 10px;">SECTIONS</td> <td>REQD.</td> </tr> <tr> <td>6.5/8"-6</td> <td>8"-4</td> <td>393 393A 393B</td> <td>393C</td> </tr> <tr> <td colspan="2">STATION 3</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> </tr> <tr> <td colspan="4" style="text-align: right;">CAN ONLY BE USED WITH SECTION 339 & 339B</td> </tr> <tr> <td>STATION 4</td> <td>STATION 3</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> </tr> <tr> <td>STATION 5</td> <td>STATION 4</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> </tr> <tr> <td>STATION 6</td> <td></td> <td style="text-align: center;">1</td> <td style="text-align: center;">1 1</td> </tr> </table> 3. 1.1/2" ROLLER DIA. 4. SECTION 393 5. <table border="0" style="display: inline-table; vertical-align: top;"> <tr> <td style="padding-right: 10px;">2.1/4-6</td> <td style="padding-right: 10px;">6.5/8"-6</td> <td>— STATIONS 4 & 5</td> </tr> <tr> <td colspan="3">UPPER LEVER CONNECTED IN HOLE A</td> </tr> <tr> <td colspan="3">SLIDE MOVEMENT - CAM RISE X SCALE READING</td> </tr> <tr> <td colspan="3">UPPER LEVER CONNECTED IN HOLE B</td> </tr> <tr> <td colspan="3">SLIDE MOVEMENT - CAM RISE X SCALE READING</td> </tr> <tr> <td colspan="3" style="text-align: center;">2</td> </tr> <tr> <td style="padding-right: 10px;">2.1/4-6</td> <td style="padding-right: 10px;">6.5/8"-6</td> <td>— STATIONS 3 & 6</td> </tr> <tr> <td colspan="3">SLIDE MOVEMENT - CAM RISE X SCALE READING</td> </tr> </table> 6. PART SECTION 'BB' 7. REAR OF MACHINE 'B' | 2.1/4-6 | 2.5/8"-4 | SECTIONS | REQD. | 6.5/8"-6 | 8"-4 | 393 393A 393B | 393C | STATION 3 | | 1 | 1 | CAN ONLY BE USED WITH SECTION 339 & 339B | | | | STATION 4 | STATION 3 | 1 | 1 | STATION 5 | STATION 4 | 1 | 1 | STATION 6 | | 1 | 1 1 | 2.1/4-6 | 6.5/8"-6 | — STATIONS 4 & 5 | UPPER LEVER CONNECTED IN HOLE A | | | SLIDE MOVEMENT - CAM RISE X SCALE READING | | | UPPER LEVER CONNECTED IN HOLE B | | | SLIDE MOVEMENT - CAM RISE X SCALE READING | | | 2 | | | 2.1/4-6 | 6.5/8"-6 | — STATIONS 3 & 6 | SLIDE MOVEMENT - CAM RISE X SCALE READING | | | <ol style="list-style-type: none"> 8. 12 HOLES 3/8 BSF. EQUI-SPACED ON 13.1/2 PCD. 12 HOLES 3/8 BSF. EQUI-SPACED ON 9.1/8 PCD. 12 HOLES 3/8 BSF. EQUI-SPACED ON 6.5/8 PCD. 9. MAX. & MIN. RADII TO ROLLER CENTRE WHEN OPERATING ON UPPER CROSS SLIDE. 10. SECTION 393B 11. SECTION 393A 12. ROTATION 13. 'A' FRONT OF MACHINE 14. GROOVE IN THIS POSITION AT 0° TIMING 15. MAX & MIN. RADII TO ROLLER CENTRE WHEN OPERATING ON INTERMEDIATE CROSS SLIDE 16. 0° TIMING ANGLE 17. 15" O/D CAM DISC 18. 14,5036 14,5000 CAM LOCATING DIA. 19. 5/8 THICKNESS OF CAMS 20. PART SECTION 'AA' 21. MAX. THAT SCREW SHOULD ENTER CAM DISC IS 9/16 22. 5,625 5,623 DIA. |
| 2.1/4-6 | 2.5/8"-4 | SECTIONS | REQD. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6.5/8"-6 | 8"-4 | 393 393A 393B | 393C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| STATION 3 | | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CAN ONLY BE USED WITH SECTION 339 & 339B | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| STATION 4 | STATION 3 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| STATION 5 | STATION 4 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| STATION 6 | | 1 | 1 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2.1/4-6 | 6.5/8"-6 | — STATIONS 4 & 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| UPPER LEVER CONNECTED IN HOLE A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SLIDE MOVEMENT - CAM RISE X SCALE READING | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| UPPER LEVER CONNECTED IN HOLE B | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SLIDE MOVEMENT - CAM RISE X SCALE READING | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2.1/4-6 | 6.5/8"-6 | — STATIONS 3 & 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SLIDE MOVEMENT - CAM RISE X SCALE READING | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Fig. 24 AUXILIARY CROSS SLIDE OPERATION 393 Z 10

2

2 1/8 - 6	2 3/8 - 4	SECTIONS	REDD.	
6 7/8 - 6	6" - 4	303	303A	303B
STATION 3		1	1	1
STATION 4	STATION 3	1	1	
STATION 5	STATION 4	1	1	
STATION 6		1	1	1

CAN ONLY BE USED WITH PISTON 303A/B/C

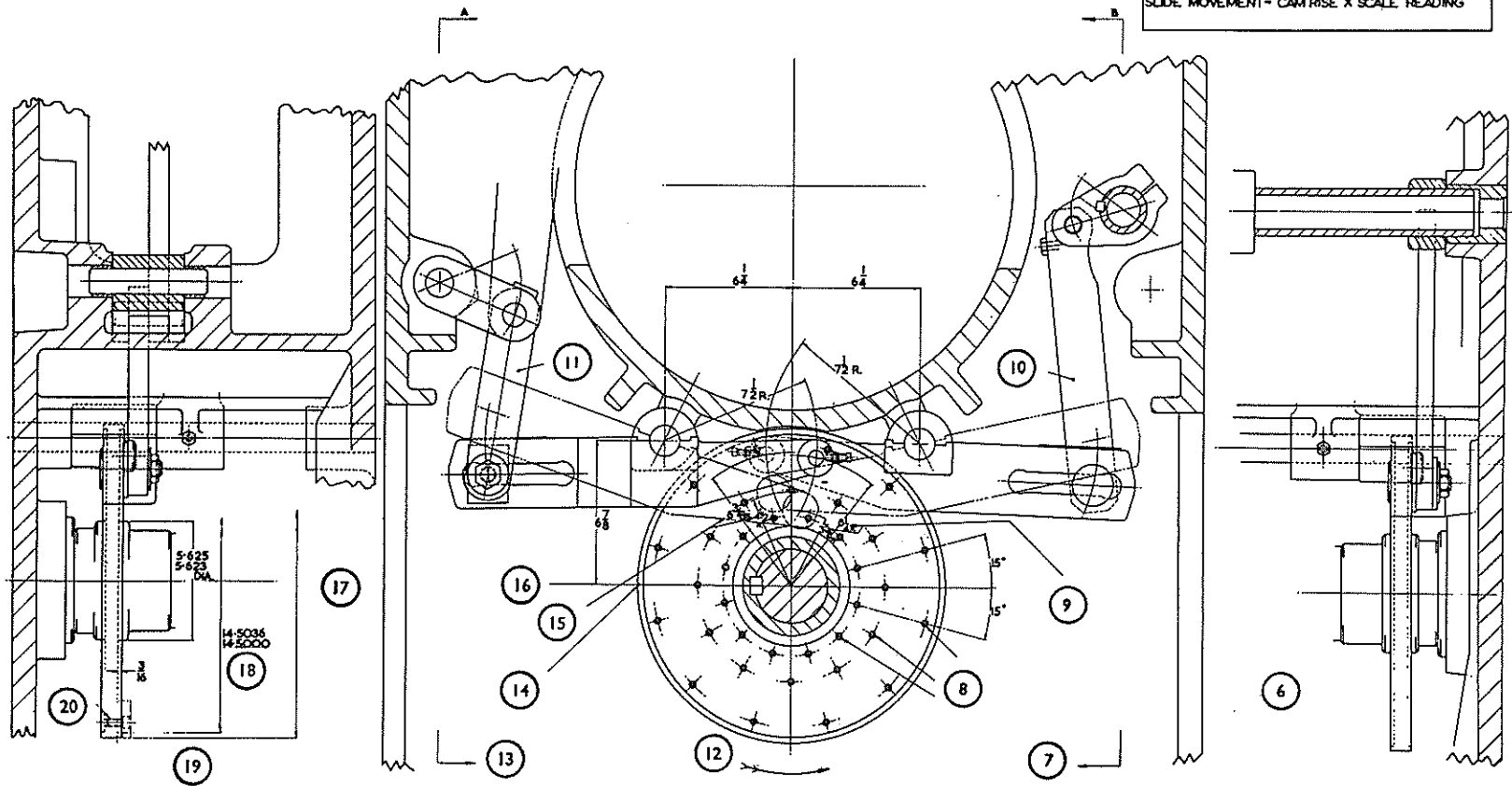


2 1/8 6 5/8 - 6 — STATIONS 4 & 5

UPPER LEVER CONNECTED IN HOLE A.	SLIDE MOVEMENT* CAM RISE X SCALE READING
UPPER LEVER CONNECTED IN HOLE B.	SLIDE MOVEMENT* CAM RISE X SCALE READING

2 1/8 6 5/8 - 6 — STATIONS 3 & 6

SLIDE MOVEMENT* CAM RISE X SCALE READING
--



COLLET OPERATING MECHANISM

Collet Operating Mechanism, Fig. 27, Page 73.

After the workpiece is cut off in 6th station, the collet is opened, bar stock is fed out to the bar stop which controls length and the collet is closed just before indexing commences (see Timing Diagrams, Fig. 16, Page 47).

The Collet Operating Mechanism consists of a cam-operated lever carried on a fulcrum pin in the bridge between the drum housing and the end bracket and connected at its upper end to the collet slide by a link. The link pin in the upper end of the lever is eccentric and is clamped in the lever so that the position of the collet slide and bobbins can be adjusted to ensure that the bobbins have overtravel beyond the point where the collet is fully closed, see Fig. 25, Page 69 for dimension.

The collet slide slides on two round bars and carries the collet shoe, which is spring loaded to engage each collet bobbin in turn. The collet shoe can be disengaged from the bobbin for setting up purposes by turning the **Collet Shoe Lever** to the "dead-centre" position of the eccentric.

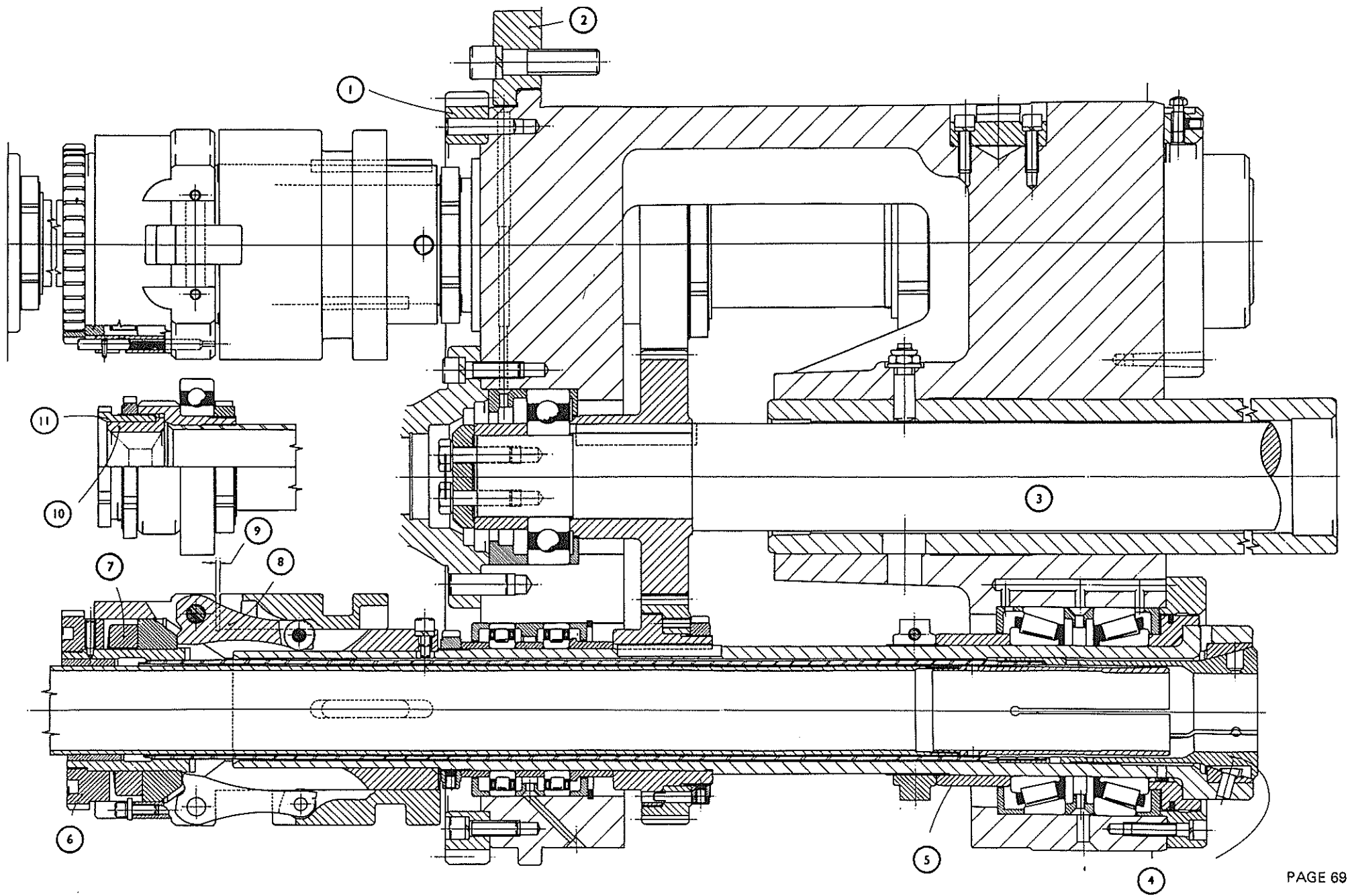
When a collet shoe is replaced by a new one, the face of the new shoe should be adjusted by filing so that the eccentric reaches the "dead-centre" position and thus holds the shoe disengaged.

Hand Operation of the collet is provided by inserting the hand lever in its boss on the shaft in the end bracket. The inner lever, clamped on the shaft serrations, is connected to the cam lever by a link so arranged that the operator has considerable purchase over the load. The angular position of the hand lever can be varied to suit the operator by moving the inner lever on the shaft serrations. The collet can be operated by hand only while the cam roller is in the gap provided in the cam track. The timing switch cam for the trip mechanism should be set so that it operates at the point (indicated on the timing dial), so that, when the feed trips, there is no pressure on the collet shoe and burning of the shoe is avoided.

Collet adjustment is made by withdrawing the locking plunger and turning the adjusting nut, using the special tool provided. One pin of the tool should be placed in the groove in the face of the nut, while the other rests in any half-round notch. The tool can be used to "ratchet" the nut in either direction, giving very quick adjustment. Alternatively an adjustable pin spanner can be used in a similar way. The thread is LEFT HAND.

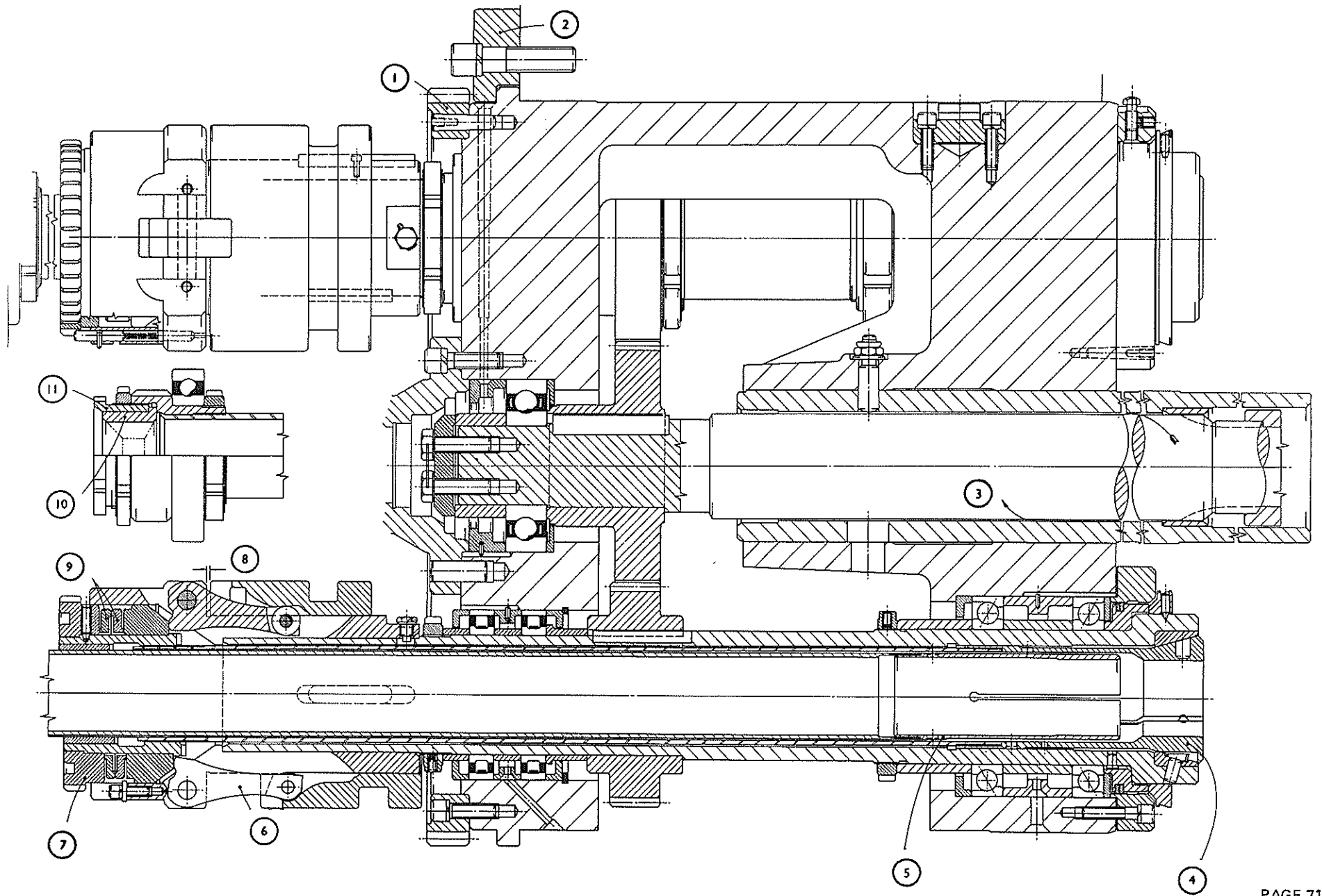
1. INDEXING GEAR
2. THRUST BLOCK
3. CENTRE SHAFT 'C'
4. COLLET (LEFT HAND THREAD)
5. FEED FINGER (LEFT HAND THREAD)
6. COLLET ADJUSTING RING. (LEFT HAND THREAD)
7. COMPENSATING RING
8. TOGGLE
9. 1/8 (3mm) WHEN CLOSED
10. STEADY BUSH
11. SCREWED SLEEVE (LEFT HAND THREAD)

Fig. 25 WORKSPINDLE ARRANGEMENT 300 Z 66



1. INDEXING GEARS
2. THRUST BLOCK
3. CENTRE SHAFT ' C '
4. COLLET (L. HAND THREAD)
5. FEED FINGER (L. HAND THREAD)
6. TOGGLE
7. COLLET ADJUSTING RING (L. HAND THREAD)
8. 1/8 (3mm) WHEN CLOSED
9. COMPENSATING WASHERS
10. STEADY BUSH
11. SCREWED SLEEVE (L. HAND THREAD)

Fig. 26 SPINDLE ARRANGEMENT 2.1/4" CAPACITY 6 SPINDLE STANDARD MACHINE A.C. BEARINGS 300 Z 66A



300 Z 66 A

BAR FEED MECHANISM

Bar Feed Mechanism, Fig. 27, Page 73

The bar feed is operated in the forward direction by a spring loaded, cam-controlled lever, also carried on a fulcrum pin in the bridge and having an arcuate T-slot in its upper part. The return movement is positive by cam. Stop screws in the T-slot limit the range of adjustment of the slidable stroke-setting block, which is clamped by a T-slot and hexagon nut. A link connects the cam lever to the bar feed slide, which slides on the same guide rods as the collet slide.

The Bar Feed Spring Tension may be adjusted by means of the two nuts on either side of the spring plate on the screwed rod. The spring load should always be kept at the minimum possible for consistent bar feeding length.

The Bar Feed Stroke Length may be adjusted, preferably with the mechanism in the forward position, by adjusting the stroke-setting block to the adjacent scale. The forward position of the bar feed slide is constant irrespective of stroke. Before adjusting the stroke and particularly before **increasing** the stroke, precautions described later should be taken against straining the mechanism.

The Safety Link between the bar feed stroke lever and the bar feed slide is hinged in the middle and provided with a spring plunger and suitable abutments, so that during the forward stroke it is rigid and during the return stroke it will collapse if there is an overload above the value determined by

the plunger spring. Thus, with spring operation in the forward direction and the spring loaded safety link for protection in the return direction, the bar feed mechanism is protected from damage.

If the safety link collapses, the cause of the overload should be found and the link re-set by forcing it to re-engage by blows with a soft faced hammer.

The Bar Feed Slide has the feed tube **Aligning Ring** bolted to it and this serves to pull the feed tube in the 6th station back after the collet is closed, during the first half of the index of the spindle from 6th to 1st station. The Aligning Ring also serves to keep all the other feed tubes in the back position.

The Bar Feed Shoe is also carried in the bar feed slide and pushes the feed finger forward. The shoe has a stop screw which is adjusted to control and limit the engagement of the shoe with the outer race of the feed tube ball bearing. The Shoe is also spring loaded against this stop so that in the event of a feed tube indexing out of endwise position the shoe will be depressed without damage, but the tube will not be fed forward.

The Bar Feed Shoe Lever (on later machines) engages or disengages the bar feed and is mounted on a splined shaft passing through a bracket, bolted to the machine end bracket, into the splined pivot sleeve of the bar feed shoe in the bar feed slide.

It is used for external operation and the handle has a spring loaded plunger which locates in a hole to hold the shoe in the disengaged position.

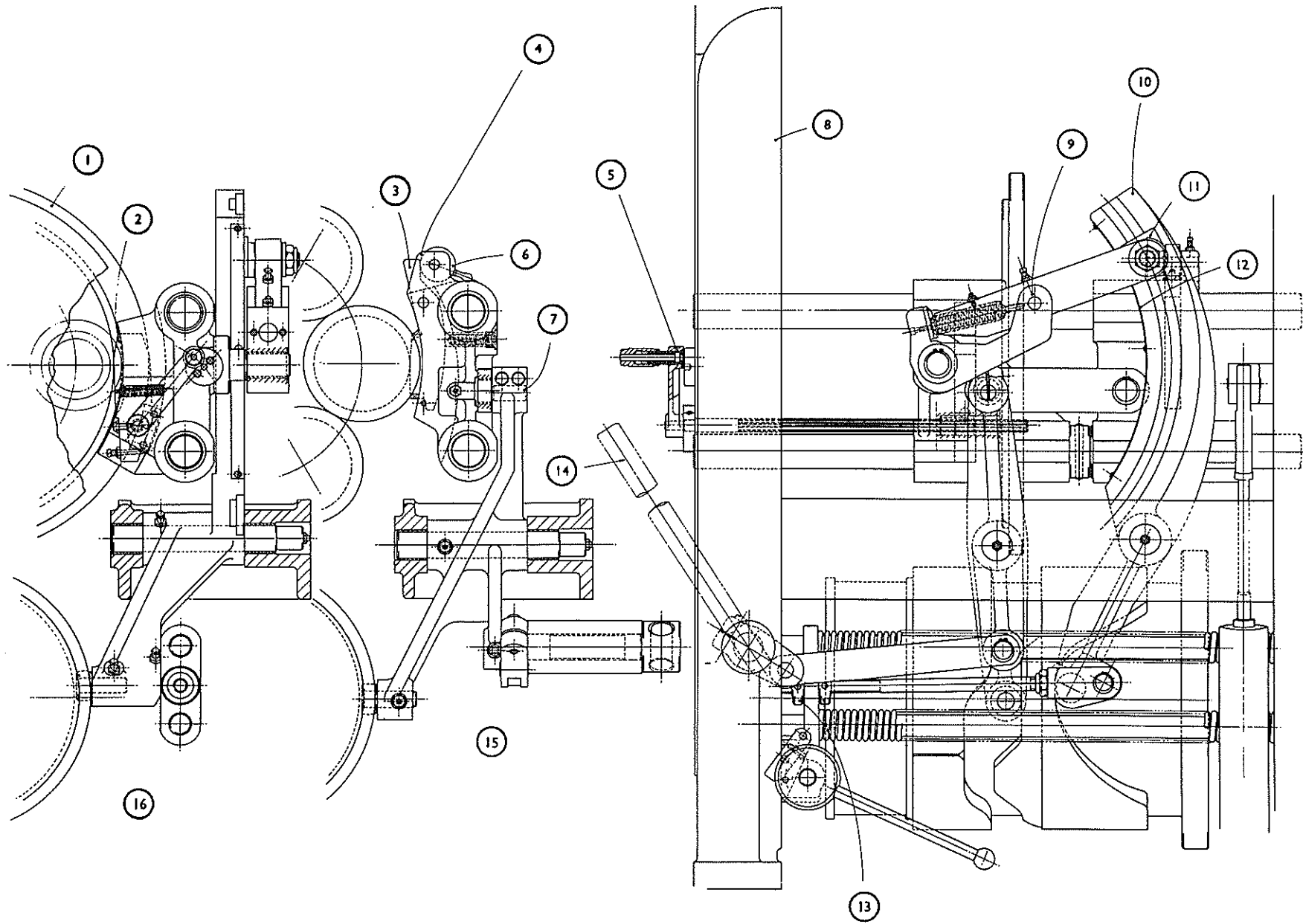
The Bar Feed Shoe Plunger (on early machines) is spring loaded and arranged so that it can be turned and held out of action or released to engage a hole in the side of the shoe, when the latter is depressed by hand, thereby preventing the feed tube being fed forward. On later machines the Bar Feed Shoe Plunger is replaced by the Bar Feed Shoe Lever which is arranged for external operation.

The Guide Ring (see Fig. 28, Page 77) is carried on two bars, is adjustable along them, and is clamped in position by pad bolts. The guide ring is cut away in 6th station to clear the bar feed slide. It guides the feed tube ball bearings during their progress from station to station, between the aligning ring and the several spring loaded guide ring segments which are provided to avoid damage in the event of faulty setting.

The position of the guide ring should be set with the machine wound by hand to the position where the bar feed slide has been fully returned, and preferably with the spindle drum locked, so that there is about 1/32" (0.8mm.) clearance between the feed tube ball bearings and the spring loaded guide ring segments. An open wrench is used on the hexagon of the rack pinion to move the guide ring.

- | | | |
|--|------------------------|--|
| 1. ALIGNING RING | 5. BAR FEED SHOE LEVER | 11. STROKE SETTING BLOCK |
| 2. BAR FEED SHOE | 6. COLLET SHOE LEVER | 12. SCALE |
| 3. COLLET SHOE | 7. ECCENTRIC LINK PIN | 13. SPRING ADJUSTING NUTS |
| 4. NOTE:- WHEN FITTING NEW COLLET SHOE, ADJUST FACE IN CONTACT WITH ECCENTRIC UNTIL ECCENTRIC LOCKS OVER IN DISENGAGED POSITION. | 8. END BRACKET | 14. END VIEW OF COLLET OPERATING SLIDE & LEVER |
| | 9. SAFETY LINK | 15. COLLET HAND LEVER. |
| | 10. BAR FEED CAM LEVER | 16. END VIEW OF BAR FEED SLIDE & LEVER |

Fig. 27 BAR FEED & COLLET OPERATING MECHANISM 300 Z 78



AUTO STOP MECHANISM

The Auto Stop Sensing mechanism (see Fig. 28, Page 77 and note setting instructions), is used to feel if the feed finger has been drawn off the end of the bar stock, and when this occurs to release a limit switch to prepare a circuit to an electrical control relay in the control panel. When the cam operated timing switch closes, the relay will be energised to close the separate circuits to the feed trip solenoid and the signal lamp.

The Sensing Finger is mounted on sliding trip shaft D, spring loaded towards the stock carriage by the spring N. The finger is set in position (after setting the Guide Ring as above and with the spindle drum fully locked) so that it sits in the cut-out on the rear face of the **Aligning Ring**. An easy way of obtaining this setting is provided by the cap screw projecting from the guide ring. When the boss of the sensing finger lever is pushed forwards into contact with the head of the cap screw, the setting is correct. The spring load is adjusted by means of the sleeve and nut S. The spring load is controlled by a cam roller Q on a bracket located between collars on the shaft through a cam on the inside face of the stock carriage driving disc R. The sliding shaft is free to rotate within the cam roller bracket, for the purpose described later and the cam roller bracket is prevented from twisting about the shaft by the torque pin.

The cam is so timed that it will allow the sensing finger and its shaft to slide towards the stock carriage, if there is insufficient resistance, during the period when each spindle in turn is indexing towards the bar feeding station.

If the feed finger has already been drawn back off the end of the bar stock, the spring load of the sensing finger will be sufficient to draw it towards the stock carriage.

If the feed finger is still gripping the bar stock, the spring load of the sensing finger will be insufficient to move it.

The drop of the cam is 3/16" (5mm.) and this is the amount of travel of the sensing finger and shaft when the feed finger is off the end of the bar stock.

The outer end of the shaft carries a lever E having an abutment face bearing against the head of a screw F carried in the trip lever G. This lever is pivoted in the sensing mechanism bracket and has a latch face at one end and a limit switch tappet screw J at the other. When the feed tube, sensing finger, shaft and lever move endwise, the limit switch screw releases the limit switch K so that its contacts are closed and the adjacent spring loaded latch plunger L engages the latch face to hold the trip lever clear of the limit switch. Closing of the limit switch contacts prepares the trip and signal relay circuit, which is completed when the cam operated timing switch closes at the point in the cycle when the collet is open ready for the next bar to be inserted. The feed clutch is tripped, leaving the spindles running.

After a new bar has been loaded and the collet closed by hand, the latch plunger L is pulled out to release the trip lever G. This operates the limit switch K to open its contacts, thus opening the relay circuit, the signal lamp circuit, and de-energising the solenoid so that the feed clutch may again be engaged after starting the machine.

For setting up and test purposes, when it may be necessary to run the machine with only one or even no bars in the machine, the sensing mechanism may be made inoperative by pulling out the latch plunger L and turning the Stop P to hold the plunger out of engagement.

Continued.....

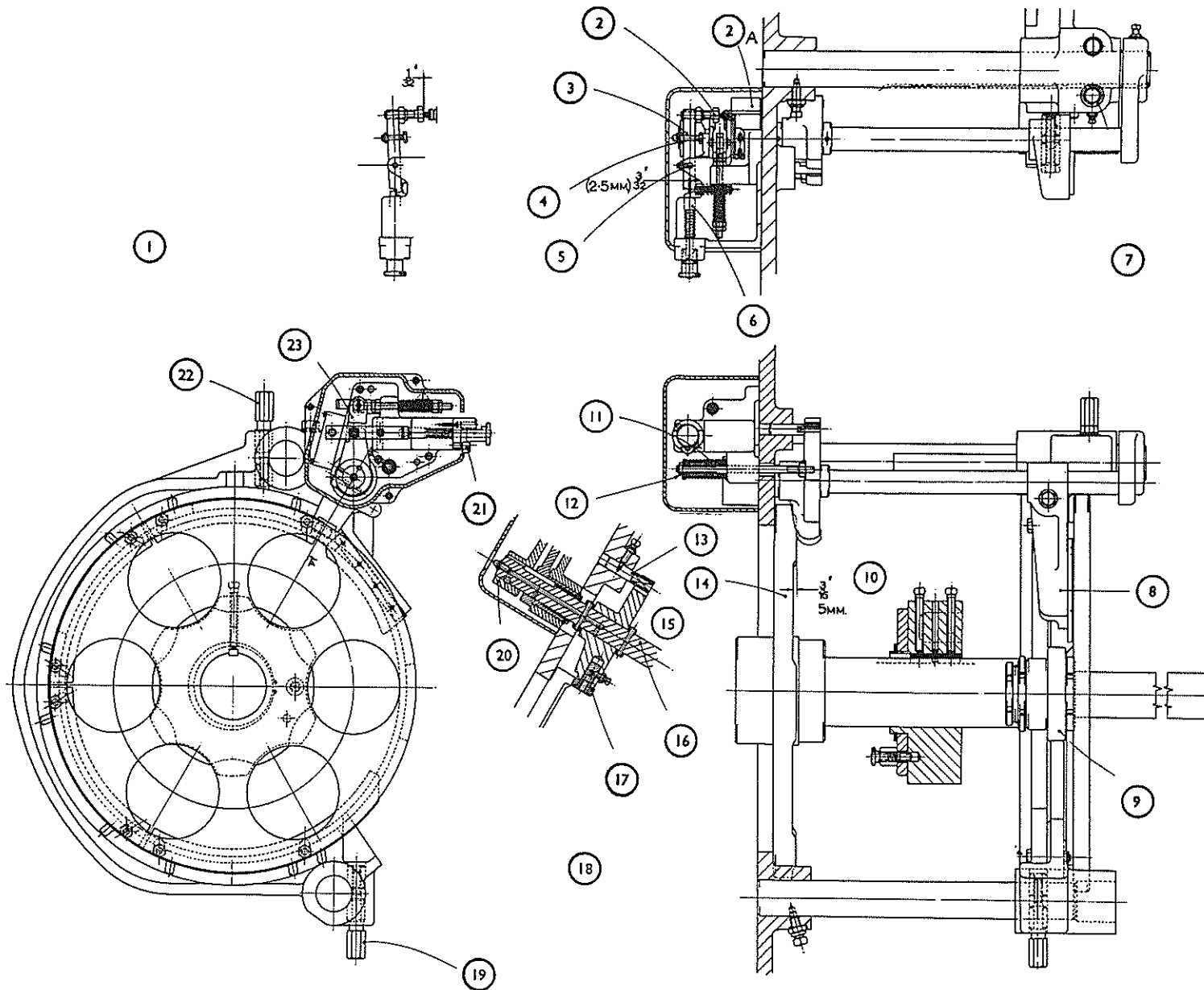
AUTO STOP MECHANISM

An additional lever M is pivoted in the sensing mechanism bracket and is keyed to the sliding shaft which slides through it. The Lever M has a spring rod attached to it and a pair of stop nuts on the rod are used to set the angular position of the sliding shaft and the sensing finger, so that the latter is set correctly in relation to the index circle and engages the feed tube ball bearing equally all round. The spring is adjusted to provide an adequate load.

In the event of a feed tube accidentally indexing out of place endwise in relation to the sensing finger, the finger will be swung out of the way without damage. This also applies when hand-winding backwards.

- | | |
|---|---|
| 1. VIEW SHOWING TAPPET SCREW 'J' WITH PLUNGER 'L' IN ENGAGEMENT WITH TRIP LEVER 'G' | 14. DISC 'R' |
| 2. TAPPET SCREW 'J' | 15. SECTION 'AA' |
| 3. TRIP LEVER 'G' | 16. TRIP SHAFT 'D' |
| 4. SCREW 'F' | 17. ROLLER 'Q' |
| 5. PIVOT PIN 'H' | 18. SETTING INSTRUCTIONS:- WITH ROLLER 'Q' ON PEAK OF CAM ON DISC 'R' ADJUST SCREW 'F' UNTIL TRIP LEVER 'G' OVERLAPS PLUNGER 'L' TO DIMENSION 3/32 AS SHOWN, DEPRESS LEVER 'G' AND ENGAGE PLUNGER 'L', AND ADJUST HEAD OF TAPPET SCREW 'J' 1/32 CLEAR OF LIMIT SWITCH 'K' AS SHOWN (1/32 = .75mm) |
| 6. PLUNGER 'L' | 19. LOWER PAD BOLT |
| 7. ADJUSTING PINION | 20. LEVER 'E' |
| 8. SENSING FINGER | 21. STOP 'P' |
| 9. FEED TUBE BOBBIN BEARING 'B' | 22. UPPER PAD BOLT |
| 10. CAM ON FACE OF DISC | 23. LEVER 'M' |
| 11. SPRING 'N' | |
| 12. NUT 'S' | |
| 13. TORQUE PIN | |

Fig. 28 AUTO STOP MECHANISM 300 Z 64



BAR STOP & REVERSE OPERATION

The Bar Stop (See Fig. 29, Page 79)

The bar stop is used to control and limit accurately the length of bar fed out when the collet is open. It is mounted on the bar stop shaft carried in the 6th station Cut-off Slide bracket and a bracket on the main drive housing. The thrust of the bar hitting the stop is taken on the latter bracket. Lengthwise adjustment of the bar stop is made in coarse steps by means of the pin through the bar stop sleeve and the several holes in the shaft. Fine adjustment is made by the two locknuts along the thread of the sleeve.

The bar stop normally swings downwards into its operative position. On this machine the operating mechanism can alternatively be arranged to swing the stop upwards into its operative position but this is not recommended as it then tends to interfere with the work chute. Details are, however, given later.

During the working cycle of the machine, the bar stop mechanism is held against the positive stop by the tension spring and the bar stop is away from the workpiece. When the cam operates the lever to bring the stop to its operative position against the pull of the tension spring, the stop screw comes into contact with the stop stud to control the angular position of the bar stop in line with the spindle. At the same time loading the preloaded compression spring within its tube to the amount shown on Fig. 29, Page 79, thereby holding the bar stop securely in position. To adjust the amount of load to the amount given, the complete spring, tube and rod assembly should be turned with a wrench on the hexagon nut A and the locknut B—finally locked up.

The preloaded compression spring and tube assembly ensures that the mechanism cannot be damaged in the event of a jam as the bar stop swings to its operative position.

When the automatic trip mechanism trips the feed clutch with the collet open ready for insertion of a new bar, the old bar end should first be taken out of the collet by holding the bar stop upwards out of its position by means of the hand lever which compresses the spring in its tube.

Reverse Operation of the Bar Stop

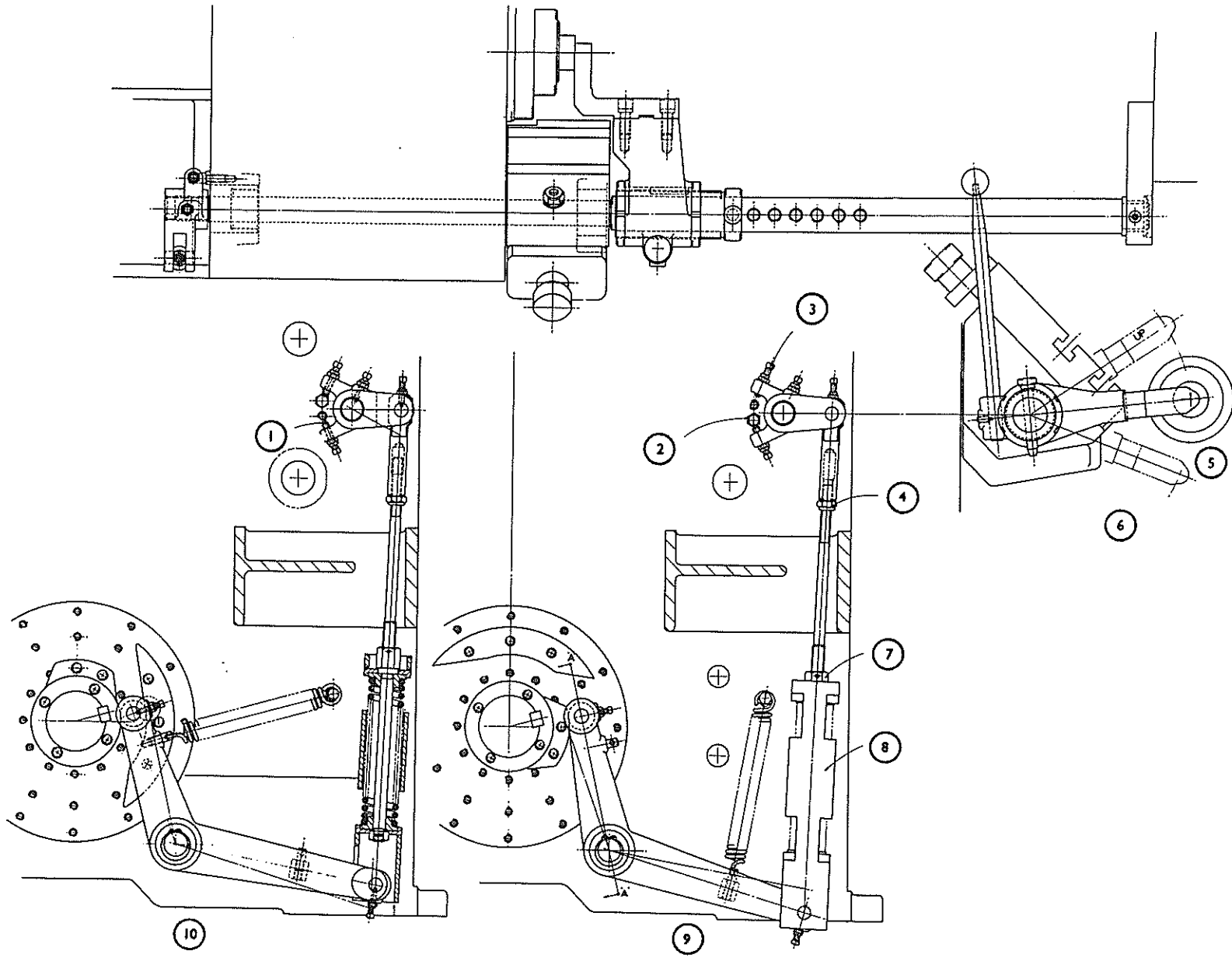
When it is necessary to reverse the operation of the bar stop, as mentioned above, so that it swings upwards to its operative position, the tension spring is attached to the lower arm of the cam lever as shown. The bar stop inner and outer cams are also re-positioned relative to the keyway in the main camshaft as shown. With this arrangement the inner cam advances the stop and the outer cam retracts it. The stop stud is also re-positioned in the upper of the two holes.

The lower stop screw is then adjusted to bring the bar stop in line with the spindle in the operative position and the spring, tube and rod assembly turned with a wrench on the hexagon nut A and the locknut B locked to give the amount of preload shown on Fig. 29, Page 79.

With this arrangement the hand lever is used to depress the bar stop while removing bar ends.

1. ADJUST SCREW TO MAINTAIN ROLLER 1/32" (1mm) CLEAR OF PEAK OF INNER CAM
2. STOP SCREW
3. SET THIS SCREW TO CLEAR WHEN STOP IS SWINGING 'DOWN'
4. LOCKNUT 'B'
5. DOWN
6. TO SET THE BAR STOP TO SWING DOWN CHANGE POSITION OF SPRING, STOP SCREW AND CAMS AS SHOWN
7. HEXAGON NUT 'A'
8. ROD TO BE ADJUSTED TO GIVE 1/16" (1.5mm) COMPRESSION OF SPRING BOX WHEN STOP IS IN POSITION SHOWN (THIS APPLIES FOR 'UP' & 'DOWN' SWINGING STOP)
9. ARRANGED FOR STOP TO SWING 'DOWN' (SPECIAL)
10. ARRANGED FOR STOP TO SWING 'UP' (FITTED AS STANDARD)

Fig. 29 BAR STOP (6TH STATION) 300 Z 79



300 Z 79

STOCK CARRIAGE

(See Fig. 30, Page 81).

The stock carriage comprises two principal parts, the stand and the tube assembly.

The Stand is in one piece and should be bolted to the floor in line with the machine, to dimensions given on the Foundation drg. Fig. 1, Page 7. Alignment in both vertical and horizontal planes is made by adjusting the appropriate levelling screws which should bear on steel plates. The rollers on which the tube assembly rotates are crowned slightly to accommodate minor errors in alignment.

Cavities in the stand may be used for storing loose equipment and tools.

The Tube Assembly has a central tube to which are welded two discs to space and guide the stock tubes. The rear disc is carried on the rollers in the stand.

At the machine end the central tube is connected to its driving disc (which is driven by the stem bolted to the back of the spindle drum) by a coupling designed to have a limited amount of both torsional and longitudinal flexibility. A ring which is bolted and tenoned to the driving disc is provided with a cross pin and flanged synthetic bushes which give the necessary flexibility.

When mounting the tube assembly, it is not necessary to detach the ring or cross pin as the complete assembly is secured by the six cap screws.

The Stock Tubes each have a split and clamped cap at the outer end and a flanged cap at the inner end which retain the stock springs between them.

The standard stock springs have a capacity of 2.1/4" (57mm.) (2", 51mm., on 2" -6 spindle machines), but alternative or additional springs are available for 1.1/4" capacity on both machines.

The springs are convoluted to provide resilient support for the bar stock and reduce noise. They should be kept well lubricated with soft grease and all bars should be wiped over with grease or oil before insertion.

Three clamps are spaced between pairs of tubes and are used to secure the tubes.

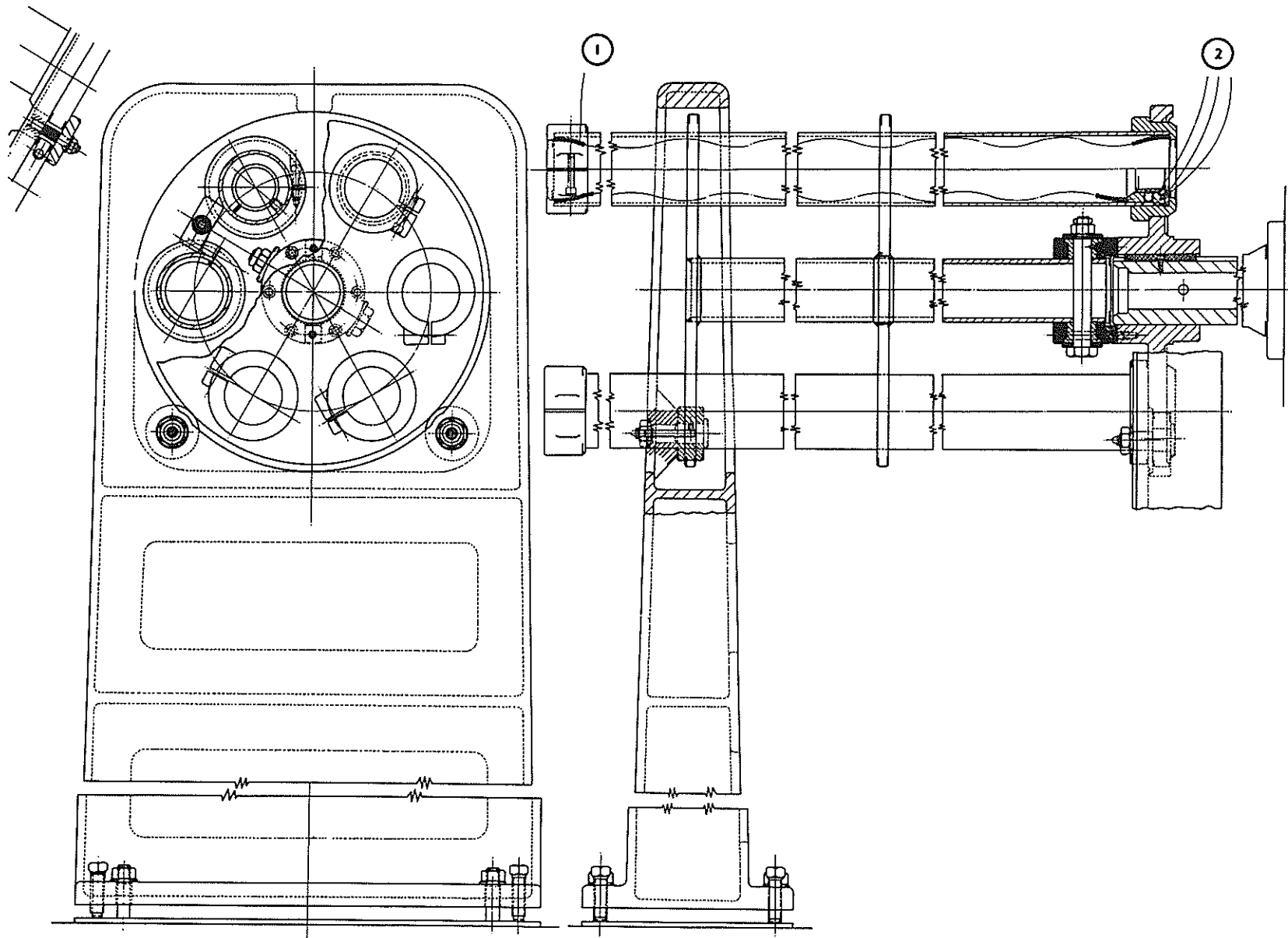
For changing of feeders each stock tube may be drawn back to allow the feeder and its tube to be withdrawn.

When inserting a new bar of round stock (which should be chamfered at both ends), it should be pushed rapidly forward so that its inertia will force it into the feeder. Following this, it should be tapped in, using a scrap piece of bar, in short, sharp blows. Hexagon bar should be carefully entered into the feeder before tapping it through.

On 2.1/4"-6 machines, optional extra equipment can be provided to mount steady bushes in the machine end of the stock tubes.

1. (57.5 mm) 2.1/4 CAPACITY SPRING(STANDARD)375. X. 169
(32 mm) 1.1/4 CAPACITY SPRING (SPECIAL) 375. X. 170
2. THESE PARTS SUPPLIED TO SPECIAL ORDER ONLY

Fig. 30 STOCK CARRIAGE 300 Z 58



LUBRICATING SYSTEM

(See Fig. 4, Page 15).

The oil tank is situated in the tray in front of the main drive housing. A dip stick is provided and the tank oil level should be regularly checked.

Care should be taken to put only lubricating oil in the tank. Use Wickman Oil Grade 4 (See Fig. 39, Page 103). The tank is filled by removing the front attachment drive compartment cover and pouring the oil into the drive housing from whence it drains into the tank.

The Lubrication Pump is of the gear type and is chain driven from the constant speed pulley shaft. The pump is mounted in an eccentric bush for chain adjustment and is locked by a locknut.

Oil is drawn through a strainer with an adjacent foot valve to avoid priming. A relief valve is also fitted in the intake pipe to release pressure should the main motor be started in the wrong direction. The oil is pumped through a Purolator scraper type filter to a further relief valve set at a high pressure which does not normally require adjustment. The Purolator knob should be turned daily and the element removed and cleaned periodically. Part of the oil is pumped to a Micronic filter and then on to the spindle bearing sight feeds as well as all

points feeding the upper cross slides, drum housing and collet and bar feed mechanisms.

The Micronic filter has a replaceable element which must be changed periodically. A spare element is provided in the equipment with the machine.

Part of the oil is by-passed before the Micronic filter to a second relief valve which is adjusted to about 20 lbs/sq.in. (1.4kg./cm²) and it is this pressure which is read at the pressure gauge. This oil circulates to various needle valve headers and spray pipes arranged to feed points in the drive housing. Oil is also fed to the drip tray above the longitudinal slide mechanism. This tray is provided with drip pipes to feed all important parts of the mechanism.

The spindle bearing sight feeds are most important and should be observed continuously to see that the rate of feed is steady and in accordance with the instruction plate. The actual rate of feed should be adjusted according to spindle speed, but should be kept on the generous side while the machine is new.

The lubrication system is adjusted correctly before despatch but should be checked on installation and at regular intervals.

COOLANT SYSTEM

The Coolant Pump, which is of the gear type, Fig. 12, Page 37, is mounted on the attachment face of the drive housing. The pump is chain driven from the pulley shaft. A jockey wheel and arm are provided for chain adjustment. The pump drive shaft, which passes through the drive housing, is friction driven from the driven chain wheel by means of a spring ring. Should an overload occur in the pump the drive will slip, but the motor should be stopped as soon as possible to avoid overheating. If the machine is required to run without coolant, the spring can be removed and the chain wheel will run loosely on the shaft, Fig. 12, Page 37. The coolant is drawn from the tray through a strainer box which should be kept correctly fitted over the intake pipe. The strainer, which is fitted with a loose lid, should be inspected and cleaned at regular intervals.

A relief valve is fitted to the pump outlet and overflow is piped back into the tray. Coolant taps are provided on headers on each side of the machine and adjacent to the lower cross slides.

Holes for additional coolant taps are provided with taper plugs in the headers. On some set-ups it may be found advantageous to use the alternative holes so that the flexible pipes are clear of other pipes or attachments.

SWARF CONVEYOR

(See Fig. 3, Page 11).

The Swarf conveyor is fitted as an optional extra, but conduit and wiring is normally fitted in the standard machine to simplify installation. The conveyor is of the screw type driven by a ¼ h.p. motor and reduction gearbox controlled by push buttons on the control panel door.

A shear pin in the coupling adjacent to the motor gearbox provides overload protection in addition to that provided by thermal trips in the motor starter. Spare shear pins are supplied in a container clipped to the side of the conveyor. Before replacing a shear pin, the cause of overload should be found and removed. Holes are provided in the end of the conveyor screw so that it can be turned by hand.

Quickly detachable sheet steel chutes are fitted in the tray between the main housings to guide the swarf into the conveyor. A sheet steel channel is closely fitted into the conveyor trough and serves to prevent coolant washing swarf out of the conveyor before it is packed in to the screw. The coolant overflows from the lip of the channel at a relatively high level and falls into a strainer placed below it. This strainer removes small swarf carried in suspension in the coolant.

1. N/MIN
2. CUTTING SPEED FT./MIN.
3. CUTTING SPEED METRES/MIN.
4. DIA. M/M.
5. DIA. INS.

Fig. 31 CUTTING SPEEDS TABLE 300 V 153

⑤	1/4	85	76	68	60	54	47	42	37	33	30	27	25	25	22	20	18	16	13	12	11	9.6	8.6	7.9	7.2	②
	1/2	170	152	135	121	108	93	83	74	66	59	54	50	49	44	39	35	31	27	24	22	19	17	16	15	
	1	341	303	270	241	216	186	167	149	133	118	109	100	99	88	78	70	63	54	48	43	38	34	31	29	
	1 1/2	511	455	405	362	324	279	250	223	199	177	163	150	148	132	117	105	94	81	72	65	58	51	47	44	
	2	682	606	540	483	432	372	333	297	265	236	218	200	197	176	157	140	125	108	96	86	77	69	63	58	

④	5	20	18	16	14	13	11	10	8.9	8.0	7.1	6.5	6.0	5.9	5.3	4.7	4.2	3.8	3.2	2.9	2.6	2.3	2.1	1.9	1.7	③
	10	41	36	32	29	26	22	20	18	16	14	13	12	12	11	9.4	8.4	7.5	6.5	5.8	5.2	4.6	4.1	3.8	3.5	
	20	82	73	65	58	52	45	40	36	32	28	26	24	24	21	19	17	15	13	12	10	9.2	8.2	7.5	7.0	
	30	123	109	97	87	78	67	60	54	48	43	39	36	36	32	28	25	23	19	17	16	14	12	11	10	
	40	164	146	130	116	104	89	80	72	64	57	52	48	47	42	38	34	30	26	23	21	18	16	15	14	
	50	204	182	162	145	130	112	100	89	80	71	65	60	59	53	47	42	38	32	29	26	23	21	19	17	

PICK-UP ATTACHMENT FOR
WICKMAN 2 1/4in-6 SPINDLE
BAR MACHINE

PICK-UP ATTACHMENT FOR 2.1/4-6 BAR MACHINE

Pick-up attachments are available for 3rd and 6th stations. They may be used for either 'plain pick-up' where a component is steadied to provide a pipless part-off, or for 'pick-up and back machining operations' where a component is to receive a minor back machining operation after part-off such as chamfering, recessing or deburring. The latter is done in conjunction with a special bar stop cam and mechanism, with a suitable tool mounted on the rear face of the bar stop arm. See Figs. 32 and 36.

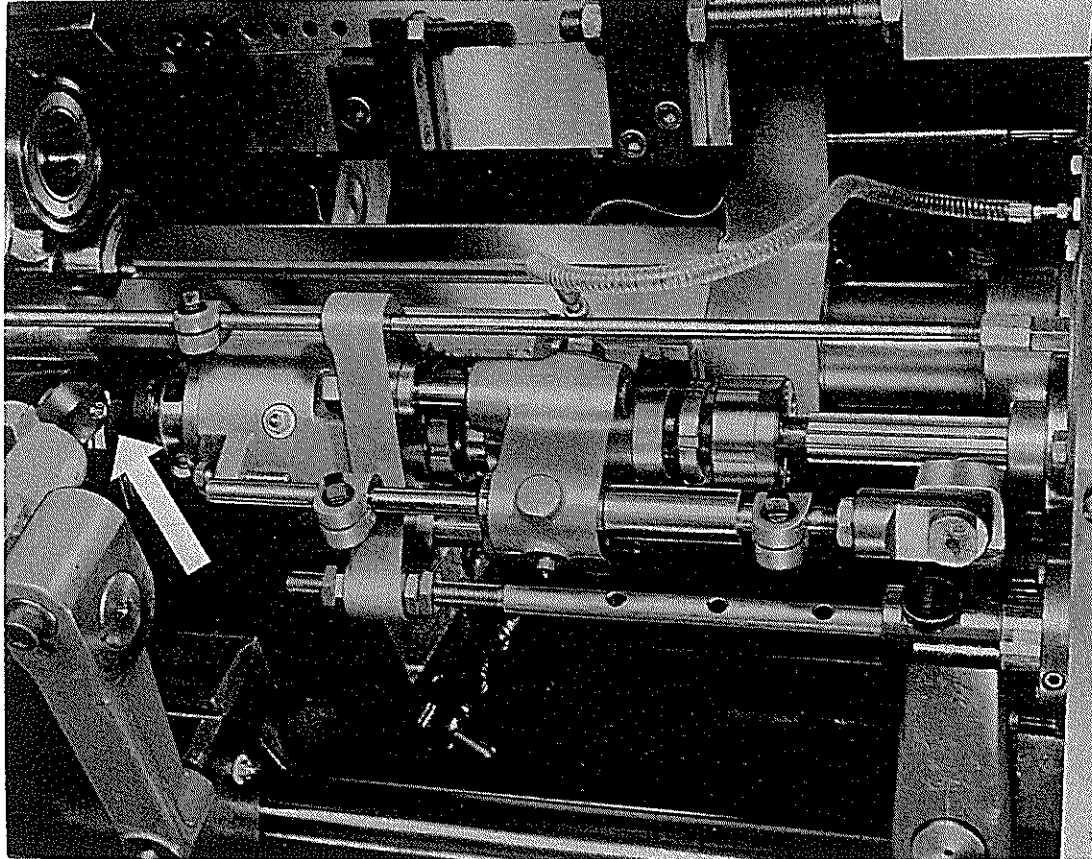
The pick-up attachment (Fig. 33) is of the dead length collet type with the collet operated by twin toggles 'A' controlled by a special cam mounted on the main camshaft in front of the main drive housing. (This cam together with its linkage is shown in Fig. 35. The attachment is slideable on the subslide 'B' bolted to the centreblock and is traversed by the standard auxiliary longitudinal motion. The component is gripped under the action of the spring compensating washers 'C' (Fig. 33) which take up any minor variation in component size.

Ejection of the component from the pick-up collet is normally of the solid type but spring-loaded ejection can be provided for special applications by inserting a suitable spring between the nut 'D' and the bush 'E'. In the case of solid ejection, the sleeve 'F' and the plunger 'G' allow for overtravel after collet opening. The pick-up ejector 'H' and the collet 'J' are made to suit the component.

The dead stop rod 'K' ensures that every component is picked up at the same position. The stop screw 'L' in conjunction with the stop pad 'EE' on the combined bar stop and back burr arm, see Fig. 36, ensures that the back forming operation is constant on all components.

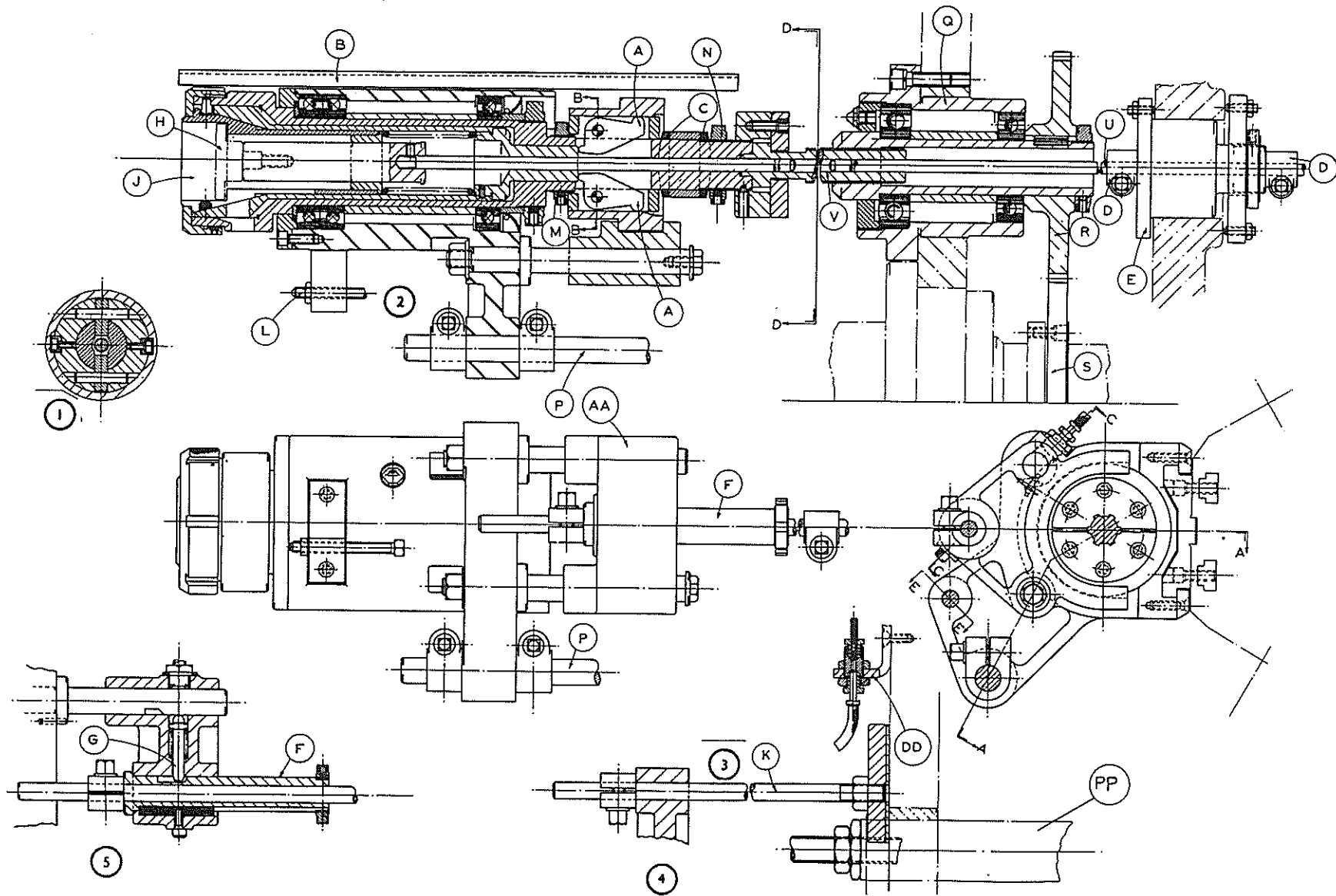
Cams for the longitudinal motion are supplied as standard for 'plain pick-up' only, but for 'pick-up and back machining' the cam is designed to suit the component. However, semi-standard cams are available to cover certain ranges of components and details will be given on application.

Fig. 32 VIEW OF PICK-UP ATTACHMENT SHOWING TYPICAL CUTTER ON BAR STOP ARM



1. SECTION 'BB' .
2. SECTION 'AA' .
3. DEAD STOP ROD
4. PART SECTION 'EE' .
5. PART SECTION 'CC' .

Fig. 33 ARRANGEMENT OF PICK-UP ATTACHMENT FOR 6TH POSITION



ASSEMBLY

The following procedure should be adopted when assembling 3rd or 6th Station attachments on machines.

Fit the standard auxiliary longitudinal motion 'PP' (Fig. 33) with cam. Assemble the bearing housing 'Q' in its appropriate bore in the main drive housing face and fit the attachment gear 'R' to mesh with the driving gear 'S' on the centre shaft. Next fit the ejector rod bung assembly 'E' complete with the ejector rod 'U' and nuts 'D' in the bore of inner wall of the main drive housing in line with the bearing housing.

Remove the splined shaft 'V' from the pick-up attachment and place it in the splined bush of the bearing housing 'Q'. Offer the attachment up to the machine complete with the auxiliary slide 'B', dead stop rod 'K', and pusher rod 'P', slide the tee nuts into the tee slots and lock the slide to the centre block.

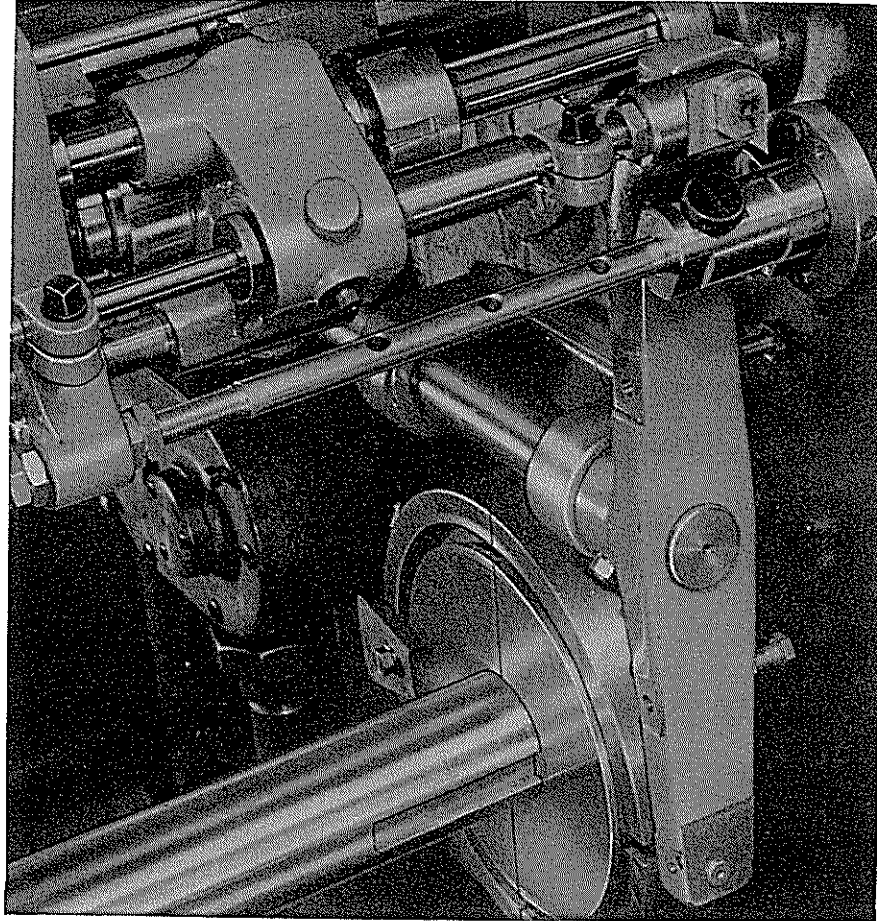
Re-assemble the splined shaft 'V' to the coupling, fit the pusher rod to the pusher shaft on the longitudinal motion and screw in the dead stop rod to the Main Drive Housing face, leaving all clamp nuts loose for the time being. Fit the pick-up collet 'J' and ejector 'H' to the attachment.

COLLET OPERATING MECHANISM

Assemble the cam drum 'Z' (Fig. 35) on the main camshaft in its approximate position. Offer up the pivot bracket 'W' complete with the lever 'X' and the pusher rod 'Y' to the main drive housing and slide the rod into the attachment glut sleeve 'F' (Fig. 33). Fix the bracket to the face of the main drive housing using the tapped holes provided and with the attachment in its maximum back position ensure that the rod 'Y' has free movement in the attachment sleeve 'F' before completely tightening up the cap screws. Finally slide the cam drum to centralise approximately in a vertical line with the pivot shaft.

Note:— On machines where tapped holes are not provided it will be necessary to drill and tap four suitable holes in the main drive housing face for the pivot bracket 'W'. In this case, the holes should be marked off the bracket and besides following the foregoing instructions, care should be taken to see that the pivot shaft 'V' is horizontal and that the pivot bracket is centralised with the machine centre line in the event of an extra Pick-up Attachment being required in the opposite station at some future date, i.e., 3rd and 6th stations combined.

Fig. 34 VIEW SHOWING COLLET OPERATING LINKAGE WITH CAM



COMBINED BAR STOP AND BACK MACHINING MECHANISMS

For pick-up and back machining applications, a special bar stop mechanism is required to replace certain parts of the standard bar stop mechanism, also a special bar stop cam is required to replace the standard cam. Reference should be made in the fitting of these, to the arrangement drawing of the combined bar stop and back machining mechanism (Fig. 36).

SETTING OF BAR STOP ARM

Handwind the machine to the first part of the fall of the bar stop cam. Next set the pad of the stop lever 'GG' (Fig. 36) to just touch the pad on the stop bracket 'FF'. Set the bar stop arm exactly on spindle centre line and with the adjusting nuts on the vertical bar stop rod in the rear compartment of the drum housing adjust the lever 'GG' until its pad is approximately 1/32" away from the stop bracket pad. Continued hand winding of the machine to the second part of the cam fall should now provide sufficient spring pressure on the stop pads with the bar stop arm on spindle centre line.

SETTING OF ATTACHMENTS

Adjust the tension on the pick-up attachment collet by gripping a test piece in the collet and adjusting the nuts 'M' and 'N' (Fig. 33) on the main spindle. The collet may be closed by inserting a lever between the side of the glut 'AA' and the end of the attachment body and pushing back. By this method it is possible to judge the amount of tension on the collet which is provided by the spring compensating washers 'C'. Care should be taken to tighten up the set screws in the nuts after adjustment.

Determine the stroke setting of the longitudinal motion from the tooling layout and set the scale of the motion to this figure. Handwind the machine over until the longitudinal

motion just reaches its maximum forward position. Push attachment to its correct maximum forward position, and tighten up the clamp nuts to trap the attachment between them. Set the clamp nut on the dead stop rod. With the glut in the collet open position, move the collet operating lever 'X' (Fig. 35) forward towards the drum housing by approximately 5/16" from the vertical. Push the front clamp nut on the collet operating rod up to the head of the glut sleeve 'F' (Fig. 33) and tighten up. Next slide round the rear cam dog 'BB' (Fig. 35) on the cam drum in the direction of shaft rotation, until it just touches the roller on the operating lever. Lock in position and continued handwinding should close the collet.

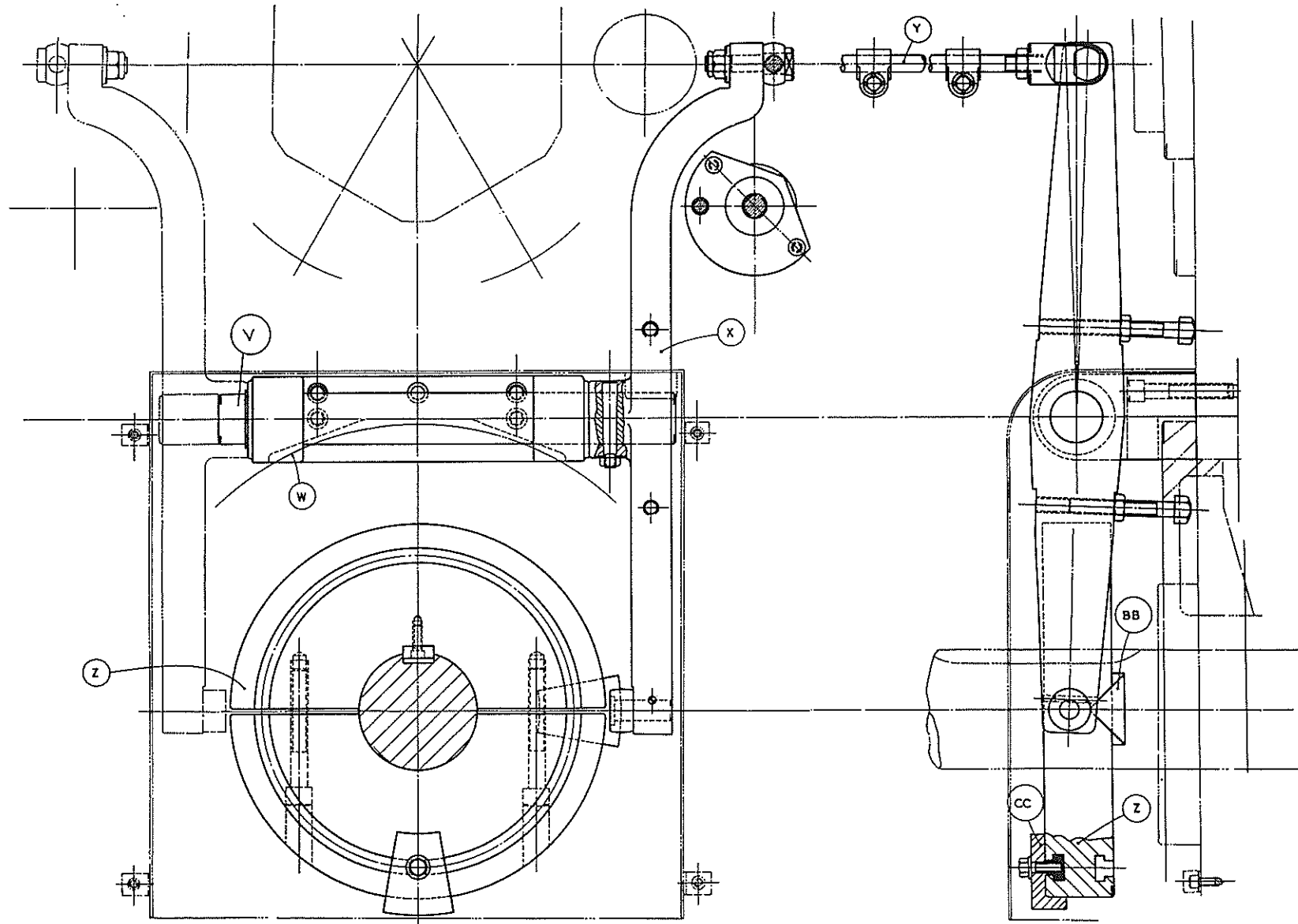
Bring the attachment to its maximum back position and set the ejector rods until the ejector nose is just level with the end of the collet. Lock up the two clamp nuts 'D' (Fig. 33) on the rear ejector rod.

Handwind the machine over to the finish of the back machining position on the cam. Slide the rear clamp nut up to the collet operating sleeve 'F' and move the front cam dog 'CC' round in the direction of shaft rotation, until this just contacts the roller on the lever. Both lock nuts should then be locked in position.

Adjust the stop screw 'L' (Fig. 33) on the front end of the attachment until it just touches the pad on the bar stop arm. This will ensure that the back machining operations are consistent on each individual component. Further handwinding of the machines should now retract the attachment and at the same time open the collet.

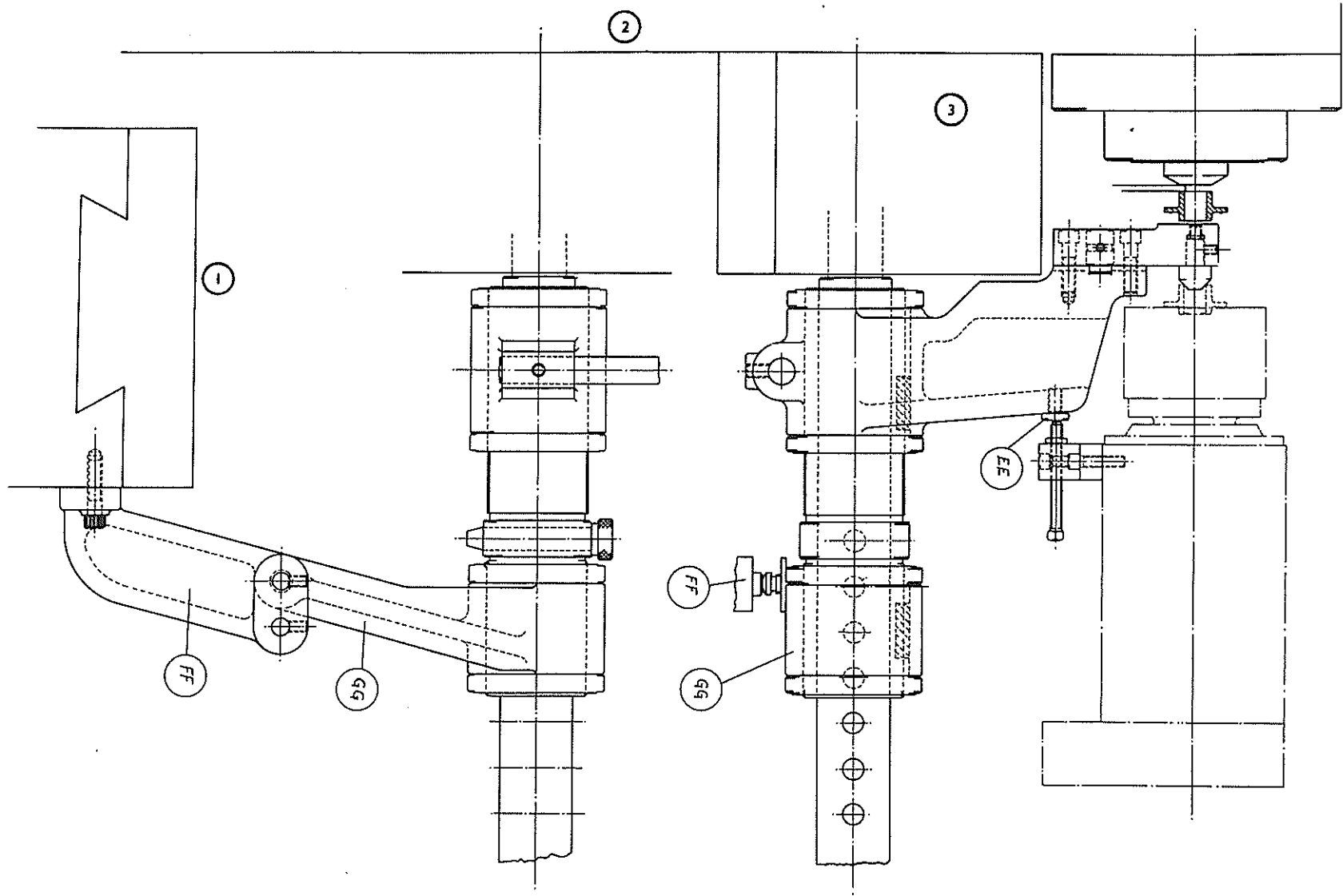
It should be realised that most of the instructions given are approximate settings only and finer adjustments may be necessary to suit the component.

Fig. 35 ARRANGEMENT OF COLLET OPERATING MECHANISM FOR 6TH POSITION PICK-UP ATTACHMENT



1. 1ST POSITION CROSS SLIDE
2. DRUM HOUSING
3. 6TH POSITION CROSS SLIDE

Fig. 36 ARRANGEMENT OF SPECIAL BAR STOP MECHANISM FOR BACK MACHINING WITH PICK-UP ATTACHMENT AT 6TH POSITION

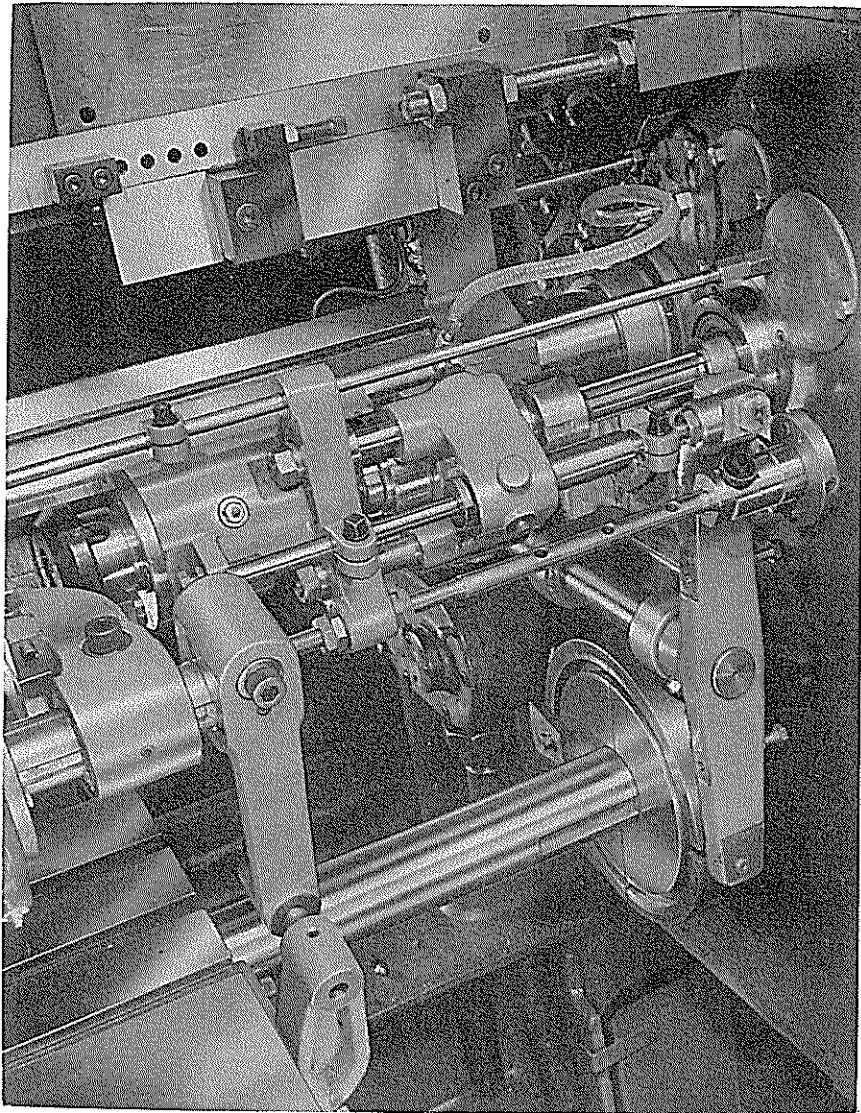


LUBRICATION

Mount the lubrication connector bracket 'DD' (Fig. 33) complete with fittings at a suitable position on the main drive housing face and connect the flexible hose assembly from the glut 'AA' to the connector on the bracket. To the other end of the connector fit a suitable length of 3/16" (outside dia.) copper tubing and run this to the lubricator header inside the upper camshaft housing at the rear of the machine.

Fill the attachment with oil through the oiling nipple in the body.

Fig. 37 GENERAL VIEW OF PICK-UP ATTACHMENT WITH BAR STOP AND COLLET OPERATING ASSEMBLIES



**INSTRUCTIONS FOR EXAMINATION AND
ADJUSTMENT OF SPINDLES END-FLOAT ON
MACHINES FITTED WITH TIMKEN TAPER
ROLLER BEARINGS.**

(1¾"-6, 2¼"-6, 2⅝"-6, 3¼"-6, 3½"-4, 4⅝"-4, 7¼"-6 and 9"-4 MACHINES)

From time to time it may become necessary to examine and adjust the Timken Taper Roller Bearings which form an integral part of the Work Spindle Assemblies fitted to Wickman Multi Spindle Automatics.

Concise instructions and the procedure to be followed is given in the following text which will permit adjustments to be made to Machines in the field.

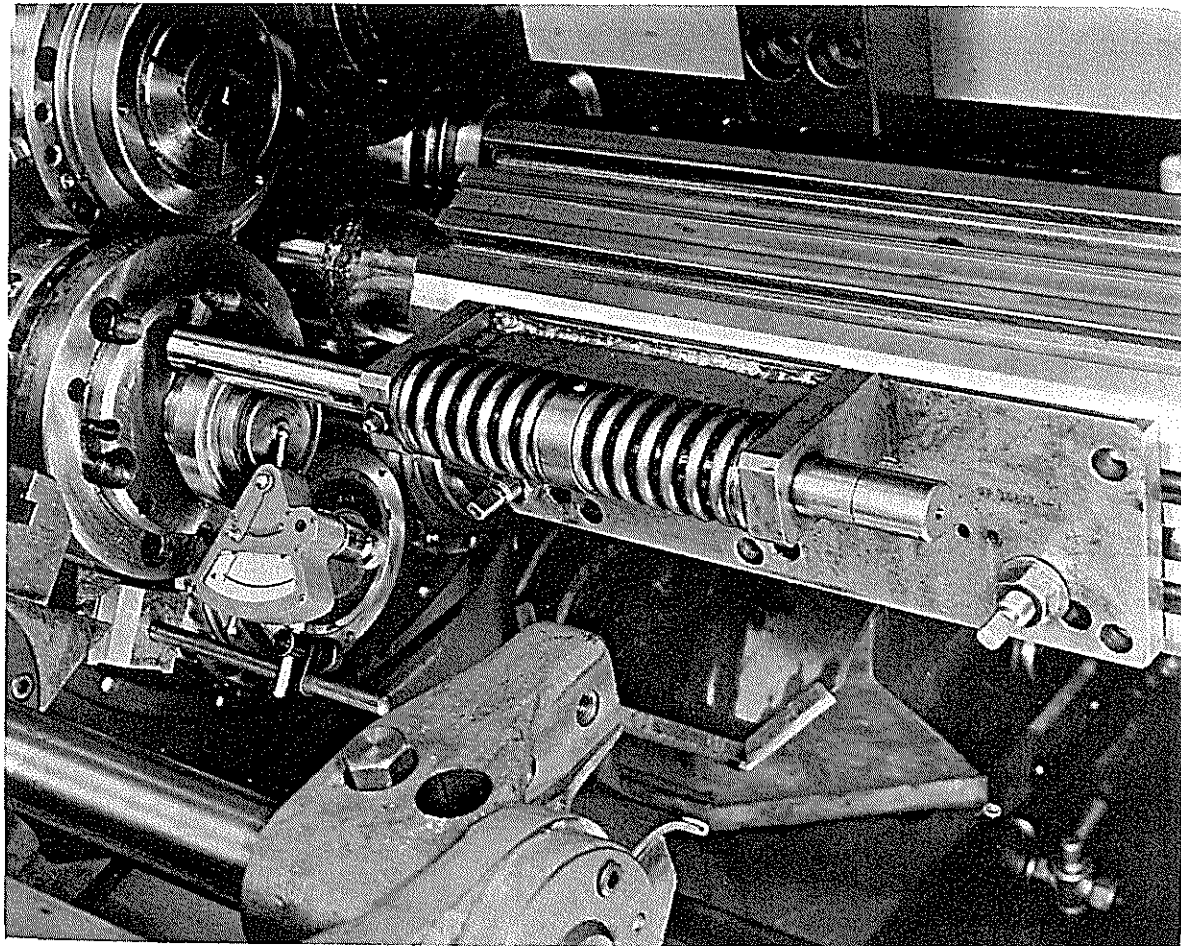
Equipment Required

Loading Attachment, MP 16660.

Lownes Precision Indicator complete with Mounting Rod and Magnetic Base.

1. Work Spindles to be fitted with bar-stock. End of bar-stock to be set flush to Collet face.
2. Collet Tubes to be adjusted to give normal tension when closed by hand mechanism.
3. Ensure that Allen Cap Screws in Spindle Front Bearing Locknuts are secured otherwise incorrect readings will be obtained.
4. Set Main Drive Housing Gears in slow-range and fit Speed Gears to give a Spindle speed between 150-200 r.p.m.
5. Set Centre Quadrant to give Centre Block, at least 2 in. (50 mm.) Stroke and handwind Centre Block halfway through feed stroke.
6. Attach Faceplate of Endfloat Adjustment Equipment to the Spindle in 6th Station.
7. Secure Loading Mechanism to 6th Station face of Centre Block, with claw located over deep groove bearing of Faceplate.
8. Run Workspindles and apply load to Spindle Bearings by winding Centre Block forward to expose the loading mark engraved on the shank of the Claw. Do not overwind the loading mark otherwise excessive pressure will be applied to the bearings.
9. Attach Lownes Indicator to the face of the Spindle Drum or Stop Ring using the Magnetic Base. (Important: The Magnetic Base must not be attached to the Drum Housing). Set Stylus of indicator on centre button of Faceplate and adjust pointer of indicator to Zero position. Check that the pointer remains steady with maximum total swing not exceeding 0.0002 in, as Work Spindles revolves. Excessive swing denotes incorrect seating of bearings or error in parallelism of spacers in the Spindle Assembly.
10. With Work Spindles revolving, apply load to Work Spindle in opposite direction by retracting Centre Block to expose the forward loading line; Note reading on Scale of Lownes Indicator.
11. Stop Machine, release Allen Cap Screw in Spindle Front Bearing Locknut and adjust, in small increments, to obtain 0.0009 in./0.0011 in, endfloat in Bearing. Ensure that Allen Cap Screw is secured after each movement of Locknut. Re-check endfloat after each adjustment.

Fig. 38



Oil Grade Ref.	Application	B.P.	Shell	Texaco	Duckham	Petrofina	Castrol	Remarks
1	Light Spindle Oil	Energol HL.40	Tellus 15	Spintex 60	Zircon 1	Cirkan 15	Hyspin AWS.10	MTIRA.4
2	Air Line Lubrication	Energol HL.50	Tellus 23	Spintex 100	Zircon 3	Hydran 21	Hyspin AWS.22	Use in colder climates
3	Air Line Lubrication	Energol HL.65 or HLP.65	Tellus 27	Rando HD.A	Zircon 4	Hydran 31	Hyspin AWS.32	Use in warmer climates MTIRA.6
4	Magnetic Clutch Drive Air Line Lubrication Hyd. Chuck Operation Bijur System. General Lub. Spindle Bearings	Energol HLP.80	Tellus 29	Rando HD.B	Zircon 5	Hydran 31	Hyspin AWS.46	General oil for colder climates
5	General Lubrication Bijur System Spindle Bearings	Energol HLP.100	Tellus 33	Rando HD.C	Zircon 6	Hydran 37	Hyspin AWS.68	General oil for warmer climates MTIRA.7
6	Reduction Units	Energol CS.300	Vitrea 71	Regal GR & O	Galrex 9	Solna 58	Alpha 417	Use in conveyor reduction box
7	Slideways	Energol HP.20-C	Tonna 33 or Vitrea 75	Way Lub.D	Adglide 6	Artac 37	Magna BD	MTIRA.11
Grease Grade								
1	Electric Motors	Ener-grease LS.3	Alvania R2 and R3	Regal Starfak Prem'm 3	Admax 13	Marson HTL.3	Spheerol AP.3	MTIRA.3
2	Spindle Nose Cap	Ditto	Ditto	Ditto	Ditto	Ditto	Ditto	

SUMMARY OF SUPPLIERS' COMPARABLE LUBRICANTS FOR WICKMAN AUTOMATICS

Where alternative grade references are given use the 'lighter' grade (lower number) unless oil consumption is excessive.

Slideways, Grade 5 suitable with oil base coolants, Grade 7 with water or oil base coolants.

Oil Grade Ref.	Application	Mobil	Vaughan	Esso	Gulf	Century	Remarks
1	Light Spindle Oil	Velocite Oil No. 6	KSO.5L	Nuto H36	Harmony 34AW	P79A	MTIRA.4
2	Air Line Lubrication	Velocite Oil No. 10	KSO.No. 1	Nuto H40	Harmony 40AN	P313	Use in colder Climates (U.K.)
3	Air Line Lubrication	DTE Oil Light or DTE.24	Evco Med. Hyd. or Hydrodrive HP.150	Nuto H44	Harmony 43AW	PWLA	Use in warmer climates MTIRA.6
4	Magnetic Clutch Drive Air Line Lubrication Hyd. Chuck Operation Bijur System. General Lub. Spindle Bearings	DTE Oil Medium or DTE 25	Evco Heavy Hyd. or Hydrodrive HP.200	Nuto H48	Harmony 48AW	PWLB PWLB	General oil for colder climates (U.K.)
5	General Lubrication Bijur System Spindle Bearings	DTE Oil Heavy Med. or DTE.26	Evco Extra Heavy Hyd. or Hydrodrive HP.300	Nuto H54	Harmony 54AW	PWLC	General oil for warmer climates MTIRA.7
6	Reduction Units	DTE Oil BB	Cosmolubric EHC	Esstic 78	Mechanism LP 85	WLP	Use in conveyor reduction box
7	Slideways	Vactra Oil No.2	Way Lubricant 297	Febis K.73	Gulfway 52 or Slideway 52	428AP	MTIRA.3
Grease Grade							
1	Electric Motors	Mobilplex 48	Evco BB No. 3 Grease	Beacon 2 or 3	Gulfcrown No. 3	Lupus 3	MTIRA.3
2	Spindle Nose Cap	Ditto	Cosmolube * No. 4 Grease	Beacon 2 or 3	Gulfcrown No. 3	Lupus 3	

SUMMARY OF SUPPLIERS' COMPARABLE LUBRICANTS FOR WICKMAN AUTOMATICS

* Cosmolube No. 4, use sparingly and only in nose cap seals.

ATTACHMENT DIAGRAMS

ATTACHMENTS

The attachments consist of sections or units, and many common sections can be interchanged between attachments.

The sections required for any desired attachment or combination of attachments can be found on the chart.

- 1 TOOLING ARRANGEMENT
- 2 THREADING WITH REVOLVING DIEHEAD THREADING ATTACHMENT
- 3 THREADING WITH CLUTCH DRIVE ATTACHMENT
- 4 HIGH SPEED DRILLING (MOTION FROM CENTRE BLOCK)
- 5 HIGH SPEED DRILLING WITH INDEPENDENT LONGITUDINAL MOTION
- 6 REAMING WITH INDEPENDENT LONGITUDINAL MOTION
- 7 INDEPENDENT CROSS SLIDE MOTION

- | | | |
|---|---------|--------------------------|
| 8 | CHASING | USING SECTION 192 Mk.III |
| | | USING SECTION 392 Mk.I |

- 9 SLOW SPEED REAMING
- 10 REMARKS
- 11 SECTION NUMBER
- 12 DESCRIPTION OF SECTION
- 13 STATIONS
- 14 GEARS
- 15 FOR GEARS REQUIRED SEE
- 16 SEE 382 X 11 FOR RATIOS AVAILABLE
- 17 ATTACHMENT SECTIONS

- 381 THREADING CLUTCH DRIVE
- 381D ATTACHMENT GEARS
- 382 THREADING ATTACHMENT DRIVE SLEEVE
- 386 PARTS COMMON TO THREADING ATTACHMENTS
- 386A THREADING ATTACHMENT EXTRA PARTS, STATIONS 4 & 5
- 386B THREADING CAMS, STATION 4
- 386C THREADING CAMS, STATION 5
- 386D PUSHER BRACKET, THREADING & REAMING, STATIONS 3 & 6
- 186F THREADING ATTACHMENT RETURN CHECK SWITCH
- 386G EXTRA PARTS TO FIT SECTION 186F
- 382A DRIVE SLEEVE ADAPTOR (1 off REQUIRED WHEN DRIVES WITH DRIVEN GEARS OF MORE THAN 51 TEETH ARE REQUIRED IN ADJACENT STATIONS).

- 387 THREADING & REAMING CAMS, STATIONS 3 & 6
- 388 ATTACHMENT BODY & SLIDE
- 389A AUXILIARY LONGITUDINAL MOTION, STATION 6
- 389B AUXILIARY LONGITUDINAL MOTION, STATION 8
- 390A HIGH SPEED DRILL DRIVE
- 390B HIGH SPEED DRILL GEARS
- 390J SYNCHRONOUS DRIVE UNIT

- 13
- Group X HIGH SPEED DRILLING LIVE SPINDLE UNIT
- 393 AUXILIARY CROSS-SLIDE MOTION COMMON PARTS
- 393A AUXILIARY CROSS-SLIDE MOTION, EXTRA PARTS 4 & 5
- 393B AUXILIARY CROSS-SLIDE MOTION, EXTRA PARTS 3 & 6
- 393C AUXILIARY CROSS-SLIDE MOTION, EXTRA PARTS 6 BRACKET TOOLHOLDER
- 192
- Mark III CHASING ATTACHMENT SECTION 192 Mk.III
- 392
- Mark I CHASING ATTACHMENT SECTION 392 Mk.I
- 392A
- Mark II CHASING ATTACHMENT DRIVE Mk.II USING SECTION 192 OR 392, STATION 5
- 392B
- Mark II EXTRA PARTS USING SECTION 192 Mk.I, Mk.II or Mk.III, STATION 5
- 392C
- Mark II EXTRA PARTS USING SECTION 392 Mk.I STATIONS 4 OR 5, 2¼"- 6 ONLY
- 392D
- Mark II CHASING ATTACHMENT DRIVE Mk.II USING SECTION 192 OR 392, STATION 4
- 392E
- Mark III EXTRA PARTS USING SECTION 192 Mk.III STATION 4
- 392
- Mark II EXTRA PARTS USING SECTION 392 Mk.I STATIONS 4 OR 5, 6½"- 6 ONLY
- 18 MACHINE SECTIONS
- 324A AUXILIARY FRONT LONGITUDINAL SLIDE OPERATION STATION 5, 9" MAXIMUM STROKE
- 324D AUXILIARY LONGITUDINAL SLIDE OPERATION STATION 5, 5" OR 7½" MAXIMUM STROKE
- 325A AUXILIARY REAR LONGITUDINAL SLIDE OPERATION STATION 4, 9" MAXIMUM STROKE
- 325D AUXILIARY LONGITUDINAL SLIDE OPERATION STATION 4, 5" OR 7½" MAXIMUM STROKE
- 19 1 SET
- 20 1 GEAR
- 21 NOT INCLUDED IN PRICE OF HIGH-SPEED DRILLING ATTACHMENT
- 22 FOR CAMS SEE 387 Z 1 & 387 Z 2
- 23 FOR GEARS SEE 390 Z 10
SEE 390 Z 11
- 24 SPECIFY CAMS
- 25 SUPPLY PAIR OF GEARS & LEAD CAM TO SUIT CUSTOMER.
TO OBTAIN CORRECT LEAD CAM & GEARS SEE 392 Z 2A, 3A, 5 OR 6
- 26 REPLACES SECTION 324. FOR CAMS SEE SECTION 324B
SPECIFY STROKE & CAMS
REPLACES SECTION 325. FOR CAMS SEE SECTION 325B
SPECIFY STROKE & CAMS

Fig. 40 ATTACHMENTS SECTION CHART 300 Y 38A

SECTION NO.	DESCRIPTION OF SECTION	②				③				④				⑤				⑥				⑦				⑧				⑨				REMARKS
		THREADING WITH REVOLVING DIEHEAD THREADING ATTACHMENT				THREADING WITH CLUTCH DRIVE ATTACHMENT				HIGH SPEED DRILLING WITH INDEPENDENT MOTION FROM CENTRE BLOCK				HIGH SPEED DRILLING WITH INDEPENDENT LONGITUDINAL MOTION				REAMING WITH INDEPENDENT LONGITUDINAL MOTION				INDEPENDENT CROSS-SLIDE MOTION				CHASING				SLOW SPEED REAMING				
		STATIONS	STATIONS	STATIONS	STATIONS	STATIONS	STATIONS	STATIONS	STATIONS	STATIONS	STATIONS	STATIONS	STATIONS	STATIONS	STATIONS	STATIONS	STATIONS	STATIONS	STATIONS	STATIONS	STATIONS	STATIONS	STATIONS	STATIONS	STATIONS	STATIONS	STATIONS	STATIONS	STATIONS					
32M	THREADING CLUTCH DRIVE.																																	
32D	ATTACHMENT GEARS.																																	
322	THREADING ATTACHMENT DRIVE SLEEVE																																	
324	PARTS COMMON TO THREADING ATTACHMENTS																																	
324A	THREADING ATTACHMENT EXTRA PARTS STNS. 4 & 5																																	
324B	THREADING CAMS STN. 4																																	
324C	THREADING CAMS STN. 5																																	
324D	PUSHER BRACKET THREADING & REAMING STN. 3 & 6																																	
324F	THREADING ATTACHMENT RETURN CHECK SWITCH																																	
324G	EXTRA PARTS TO FIT SECTION 186 F																																	
322A	DRIVE SLEEVE ADAPTOR (1 OFF RECD. WHEN DRIVES WITH DRIVEN GEARS OF MORE THAN 5:1 ARE RECD. IN ADJACENT STATIONS.)																																	
327	THREADING & REAMING CAMS STNS. 3 & 6.																																	
328	ATTACHMENT BODY & SLIDE																																	
329A	AUXILIARY LONGITUDINAL MOTION STNS. 6																																	
329B	AUXILIARY LONGITUDINAL MOTION STNS. 3																																	
329A	HIGH SPEED DRILL DRIVE																																	
329B	HIGH SPEED DRILL GEARS																																	
329J	SYNCHRONOUS DRIVE UNIT																																	
329K	HIGH SPEED DRILLING LIVE SPINDLE UNIT.																																	
329	AUXILIARY CROSS-SLIDE MOTION COMMON PARTS																																	
329A	AUXILIARY CROSS-SLIDE MOTION EXTRA PARTS 4 & 5																																	
329B	AUXILIARY CROSS-SLIDE MOTION EXTRA PARTS 3 & 6																																	
329C	AUXILIARY CROSS-SLIDE MOTION EXTRA PARTS 6																																	
	BRACKET TOOL HOLDER																																	
329	CHASING ATTACHMENT SECT. 192 MK. III																																	
329	CHASING ATTACHMENT SECT. 392 MK. I																																	
329A	CHASING ATTACHMENT DRIVE MK. II 5TH STATION																																	
329B	EXTRA PARTS USING SECT. 192 MK. I OR MK. II OR MK. III																																	
329C	EXTRA PARTS USING SECT. 392 MK. I																																	
329D	EXTRA PARTS USING SECT. 192 MK. II																																	
329E	EXTRA PARTS USING SECT. 392 MK. III																																	
329F	EXTRA PARTS USING SECT. 192 MK. I, 5 OR 6 ONLY																																	
324A	AUX. FRONT LONG. SLIDE OPN. STN. 5. 9" MAX. STROKE																																	
324B	AUX. LONG SLIDE OPN. STN. 5. 5" OR 7 1/2" MAX. STROKE																																	
325A	AUX. REAR LONG SLIDE OPN. STN. 4. 9" MAX. STROKE																																	
325D	AUX. LONG SLIDE OPN. STN. 4. 5" OR 7 1/2" MAX. STROKE																																	

SLOW SPEED REAMING

SLOW SPEED REAMING

In some circumstances it is desirable to ream at a lower surface speed than is possible with the existing spindle speed, which may have been fixed by other tooling. If the reamer is driven in the same direction as the work spindle, but at a faster or slower speed the difference between the speed of the work and that of the reamer will provide a suitable speed for reaming.

This rotation of the reamer can be obtained by mounting the reamer holder in a threading spindle (SECT.286) in the attachment body and slide (SECT.288) or bracket tool holder W5-134-33/3, and driving it with the threading attachment drive sleeve (SECT.282). If different ratios are required or if drives using driven gears of over 51 teeth are required in adjacent stations (including drives used for dieheads) then the special adaptor plate (382 X 116) should be used. Use of the special adaptor plate however allows only one "OFF" ratio to be used if threading clutches are also fitted.

It should be noted that RIGHT/H. reamers should be driven SLOWER than the spindle speed and LEFT/H. reamers should be driven FASTER than spindle speed.

When using tables:-
 Effective reamer RPM = $\frac{\text{work spindle RPM}}{\text{Ratio}}$

GEARS IN DRUM — DRIVER 57T, DRIVEN 51T
 •• 100 RPM. OF SPINDLE = 89.473 RPM OF CENTRE SHAFT

RIGHT HAND REAMERS

DRIVER	42T	46	49	51
DRIVEN	66T.	62	59	57
RATIO	2.32	3.0	3.89	5.0
	*	*		*

LEFT HAND REAMERS

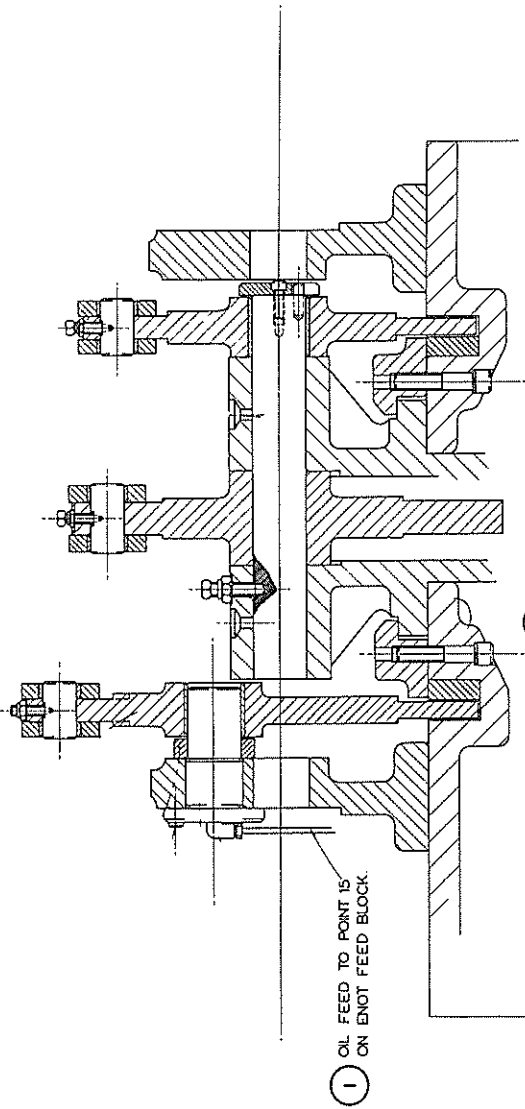
DRIVER	66	65	63	62
DRIVEN	42	43	45	46
RATIO	2.46	2.84	3.96	4.9
	*			*

* STANDARD PAIRS OF GEARS

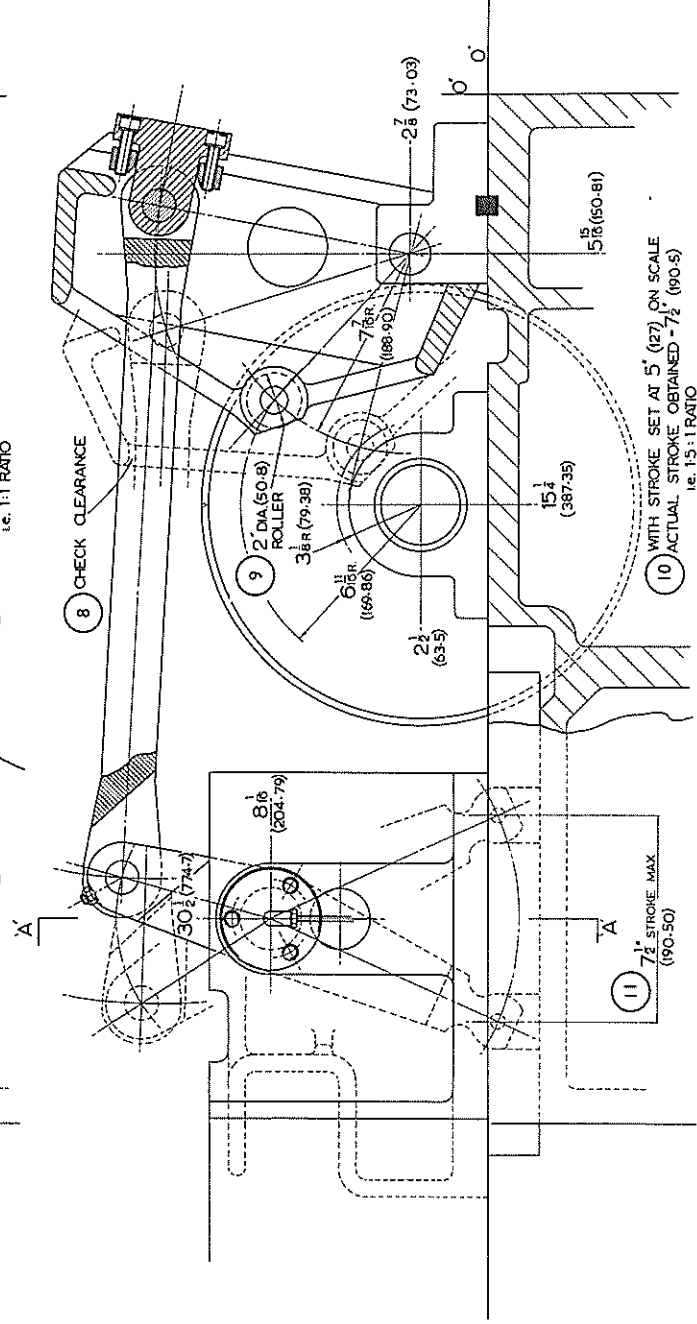
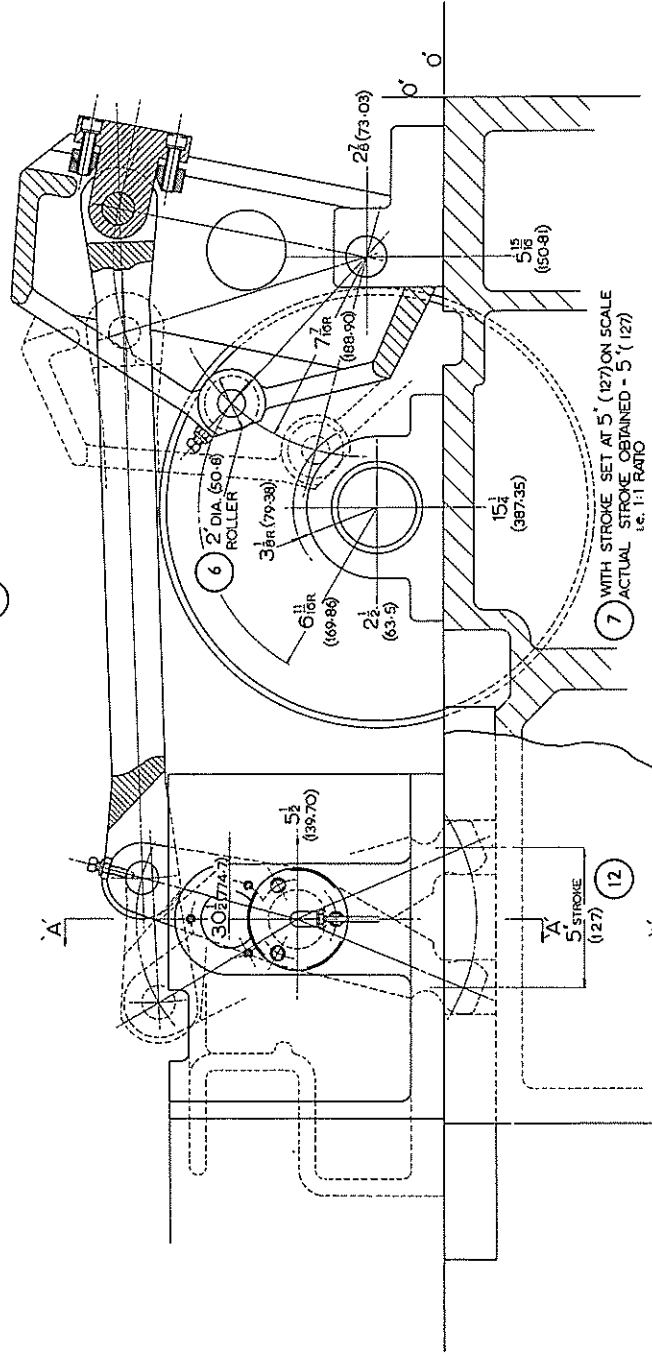
- 1 OIL FEED TO POINT 15 ON ENOT FEED BLOCK
- 2 5TH. STATION LEVER
- 3 CENTRE BLOCK LEVER
- 4 4TH. STATION LEVER
- 5 SECTION 'A' 'A'
- 6 2" DIA. ROLLER
- 7 WITH STROKE SET AT 5" ON SCALE ACTUAL STROKE OBTAINED = 5"
I.E. 1:1 RATIO
- 8 CHECK CLEARANCE
- 9 2" DIA. ROLLER
- 10 WITH STROKE SET AT 5" ON SCALE ACTUAL STROKE OBTAINED = 7.1/2"
I.E 1.5:1 RATIO
- 11 7.1/2" STROKE MAX.
- 12 5" STROKE

2 3 4

5TH STATION LEVER. CENTRE BLOCK LEVER. 4TH STATION LEVER.



5 SECTION A-A



- 1 SECTION 327.
- 2 RESET BRACKET FOR 4TH & 5TH. STATIONS
- 3 4TH STATION
- 4 5TH. STATION
- 5 3RD. STATION
- 6 6TH. STATION
- 7 SECTION 389B
- 8 IN STATIONS 3 & 6 RESET BLOCK IS CARRIED ON THIS SHAFT
- 9 1/64" CLEARANCE (0.04 mm)
- 10 SET THESE NUTS WITH NO CLEARANCE WHEN CLUTCH IS FORWARD.
FOR USE WITH SELF OPENING DIEHEADS NUTS TO BE LOCKED AGAINST
SLEEVE WITH CLUTCH IN POSITION SHOWN.
- 11 RESET BRACKET
- 12 ADJUST THESE NUTS TO RESET CLUTCH WHEN SLIDING BLOCK IS
FULLY BACK.
- 13 RESET BLOCK. SECTION 389A
- 14 FITTED FOR USE WITH SOLID TAPS & DIES
- 15 DRIVEN GEAR ' D '
- 16 DRIVEN GEAR ' B '
- 17 CONNECT TO OIL SUPPLY
- 18 SECTION 382.
- 19 ' OFF '
- 20 ' ON '
- 21 FITTED FOR USE WITH SELF OPENING DIEHEADS.

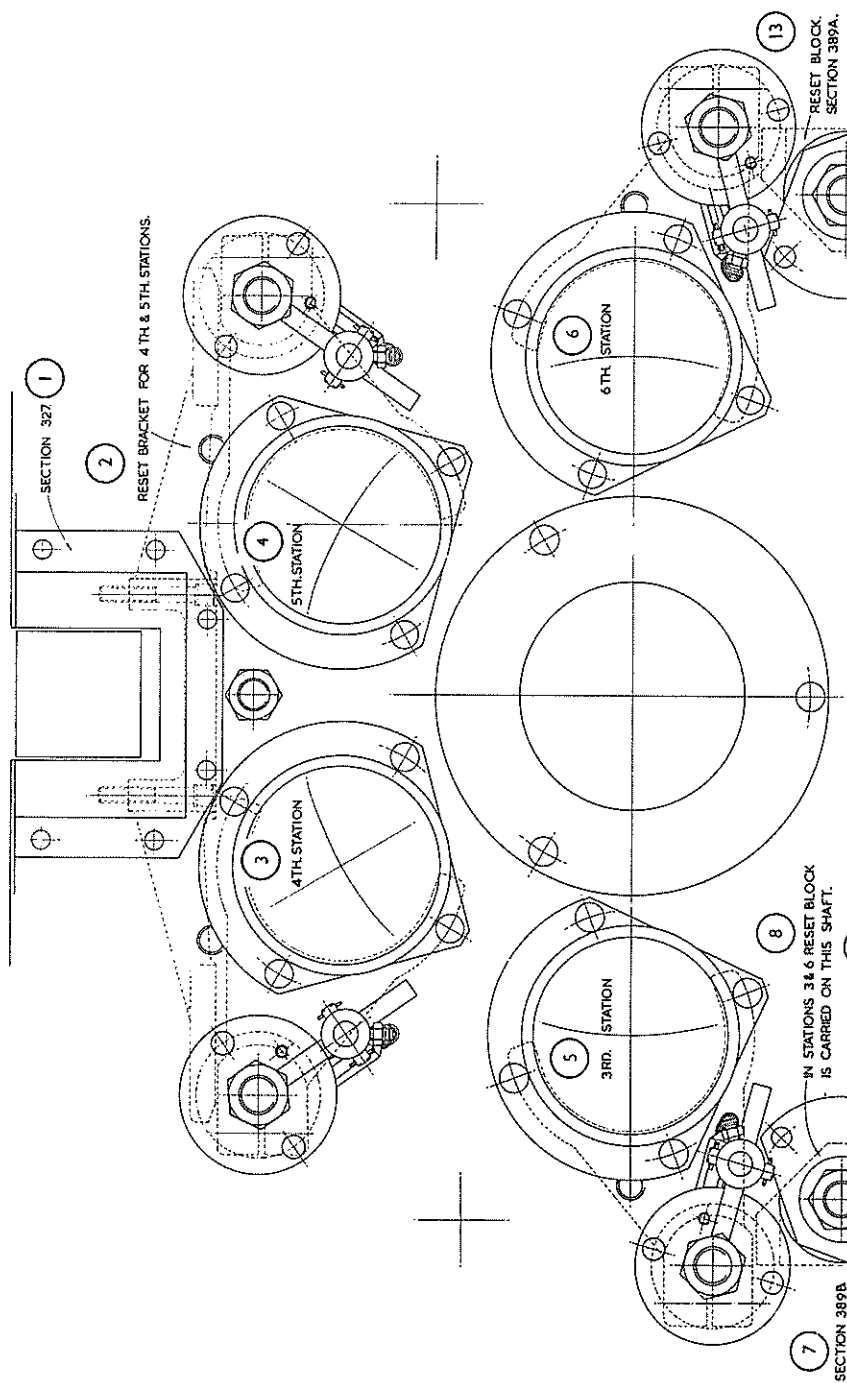
- 22 TO ADJUST CLUTCH TURN SERRATED DISC.
- 23 DRIVING GEAR ' C '
- 24 CLEARANCE WHEN CLUTCH IS FULLY OVER
- 25 DRIVING GEAR ' A '
- 26 CLAMPING SCREW
- 27 RIGHT HAND ' OFF '

DRIVING GEAR ' C '	DRIVEN GEAR ' D '	RATIO		
TEETH	REF.	TEETH	REF.	
67	381V130/67	41	381V130/41	2.2
- 28 LEFT HAND ' OFF '

DRIVING GEAR ' C '	DRIVEN GEAR ' D '	RATIO		
TEETH	REF.	TEETH	REF.	
42	381V130/42	66	381V130/66	2.3
- 29 SECTION 317.
- 30 RIGHT HAND ' ON '

DRIVING GEAR ' A '	DRIVEN GEAR ' B '	RATIO		
TEETH	REF.	TEETH	REF.	
46	381V130/46	62	381V130/62	3.0
51	381V130/51	57	381V130/57	5.0
53	381V130/53	55	381V130/55	7.3
- 31 LEFT HAND ' ON '

DRIVING GEAR ' A '	DRIVEN GEAR ' B '	RATIO		
TEETH	REF.	TEETH	REF.	
62	381V130/62	46	381V130/46	4.9

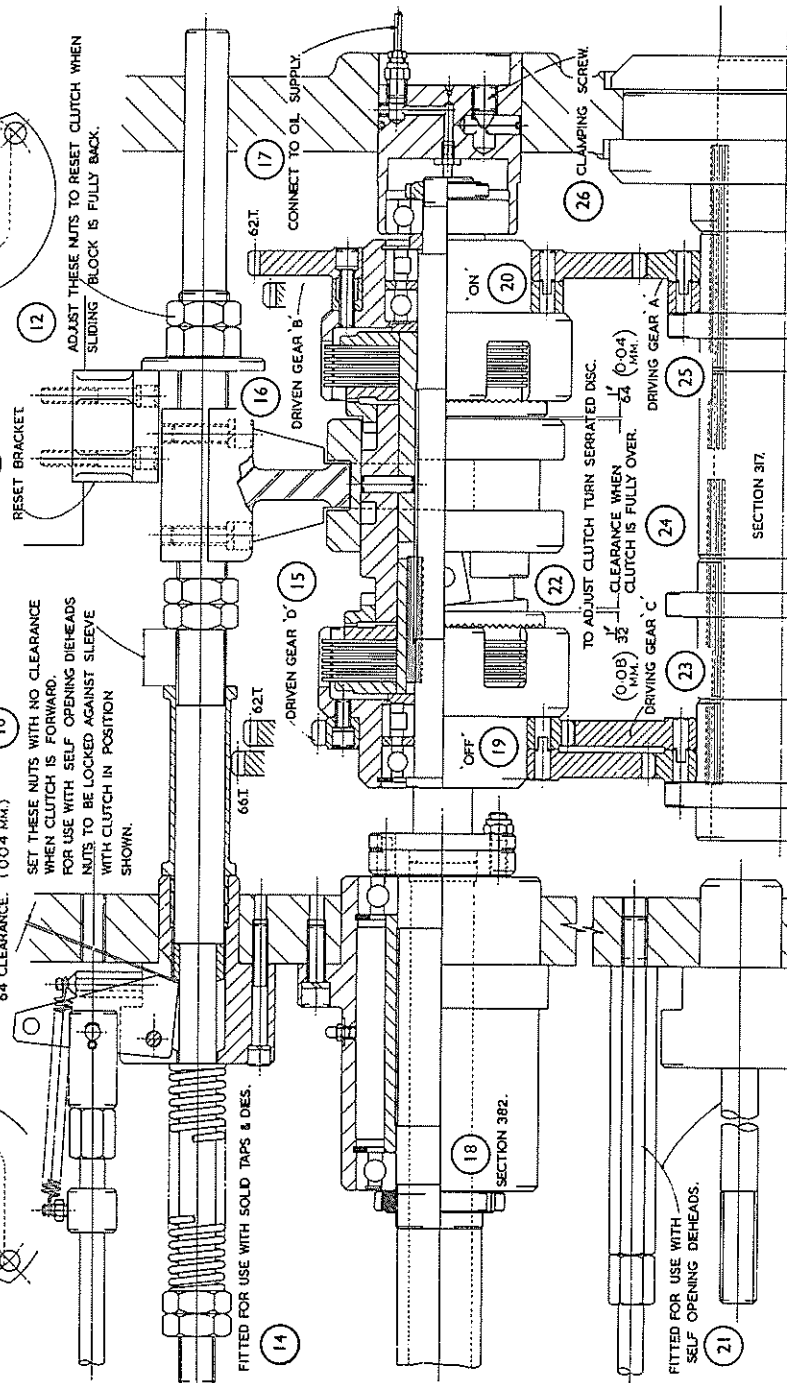


SECTION 327

RESET BRACKET FOR 4TH & 5TH STATIONS.

IN STATIONS 3, 4 & 5 RESET BLOCK IS CARRIED ON THIS SHAFT.

RESET BLOCK. SECTION 389A.



RESET THESE NUTS TO RESET CLUTCH WHEN SLIDING BLOCK IS FULLY BACK.

ADJUST THESE NUTS TO RESET CLUTCH WHEN SLIDING BLOCK IS FULLY BACK.

CONNECT TO OIL SUPPLY.

TO ADJUST CLUTCH TURN SERRATED DISC.

CLEARANCE WHEN CLUTCH IS FULLY OVER.

CLAMPING SCREW.

SECTION 382.

SECTION 317.

RIGHT HAND 'ON'

DRIVING GEAR 'A' TEETH	DRIVEN GEAR 'B' REF. TEETH	RATIO
46	38W/30/46	3.0
51	38W/30/51	5.0
53	38W/30/53	7.3

RIGHT HAND 'OFF'

DRIVING GEAR 'C' TEETH	DRIVEN GEAR 'D' REF. TEETH	RATIO
67	38W/30/67	4.1
	38W/30/41	2.2

LEFT HAND 'ON'

DRIVING GEAR 'A' TEETH	DRIVEN GEAR 'B' REF. TEETH	RATIO
62	38W/30/62	4.6
	38W/30/46	4.9

LEFT HAND 'OFF'

DRIVING GEAR 'C' TEETH	DRIVEN GEAR 'D' REF. TEETH	RATIO
42	38W/30/42	6.0
	38W/30/66	2.3

381 Z 10

THREADING ATTACHMENTS

Threading attachments can be fitted in 3rd, 4th, 5th and 6th stations.

Threading operations are usually performed at lower surface speeds than those suitable for turning or drilling and as it is not possible to vary the spindle speed during the time cycle and in order to obtain suitable surface speeds for threading while still using economical work spindle speeds, it becomes necessary to rotate the threading tool in the same direction as the work spindle but at a faster or slower speed.

The difference between the work spindle speed and the threading tool speed will then provide an effective surface speed for threading.

A commonly used threading speed is one-fifth of the work spindle speed, requiring the threading tool to be rotated at four-fifths of the work spindle speed for right-hand threads, or one-and-one-fifth times the work spindle speed for left-hand threads. This is termed an "ON" ratio of five, being the ratio of work spindle speed to attachment spindle speed during the "ON" threading of the die or tap. If the cycle time permits, slower ratios may be used to reduce cutting speeds, increase tool life, and improve finish.

Faster ratios may be employed on free cutting materials, thus permitting faster machine cycle times.

Since a solid tap or die, after performing the threading, must also be run "OFF" the component during the feed cycle, it is desirable that this non-productive operation be performed as quickly as possible. Excessive difference between forward and return speeds will, however, cause increased clutch wear and a possible difficulty in maintaining threaded length and finish. A commonly used "OFF" ratio is approximately 2:1, i.e., the relative speed is half the work spindle speed.

Threading Attachment Drive Sleeve. Section 382.

When using a self-opening diehead, or collapsing tap, the drive sleeve only may be used to drive the threading spindle as it gives an "ON" drive only, with a driven gear mounted on the

Adaptor Plate engaging a driving Gear on the centre shaft, this arrangement is known as a diehead drive. When more than one diehead drive is fitted to the machine, the ratio must be the same for each.

If it is required to fit attachment drive sleeves in adjacent stations, the gear drives must be staggered by using the special adaptor plate 382 X 166. This special adaptor plate must also be used when two different drive ratios are required. It should be noted however that use of this special adaptor plate makes only one "OFF" ratio possible if threading clutch drives are also used.

THREADING CLUTCH DRIVE

Section 381

The replacement on a diehead drive of the driven gear and its adaptor plate by a threading clutch results in a universal threading drive which can be used for solid taps and dies. This universal threading drive gives an "ON" ratio and an "OFF" ratio. When more than one threading clutch is fitted, the following conditions apply

RH. threads together

Two different "ON" ratios may be fitted.
Two different "OFF" ratios may be fitted

LH. threads together

Two different "ON" ratios may be fitted.
Two different "OFF" ratios may be fitted.

RH and LH threads together

One RH "ON" and one LH "ON" ratio may be fitted.

One RH "OFF" and one LH "OFF" ratio may be fitted.

When the threading clutch is fitted for use with a self-opening diehead, the "ON" ratio is engaged continuously by retaining the glut shaft in the one position. This avoids frequent stripping and refitting of the clutch drive to suit solid taps or self opening dieheads. It also permits different "ON" ratios to be used concurrently when using more than one self-opening diehead and is necessary when left-hand and right-hand threads are cut concurrently with self-opening dieheads.

Calculating workspindle Revolutions for Threading.

When considering the use of a threading attachment, it is first necessary to establish the number of work spindle revolutions required. These depend on the lead, length of thread and threading ratios used, an allowance of two threads being made for starting.

Work spindle revolutions required when using self-opening diehead.

When using self-opening dieheads the number of revolutions required may be found by multiplying the number of threads to be cut plus the allowance for starting, by the "ON" ratio used.

Number of threads to be cut = length of thread x T.P.I., to which is added two threads for starting.

Calculation (a)

Work spindle revolutions =

$$[(\text{Length of thread} \times \text{T.P.I.}) + 2] \times \text{"ON" ratio.}$$

For example:- To cut a 20 T.P.I., thread $\frac{3}{4}$ " long with an "ON" ratio of 5, work spindle revolutions required are as follows:-

$$[(\frac{3}{4} \times 20) + 2] \times 5 = 85 \text{ revolutions.}$$

Work spindle revolutions required when using solid taps and dies.

When using solid taps or dies, extra revolutions must be allowed for the tap or die to run off the job.

Calculation (b)

Work spindle revolutions

$$[(\text{Length of thread} \times \text{T.P.I.}) + 2] \times [\text{"ON" ratio} + \text{"OFF" ratio}]$$

For example:- To cut a 20 T.P.I. thread $\frac{3}{4}$ " long with an "ON" ratio of 5 and an "OFF" ratio of 2, the work spindle revolutions required are as follows:-

$$[(\frac{3}{4} \times 20) + 2] \times [5 + 2] = 119 \text{ work spindle revolutions.}$$

When threading in Stations 3, 4, or 5 and employing standard threading cams, ascertain that the work spindle revolutions required for threading do not exceed the available cutting revolutions which are

given on the speed and feed chart. The available cutting revolutions depend on the cycle time and are determined by the longest operation, which, in some cases, may be the threading operation.

When threading in Stations 3 or 6 and employing accelerated threading cams, the work spindle revolutions required for threading should not normally exceed half of the available cutting revolutions. When using threading cams provision is made for the return cam to be retarded in two 10 steps, giving a maximum $\frac{9}{16}$ or $\frac{5}{8}$ of the available cutting revolutions for threading.

The use of these figures will depend upon the time available for loading and unloading the workpiece.

If the calculated revolutions required for threading exceed the maximum, either the cycle time must be increased to give more available cutting revolutions, or a faster "ON" ratio must be used.

THREADING CAMS Stations 4 & 5 Mk II

Threading cams must be used with self-opening dieheads or with solid taps and dies. The timing of the movements given by these cams is shown on the timing diagram Fig. 16, Page 47 and the following sequence of movements to the threading push rod is produced.

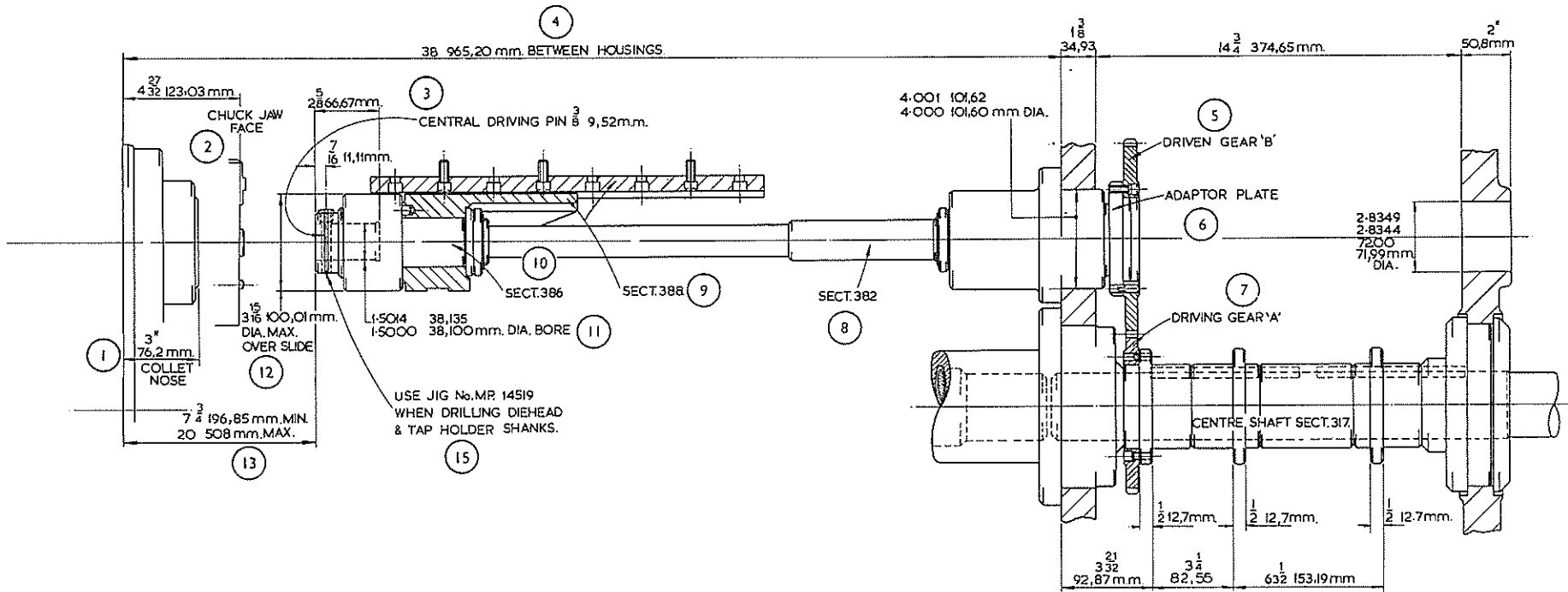
1. Fast approach stroke
2. Feed stroke. This is set to suit the thread being cut and serves to lead the threading tool correctly.
3. Drop Back. This is slightly greater than the feed stroke and takes place while the threading tool continues, pulling itself along on the thread it is cutting.
4. Dwell. This continues while the threading tool completes the cutting and in the case of solid taps and dies runs off the work.
5. Fast Return.

1. 3" (76,2mm) COLLET NOSE
2. 4.27/32" (123,03mm) CHUCK JAW FACE
3. CENTRAL DRIVING PIN $\frac{3}{8}$ " (9,52mm)
4. 38" (965,20mm) BETWEEN HOUSINGS
5. DRIVEN GEAR ' B '
6. ADAPTOR PLATE
7. DRIVING GEAR ' A '
8. SECT. 382
9. SECT. 388
10. SECT. 386
11. 1.5014 38,135
1.5000 38,100 mm. DIA. BORE
12. 3.15/16" (100,01 mm) DIA. MAX. OVER SLIDE
13. $7\frac{3}{4}$ " (196,85mm)MIN.
20" (508 mm) MAX.
14. RIGHT HAND

DRIVING GEAR ' A '		DRIVEN GEAR ' B '		RATIO	
TEETH	REF.	TEETH	REF.		
46	381 V 130/46	62	381 V 130/62	3.0	WHEN THESE DRIVES ARE FITTED IN ADJACENT STATIONS 1 OFF SECT. 382A IS ALSO REQUIRED
51	381 V 130/51	57	381 V 130/57	5.0	
53	381 V 130/53	55	381 V 130/55	7.3	

LEFT HAND

DRIVING GEAR ' A '		DRIVEN GEAR ' B '		RATIO
TEETH	REF.	TEETH	REF.	
62	381 V 130/62	46	381 V 130/46	4.9
15. USE JIG No.MP. 14519 WHEN DRILLING DIEHEAD & TAP HOLDER SHANKS
16. SECT. 382
17. SPECIAL ADAPTOR PLATE 382 X 116 & NUTS 382 X 117 (SECT. 382A)
18. DRIVEN GEAR ' B '
19. DRIVING GEAR ' A '
20. ALTERNATIVE DRIVE ARRANGEMENT WHEN 2 DRIVE RATIOS ARE REQUIRED
OR WHEN DRIVE WITH MORE THAN 51T DRIVEN GEARS ARE REQUIRED IN
ADJACENT STATIONS.

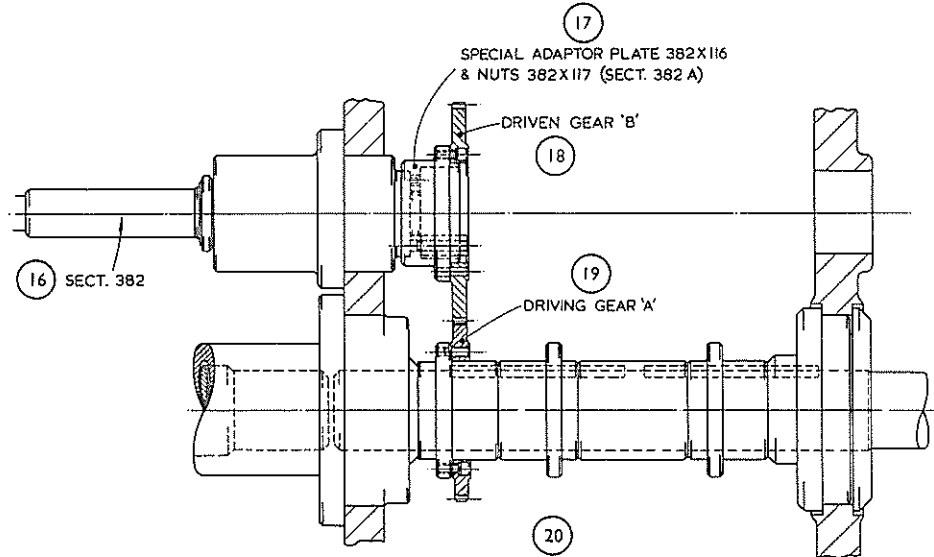


RIGHT HAND (14)

DRIVING GEAR 'A'		DRIVEN GEAR 'B'		RATIO	WHEN THESE DRIVES ARE FITTED IN ADJACENT STATIONS 1 OFF SECT. 382A IS ALSO REQUIRED.
TEETH	REF.	TEETH	REF.		
46	381 V 130/46	62	381 V 130/62	3-0	
51	381 V 130/51	57	381 V 130/57	5-0	
53	381 V 130/53	55	381 V 130/55	7-3	

LEFT HAND

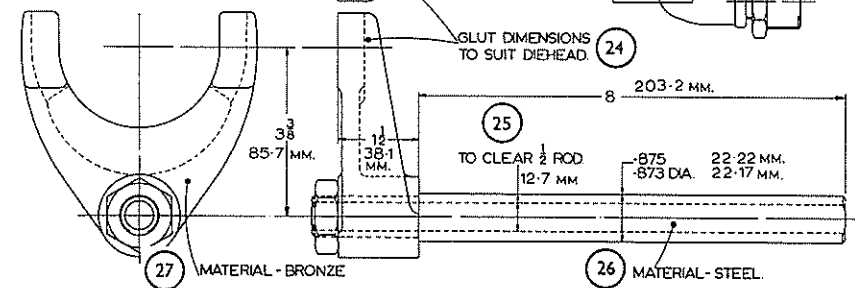
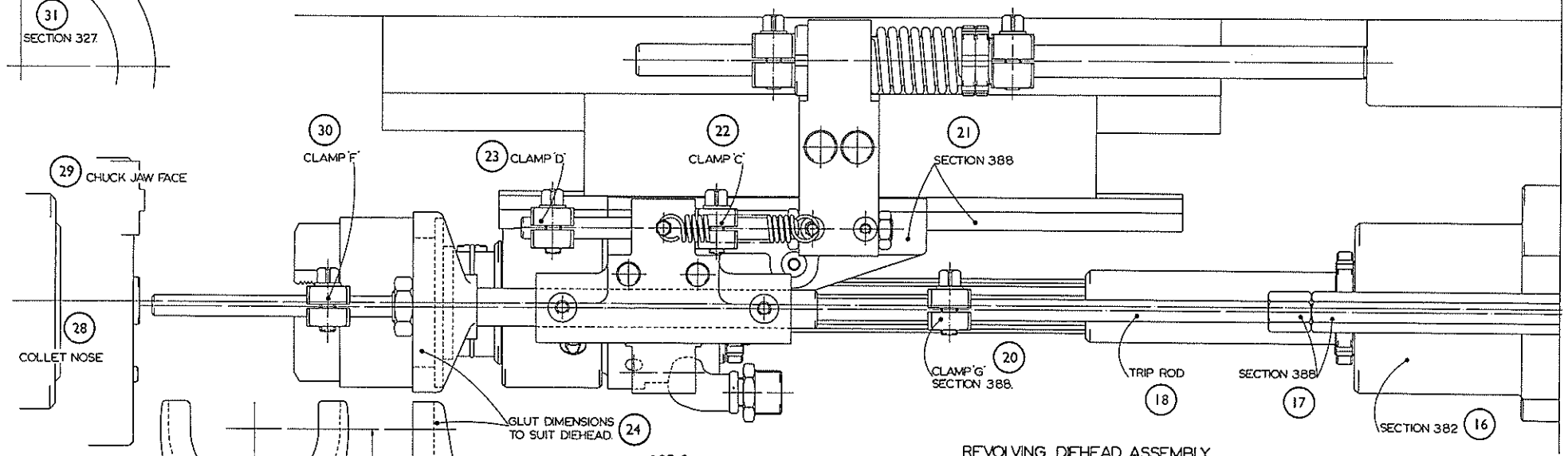
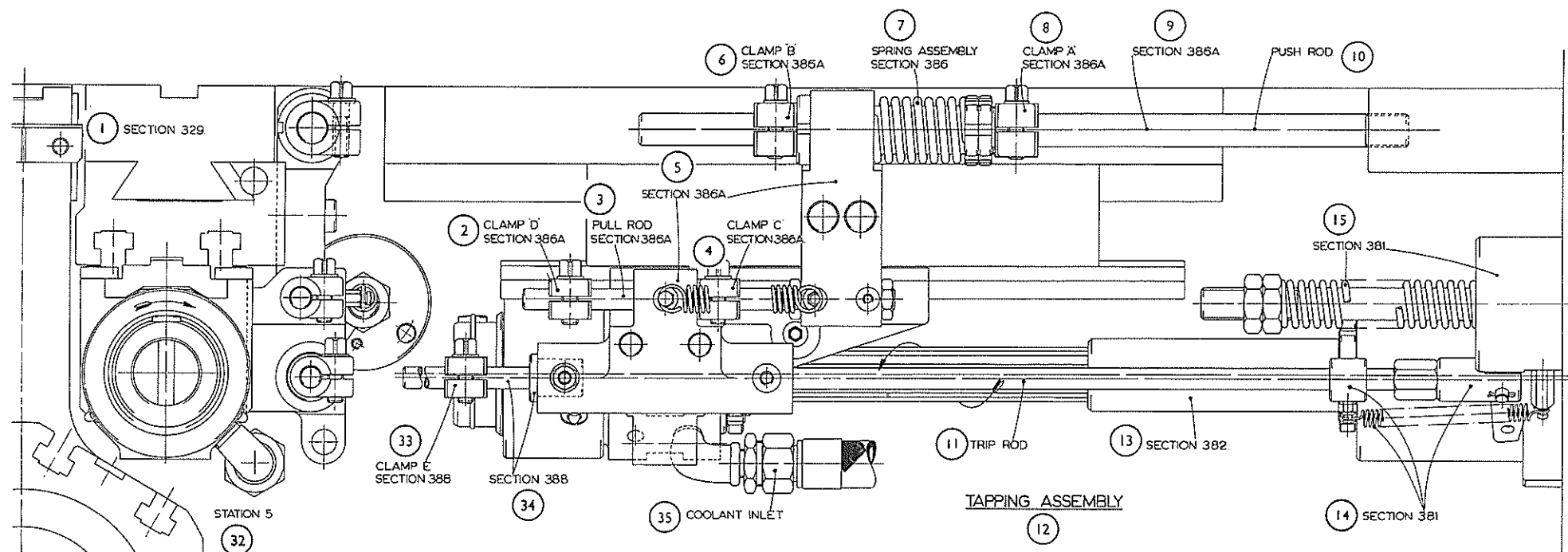
DRIVING GEAR 'A'		DRIVEN GEAR 'B'		RATIO
TEETH	REF.	TEETH	REF.	
62	381 V 130/62	46	381 V 130/46	4-9



ALTERNATIVE DRIVE ARRANGEMENT WHEN 2 DRIVE RATIOS ARE REQUIRED OR WHEN DRIVEN WITH MORE THAN 51^T DRIVEN GEARS ARE REQUIRED IN ADJACENT STATIONS.

382 Z 10

- | | | | |
|----|-----------------------------|----|---------------------------------|
| 1 | SECTION 329 | 19 | REVOLVING DIEHEAD ASSEMBLY |
| 2 | CLAMP 'D' SECTION 386A | 20 | CLAMP 'G' SECTION 388. |
| 3 | PULL ROD SECTION 386A | 21 | SECTION 388 |
| 4 | CLAMP 'C' SECTION 386A | 22 | CLAMP 'C' |
| 5 | SECTION 386A | 23 | CLAMP 'D' |
| 6 | CLAMP 'B' SECTION 386A | 24 | GLUT DIMENSIONS TO SUIT DIEHEAD |
| 7 | SPRING ASSEMBLY SECTION 386 | 25 | TO CLEAR 1/2 ROD 12.7 mm |
| 8 | CLAMP 'A' SECTION 386A | 26 | MATERIAL-STEEL |
| 9 | SECTION 386A | 27 | MATERIAL-BRONZE |
| 10 | PUSH ROD | 28 | COLLET NOSE |
| 11 | TRIP ROD | 29 | CHUCK JAW FACE |
| 12 | TAPPING ASSEMBLY | 30 | CLAMP 'F' |
| 13 | SECTION 382 | 31 | SECTION 327 |
| 14 | SECTION 381 | 32 | STATION 5 |
| 15 | SECTION 381 | 33 | CLAMP 'E' SECTION 388 |
| 16 | SECTION 382 | 34 | SECTION 388 |
| 17 | SECTION 388 | 35 | COOLANT INLET |
| 18 | TRIP ROD | | |



386 Z 10

FITTING AUXILIARY LONGITUDINAL MOTIONS STATIONS 3 & 6

First fit the cams to the drum on the main camshaft and check to ensure that a $1\frac{3}{8}$ " diameter roller will pass at all points around the drum.

The auxiliary longitudinal motions should now be fitted. These are shown diagrammatically on Fig. 43, Page 113. together with all dimensions of the cam drums.

Setting the Threading Attachment, Stations 4 and 5. Fig. 48, Page 125, for Self-opening Diehead.

1. Set operating block on cam lever to scale setting as calculated. (Calculation c).
2. Handwind to beginning of feed stroke.
3. Adjust Clamp 'A' until the dies are just clear of the work. If the length of the thread is less than $\frac{1}{3}$ the scale setting a minimum clearance equal to $\frac{1}{3}$ the scale setting less the thread length must be set between the dies and the work.

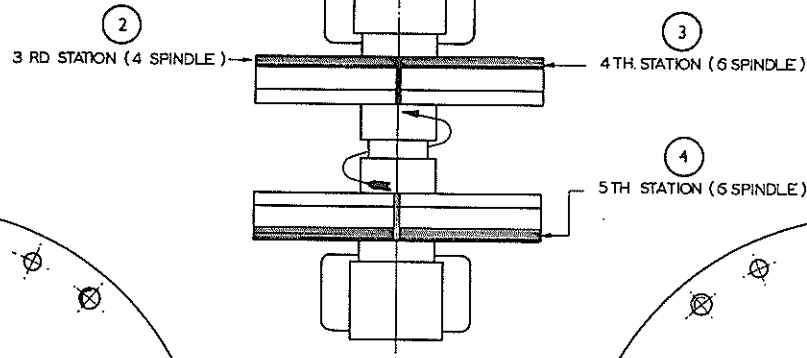
4. Set Clamp 'C' in conjunction with Clamp 'A' to obtain the most advantageous working position of the attachment body on its slide.
5. Set Clamp 'B' just clear of the push sleeve.
6. Set Clamp 'D' with a minimum clearance equal to the thread length, plus the clearance set between the dies and the work, minus $\frac{1}{3}$ of the scale setting.
It is advisable to start with more clearance than this and adjust closer after the diehead trip has been set correctly.
This clamp must not contact the attachment body bracket before the diehead has opened.
7. Set Clamp 'F' to open the diehead when the correct length of thread has been cut.
The forward motion of the push rod must have ceased before the diehead opens.
8. Set Clamp 'G' to close the diehead when the attachment is fully back.

Setting the Threading Attachment when using Taps or Button Dies. Stations 4 and 5.

1. As self-opening dieheads.
2. As self-opening dieheads.
3. As self-opening dieheads.
4. As self-opening dieheads.
5. As self-opening dieheads.
6. Set Clamp 'D' with a minimum clearance equal to the thread length PLUS the clearance set between the tap or die and the work PLUS $\frac{1}{8}$ ".
It is advisable to start with more clearance than this and adjust closer after the clutch trip has been set correctly.
This clamp must not contact the attachment body bracket before the tap or die has finished and is clear of the work.
7. Set Clamp 'E' to trip the clutch into reverse when the tap has reached full depth.
This can be done by setting the clamp clear of the bush by an amount equal to the thread length PLUS the clearance set, LESS $\frac{1}{8}$ ".

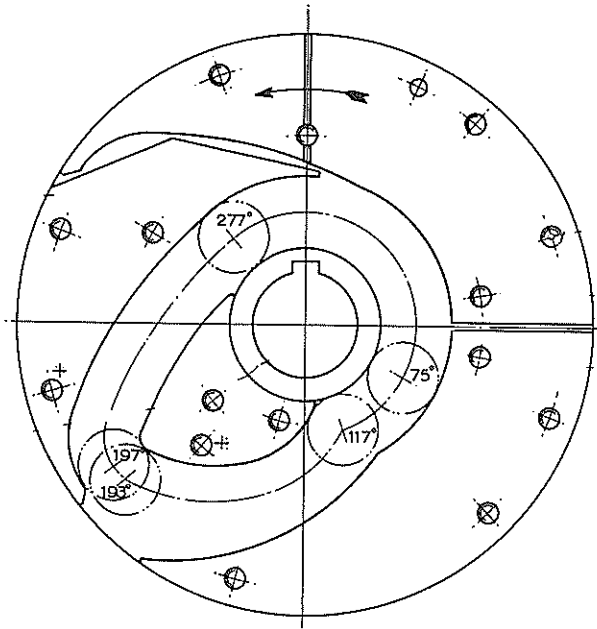
1. GROOVES ON THE FACES TO BE IN LINE WITH THE NOTCH ON THE PERIPHERY OF THE CAM CARRIER.
2. 3RD STATION (4 SPINDLE)
3. 4TH STATION (6 SPINDLE)
4. 5TH STATION (6 SPINDLE)
5. TO FIND SCALE SETTING REQUIRED SCALE SETTING IN INCHES
= AVAILABLE CUTTING REVS.
2 X 'ON' RATIO X T.P.I.
6. DO NOT FIT THIS CAM WHEN USING SELF OPENING DIEHEAD
7. SECTION 386B MARK III
4TH STATION THREADING CAMS (6 SPINDLE)
3RD STATION THREADING CAMS (4 SPINDLE)
VIEW ON ARROW 'B'
8. FEED PER REV IS TWICE THAT SHOWN ON FEED & SPEED CHART 372 Y 148
FEED STROKE EQUALS SCALE READING
APPROACH STROKE EQUALS FAST MOTION STROKE
9. EXTRA HOLES ARE REQUIRED IN CAM DISC
* IF USED ON MACHINES BEFORE INSPECTION No.10554
10. SECTION 386C MARK III
5TH STATION THREADING CAMS (6 SPINDLE)
VIEW ON ARROW 'A'
11. DO NOT FIT THIS CAM WHEN USING SELF OPENING DIEHEAD

① GROOVES ON THE FACES TO BE IN LINE WITH THE NOTCH ON THE PERIPHERY OF THE CAM CARRIER.



⑤ TO FIND SCALE SETTING REQUIRED
SCALE SETTING IN INCHES
= AVAILABLE CUTTING REVS.
2 X ON RATIO X T.P.I.

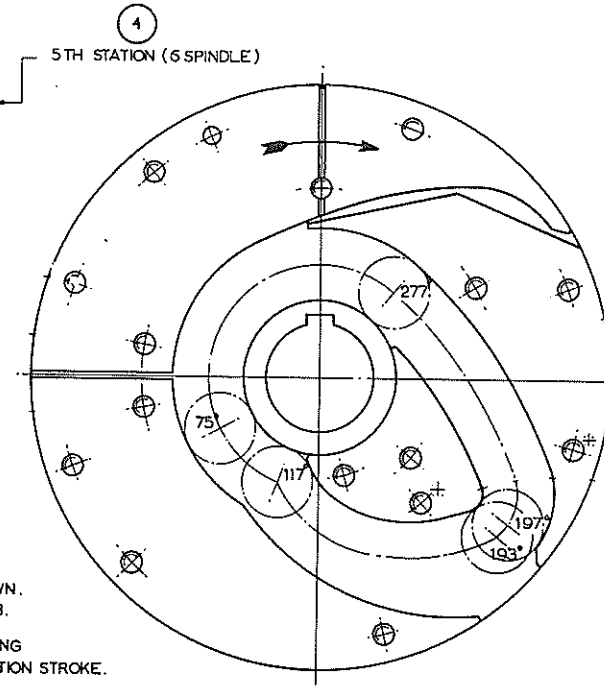
⑪ DO NOT FIT THIS CAM WHEN USING SELF OPENING DIEHEAD.



⑩ SECTION 386C. MARK III
5 TH. STATION THREADING CAMS (6 SPINDLE)
VIEW ON ARROW 'A'.

⑧ FEED PER REV. IS TWICE THAT SHOWN.
ON FEED & SPEED CHART 372.Y148.
FEED STROKE EQUALS SCALE READING
APPROACH STROKE EQUALS FAST MOTION STROKE.

⑨ EXTRA HOLES ARE REQUIRED IN CAM DISC
*IF USED ON M/C'S BEFORE INSP. NO. 10554.

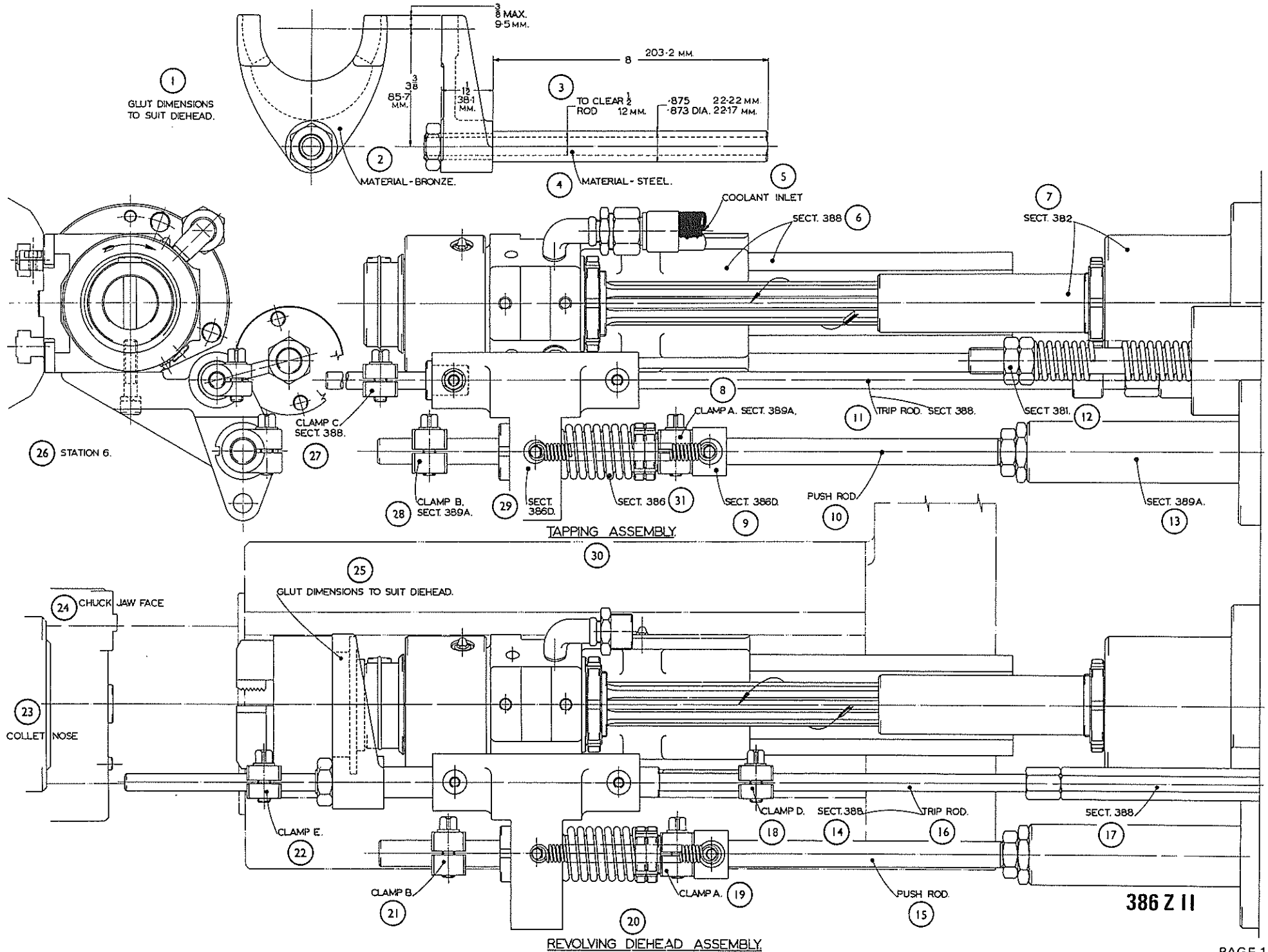


⑦ SECTION 386B MARK II.
4 TH. STATION THREADING CAMS (6 SPINDLE.)
3 RD. STATION THREADING CAMS (4 SPINDLE)
VIEW ON ARROW 'B'.

⑥ DO NOT FIT THIS CAM WHEN USING SELF OPENING DIEHEAD.

386 Y 4B

- | | | | |
|----|---------------------------------|----|---------------------------------|
| 1 | GLUT DIMENSIONS TO SUIT DIEHEAD | 17 | SECT. 388 |
| 2 | MATERIAL-BRONZE | 18 | CLAMP D |
| 3 | TO CLEAR ROD 1/2 12mm | 19 | CLAMP A. |
| 4 | MATERIAL-STEEL | 20 | REVOLVING DIEHEAD ASSEMBLY |
| 5 | COOLANT INLET | 21 | CLAMP B |
| 6 | SECT. 388 | 22 | CLAMP E. |
| 7 | SECT. 382 | 23 | COLLET NOSE |
| 8 | CLAMP A. SECT. 389A | 24 | CHUCK JAW FACE |
| 9 | SECT. 386D | 25 | GLUT DIMENSIONS TO SUIT DIEHEAD |
| 10 | PUSH ROD | 26 | STATION 6 |
| 11 | TRIP ROD. SECT. 388 | 27 | CLAMP C. SECT. 388 |
| 12 | SECT. 381 | 28 | CLAMP B. SECT. 389A |
| 13 | SECT. 389A | 29 | SECT. 386D |
| 14 | SECT. 388 | 30 | TAPPING ASSEMBLY |
| 15 | PUSH ROD | 31 | SECT. 386 |
| 16 | TRIP ROD | | |



386 Z II

SETTING THREADING ATTACHMENTS

Setting the Threading Attachment for Self-opening Dieheads. Stations 3 & 6

1. Having set the correct scale setting, handwind the machine to the beginning of feed stroke.
2. Adjust clamp 'A' until the dies are just clear of the work.
If the feed stroke of the cam is greater than the thread length, a clearance equal to the feed stroke less the thread length must be set between the dies and the work.
3. Set clamp 'E' to open the diehead when the correct length of thread has been cut.
Forward movement of the push rod must have ceased before the diehead opens.
4. Set clamp 'B' so that, while never touching the push sleeve during the forward motion of the diehead, it would nevertheless give a positive pull back to the attachment should the return spring fail.
5. Set clamp 'D' to close the diehead when the attachment is fully back.

Setting the Threading Attachment for Taps and Button Dies:-

1. Set correct scale setting and handwind the machine to start of feed stroke.
2. Set clamp (A) until the dies are just clear of the work.
If the feed stroke of the cam is greater than the thread length, a clearance equal to the feed stroke less the thread length must be set between the dies and the work.
3. Set clamp 'C' to trip the clutch into reverse when the tap has reached full depth.
This may be done by setting the clamp clear of the bush by an amount equal to the thread length plus the clearance set between the tap or die and the work, less $\frac{1}{8}$ ".
4. Set clamp 'B' so that, while never touching the push sleeve during the forward motion of the diehead, it would nevertheless give a positive pull back to the attachment should the return spring fail.

General Notes on Setting Threading Attachments

It is advisable to check threading attachment settings by use of the "Jog" button and with the index clutch out so that all settings and adjustments can be checked and modified if necessary.

Never handwind the machine through feed when threading is set and a component is at the threading station.

Never handwind backwards without either relieving the clamp 'A' (see Figs. 48 & 49, Pages 125 & 127), so that the tap or die is clear of the work, or removing the tap or die. When using a self opening diehead, this may be tripped open in order to handwind backwards.

When setting, watch the movement of the attachment to observe whether clutches are slipping; movement ceases when this occurs.

Scale setting, clearance to be set, and cams to be used should be specified on the tooling layout and not left to the setter to calculate.

It should be noted that the setting instructions given refer to normal threaded components. Should it be required to thread very long components, reference should be made to Wickman Limited.

THREADING ATTACHMENT RETURN CHECK SWITCH

Sections 186F & 386G

These units can be fitted to the threading attachment in 3rd, 4th and 5th stations.

Return Check Switches were only fitted or supplied with threading attachments to special order, but are now fitted as standard equipment.

The unit consists of a bracket-mounted microswitch with a spring-cushioned bell crank lever, a spring operated rod and stop plate (Section 186F) and the necessary electrical connections (Section 386G).

The unit is designed to close a micro-switch on threading attachment return stroke; failure to return keeps the switch open and allows the feed trip cam switch to de-energise the feed solenoid thereby tripping the feed clutch to stop the machine.

The switch bracket is bolted to the main drive housing attachment face and the stop plate bolted to the threading attachment bracket. The operating rod carrying the spring 'B' and clamp 'A' is passed through the hole in the stop plate.

To set the mechanism, handwind the machine until the feed trip cam switch de-energises the feed during the slides return (this will happen if the repeat cycle buttons have not been pressed) then handwind backwards three turns of the handcrank and set clamp 'A' on the operating rod to compress the springs and hold the micro-switch in the closed position. Check that enough spring movement is available to cover any further return stroke of the attachment.

It is advisable to check the action of the micro switch daily by holding the rod so that it does not operate the switch and in this condition one feed should be tripped, when the attachment returns.

AUXILIARY LONGITUDINAL SLIDES OPERATION STATIONS 4 & 5

Two types of unit are available.

1. The simpler type Section 324D (5th Station) or 325D (4th Station), consists of a lever mounted on a fulcrum stud in the beam, replacing the standard lever carried in the sliding block mechanism. A shorter lever shaft is fitted to the sliding block and the standard link connected to the special lever. A maximum stroke of 7½" is available with the mechanism using the standard feed cam, the feed rate being 1½ times that shown on the speed and feed chart.

Alternatively a different lever may be mounted on the fulcrum stud to give strokes, up to 5", with a better mechanical advantage.

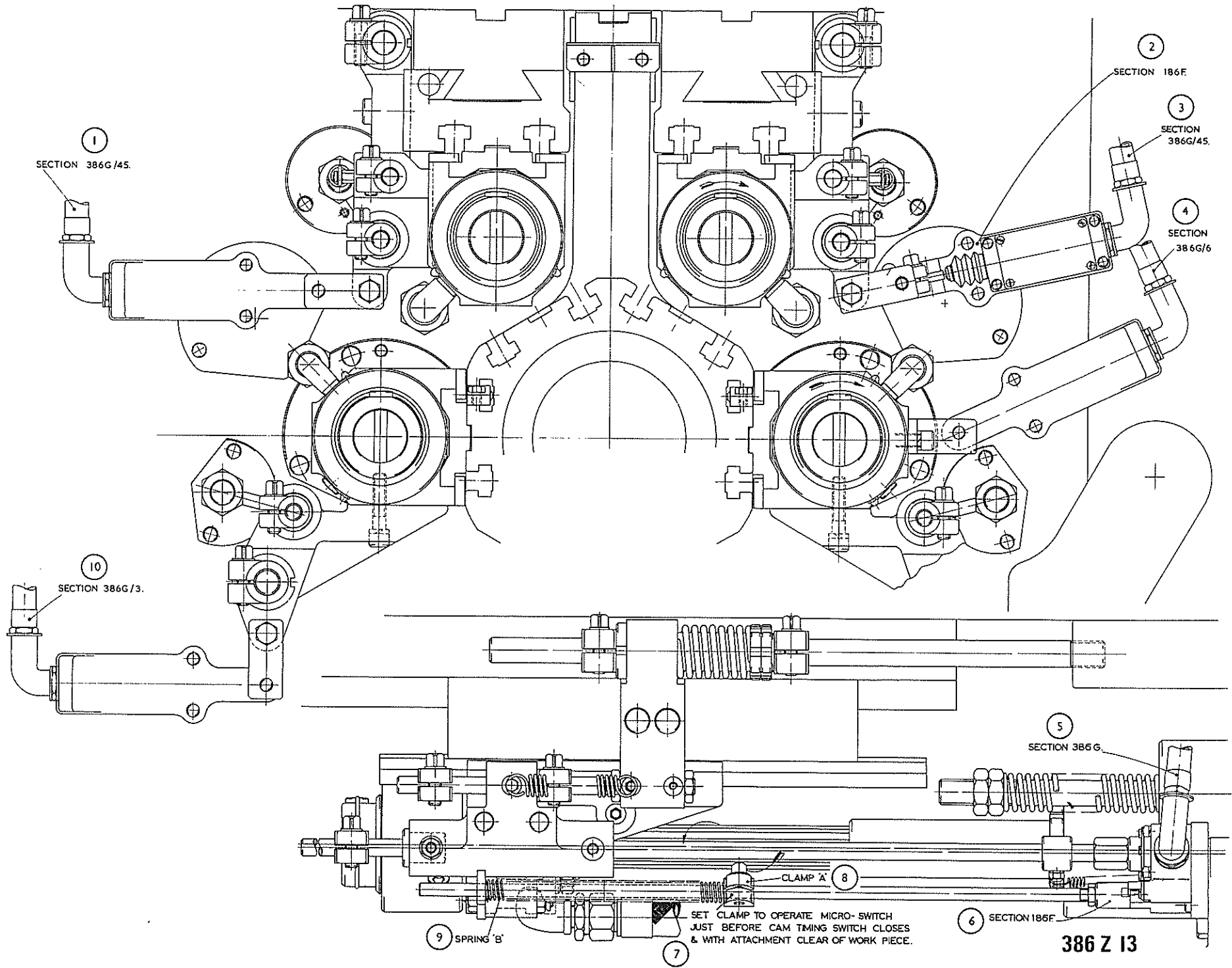
The unit can be interchanged between 4th and 5th Stations.

Special cams may be used with these motions to suit tooling requirements.

2. The second type of unit Section 324A (5th Station) or 325A (4th Station) is also mounted as above, but a non-standard linkage and cam lever are used to obtain strokes up to 9".

- 1 SECTION 386G/45
- 2 SECTION 186 F
- 3 SECTION 386G/45
- 4 SECTION 386G/6
- 5 SECTION 386G
- 6 SECTION 186F
- 7 SET CLAMP TO OPERATE MICRO-SWITCH JUST BEFORE CAM
TIMING SWITCH CLOSSES & WITH ATTACHMENT CLEAR OF WORKPIECE
- 8 CLAMP 'A'
- 9 SPRING 'B'
- 10 SECTION 386G/3

386 Z 13 APPLICATION DRAWING OF MICRO-SWITCHES FOR CHECKING THREADING ATTACHMENT RETURN



FITTING THE THREADING UNITS STATIONS 4 & 5

The main body of the threading attachment is fitted as shown in Fig. 44, Page 111.

When used in Stations 4 and 5 the threading slide is fitted to the longitudinal slide and in Stations 3 and 6 to the centre block.

The slide must be positioned to reduce to a minimum the overhand of the threading attachment body on its slide during any of its working positions.

The diehead or tap or dieholder is fitted in the bore at the front end of the threading spindle and driven by a central pin through the shank. It is essential that the spring ring is replaced to retain this screw during running.

When using solid taps or dies it is essential that some form of floating holder be used.

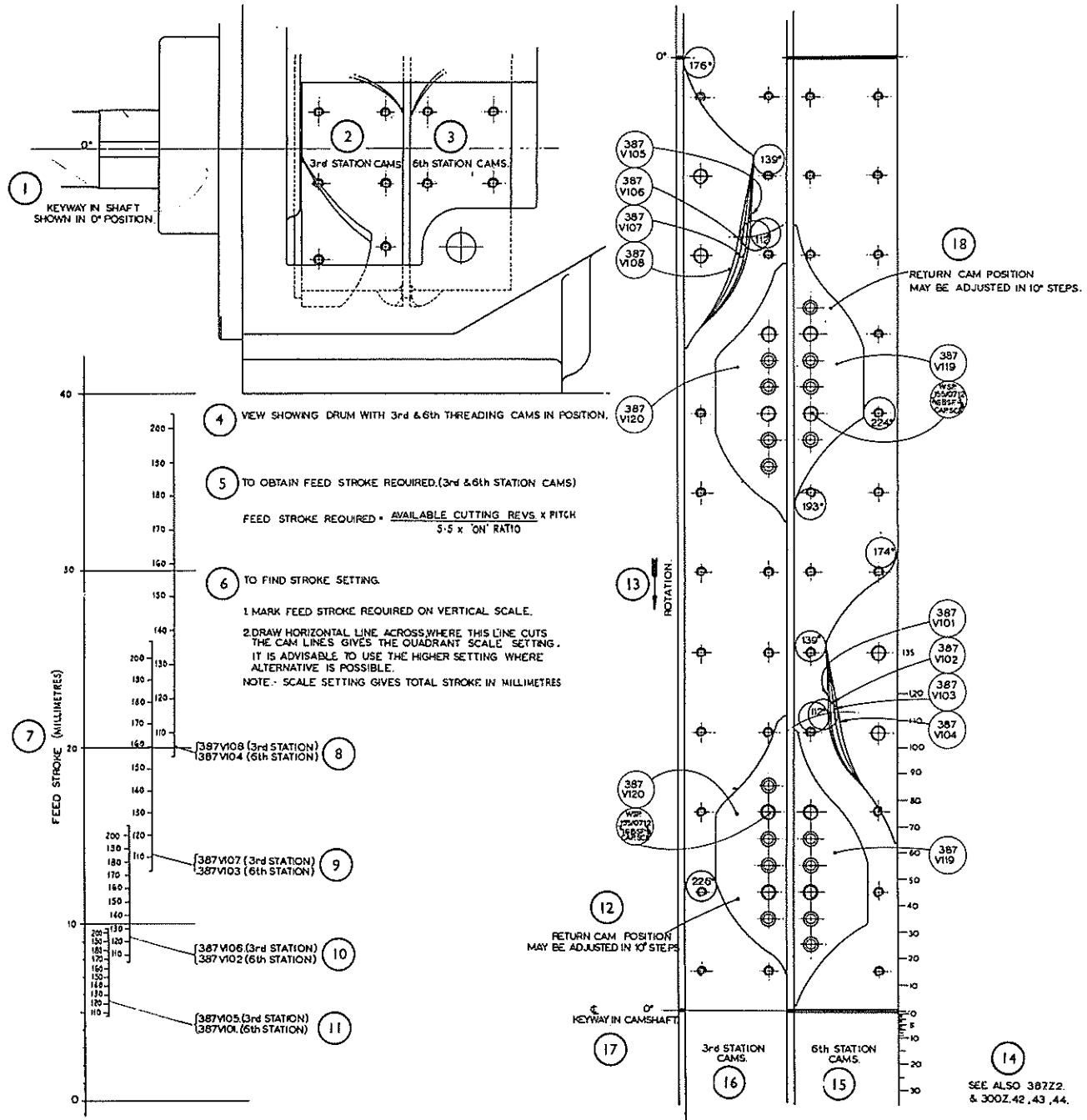
In Stations 4 and 5 the trip rods and rush rods are fitted as shown in Fig. 48, Page 125, depending on whether a self-opening diehead or solid tap or die is to be used.

In Stations 3 and 6, set the trip and push rods as shown in Fig. 49, Page 127. The two attachments are operated by the auxiliary longitudinal motions, Section 389A for Station 6 and Section 389B for Station 3. It is advisable to fit these sections before fitting the bracket and rods on the threading attachment.

Fitting Threading Cams for Stations 4 and 5.
Fig. 50, Page 129

Threading cams are fitted in place of the standard feed cams. The line on the return cam should be in line with the groove on the outside of the cam disc. It will be found easier to fit the cams if the operating link is disconnected from the operating lever by removal of the pin in the stroke adjusting block. Check that the cam roller will pass freely round the cam track. The outer guard cam 386 V 142A or 386 V 144A should be fitted only when using taps or button dies.

- | | |
|---|--|
| <p>1 KEYWAY IN SHAFT SHOWN IN 0° POSITION.</p> <p>2 3RD. STATION CAMS</p> <p>3 6TH. STATION CAMS</p> <p>4 VIEW SHOWING DRUM WITH 3RD. & 6TH. THREADING CAMS IN POSITION.</p> <p>5 TO OBTAIN FEED STROKE REQUIRED (3RD & 6TH STATION CAMS)</p> <p style="text-align: center;">FEED STROKE REQUIRED = $\frac{\text{AVAILABLE CUTTING REVS.} \times \text{PITCH}}{5.5 \times \text{'ON' RATIO}}$</p> <p>6 TO FIND STROKE SETTING</p> <p style="margin-left: 20px;">1. MARK FEED STROKE REQUIRED ON VERTICAL SCALE.</p> <p style="margin-left: 20px;">2. DRAW HORIZONTAL LINE ACROSS, WHERE THIS LINE CUTS THE CAM LINES GIVES THE QUADRANT SCALE SETTING. IT IS ADVISABLE TO USE THE HIGHER SETTING WHERE ALTERNATIVE IS POSSIBLE.</p> <p>NOTE: SCALE SETTING GIVES TOTAL STROKE IN MILLIMETRES</p> | <p>7 FEED STROKE (MILLIMETRES)</p> <p>8 (387V108 (3RD. STATION)
(387V104 (6TH. STATION)</p> <p>9 (387V107 (3RD STATION)
(387V103 (6TH. STATION)</p> <p>10 (387V106 (3RD. STATION)
(387V102 (6TH. STATION)</p> <p>11 (387V105 (3RD. STATION)
(387V101 (6TH. STATION)</p> <p>12 RETURN CAM POSITION MAY BE ADJUSTED IN 10° STEPS.</p> <p>13 ROTATION</p> <p>14 SEE ALSO 387Z2 & 300Z42, 43, 44</p> <p>15 6TH. STATION CAMS</p> <p>16 3RD. STATION CAMS</p> <p>17 KEYWAY IN CAMSHAFT</p> <p>18 RETURN CAM POSITION MAY BE ADJUSTED IN 10° STEPS</p> |
|---|--|



CALCULATING SCALE SETTINGS FOR THREADING CAMS

These threading cams have the same amount of rise as the standard feed cams and therefore, the total stroke is the same as the scale setting, plus the fast motion. The total stroke is divided into two parts, approach stroke and feed stroke.

Approach Stroke = $\frac{2}{3}$ scale setting + fast motion.
Feed Stroke = $\frac{1}{3}$ scale setting.

The rate of feed during the feed stroke is twice that of the standard feed cams, or twice the feed rate shown on the speed and feed chart for the particular scale setting.

CALCULATION (c)

Scale setting in inches = $\frac{\text{available cutting revs}}{2 \times \text{"ON" Ratio} \times \text{T.P.I.}}$

Maximum scale setting is 5"

For example. To cut 20 T.P.I. thread using an "ON" ratio of 5. From speed and feed chart, available cutting revs (or 'n' 148^o) = 100.

(This is determined by the longest operation).

The scale setting is obtained by using Calculation (c)

$$\text{Scale setting} = \frac{100}{2 \times 5 \times 20} = \frac{100}{200} = \frac{1}{2}''$$

Scale settings for Stations 3 and 6, using Threading Cams.

The feed stroke and scale settings are found from Fig.47, Page 123. A choice of four lead cams is given and the cam giving the greatest scale setting should be used wherever possible for ease of loading the work into the chuck.

The scale setting gives the total stroke in inches.

Data to be given on the layout.

The information obtained by methods explained in the previous pages should be incorporated in the tooling layout and not be left for the setter to calculate.

The following items, for instance, should be considered essential:-

1. Full details of sections to be used.
(See Attachments Sections Chart, Fig. 40, Page 107.
2. The gears to be used on the drive units for "ON" and "OFF" ratios.
3. The cams to be used.
4. The scale settings to be set.

Fitting the Drive Units

The driving gears on the centre shaft are fitted first. To facilitate this, remove the screws holding the bearing housing located behind the pick-off gear and withdraw the shaft outwards, dropping off the spacers in the attachment compartment.

If the threading clutches are to be fitted in Stations 4 or 5, the glut shifting fork should be fitted next to the underside of the sliding block.

The universal drive is fitted as shown on Fig. 45, Page 119. The rear housing must first be fitted into the drive housing. The clutch can then be fitted complete with its driven gears and the diehead drive is slid in to support it. Fit the locknuts on the studs on the diehead drive and tighten securely. Tighten the screws of the diehead drive. The rear housing must be connected to the oil supply, two connections being provided from the top of the main drive housing, forward of the upper wormwheel. The oil supply is adjusted at the distributor block on top of the housing.

If the diehead drive only, Section 182, is to be used it is fitted as shown on Fig. 44, Page 117, but if in combination with a universal drive, see Fig. 45, Page 119.

The driven gear and the adaptor plate must be fitted after the diehead drive has been fitted into the machine.

The glut shaft should be fitted after the clutch, the spring being removed for the purpose. With the glut adjusted and clamped on the rod so that in the "ON" position there is $\frac{1}{64}$ " clearance between the clutch bobbin and adjacent clutch parts (as shown on Fig. 45, Page 119) the latch has 0.015" clearance to drop into engagement.

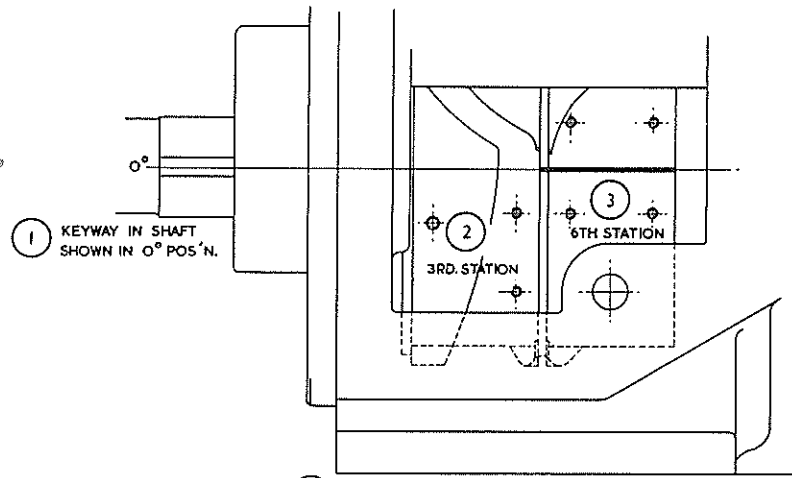
In Stations 4 and 5 the nuts in front of the glut should be set with the sliding block fully back to obtain above condition.

In Stations 3 and 6 the clamp is set on the push rod to obtain above condition with the attachment mechanism fully back.

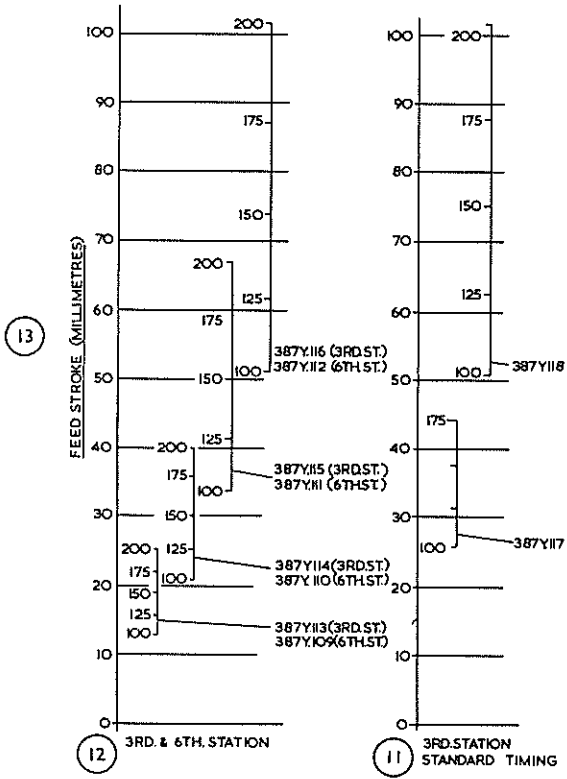
In all stations the pair of nuts limiting travel into the "OFF" position should be set so that there is $\frac{1}{32}$ " clearance between bobbin and adjacent clutch parts.

Both sides of the clutch should then be adjusted and finally the operating spring should be adjusted so that the clutch will trip satisfactorily.

When the clutch is set for use with a self-opening diehead, the operating spring with its nuts and sleeve is removed, the latch spring taken off and the trip rod uncoupled from the latch. The latch and its pin are then removed. The nuts on the glut shaft are moved along to retain the clutch in the "ON" position.



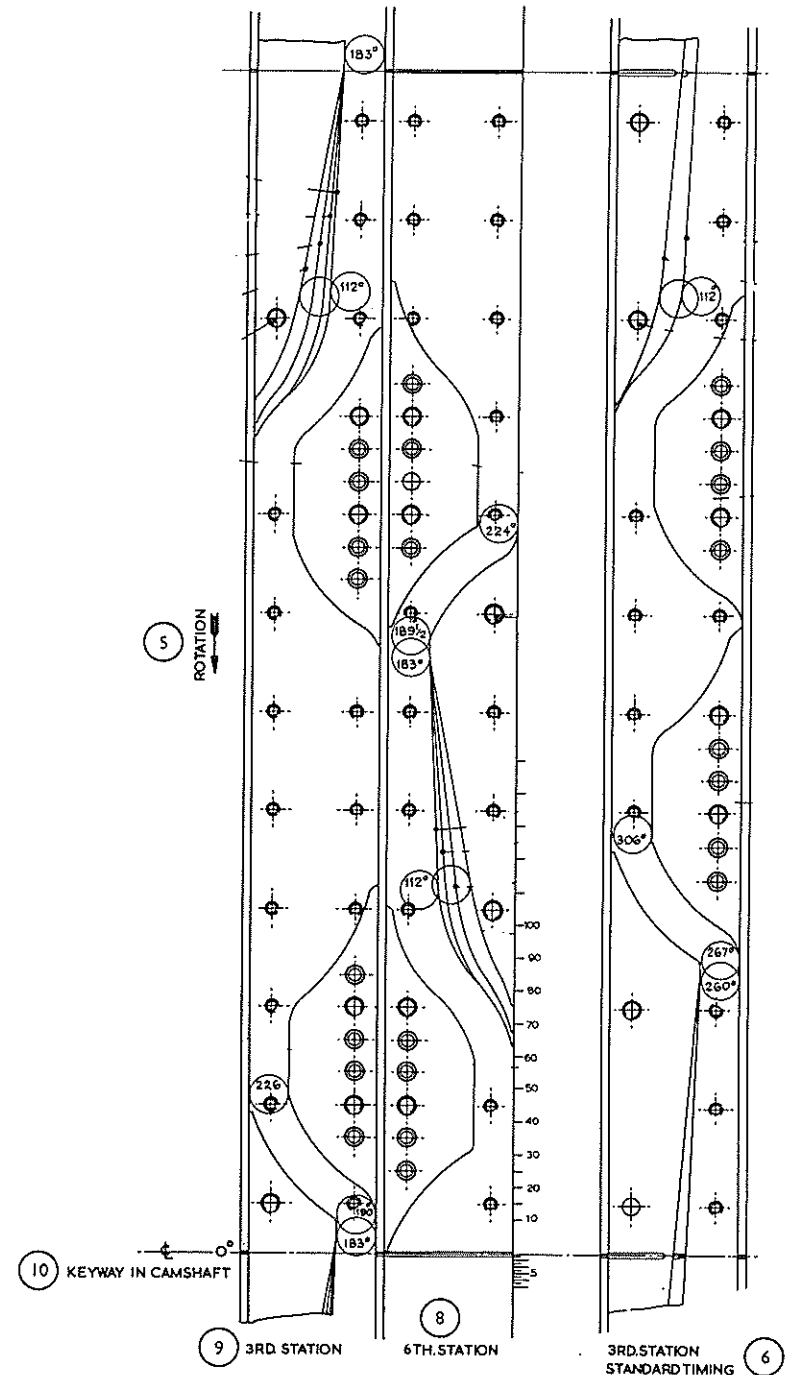
4 VIEW SHOWING DRUM WITH 3RD. & 6TH. REAMING CAMS IN POSITION.
 TO OBTAIN FEED/REV. MULTIPLY ACTUAL FEED STROKE BY
 2.08 (ACCEL CAMS) OR 1 (STANDARD CAM) AND FIND FROM THE
 CHART FEED/REV. FOR THE STROKE OBTAINED.



14 TO FIND STROKE SETTING

1. MARK FEED STROKE REQUIRED ON VERTICAL SCALE.
2. DRAW HORIZONTAL LINE ACROSS. WHERE THIS LINE CUTS THE CAM LINES GIVES THE QUADRANT SCALE SETTING. IT IS ADVISABLE TO USE THE HIGHER SETTING WHERE ALTERNATIVE IS POSSIBLE.

NOTE:- SCALE SETTING GIVES TOTAL STROKE IN MILLIMETERS.



387 Z 2

ATTACHMENT BODY & SLIDE

Section 388.

This attachment is designed to carry reamers, the threading spindle, the high speed drilling spindle and other end working tools of the shank type.

The attachment can be fitted in 3rd and 6th Stations, the slide being mounted on the centre block, and also in 4th and 5th Stations on the independent longitudinal slides.

The attachment is operated in Stations 3 and 6 by cams through the auxiliary longitudinal motion for the station concerned. Cams are available for accelerated and standard timing reaming and threading in Station 3 and for accelerated reaming and threading in Station 6.

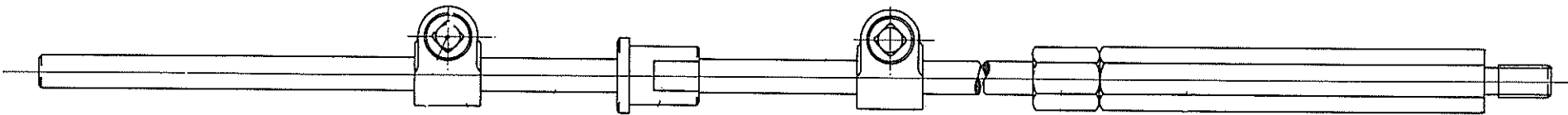
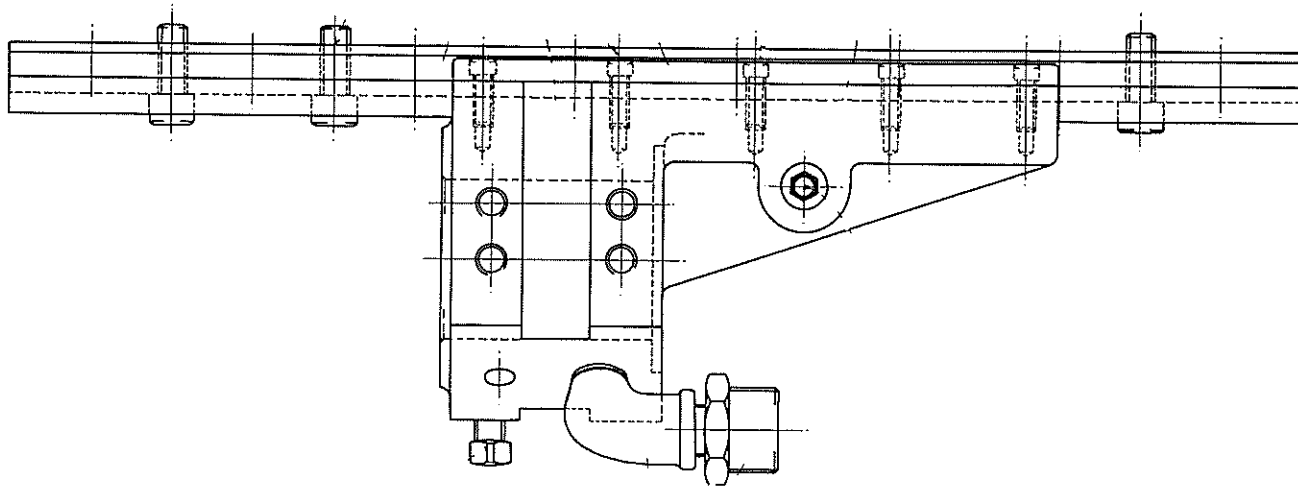
See Fig. 46 Page 121 for layout of the reaming cams, Stations 3 and 6.

See Fig. 47 Page 123 for layout of the threading cams in Stations 3 and 6.

Four reaming feed cams are available for accelerated timing in Stations 3 and 6 and two for standard timing in Station 3. A range of cams is required to give different proportions of feed to approach stroke. Standard timing cams are timed with the centre tool block, while accelerated timing cams return early in order to clear the work for loading and unloading.

Four threading feed cams are available for Stations 3 and 6 to cover a wide range of thread leads, cycle times and threading ratios.

The slide should be set on the centre block with the minimum of overhang of the attachment body and slide in all positions.



388 Y I

AUXILIARY LONGITUDINAL MOTIONS STATIONS 3 & 6

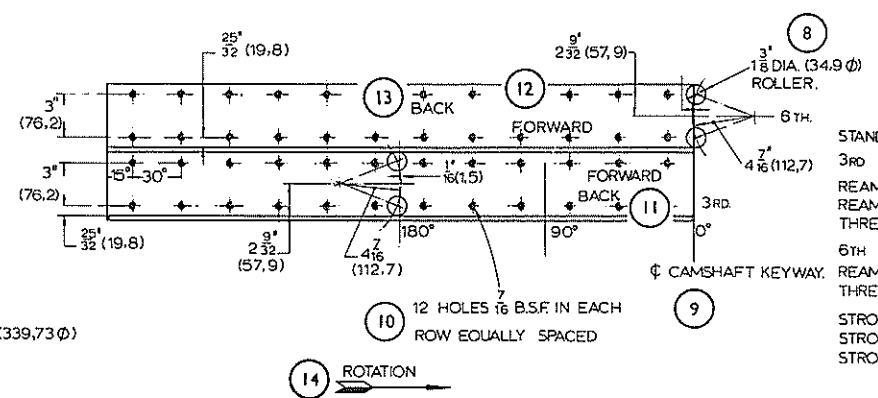
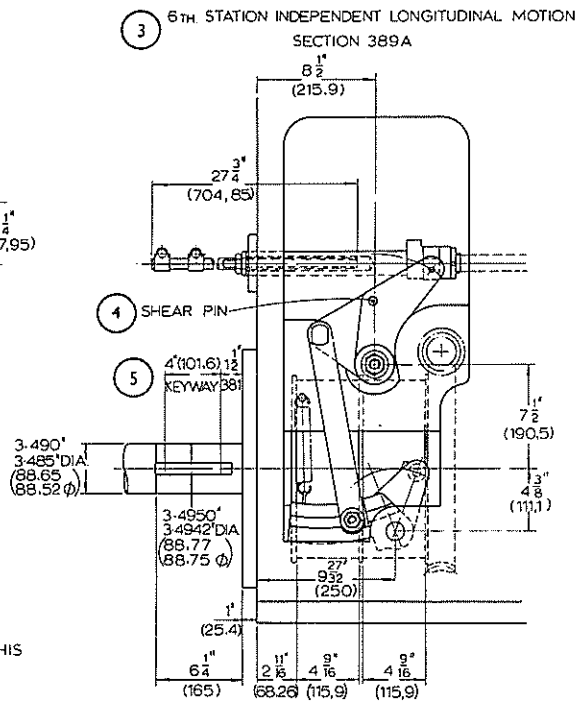
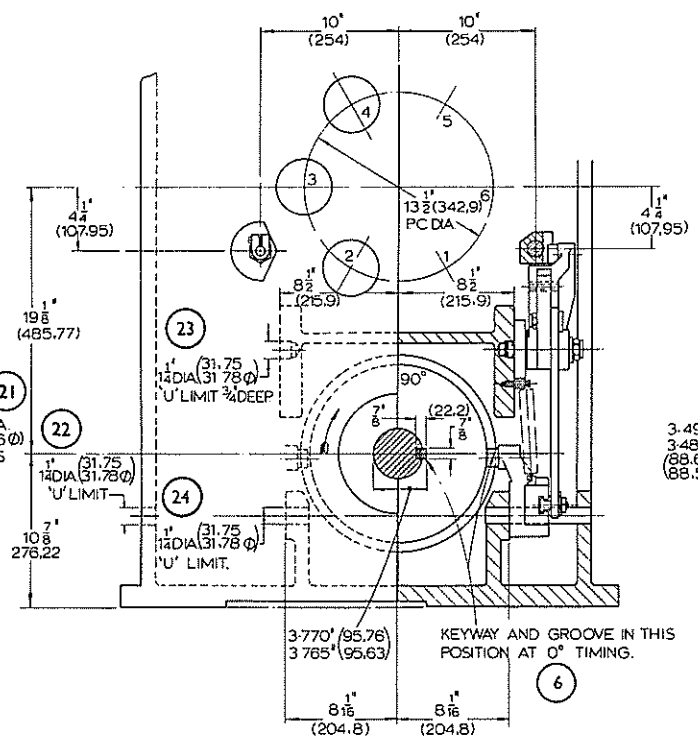
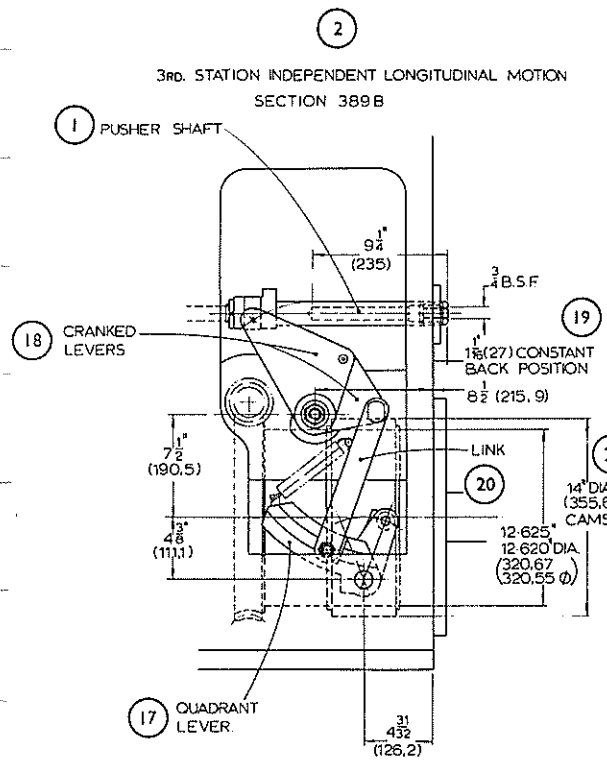
Station 6. Section 389A)
 Station 3. Section 389B) See Fig. 43, Page 113

These are used for operating the Attachment Body to perform reaming, threading and other operations, in Stations 3 and 6. The stroke is adjusted by the link block along the quadrant lever. The scale reading gives the total stroke in inches and in millimetres.

The upper lever is articulated and the two halves connected by a shear pin. Should the pin shear due to overload, the attachment will be positively returned but will not be fed forward during the next cycle.

In the 3rd Station, this shear pin may be replaced by a solid bolt if desirable, owing to the potential danger to subsequent tooling should the 3rd Station attachment fail to function.

- | | |
|--|--|
| <p>1 PUSHER SHAFT</p> <p>2 3RD. STATION INDEPENDENT LONGITUDINAL MOTION
SECTION 389B</p> <p>3 6TH. STATION INDEPENDENT LONGITUDINAL MOTION
SECTION 389A</p> <p>4 SHEAR PIN</p> <p>5 4" (101.6) 1.1/2" (38.1) KEYWAY</p> <p>6 KEYWAY AND GROOVE IN THIS POSITION AT 0° TIMING.</p> <p>7 STANDARD CAMS AVAILABLE SECTION 387</p>
<p>3RD. STATION</p>
<p>REAMING STANDARD TIMING</p> <p>REAMING ACCELERATED TIMING</p> <p>THREADING ACCELERATED TIMING</p>
<p>6TH. STATION</p> <p>REAMING</p> <p>THREADING</p>
<p>STROKE SETTING DIAGRAM FOR ACCELERATED REAMING - 387Z2</p> <p>STROKE SETTING DIAGRAM FOR THREADING 387Z1</p> <p>STROKE SETTING DIAGRAM FOR REAMING ST.3 387Z2</p> | <p>8 1 3/8" DIA. (34.9 Ø) ROLLER</p> <p>9 Ø CAMSHAFT KEYWAY</p> <p>10 12 HOLES 7/16 B.S.F. in EACH ROW EQUALLY SPACED.</p> <p>11 FORWARD, BACK</p> <p>12 FORWARD</p> <p>13 BACK</p> <p>14 ROTATION</p> <p>15 LAYOUT OF CAM DRUMS</p> <p>16 CAMS TO BE LAID OUT ON 1 3/8" DIA. (339.730)
DEVELOPED LENGTH 42.02 (1067.3)</p> <p>17 QUADRANT LEVER</p> <p>18 CRANKED LEVERS</p> <p>19 1.1/16" (27) CONSTANT BACK POSITION</p> <p>20 LINK</p> <p>21 14" DIA. (355.60) CAMS</p> <p>22 1 1/4" DIA. (31,75 31,780) 'U' LIMIT</p> <p>23 1 1/4" DIA. (31,75 31,780) 'U' LIMIT 3/4" DEEP</p> <p>24 1 1/4" DIA. (31,75 31,780) 'U' LIMIT.</p> |
|--|--|



⑬ CAMS TO BE LAID OUT ON 13 3/8 DIA. (339.73 φ)
DEVELOPED LENGTH 42-02 (1067.3)

⑰ STANDARD CAMS AVAILABLE SECTION 387
3RD STATION
REAMING STANDARD TIMING
REAMING ACCELERATED TIMING
THREADING ACCELERATED TIMING
6TH STATION
REAMING
THREADING
STROKE SETTING DIAGRAM FOR ACCELERATED REAMING-387 Z 2
STROKE SETTING DIAGRAM FOR THREADING-387 Z 1
STROKE SETTING DIAGRAM FOR REAMING ST 3-387 Z 2

⑮ LAYOUT OF CAM DRUMS.

HIGH SPEED DRILLING UNIT

Drive Section 390A

Live Spindle Unit. Section 13 Group K.

This attachment can be fitted in all stations, singly or in combination. High speed drilling attachments used concurrently can be driven at a ratio of 2:1 or 2.5:1 independently, or alternatively all at a ratio of 3:1.

The ratio gives the relative speed of the drill and the work. A ratio of 2:1 means that the relative drill speed is twice the work spindle speed, i.e. the ratio quoted allows for the fact that the drill and work spindle rotate in opposite directions.

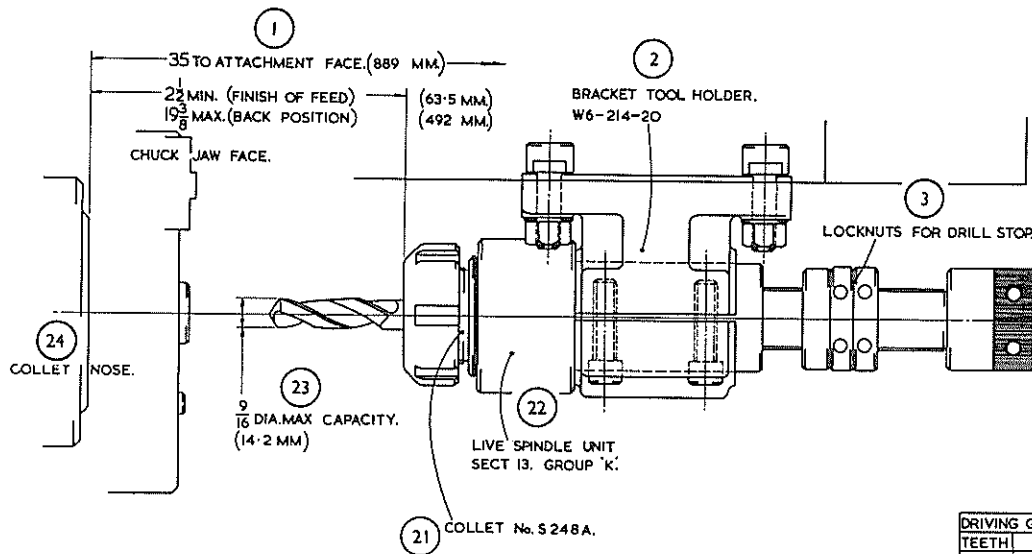
The driving and driven gears are selected to suit the ratio required, see table, Fig. 41, Page 109. The idler gear stud must be fitted to the selected ratio hole in the idler bracket. The holes in the bracket are identified by the appropriate ratio.

The attachment will accommodate parallel shank drills up to 9/16" dia (14 mm) held in collets, No. S248A.

Locknuts on the drilling spindle (LH thread) control a stop rod providing a fine adjustment for the position of drill and also positive end support.

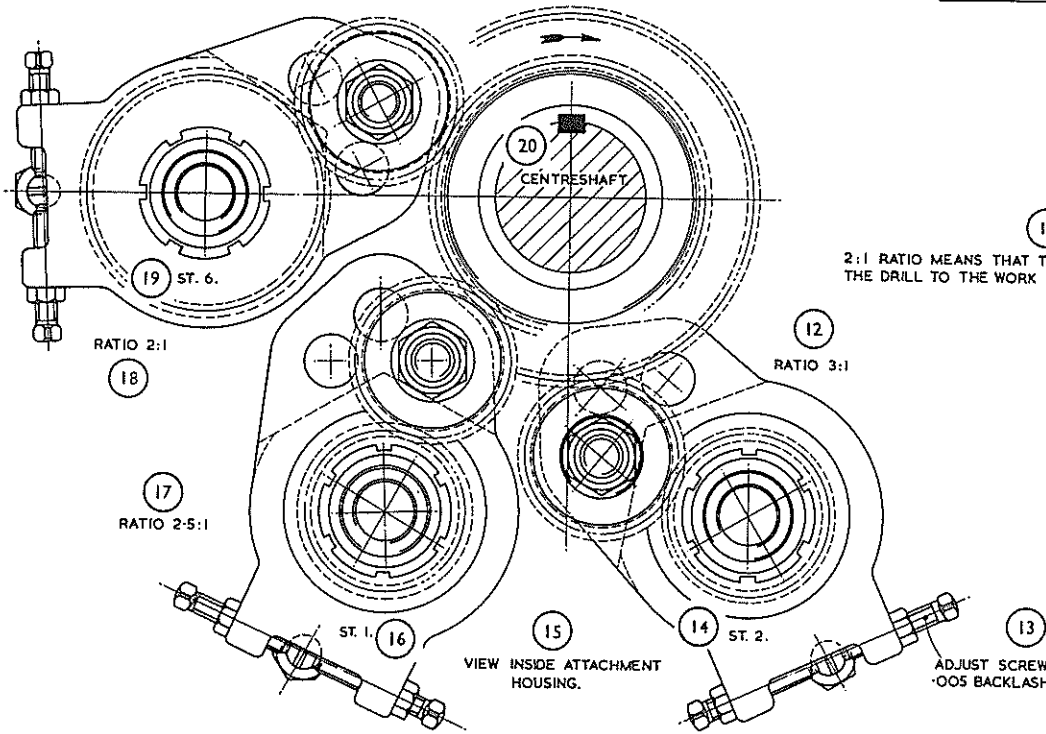
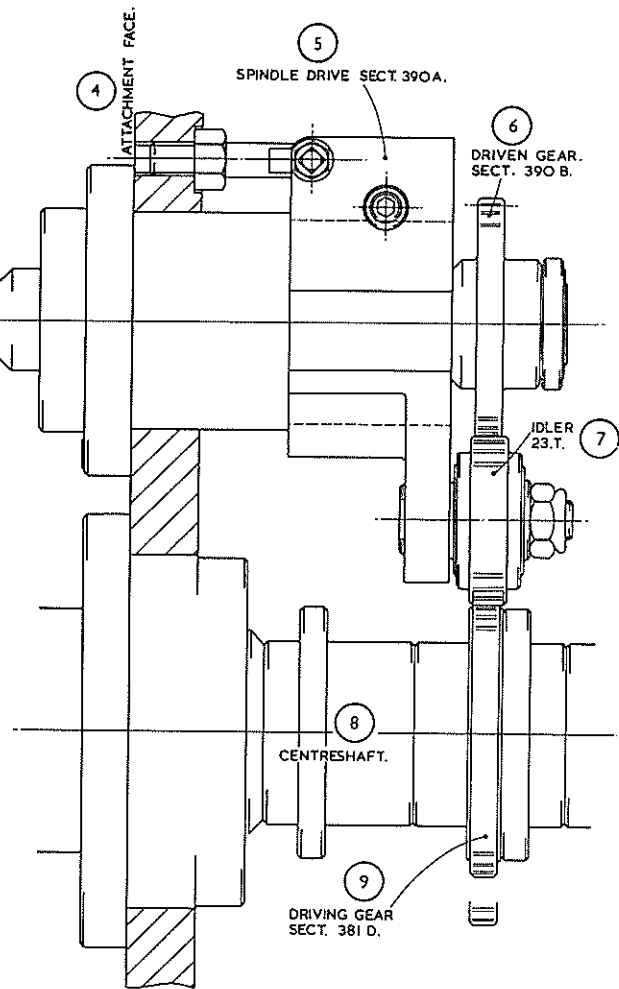
The spindle housing of the attachment fits in either a standard or extended bracket toolholder, or in the attachment body. Section 388.

- 1 35" TO ATTACHMENT FACE
2.1/2" MIN. (FINISH OF FEED) 19.3/8" MAX. (BACK POSITION)
CHUCK JAW FACE
- 2 BRACKET TOOL HOLDER W6-214-20
- 3 LOCKNUTS FOR DRILL STOP
- 4 ATTACHMENT FACE
- 5 SPINDLE DRIVE SECT. 390A
- 6 DRIVEN GEAR. SECT. 390B
- 7 IDLER 23.T
- 8 CENTRESHAFT
- 9 DRIVING GEAR SECT. 381D
- 10 DRIVING GEAR DRIVEN GEAR RATIO
TEETH REF. TEETH REF.
- 40 381V130/40 35 390X127/35 2:1
- 40 381V130/40 24 390X127/24 2.5:1
- 54 381V130/54 24 390X127/24 3:1
- 11 2:1 RATIO MEANS THAT THE RELATIVE SPEED OF THE DRILL TO THE
WORK IS TWICE THE SPINDLE SPEED.
- 12 RATIO 3:1
- 13 ADJUST SCREWS TO GIVE .005" BACKLASH IN GEARS
- 14 STATION 2
- 15 VIEW INSIDE ATTACHMENT HOUSING
- 16 STATION 1
- 17 RATIO 2.5:1
- 18 RATIO 2:1
- 19 STATION 6
- 20 CENTRESHAFT
- 21 COLLET No. S248A
- 22 LIVE SPINDLE UNIT. SECT. 13. GROUP 'K'
- 23 9/16" DIA. MAX. CAPACITY
- 24 COLLET NOSE



10

DRIVING GEAR		DRIVEN GEAR		RATIO
TEETH	REF.	TEETH	REF.	
40	381V130/40	35	390X127/35	2 : 1
40	381V130/40	24	390X127/24	2.5 : 1
54	381V130/54	24	390X127/24	3 : 1



390 Z 10

1	2¼-6 6⅝"-6	2⅝"-4 8"-4	SECTIONS REQD. 393 393A 393B 393C
	STATION 3		1 1
	STATION 4	STATION 3	1 1
	STATION 5	STATION 4	1 1
	STATION 6		1 1 1

CAN ONLY BE USED
WITH SECTION 339 & 339B

2 TWO AUXILIARY CROSS SLIDE MOTIONS CANNOT BE USED ON THE
SAME SIDE OF MACHINE CONCURRENTLY.

3 1½" ROLLER DIA.

4 SECTION 393

5 2¼-6 6⅝"-6 — STATIONS 4 & 5

UPPER LEVER CONNECTED IN HOLE A. SLIDE MOVEMENT =
CAM RISE X SCALE READING

UPPER LEVER CONNECTED IN HOLE B. SLIDE MOVEMENT =
CAM RISE X SCALE READING

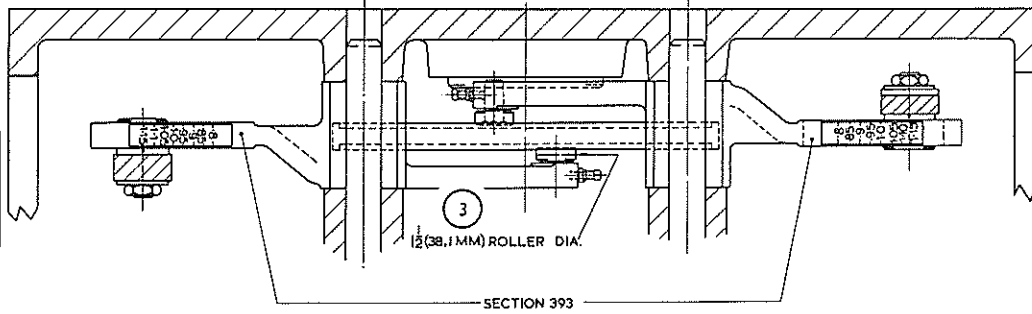
2

2¼-6 6⅝"-6 — STATIONS 3 & 6

SLIDE MOVEMENT = CAM RISE X SCALE READING

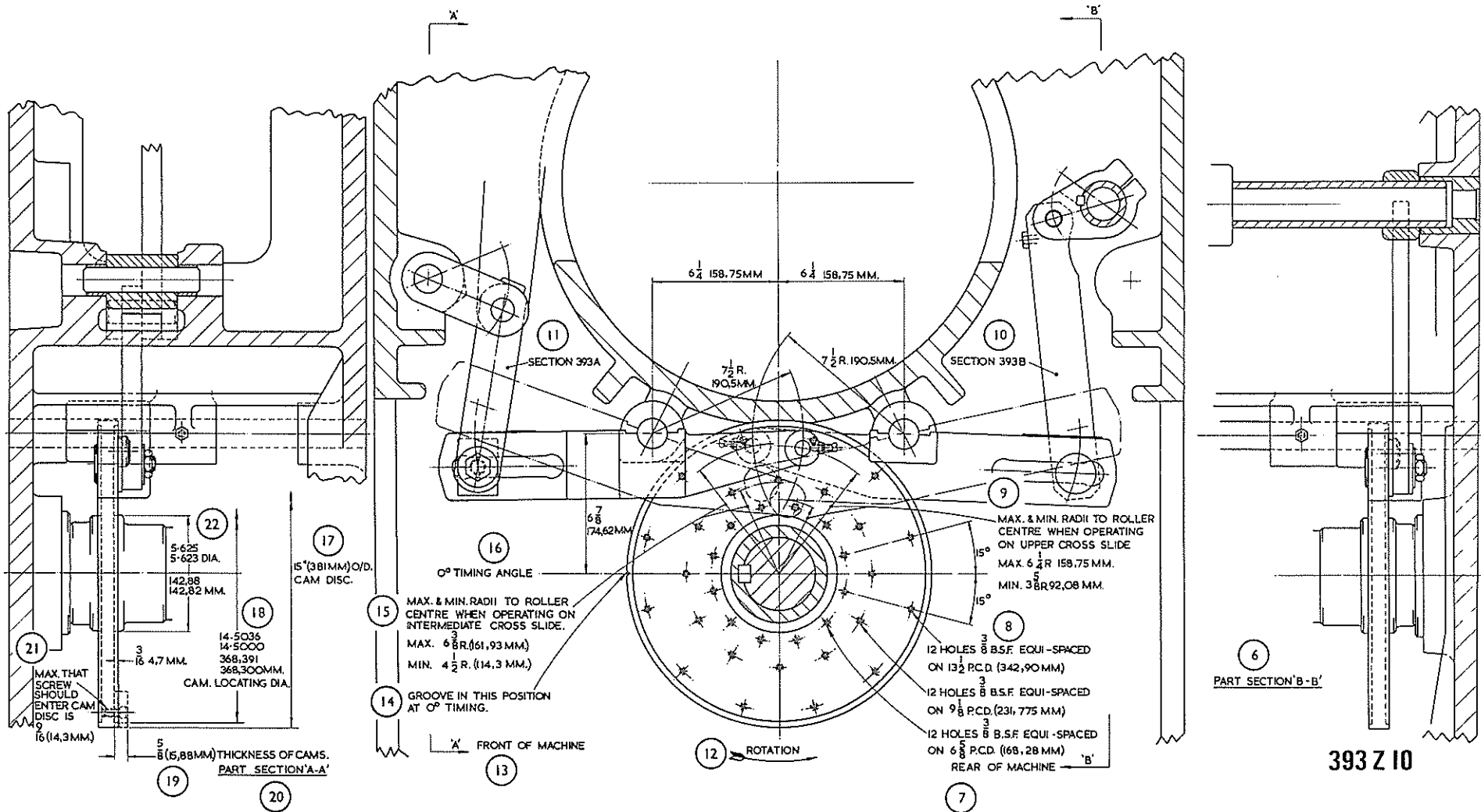
- 6 SECTION 393B
- 7 MAX. & MIN. RADII TO ROLLER CENTRE WHEN OPERATING ON UPPER CROSS SLIDE.
- 8 PART SECTION ' BB '
- 9 12 HOLES 3/8 BSF. EQUI-SPACED ON 13¼ P.C.D.
12 HOLES 3/8 BSF. EQUI-SPACED ON 9⅝ P.C.D.
12 HOLES 3/8 BSF. EQUI-SPACED ON 6⅝ P.C.D.
- 10 REAR OF MACHINE ' B '
- 11 ROTATION
- 12 FRONT OF MACHINE
- 13 GROOVE IN THIS POSITION AT 0° TIMING
- 14 MAX. & MIN. RADII TO ROLLER CENTRE WHEN OPERATING ON INTERMEDIATE CROSS SLIDE.
- 15 0° TIMING ANGLE
- 16 15" O/D CAM DISC
- 17 14.5036 14.5000 CAM LOCATING DIA.
- 18 5/8 THICKNESS OF CAMS
- 19 PART SECTION ' AA '
- 20 MAX. THAT SCREW. SHOULD ENTER CAM DISC IS 9/16
- 21 5.625 5.623 DIA.
- 22 SECTION 393A

2 1/4"-6	2 3/4"-4	SECTIONS REQD.			
6 7/8"-6	6"-4	393	393A	393B	393C
STATION 3		1		1	CAN ONLY BE USED WITH SECTION 393 & 393B
STATION 4	STATION 3	1	1		
STATION 5	STATION 4	1	1		
STATION 6		1		1	1



2 1/4"-6	6 7/8"-6	STATIONS 4 & 5	
UPPER LEVER CONNECTED IN HOLE 'A'	SLIDE MOVEMENT = CAM RISE X SCALE READING		
UPPER LEVER CONNECTED IN HOLE 'B'	SLIDE MOVEMENT = CAM RISE X SCALE READING		
2 1/4"-6 6 7/8"-6 — STATIONS 3 & 6			
SLIDE MOVEMENT = CAM RISE X SCALE READING			

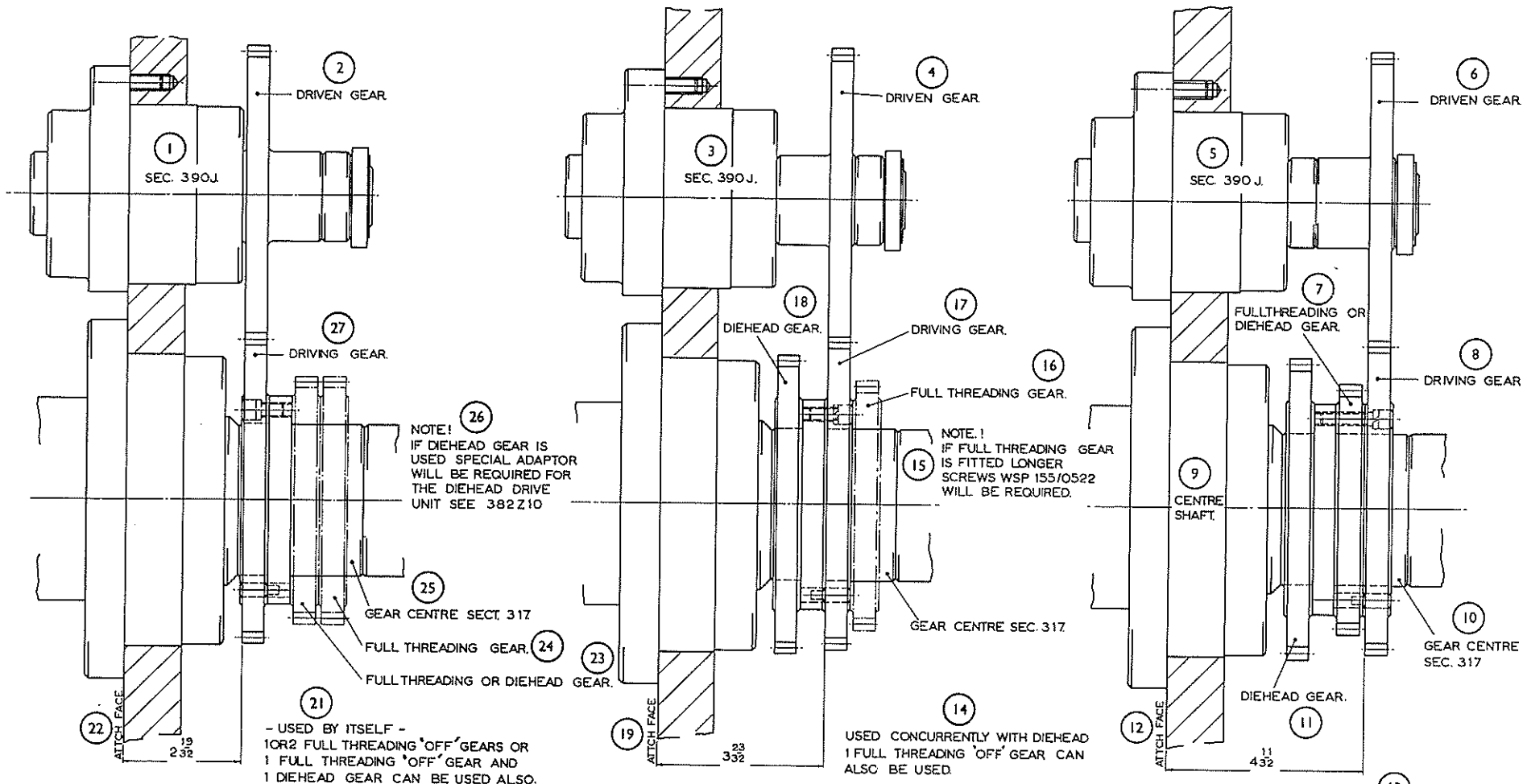
1 TWO AUXILIARY CROSS SLIDE MOTIONS CANNOT BE USED ON THE SAME SIDE OF M/C CONCURRENTLY.



- 1 SEC. 390J.
- 2 DRIVEN GEAR
- 3 SEC. 390J
- 4 DRIVEN GEAR
- 5 SEC. 390J
- 6 DRIVEN GEAR
- 7 FULLTHREADING OR DIEHEAD GEAR
- 8 DRIVING GEAR
- 9 CENTRE SHAFT
- 10 GEAR CENTRE SEC. 317
- 11 DIEHEAD GEAR
- 12 ATTCH. FACE

- 13 USED CONCURRENTLY WITH DIEHEAD AND 1 FULL THREADING ATTACHMENT OR 2 DIEHEADS OF DIFFERENT RATIOS OR 2 DIEHEADS WITH DRIVEN GEARS OF 51 T. OR MORE CAN BE FITTED IN ADJACENT STNS.
- 14 USED CONCURRENTLY WITH DIEHEAD 1 FULL THREADING ' OFF ' GEAR CAN ALSO BE USED.
- 15 GEAR CENTRE SEC. 317.
- 16 NOTE!
IF FULL THREADING GEAR IS FITTED LONGER SCREWS WSP.155/0522 WILL BE REQUIRED.
- 17 FULL THREADING GEAR
- 18 DRIVING GEAR
- 19 DIEHEAD GEAR
- 20 ATTCH. FACE

21	APPLICATION	SYNCHRONOUS DRIVE ATT. SECT. 390J	DRIVING GEAR 381.V.130/57	DRIVEN GEAR 381.V.128/51	CAP SCREW 5/16 B.S.FINE 5/8 L.G.W.S.P. 155/0510	CAP SCREW 5/16 B.S.FINE 1¼ L.G.W.S.P. 155/0520	LOCKWASHER W.S.P.154/05
	USED BY ITSELF	1	1	1	3		3
	USED CONCURRENTLY WITH DIEHEAD.	1	1	1	3		3
	USED CONCURRENTLY WITH DIEHEAD & 1 FULL THRDG. ATT.	1	1	1		3	3
22	– USED BY ITSELF – 1 OR 2 FULL THREADING 'OFF' GEARS OR 1 FULL THREADING 'OFF' GEAR AND 1 DIEHEAD GEAR CAN BE USED ALSO.						
23	ATTCH. FACE						
24	FULL THREADING OR DIEHEAD GEAR.						
25	FULL THREADING GEAR						
26	GEAR CENTRE SECT. 317						
27	NOTE! IF DIEHEAD GEAR IS USED SPECIAL ADAPTOR WILL BE REQUIRED FOR THE DIEHEAD DRIVE UNIT SEE 382Z10.						
28	DRIVING GEAR.						



21 - USED BY ITSELF -
1 OR 2 FULL THREADING 'OFF' GEARS OR
1 FULL THREADING 'OFF' GEAR AND
1 DIEHEAD GEAR CAN BE USED ALSO.

14 USED CONCURRENTLY WITH DIEHEAD
1 FULL THREADING 'OFF' GEAR CAN
ALSO BE USED.

13 USED CONCURRENTLY WITH DIEHEAD AND
1 FULL THREADING ATTACHMENT, OR 2
DIEHEADS OF DIFFERENT RATIOS OR 2
DIEHEADS WITH DRIVEN GEARS OF 51T.
OR MORE CAN BE FITTED IN ADJACENT STNS.

20	APPLICATION	SYNCHRONOUS DRIVE ATT. SECT. 390J.	DRIVING GEAR 381V.130/57.	DRIVEN GEAR 381V.128 /51.	CAP SCREW 5-16 B.S.FINE 5-8 LG.WSP 155 /0510.	CAP SCREW 5-16 B.S.FINE 1 1/4 LG.WSP 155 /0520.	LOCKWASHER WSP 154 /05
	USED BY ITSELF	1	1	1	3		3
	USED CONCURRENTLY WITH DIEHEAD	1	1	1	3		3
	USED CONCURRENTLY WITH DIEHEAD & 1 FULL THRDG. ATT.	1	1	1		3	3

CHASING ATTACHMENT

These attachments can be fitted to the cross slides in 4th and 5th station, and comprise a chasing attachment, a drive unit and an extra parts section.

CHASING ATTACHMENT 4TH OR 5TH STATION SECT. 192 Mk.III

The chasing slide is oscillated by the lead cam and is moved to and from the work by the relief cam and tension spring. The tension of the spring can be adjusted by the nuts on the spring anchor whilst the attachment is running to give the quietest running. The tension required varies according to the speed.

The maximum speed at which the attachment should be run is 400 cycles per minute. Oil must be maintained in the reservoir and be checked daily.

SECT.392 Mk.I

This is a larger version of Sect.192 Mk.III having increased maximum stroke as well as being more robust.

DRIVE UNIT.

4TH STATION 3920. Mk.II

5TH. STATION 392A. Mk.II

These units may be used with either Sect.192 Mk.III or Sect. 392 Mk.I

The drive is by chain from the centre shaft sprocket to a shaft which extends through to the Drive Unit mounted on the attachment face of the Main Drive Housing. The final drive across to the Chasing Attachment is by a universally jointed shaft. The drive unit is fitted with two pick-off gears which are selected to give the ratio required to suit the job.

The ratio is the number of work-spindle revolutions during one revolution of the attachment camshaft, i.e., with a ratio of 6:1 the spindle revolves six times during one revolution of the camshaft.

The relation of the drive pin in the slotted shaft must be correct as indicated by the identification letters.

Oil must be maintained in two gear compartments and must be checked daily. It should be noted that when fitting Sect.392A or 392D the centre drive shaft "Middle Bearing Housing" and "Bearing Centre" fitted to the standard machine (Fig. 9, Page 27) must be removed and replaced by the Jockey Bearing Housing 'A' and the sprocket carrying bearing 'B' (Drg. 392 Z 11). This requires the removal of the centre drive shaft 'C' by removing the screws in the bearing cap in the change gear housing, then the shaft can be withdrawn complete. Sprocket 'B' must be adjusted to the 12.1/16 in. dimension.

When section 392D is fitted the supply pipe from the coolant pump to the header bracket on the beam must be modified as shown in Drg. 392 Z 11.

EXTRA PARTS SECTION

These comprise the parts required to use a certain combination of chasing attachment. (Sect. 192 or 392) and drive unit (Sect. 392A or 392D). See attachment section chart (Page 107, Fig. 40) for correct section number.

SELECTION OF THREADING RATIOS

The ratio is chosen in conjunction with the lead cam to suit the lead of the thread to be cut, both of which are selected from the chart on Fig. 53, Page 139. With any lead cam, various leads can be cut by using different ratios

Normally ratios of 4:1, 5:1 and 6:1 are preferred in order to obtain the maximum number of passes of the chasing tool over the work during the cutting cycle. When using high work-spindle speeds, the ratio chosen must be such as to keep the speed of the attachment within the maximum allowable. The number of work-spindle revolutions during the 8° dwell (see Feed and Speed Chart, Fig. 11, Page 31) must be more than the ratio used. This ensures at least one complete pass to give a parallel thread.

CHANGING LEAD CAMS

Remove attachment from cross slide and remove cover plate above chasing slide. On releasing the tension on the relief spring unhook it from the spring anchor, and swing the slide forward until the roller is free from the lead cam. Remove the large end cap on the face opposite to the drive shaft.

Remove the camshaft nut, bearing and spacer. The lead cam may then be removed.

Extraction holes ¼ in. B.S.F. are provided in the inner cam.

The new lead cam is fitted in the reverse order, checking that there is clearance for the lead roller all the way round the cam track.

CHASING CUTTER

This must be designed to suit the lead cut.

The width of the chasing cutter may be determined by the job when threading behind a shoulder. The length behind the shoulder must be equal to the total travel due to the lead cam, plus the width of the chasing cutter, plus an allowance at each end for clearance. The minimum width of undercut required can be determined as follows:

$$\text{Minimum width of undercut} = .0725L + \frac{L}{R} \text{ clearance}$$

where L = lead of cam

R = ratio

clearance .010" (.025mm).

If found necessary to reduce the cutting load, teeth may be ground off the chaser, leaving 1 in $\frac{R}{2}$ teeth.

(Take $\frac{R}{2}$ to nearest lesser whole number).

Using a ratio of 7, leave one in every three teeth.

e.g. $\frac{7}{2}$ 3½

LEFT HAND THREADS

Left hand threads are obtained most conveniently by using left hand lead cams.

The spring, plunger and cap in the attachment chasing slide must be reversed to give endwise pressure in the opposite direction.

APPLICATION

Give the diameter and length capacity of the attachment and also useful information on lead cams and ratios to be used, undercut dimensions etc.

It should be noted that when a threading attachment is fitted in 5th station, threading clutches may be used in 3rd, 4th, 5th and 6th stations.

When a chasing attachment is fitted in 4th station however, threading clutches may only be fitted in 4th, 5th and 6th stations.

When using chasing attachments in 4th and 5th stations together a threading clutch may only be fitted in 6th station.

When two or more threading clutches are possible, two threading 'ON' ratios may be used if desired.

CHASING ATTACHMENT

These attachments can be fitted to the cross slides in 4th and 5th station, and comprise a chasing attachment, a drive unit and an extra parts section.

CHASING ATTACHMENT

4TH OR 5TH STATION

SECT. 192 Mk.III

The chasing slide is oscillated by the lead cam and is moved to and from the work by the relief cam and tension spring. The tension of the spring can be adjusted by the nuts on the spring anchor whilst the attachment is running to give the quietest running. The tension required varies according to the speed.

The maximum speed at which the attachment should be run is 400 cycles per minute. Oil must be maintained in the reservoir and be checked daily.

SECT.392 Mk.I

This is a larger version of Sect. 192 Mk.III having increased maximum stroke as well as being more robust.

DRIVE UNIT.

4TH STATION 3920. Mk.II

5TH. STATION 392A. Mk.II

These units may be used with either Sect. 192 Mk.III or Sect. 392 Mk.I

The drive is by chain from the centre shaft sprocket to a shaft which extends through to the Drive Unit mounted on the attachment face of the Main Drive Housing. The final drive across to the Chasing Attachment is by a universally jointed shaft. The drive unit is fitted with two pick-off gears which are selected to give the ratio required to suit the job.

The ratio is the number of work-spindle revolutions during one revolution of the attachment camshaft, i.e., with a ratio of 6:1 the spindle revolves six times during one revolution of the camshaft.

The universal joints must be assembled so that the fork ends of the universal joints are in line.

Oil must be maintained in two gear compartments and must be checked daily. It should be noted that when fitting Sect.392A or 392D the centre drive shaft " Middle Bearing Housing " and " Bearing Centre " fitted to the standard machine (Fig.9, Page 27) must be removed and replaced by the Jockey Bearing Housing ' A ' and the sprocket carrying bearing ' B ' (Drg. 392 Z 11). This requires the removal of the centre drive shaft ' C ' by removing the screws in the bearing cap in the change gear housing, then the shaft can be withdrawn complete. Sprocket ' B ' must be adjusted to the 12.1/16in. dimension.

When section 392D is fitted the supply pipe from the coolant pump to the header bracket on the beam must be modified as shown in Drg. 392 Z 11.

EXTRA PARTS SECTION

These comprise the parts required to use a certain combination of chasing attachment. (Sect. 192 or 392) and drive unit (Sect. 392A or 392D). See attachment section chart (Page 107, Fig. 40) for correct section number.

SELECTION OF THREADING RATIOS

The ratio is chosen in conjunction with the lead cam to suit the lead of the thread to be cut, both of which are selected from the chart on Fig. 53, Page 139. With any lead cam, various leads can be cut by using different ratios.

Normally ratios of 4:1, 5:1 and 6:1 are preferred in order to obtain the maximum number of passes of the chasing tool over the work during the cutting cycle. When using high work-spindle speeds, the ratio chosen must be such as to keep the speed of the attachment within the maximum allowable. The number of work-spindle revolutions during the 8° dwell (see Feed and Speed Chart, Fig. 11, Page 31) must be more than the ratio used. This ensures at least one complete pass to give a parallel thread.

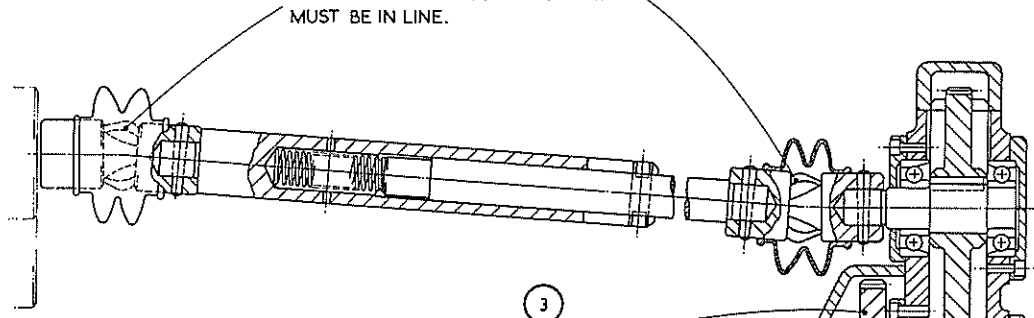
CHANGING LEAD CAMS

Remove attachment from cross slide and remove cover plate above chasing slide. On releasing the tension on the relief spring unhook it from the spring anchor, and swing the slide forward until the roller is free from the lead cam. Remove the large end cap on the face opposite to the drive shaft.

Remove the camshaft nut, bearing and spacer. The lead cam may then be removed.

Extraction holes ¼in. B.S.F. are provided in the inner cam.

2 IMPORTANT.
THESE UNIVERSAL JOINT FORK ENDS
MUST BE IN LINE.

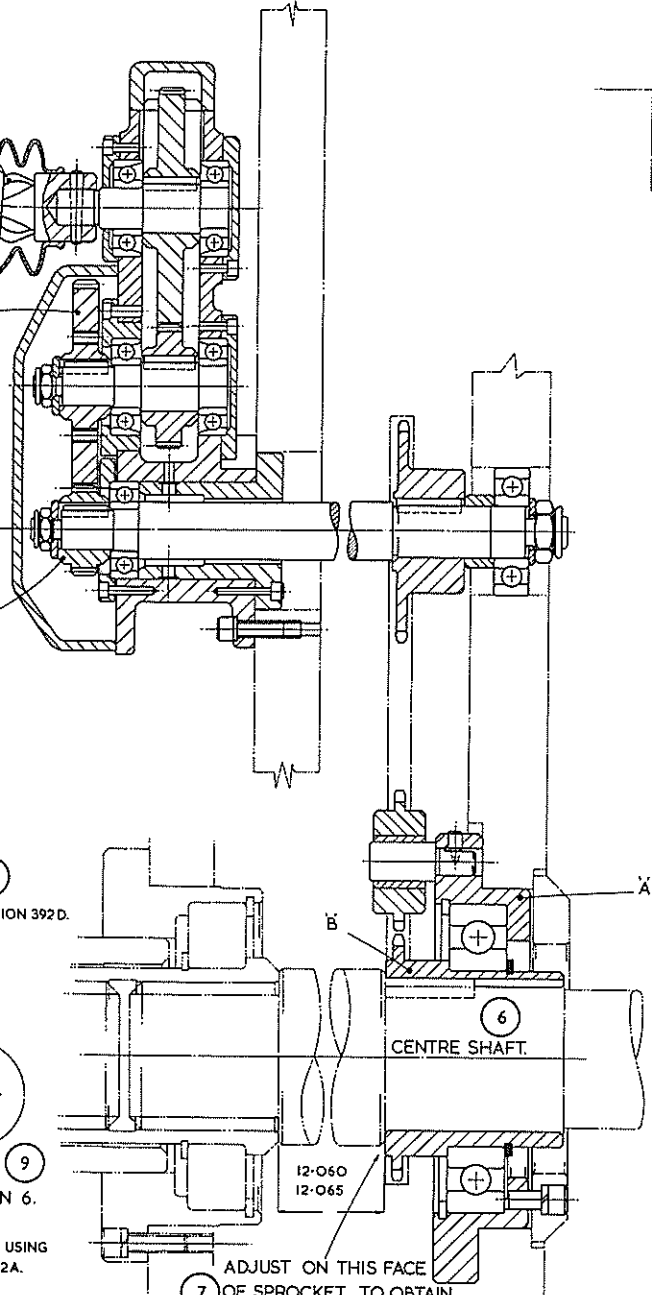


3 DRIVEN PICK-OFF GEAR.

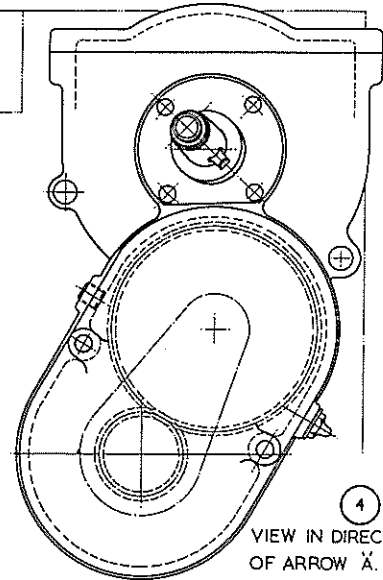
RATIO.	DRIVER			DRIVEN		
	T	D.P.	REF. NUMBER.	T	D.P.	REF. NUMBER.
2:1	66	18	192BV131A/4	33	18	192BV130A/3
3:1	44	14	192BV131A/7	33	14	192BV130A/5
4:1	55	20	192BV131A/1	55	20	192BV131A/1
5:1	44	18	192BV130A/8	55	18	192BV131A/10
6:1	44	20	192BV130A/1	66	20	192BV131A/3
7:1	28	14	192BV130A/7	49	14	192BV131A/11
8:1	33	18	192BV130A/3	66	18	192BV131A/4
9:1	20	12	392V130A/2	45	12	192BV131A/12
10:1	22	14	392V130A/1	55	14	192BV131A/13

➔ A

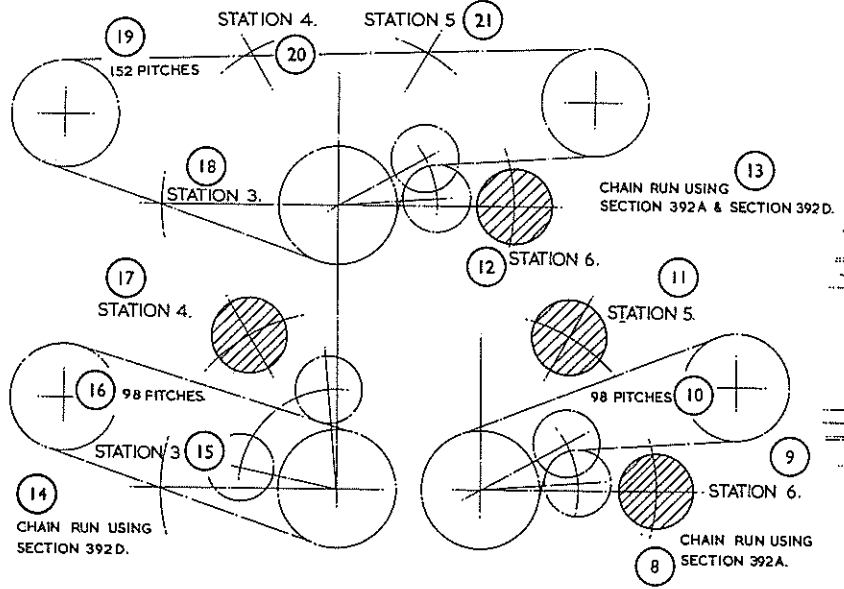
22 DRIVER PICK-OFF GEAR.



7 ADJUST ON THIS FACE OF SPROCKET TO OBTAIN DIMENSION GIVEN



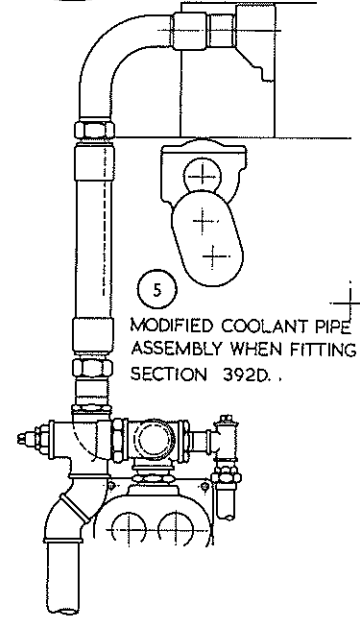
4 VIEW IN DIRECTION OF ARROW A.



14 CHAIN RUN USING SECTION 392D.

13 CHAIN RUN USING SECTION 392A & SECTION 392D.

8 CHAIN RUN USING SECTION 392A.



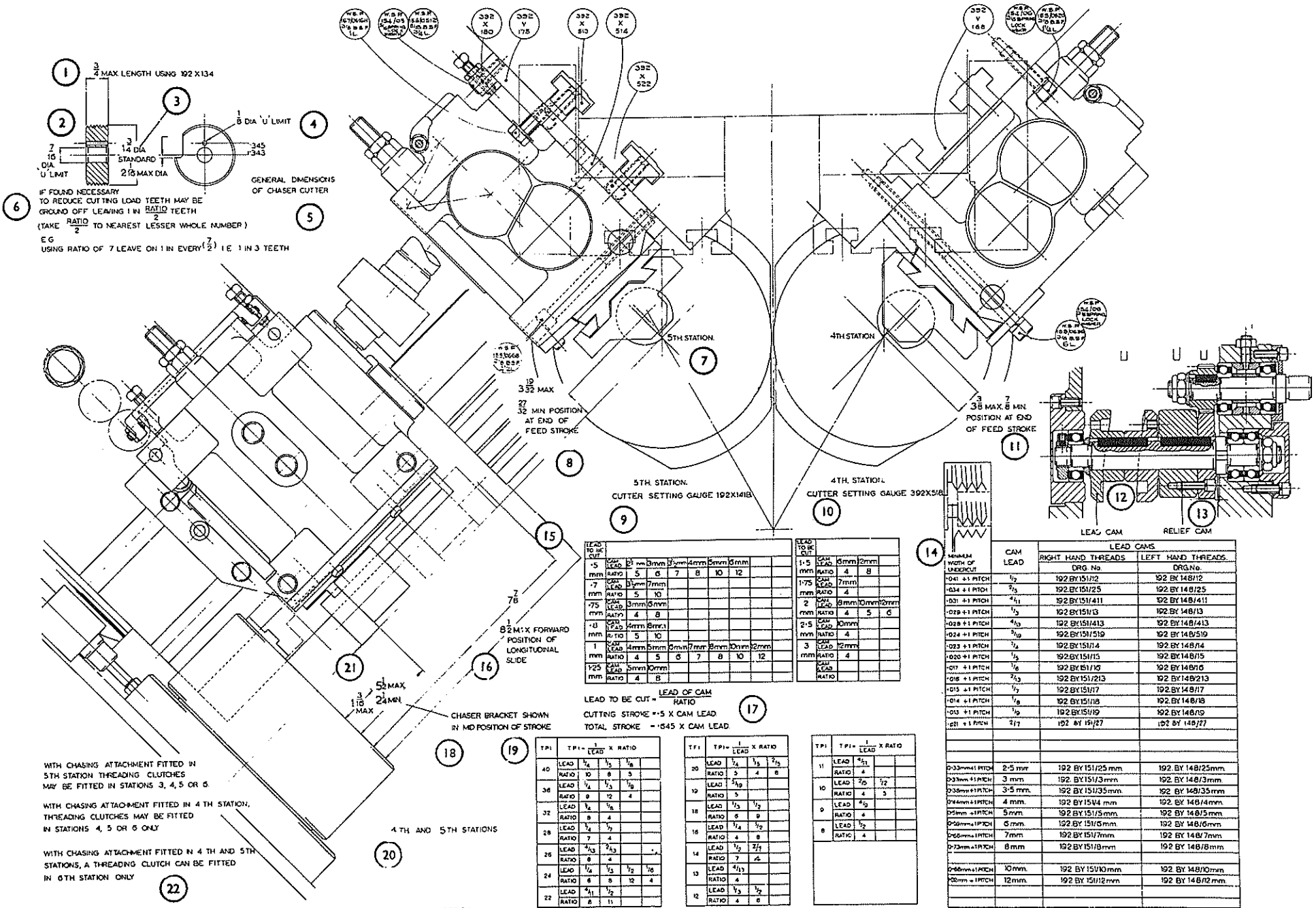
5 MODIFIED COOLANT PIPE ASSEMBLY WHEN FITTING SECTION 392D.

392 Z II

- 1 3/4" MAXIMUM LENGTH USING 192 X 134
 - 2 7/16" DIA. 'U' LIMIT
 - 3 1 3/4" DIA. STANDARD 2.1/16" MAXIMUM DIA.
 - 4 1/2" DIA. 'U' LIMIT
 - 5 GENERAL DIMENSIONS OF CHASER CUTTER
 - 6 IF FOUND NECESSARY TO REDUCE CUTTING LOAD TEETH MAY BE GROUND OFF, LEAVING 1 IN $\frac{\text{RATIO}}{2}$ TEETH.
(TAKE $\frac{\text{RATIO}}{2}$ TO NEAREST LESSER WHOLE NUMBER)
e.g.
USING RATIO OF 7. LEAVE ON 1 IN EVERY $(\frac{7}{2})$; i.e., 1 IN 3 TEETH
 - 7 5TH. STATION
 - 8 3.19/32" MAXIMUM 27/32" MINIMUM POSITION AT END OF FEED STROKE
 - 9 5TH. STATION. CUTTER SETTING GAUGE 192 X 141B
 - 10 4TH. STATION. CUTTER SETTING GAUGE 392 X 518
 - 11 3 3/4" MAXIMUM 7/8" MINIMUM POSITION AT END OF FEED STROKE
 - 12 LEAD CAM
 - 13 RELIEF CAM
 - 14 MINIMUM CAM LEAD
- | | CAM LEAD | LEAD CAMS | |
|-------------------|----------|-----------------------------------|----------------------------------|
| WIDTH OF UNDERCUT | LEAD | RIGHT HAND THREADS
DRAWING No. | LEFT HAND THREADS
DRAWING NO. |
| PITCH | | | |
| PITCH | | | |
| PITCH | | | |

- 15 LEAD TO BE CUT
CAM LEAD RATIO
CAM LEAD RATIO
CAM LEAD RATIO
- 16 8 1/2" MAXIMUM FORWARD POSITION OF LONGITUDINAL SLIDE
- 17 LEAD TO BE CUT = $\frac{\text{LEAD OF CAM}}{\text{RATIO}}$
CUTTING STROKE = 0.5 x CAM LEAD
TOTAL STROKE = 0.645 x CAM LEAD
- 18 CHASER BRACKET SHOWN IN MID POSITION OF STROKE
- 19 T.P.I. T.P.I. = $\frac{1}{\text{LEAD}} \times \text{RATIO}$
LEAD RATIO
LEAD RATIO
LEAD RATIO
- 20 4TH. & 5TH. STATIONS
5 1/2" MAXIMUM
2 1/4" MINIMUM
- 21 1.3/16" MAXIMUM 2 1/4" MINIMUM
- 22 WITH CHASING ATTACHMENT FITTED IN 5TH STATION THREADING CLUTCHES MAY BE FITTED IN STATIONS 3, 4, 5 OR 6
WITH CHASING ATTACHMENT FITTED IN 4TH. STATION THREADING CLUTCHES MAY BE FITTED IN STATIONS 4, 5 OR 6 ONLY
WITH CHASING ATTACHMENT FITTED IN 4TH. & 5TH. STATIONS, A THREADING CLUTCH CAN BE FITTED IN 6TH. STATION ONLY.

Fig. 53 CHASING ATTACHMENT APPLICATION DRAWING USING SECTION 192 Mk.III 4TH. & 5TH. STATION 1 392 Z 3A



LEAD TO BE CUT	5mm	6mm	7mm	8mm	10mm	12mm
+5 mm	5	6	7	8	10	12
-7 mm	5	10				
-75 mm	3	5	6	8		
-8 mm	4	8				
-10 mm	5	10				
-125 mm	4	5	6	7	8	10
-125 mm	4	8				

CAM LEAD	LEAD CAMS	
	RIGHT HAND THREADS	LEFT HAND THREADS
1/2	192 BY 151/2	192 BY 148/2
2/3	192 BY 151/3	192 BY 148/3
1/4	192 BY 151/4	192 BY 148/4
1/5	192 BY 151/5	192 BY 148/5
2/5	192 BY 151/5	192 BY 148/5
1/6	192 BY 151/6	192 BY 148/6
1/8	192 BY 151/8	192 BY 148/8
1/10	192 BY 151/10	192 BY 148/10
1/12	192 BY 151/12	192 BY 148/12
1/15	192 BY 151/15	192 BY 148/15
1/20	192 BY 151/20	192 BY 148/20
1/25	192 BY 151/25	192 BY 148/25
1/30	192 BY 151/30	192 BY 148/30
1/35	192 BY 151/35	192 BY 148/35
1/40	192 BY 151/40	192 BY 148/40
1/50	192 BY 151/50	192 BY 148/50
1/60	192 BY 151/60	192 BY 148/60
1/70	192 BY 151/70	192 BY 148/70
1/80	192 BY 151/80	192 BY 148/80
1/100	192 BY 151/100	192 BY 148/100
1/120	192 BY 151/120	192 BY 148/120

LEAD TO BE CUT = LEAD OF CAM RATIO
 CUTTING STROKE = 5 X CAM LEAD
 TOTAL STROKE = 1545 X CAM LEAD

TPI	TPI - 1	LEAD X RATIO
40	39	1/39
36	35	1/35
32	31	1/31
28	27	1/27
26	25	1/25
24	23	1/23
22	21	1/21

TPI	TPI - 1	LEAD X RATIO
20	19	1/19
19	18	1/18
18	17	1/17
16	15	1/15
14	13	1/13
13	12	1/12
12	11	1/11

TPI	TPI - 1	LEAD X RATIO
11	10	1/10
10	9	1/9
9	8	1/8
8	7	1/7

392 Z 3A

- 1 GENERAL DIMENSIONS OF CHASER CUTTER
- 2 MAXIMUM LENGTH USING 192 X 134
- 3 $7/16$ " DIA. "U" LIMIT
- 4 $1/4$ " DIA. STANDARD
2.1/16" DIA. MAXIMUM
- 5 $1/8$ " DIA. "U" LIMIT
- 6 IF FOUND NECESSARY TO REDUCE CUTTING LOAD TEETH MAY BE
GROUND OFF LEAVING $1 \text{ IN } \frac{\text{RATIO}}{2}$ TEETH

(TAKE $\frac{\text{RATIO}}{2}$ TO NEAREST LESSER WHOLE NUMBER)

E.G., USING RATIO OF 7 LEAVE ON 1 IN EVERY $\frac{7}{2}$ TEETH

1 IN EVERY 3 TEETH

NOTE:

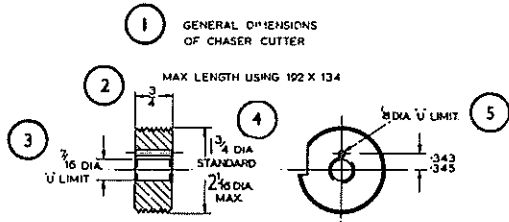
THE USE OF 3:1 RATIO SHOULD BE AVOIDED WHEREVER
POSSIBLE, SINCE IT PREVENTS THE REMOVAL OF ALTERNATE TEETH

- 7 5TH. STATION
- 8 3.13/32" MAXIMUM, 1.29/32" MINIMUM
POSITION AT END OF FEED STROKE
- 9 3.13/32" MAXIMUM, 1.29/32" MINIMUM
POSITION AT END OF FEED STROKE

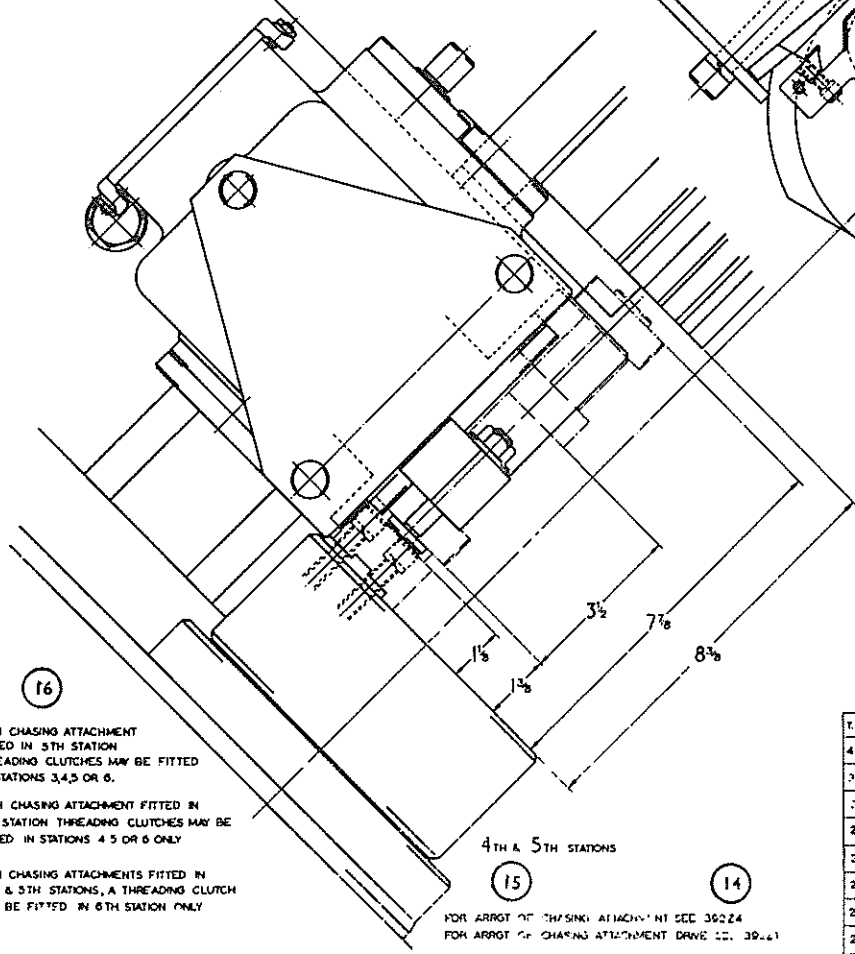
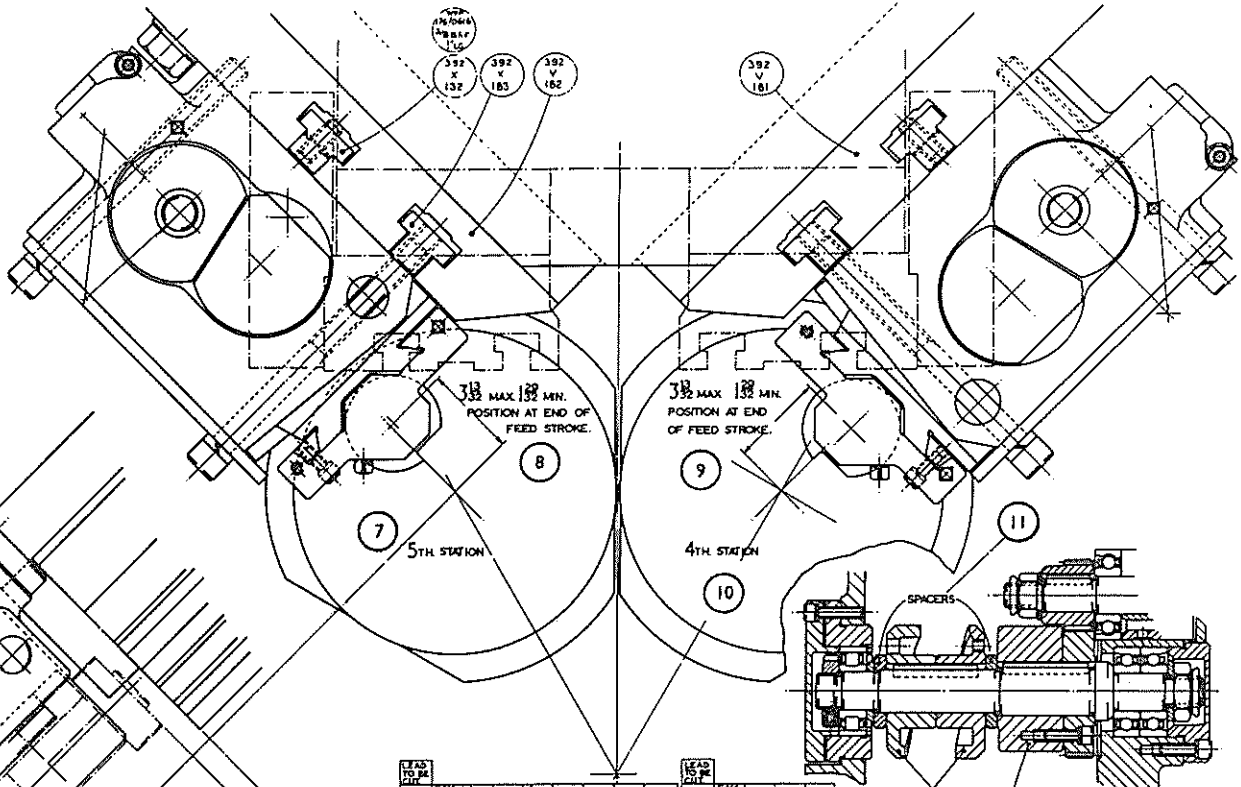
- 10 4TH. STATION
- 11 SPACERS
- 12 LEAD CAM
- 13 RELIEF CAM
- 14 FOR ARRANGEMENT OF CHASING ATTACHMENT SEE 392 Z 4
FOR ARRANGEMENT OF CHASING ATTACHMENT DRIVE SEE 392 Z 1
- 15 4TH. & 5TH. STATIONS
- 16 WITH CHASING ATTACHMENT FITTED IN 5TH. STATION THREADING CLUTCHES
MAY BE FITTED IN STATIONS 3, 4, 5 OR 6
WITH CHASING ATTACHMENT FITTED IN 4TH. STATION THREADING CLUTCHES
MAY BE FITTED IN STATIONS 4, 5 OR 6 ONLY
WITH CHASING ATTACHMENTS FITTED IN 4TH. & 5TH. STATIONS A THREADING
CLUTCH CAN BE FITTED IN 6TH. STATION ONLY

FOR ENLARGED DRAWING OF TABLES, SEE FIG. 54A

CHASING ATTACHMENT APPLICATION DRAWING USING SECTION 392 Mk.I 4TH. & 5TH. STATIONS 392 Z 6



IF FOUND NECESSARY TO REDUCE CUTTING LOAD TEETH MAY BE GROUND OFF LEAVING 1 IN RATIO TEETH (TAKE RATIO TO NEAREST LESSER WHOLE NUMBER) E.G. USING RATIO OF 7 LEAVE ON 1 IN EVERY 3 TEETH. 1 IN EVERY 3 TEETH. NOTE - THE USE OF 3:1 RATIO SHOULD BE AVOIDED WHEREVER POSSIBLE, SINCE IT PREVENTS THE REMOVAL OF ALTERNATE TEETH.



WITH CHASING ATTACHMENT FITTED IN 5TH STATION THREADING CLUTCHES MAY BE FITTED IN STATIONS 3, 4, 5 OR 6.
WITH CHASING ATTACHMENT FITTED IN 4TH STATION THREADING CLUTCHES MAY BE FITTED IN STATIONS 4, 5 OR 6 ONLY.
WITH CHASING ATTACHMENTS FITTED IN 4TH & 5TH STATIONS, A THREADING CLUTCH CAN BE FITTED IN 6TH STATION ONLY.

FOR ARRGT OF CHASING ATTACHMENT SEE 392 Z 4
FOR ARRGT OF CHASING ATTACHMENT DRIVE SEE 392 Z 1

LEAD TO BE CUT	LEAD OF CAM	RATIO	CUTTING STROKE	TOTAL STROKE
.5 mm	1.5 mm	3	1.5 mm	1.5 mm
.7 mm	2.1 mm	3	2.1 mm	2.1 mm
.75 mm	2.25 mm	3	2.25 mm	2.25 mm
.8 mm	2.4 mm	3	2.4 mm	2.4 mm
.1 mm	3.0 mm	3	3.0 mm	3.0 mm
1.25 mm	3.75 mm	3	3.75 mm	3.75 mm
1.5 mm	4.5 mm	3	4.5 mm	4.5 mm
1.75 mm	5.25 mm	3	5.25 mm	5.25 mm

T.P.I.	T.P.I.	T.P.I.	T.P.I.	T.P.I.
40	19	9	4	4
20	18	8	3	3
12	16	7	2	2
28	14	6	1	1
24	13	5	1	1
24	12	4	1	1
24	11	4	1	1
24	10	3	1	1

MINIMUM WIDTH OF LAND/OUT	CAM LEAD	RIGHT HAND THREAD	LEFT HAND THREAD	SPACER
1	392 Y 151/11	392 Y 148/11	392 Y 148/11	1 INCH
2	392 Y 151/23	392 Y 148/23	392 Y 148/23	2 OFF
3	192 BY 151/12	192 BY 148/12	192 BY 148/12	2 OFF
4	192 BY 151/37	192 BY 148/37	192 BY 148/37	2 OFF
5	192 BY 151/25	192 BY 148/25	192 BY 148/25	2 OFF
6	192 BY 151/41	192 BY 148/41	192 BY 148/41	2 OFF
7	192 BY 151/13	192 BY 148/13	192 BY 148/13	2 OFF
8	192 BY 151/41	192 BY 148/41	192 BY 148/41	2 OFF
9	192 BY 151/39	192 BY 148/39	192 BY 148/39	2 OFF
10	192 BY 151/14	192 BY 148/14	192 BY 148/14	2 OFF
11	192 BY 151/15	192 BY 148/15	192 BY 148/15	2 OFF
12	192 BY 151/16	192 BY 148/16	192 BY 148/16	2 OFF
13	192 BY 151/17	192 BY 148/17	192 BY 148/17	2 OFF
14	192 BY 151/18	192 BY 148/18	192 BY 148/18	2 OFF
15	192 BY 151/19	192 BY 148/19	192 BY 148/19	2 OFF
16	192 BY 151/27	192 BY 148/27	192 BY 148/27	2 OFF
17	192 BY 151/25 mm	192 BY 148/25 mm	192 BY 148/25 mm	2 OFF
18	192 BY 151/33 mm	192 BY 148/33 mm	192 BY 148/33 mm	2 OFF
19	192 BY 151/16 mm	192 BY 148/16 mm	192 BY 148/16 mm	2 OFF
20	192 BY 151/15 mm	192 BY 148/15 mm	192 BY 148/15 mm	2 OFF
21	192 BY 151/16 mm	192 BY 148/16 mm	192 BY 148/16 mm	2 OFF
22	192 BY 151/17 mm	192 BY 148/17 mm	192 BY 148/17 mm	2 OFF
23	192 BY 151/18 mm	192 BY 148/18 mm	192 BY 148/18 mm	2 OFF
24	192 BY 151/19 mm	192 BY 148/19 mm	192 BY 148/19 mm	2 OFF
25	192 BY 151/22 mm	192 BY 148/22 mm	192 BY 148/22 mm	2 OFF
26	192 BY 151/23 mm	192 BY 148/23 mm	192 BY 148/23 mm	2 OFF
27	192 BY 151/24 mm	192 BY 148/24 mm	192 BY 148/24 mm	2 OFF
28	192 Y 151/22 mm	192 Y 148/22 mm	192 Y 148/22 mm	2 OFF
29	192 Y 151/23 mm	192 Y 148/23 mm	192 Y 148/23 mm	2 OFF
30	192 Y 151/24 mm	192 Y 148/24 mm	192 Y 148/24 mm	2 OFF
31	192 Y 151/25 mm	192 Y 148/25 mm	192 Y 148/25 mm	2 OFF
32	192 Y 151/26 mm	192 Y 148/26 mm	192 Y 148/26 mm	2 OFF
33	192 Y 151/27 mm	192 Y 148/27 mm	192 Y 148/27 mm	2 OFF
34	192 Y 151/28 mm	192 Y 148/28 mm	192 Y 148/28 mm	2 OFF
35	192 Y 151/29 mm	192 Y 148/29 mm	192 Y 148/29 mm	2 OFF
36	192 Y 151/30 mm	192 Y 148/30 mm	192 Y 148/30 mm	2 OFF

- 1 LEAD TO BE CUT
- 2 CAM LEAD
RATIO
CAM LEAD
RATIO
- 3 LEAD TO BE CUT
- 4 CAM LEAD
RATIO
CAM LEAD
RATIO
- 5 MINIMUM WIDTH OF UNDERCUT
PITCH
PITCH
PITCH
- 6 CAM LEAD LEAD CAM
RIGHT HAND LEFT HAND SPACER
THREADS THREADS
DRAWING NO. DRAWING NO.
- 7 NOT REQUIRED
- 8 USE 2 OFF 392 X 153 WITH THESE CAMS
- 9 USE 2 OFF 392 X 153 WITH THESE CAMS
- 10 NOT REQUIRED
- 11 LEAD TO BE CUT = $\frac{\text{LEAD OF CAM}}{\text{RATIO}}$
CUTTING STROKE = $0.5 \times \text{CAM LEAD}$
TOTAL STROKE = $0.645 \times \text{CAM LEAD}$
- 12 T.P.I. T.P.I. = $\frac{1}{\text{LEAD}} \times \text{RATIO}$
LEAD
RATIO
LEAD
RATIO

ENLARGEMENT OF TABLES ON PREVIOUS DRAWING 392 Z 6

LEAD TO BE CUT	CAM LEAD						
	2 1/2mm	3mm	3 1/2mm	4mm	5mm		
.5 mm	RATIO 5	6	7	8	10		
.7 mm	RATIO 5	10					
.75 mm	RATIO 4	8					
.8 mm	RATIO 5	10					
1 mm	RATIO 4	5	6	7	8	10	
1.25 mm	RATIO 4	8					
1.5 mm	RATIO 4	8					
1.75 mm	RATIO 4						

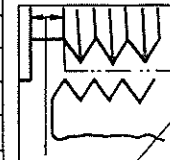
LEAD TO BE CUT	CAM LEAD		
	8mm	10mm	12mm
2 mm	RATIO 4	5	6
2.5 mm	RATIO 4		
3 mm	RATIO 4		
3.5 mm	RATIO 4		
4 mm	RATIO 3		
5 mm	RATIO 6		
5.5 mm	RATIO 4		
6 mm	RATIO 5		

11 LEAD TO BE CUT = LEAD OF CAM
 RATIO
 CUTTING STROKE = .5 X CAM LEAD.
 TOTAL STROKE = .645 X CAM LEAD.

T.P.I.	T.P.I. = 1 / LEAD X RATIO
40	LEAD 1/8, RATIO 5, 1/5, 8, 1/4, 10
36	LEAD 1/9, RATIO 4, 9, 1/4
32	LEAD 1/8, RATIO 4, 8, 1/4
28	LEAD 1/7, RATIO 4, 7, 1/4
26	LEAD 2/13, RATIO 4, 8, 4/13
24	LEAD 1/16, RATIO 4, 6, 8, 1/4, 1/3
22	LEAD 4/11, RATIO 8, 11, 1/2
20	LEAD 1/5, RATIO 4, 5, 8, 2/5

T.P.I.	LEAD	RATIO
19	5/19	5
18	1/3, 1/2	6, 9
16	1/4, 1/2	4, 8
14	1/2, 2/7	7, 4
13	4/13	4
12	1/3, 1/2	4, 6
11	4/11	4
10	2/5, 1/2	4, 5

T.P.I.	LEAD	RATIO
9	4/9	4
8	1/2	4
7	3/7	3
6	1/2, 2/3, 1	3, 4, 6
5	1	5
4 1/2	2/3	3
4	1	4



MINIMUM WIDTH OF UNDERCUT	CAM LEAD	LEAD CAM		SPACER
		RIGHT HAND THREADS	LEFT HAND THREADS	
		DRG NO.	DRG NO.	
.077 + 1 PITCH	1	392 Y 151/1	392 Y 148/1	NOT REQD
.053 + 1 PITCH	2/3	392 Y 151/23	392 Y 148/23	
.041 + 1 PITCH	1/2	192 BY 151/12	192 BY 148/12	
.036 + 1 PITCH	3/7	192 BY 151/37	192 BY 148/37	
.034 + 1 PITCH	2/5	192 BY 151/25	192 BY 148/25	
.031 + 1 PITCH	4/11	192 BY 151/41	192 BY 148/41	
.029 + 1 PITCH	1/3	192 BY 151/13	192 BY 148/13	
.028 + 1 PITCH	4/13	192 BY 151/413	192 BY 148/413	USE
.024 + 1 PITCH	5/19	192 BY 151/519	192 BY 148/519	2 OFF
.023 + 1 PITCH	1/4	192 BY 151/14	192 BY 148/14	392 X 153
.020 + 1 PITCH	1/5	192 BY 151/15	192 BY 148/15	WITH THESE CAMS
.017 + 1 PITCH	1/6	192 BY 151/16	192 BY 148/16	
.016 + 1 PITCH	2/13	192 BY 151/213	192 BY 148/213	
.015 + 1 PITCH	1/7	192 BY 151/17	192 BY 148/17	
.014 + 1 PITCH	1/8	192 BY 151/18	192 BY 148/18	
.013 + 1 PITCH	1/9	192 BY 151/19	192 BY 148/19	
.026 + 1 PITCH	2/7	192 BY 151/27	192 BY 148/27	
0.33mm+1PITCH	2.5mm	192 BY 151/25mm.	192 BY 148/25mm.	
0.37mm+1PITCH	3 mm	192 BY 151/3mm.	192 BY 148/3mm.	
0.38mm+1 PITCH	3.5mm	192 BY 151/35mm.	192 BY 148/35mm.	USE
0.44mm+1 PITCH	4 mm	192 BY 151/4 mm.	192 BY 148/4 mm.	2 OFF
0.51mm+1 PITCH	5 mm	192 BY 151/5mm.	192 BY 148/5mm.	392 X 153
0.59mm+1 PITCH	6 mm	192 BY 151/6mm.	192 BY 148/6mm.	WITH THESE CAMS.
0.66mm+1PITCH	7 mm	192 BY 151/7mm.	192 BY 148/7mm.	
0.73mm+1 PITCH	8 mm	192 BY 151/8mm	192 BY 148/8mm.	
0.88mm+1 PITCH	10mm	192 BY 151/10mm.	192 BY 148/10mm.	
1.02mm+1 PITCH	12 mm	192 BY 151/12 mm.	192 BY 148/12mm.	
1.17mm +1 PITCH	14 mm	392 Y 151/14mm.	392 Y 148/14 mm.	NOT REQD
1.75mm+1 PITCH	22mm	392 Y 151/22mm.	392 Y 148/22mm.	
2.33mm+1 PITCH	30mm	392 Y 151/30mm.	392 Y 148/30mm.	

INTERLUBE AUTOMATIC LUBRICATORS

(OPTIONAL EXTRA)

formerly

TECALEMIT-BIJUR



LUBRICATION
INTERLUBE CYCLIC METERED SYSTEM (FORMERLY DESCRIBED AS "BIJUR")
(OPTIONAL EXTRA)

The Interlube pump which has a discharge cycle time of approximately 7½ minutes is mounted above the main motor drive and is belt driven from the constant speed main pulley shaft. The pump is immersed in an oil reservoir of 6 pints (3.5 litres) capacity which should be filled with clean oil to Wickman Grade 4 up to the high mark on the vertical sight glass.

The pump has been set to give (a) the correct quantity of oil at each discharge and (b) the correct number of discharges per hour. The setting is shown on the pump drive arrangement.

The pump setting should not be altered, but the discharge volume may be adjusted by means of the by-pass valve, the slotted head of which is accessible after removing the cover plate next to the filler cap. Clockwise rotation of the by-pass screw increases, and anti-clockwise decreases pressure. The pressure gauge, mounted on the machine end bracket will give a reading when the pump discharges and should read between approximately 20 - 35 lbf/in² (1.4 - 2.6 Kg/cm²) depending on conditions.

On systems fitted with pressure switches the pressure should reach at least 20 lbf/in² (1.4 Kg/cm²) when the oil is warm.

A pressure switch at the end of the circuit is set to open on a rising pressure of 20 lbf/in² (1.4 Kg/cm²) approximately and to close on a falling pressure of 14 lbf/in² (1.0 Kg/cm²) approximately. Each time the pump discharges pressure rises, the pressure switch contacts open and de-energising the timer motor clutch relay which resets the timer mounted in the control panel. The timer is set to a 10 minute interval approximately. (Consult wiring diagram). As pressure drops due to discharge through the meter valves, the switch closes, energises the timer motor clutch relay thus starting the timer.

Failure to reach a pressure of 20 lbf/in² (1.4 Kg/cm²) during the 10 minute setting of the timer will cause the machine to stop at the end of cycle and a red warning light mounted on the control panel door to illuminate.

To restart the machine the cause of the fault must first be rectified. The control panel disconnect switch must be turned to the "OFF" position and then to the "ON" position to reset the timer, after which, normal starting procedure is followed.

If the machine has been standing idle for some hours it is advisable on re-starting to depress the instant feed button on the Bijur pump for approximately 15 seconds. If the machine has stood idle for a week or more, the instant feed button should be depressed for approximately 5 minutes. This will prime the system and ensure lubrication to points which may have drained dry of oil.

In the event of a serious pressure drop the following procedure should be adopted:-

1. Check level of oil in reservoir.
2. Bleed off any air by loosening pressure gauge and pressure switch connections.
3. With a pressure gauge screw directly to the pump outlet run the pump and depress the instant-feed button. The gauge should register approximately 200 lbf/in² (14 Kg/cm²). On releasing the button this reading should remain constant. Should the pressure drop quickly, the seating of the outlet valve should be checked.
4. Check for damaged pipe lines, especially flexibles.
5. Check pump drive belt.

Should the pressure switch be replaced, ensure that the switch is filled with oil prior to connection to the piping.

When pressure checking is fitted to the metered system, it is also fitted to the continuous lubrication system. In which case the continuous pressure is preset to run at approximately 30 lbf/in² (2 Kg/cm²). On starting the machine if this pressure is not reached before the main machine motor contacts change from "STAR" to "DELTA" (Approximately 15 second delay), the main motor will be de-energised and a red warning light on the control panel will illuminate.

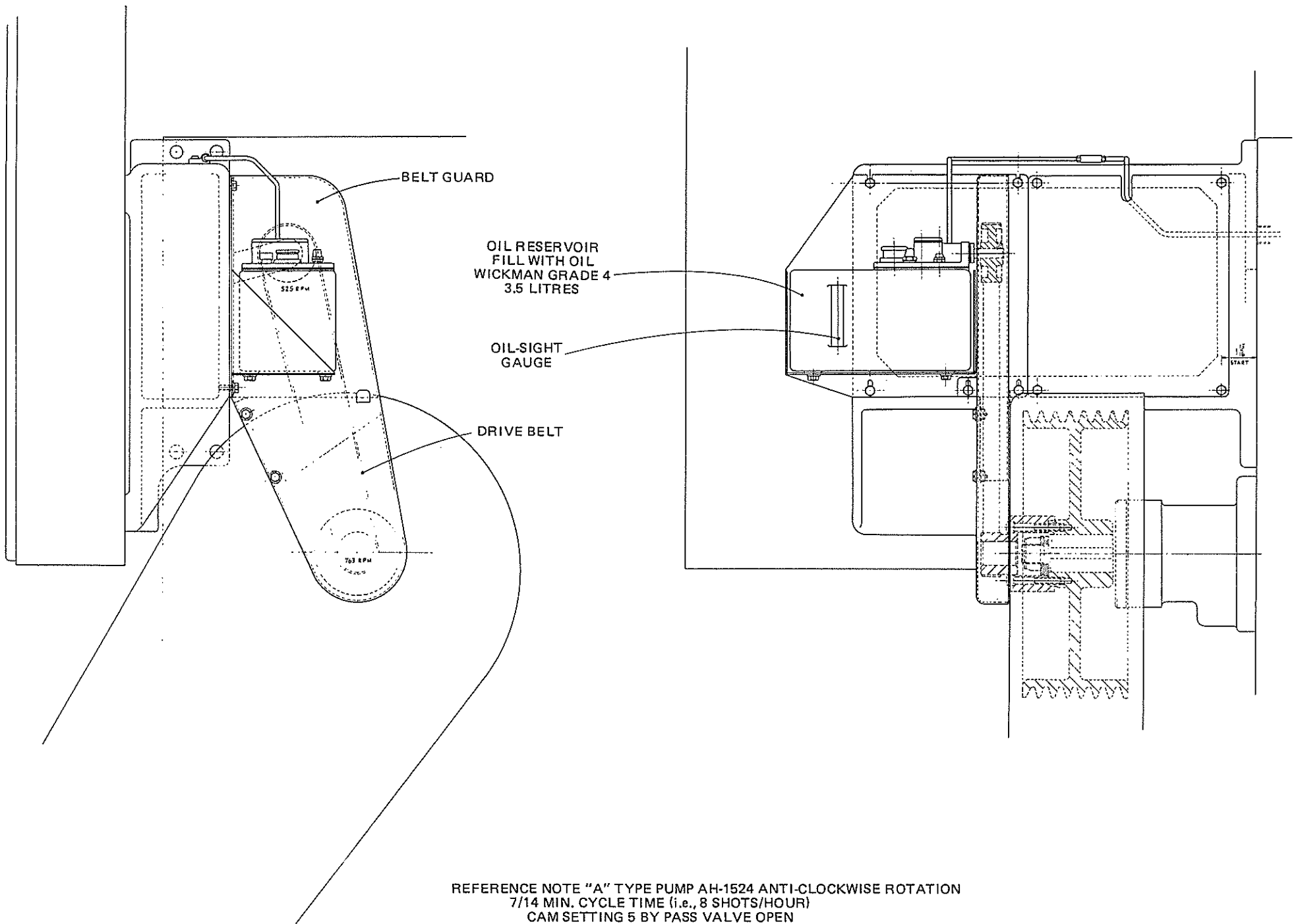
In this circumstance, re-start the machine in an attempt to obtain the required pressure. If the pressure is still inadequate and also if the pressure fails during running, proceed as follows:-

1. Check oil level in machine sump.
2. Bleed off any air at pressure switch.
3. Check for broken or flattened main line lubrication pipes.

For identification of pressure switches, timer etc., see relevant machine electrical wiring diagram.

- 1 INSTANT LUBRICATION BUTTON
- 2 BELT GUARD
- 3 OIL RESERVOIR FILL WITH OIL WICKMAN GRADE 4 3-5 LITRES
- 4 FILLER
- 5 DRIVE BELT
- 6 CONTROL PANEL
- 7 OIL SIGHT GAUGE
- 8 REFERENCE NOTE 'A' TYPE PUMP AH-1524 ANTI-CLOCKWISE ROTATION
7¼ MIN. CYCLE TIME (ie., 8 SHOTS/HOUR)
CAM SETTING 5 BY PASS VALVE OPEN

INTERLUBE PUMP DRIVE 200 Z 511



REFERENCE NOTE "A" TYPE PUMP AH-1524 ANTI-CLOCKWISE ROTATION
 7/14 MIN. CYCLE TIME (i.e., 8 SHOTS/HOUR)
 CAM SETTING 5 BY PASS VALVE OPEN

INTERLUBE PUMP DRIVE 200 Z 511

1

- 31 PULLEY BEARING HOUSING
- 32 FULCRUM BRACKET LONGITUDINAL MOTIONS
- 33 FULCRUM BRACKET LONGITUDINAL MOTIONS
- 34 FULCRUM BRACKET LONGITUDINAL MOTIONS
- 35 FULCRUM BRACKET LONGITUDINAL MOTIONS
- 36 FRONT UPPER CAMSHAFT BEARING
- 37 REAR UPPER CAMSHAFT BEARING
- 38 WORMSHAFT BEARING
- 39 LOWER CAMSHAFT BEARING
- 40 CENTRE GUIDE BEARING
- 41 LOWER CAMSHAFT BEARING
- 42 REAR UPPER CROSS SLIDE SHAFT OUTER BEARING
- 43 REAR UPPER CROSS SLIDE
- 44 REAR UPPER CROSS SLIDE
- 45 REAR LONGITUDINAL SLIDE
- 46 CENTRE GUIDE (FEED TO CENTRE BLOCK)
- 47 CENTRE GUIDE ARM
- 48 REAR UPPER CROSS SLIDE SHAFT BEARING
- 49 REAR UPPER CROSS SLIDE SHAFT BEARING
- 50 FRONT UPPER CROSS SLIDE SHAFT OUTER BEARING
- 51 FRONT UPPER CROSS SLIDE
- 52 FRONT UPPER CROSS SLIDE
- 53 CENTRE GUIDE (FEED TO CENTRE BLOCK)
- 54 FRONT LONGITUDINAL SLIDE
- 55 CENTRE GUIDE ARM
- 56 FRONT UPPER CROSS SLIDE SHAFT BEARING
- 57 FRONT UPPER CROSS SLIDE SHAFT BEARING
- 58 DRUM LOCKING SHAFT OUTER BEARING
- 61 INDEXING GEARS
- 62 DRUM LOCKING TOGGLE
- 63 3rd STATION CROSS SLIDE SHAFT BEARING
- 64 DRUM LOCKING SHAFT BEARING
- 65 REAR LOWER CROSS SLIDE SHAFT BEARING

2

- 66 FRONT CAMSHAFT BEARING
 - 67 REAR LOWER CROSS SLIDE BASE
 - 68 REAR LOWER CROSS SLIDE BASE
 - 69 REAR INTERMEDIATE CROSS SLIDE BASE
 - 70 REAR INTERMEDIATE CROSS SLIDE BASE
 - 71 REAR INTERMEDIATE CROSS SLIDE BASE
 - 72 REAR INTERMEDIATE CROSS SLIDE BASE
 - 73 REAR INTERMEDIATE CROSS SLIDE SHAFT BEARING
 - 74 CUT-OFF SLIDE SHAFT BEARING
 - 75 FRONT LOWER CROSS SLIDE SHAFT BEARING
 - 76 FRONT LOWER CROSS SLIDE BASE
 - 77 FRONT LOWER CROSS SLIDE BASE
 - 78 FRONT INTER CROSS SLIDE BASE
 - 79 FRONT INTER CROSS SLIDE BASE
 - 80 FRONT INTER CROSS SLIDE BASE
 - 81 FRONT INTER CROSS SLIDE BASE
 - 82 FRONT INTER CROSS SLIDE BASE OUTER BEARING
 - 83 LATCH
 - 84 BAR STOP SHAFT INNER BEARING
 - 85 UPPER FRONT GUIDE ROD
 - 86 LOWER FRONT GUIDE ROD
 - 87 REAR CAMSHAFT BEARING
 - 88 BAR FEED LEVER PIVOT
 - 89 COLLET OP LEVER PIVOT
 - 90 COLLET HAND OP LEVER PIVOT
 - 91 PRESSURE GAUGE
 - 92 CAMSHAFT END BEARING
 - 93 LOWER FRONT GUIDE ROD
 - 94 LOWER FRONT GUIDE ROD
- 3 WHEN STARTING THE MACHINE PRESS THE INSTANT START
BUTTON FOR APPROXIMATELY 5 SECONDS
- 4 PRESSURE FAILURE RED FLASHING INDICATOR LIGHT

Continued.....

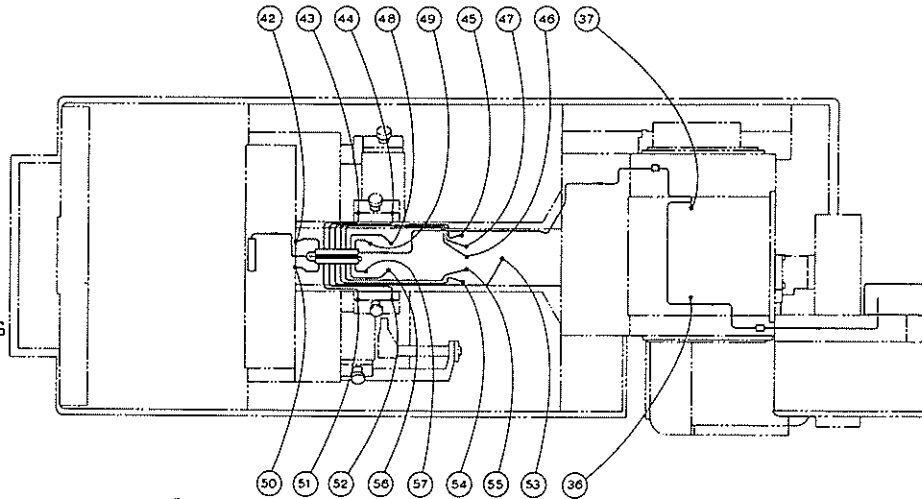
LUBRICATION DIAGRAM 268 Z 8

- 5 INTERLUBE PUMP
- 6 OIL RESERVOIR 2.9 LITRE CAPACITY CHECK LEVEL DAILY & FILL WITH OIL
WICKMAN GRADE 4
- 7 FOR CONTINUOUS LUBRICATION SYSTEM SEE 268 Z 7
FOR GREASING & FURTHER LUBRICATION ARRANGEMENTS SEE 368 Z 49 & 268 Z 63
- 8 CYCLIC SYSTEM (INTERLUBE)
- 9 ESTIMATED OIL CONSUMPTION FOR 4000 HRS. RUNNING 400 LITRES
- 10 SECTION 'XX'
- 11 PRESSURE SWITCH
- 12 PRESSURE GAUGE TO READ 2.6 Kg/cm² MIN. WHEN STARTING FROM COLD AND
NOT LESS THAN 1.4 Kg/cm² WHEN WARM EVERY 7½ MINUTES APPROX.

LUBRICATION DIAGRAM 268 Z 8

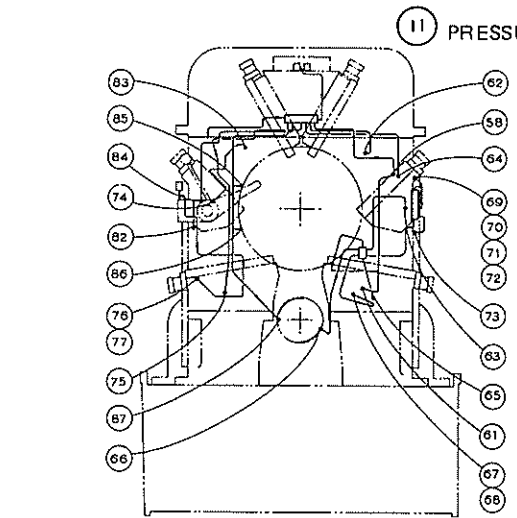
- 31 PULLEY BEARING HOUSING
- 32 FULCRUM BRKT LONGITUDINAL MOTIONS
- 33 FULCRUM BRKT LONGITUDINAL MOTIONS
- 34 FULCRUM BRKT LONGITUDINAL MOTIONS
- 35 FULCRUM BRKT LONGITUDINAL MOTIONS
- 36 FRONT UPPER CAMSHAFT BEARING
- 37 REAR UPPER CAMSHAFT BEARING
- 38 WORMSHAFT BEARING
- 39 LOWER CAMSHAFT BEARING
- 40 CENTRE GUIDE BEARING
- 41 LOWER CAMSHAFT BEARING
- 42 REAR UPPER CROSS SLIDE SHAFT OUTER BEARING
- 43 REAR UPPER CROSS SLIDE
- 44 REAR UPPER CROSS SLIDE
- 45 REAR LONGITUDINAL SLIDE
- 46 CENTRE GUIDE (FEED TO CENTRE BLOCK)
- 47 CENTRE GUIDE ARM
- 48 REAR UPPER CROSS SLIDE SHAFT BEARING
- 49 REAR UPPER CROSS SLIDE SHAFT BEARING
- 50 FRONT UPPER CROSS SLIDE SHAFT OUTER BEARING
- 51 FRONT UPPER CROSS SLIDE
- 52 FRONT UPPER CROSS SLIDE
- 53 CENTRE GUIDE (FEED TO CENTRE BLOCK)
- 54 FRONT LONGITUDINAL SLIDE
- 55 CENTRE GUIDE ARM
- 56 FRONT UPPER CROSS SLIDE SHAFT BEARING
- 57 FRONT UPPER CROSS SLIDE SHAFT BEARING
- 58 DRUM LOCKING SHAFT OUTER BEARING
- 61 INDEXING GEARS
- 62 DRUM LOCKING TOGGLE
- 63 3rd STATION CROSS SLIDE SHAFT BEARING
- 64 DRUM LOCKING SHAFT BEARING
- 65 REAR LOWER CROSS SLIDE SHAFT BEARING

1

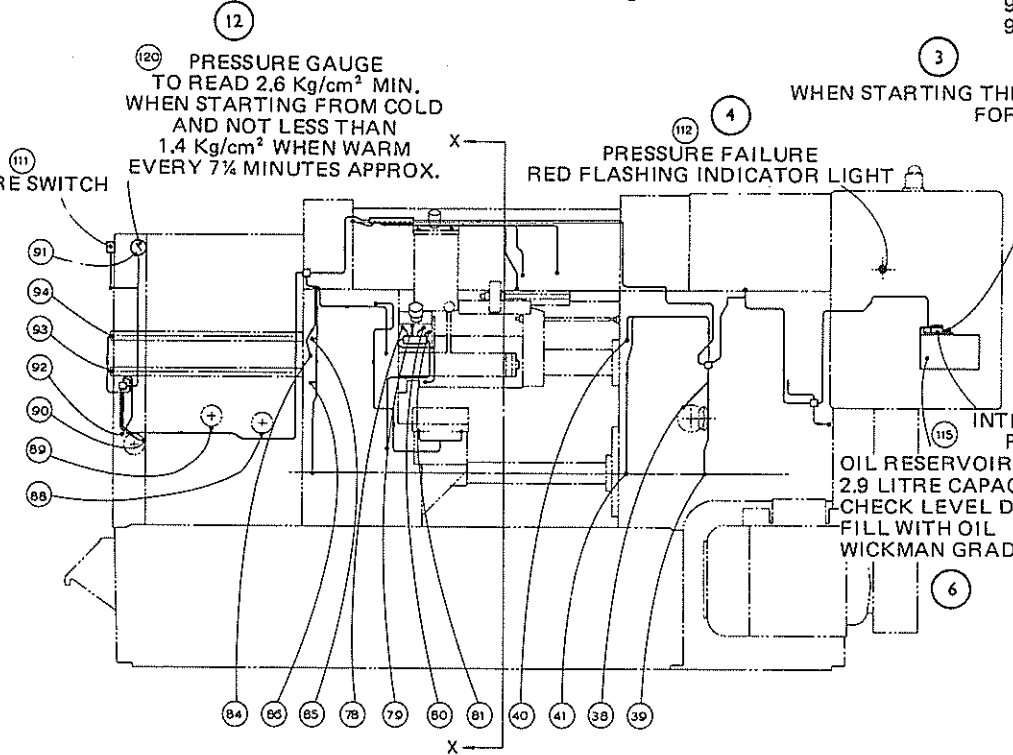


- 66 FRONT CAMSHAFT BEARING
- 67 REAR LOWER CROSS SLIDE BASE
- 68 REAR LOWER CROSS SLIDE BASE
- 69 REAR INTERMEDIATE CROSS SLIDE BASE
- 70 REAR INTERMEDIATE CROSS SLIDE BASE
- 71 REAR INTERMEDIATE CROSS SLIDE BASE
- 72 REAR INTERMEDIATE CROSS SLIDE BASE
- 73 REAR INTERMEDIATE CROSS SLIDE SHAFT BEARING
- 74 CUT-OFF SLIDE SHAFT BEARING
- 75 FRONT LOWER CROSS SLIDE SHAFT BEARING
- 76 FRONT LOWER CROSS SLIDE BASE
- 77 FRONT LOWER CROSS SLIDE BASE
- 78 FRONT INTER CROSS SLIDE BASE
- 79 FRONT INTER CROSS SLIDE BASE
- 80 FRONT INTER CROSS SLIDE BASE
- 81 FRONT INTER CROSS SLIDE BASE
- 82 FRONT INTER CROSS SLIDE BASE OUTER BEARING
- 83 LATCH
- 84 BAR STOP SHAFT INNER BEARING
- 85 UPPER FRONT GUIDE ROD
- 86 LOWER FRONT GUIDE ROD
- 87 REAR CAMSHAFT BEARING
- 88 BAR FEED LEVER PIVOT
- 89 COLLET OP LEVER PIVOT
- 90 COLLET HAND OP LEVER PIVOT
- 91 PRESSURE GAUGE
- 92 CAMSHAFT END BEARING
- 93 LOWER FRONT GUIDE ROD
- 94 LOWER FRONT GUIDE ROD

2



SECTION 'XX'
10 116



120 PRESSURE GAUGE
TO READ 2.6 Kg/cm² MIN.
WHEN STARTING FROM COLD
AND NOT LESS THAN
1.4 Kg/cm² WHEN WARM
EVERY 7 1/2 MINUTES APPROX.

112 4 PRESSURE FAILURE
RED FLASHING INDICATOR LIGHT

3 WHEN STARTING THE MACHINE PRESS THE INSTANT START BUTTON
FOR APPROXIMATELY 5 SECONDS.

5 OIL RESERVOIR
2.9 LITRE CAPACITY
CHECK LEVEL DAILY &
FILL WITH OIL
WICKMAN GRADE 4

8 CYCLIC SYSTEM (INTERLUBE)

117 FOR CONTINUOUS LUBRICATION SYSTEM SEE 268 Z 7
FOR GREASING & FURTHER LUBRICATION ARRANGEMENTS SEE 368 Z 49 & 268 Z 63

9 119 ESTIMATED OIL CONSUMPTION FOR 4000 HRS RUNNING
400 LITRES

LUBRICATION DIAGRAM 268 Z 8

INTERLUBE AUTOMATIC LUBRICATORS TYPE CG 32
CAT. Nos. TYPE AH.5010 – AH.5019, Issue 5

INTRODUCTION

1. The Tecalemit – Bijur Type AA and Type AB lubricator units described in this publication are high pressure, self-lubricating gear pumps fitted with cycle valve mechanism. Both models are designed for installation in the sump of the machine to be lubricated or in a separate reservoir and the drive is taken from a rotating shaft on the parent machine or from an electric motor. This Instruction Sheet refers only to the lubricator units listed in Table 1 below; instructions for earlier Type A lubricators (Cat. Nos. AH. 1520 – AH. 1529) are available on request.

DESCRIPTION

2. The lubricator comprises a pump body which is suspended from a cover plate and fitted at its lower end with a base (14) containing a filter pad (19), screen (18) and screen support (17) retained within the base by a clamp ring (20) and a snap ring (21). The pump gears (22) and (23) are housed in a gear chamber plate fitted between the base and the pump body and are driven through reduction gearing by a drive shaft (5) and a vertical shaft (31).

A cycle valve installed in the pump chamber is linked by a follower arm, (27), for Type AA lubricators and (26) for Type BB lubricators, to a rotary cam assembly (30) driven through a worm shaft (29) by the vertical shaft. The cam is adjustable and the setting

selected determines the delivery cycle of the lubricator and the volume of oil discharged per cycle. The Type AB lubricator is also fitted with additional reduction gearing in the form of a secondary cam shaft (28) to produce the extended cycle times obtainable from this model.

An 'instant feed' button on top of the cover plate permits manual closing of the cycle valve, irrespective of the cam position, when priming the distribution system and a non-return valve (34) is connected to the lubricator outlet tube (33) to prevent reverse flow from system when the machine is idle. A pressure relief valve (32) set to operate at approximately 200 p.s.i. is also fitted.

Secondary adjustment of the discharge volume is provided by a by-pass valve installed at the pump chamber outlet. The valve is manually adjusted by means of a threaded valve stem (13), accessible when the cover plate lid (9) is removed.

OPERATION

3. As the pump gears rotate, oil is drawn through the filter and into the pump chamber. The chamber has two outlets; one leads directly to the distribution system and the other to the cover plate via an overflow tube, flow being alternated between the two outlets by the action of the cycle valve. When the cam follower is riding on the major diameter of the cam, the cycle valve is open

Catalogue No.	Drive Shaft R.P.M.			Direction of Drive
	Min.	Normal	Max.	
TYPE CG32 LUBRICATORS				
AH.5010 AH.5011	45	67	110	L.H. R.H.
AH.5012 AH.5013	100	150	250	L.H. R.H.
AH.5014 AH.5015	400	600	1000	L.H. R.H.
AH.5018 AH.5019	650	1000	1650	L.H. R.H.
AH.5016 AH.5017	1200	18000	3000	L.H. R.H.

INTERLUBE AUTOMATIC LUBRICATORS TYPE CG 32

and oil passes up the overflow tube to lubricate the drive shaft gearing, re-turning to the reservoir through a drilled hole in the cover plate. When the follower is riding in a cam notch the cycle valve is closed by spring pressure and the oil is forced through the outlet tube and check valve into the distribution system.

LUBRICANT

4. Use only a clean straight mineral oil of a type and viscosity recommended by the machine manufacturer; do not use compounded oils.

PRIMING THE SYSTEM

5. To prime the distribution system on a new machine or one that has stood idle for a long period, fill the sump or reservoir with oil, start the machine and hold down the 'instant feed' button until oil shows freely at all bearings.

ADJUSTING THE OIL VOLUME

6. To ensure adequate lubrication of a new machine the lubricator may be adjusted by the machine manufacturer to deliver the maximum volume of oil. If

over-oiling occurs when the machine is fully run in and operating at the correct temperature the lubricator should be adjusted as follows:-

CAM ADJUSTMENT

6(a) The cam is a two-part assembly, the outer member of which engages with the inner member through a driving pin. The outer member has eight locating holes (four holes in the case of the Type AB lubricator) and these are so spaced that changing the location of the driving pin also changes the contour of the cam, increasing or decreasing the length of the cam notch and, similarly, the time that the cycle valve will remain closed. Discharge per cycle is independent of the lubricator drive speed and discharge per hour is proportional to the drive speed. The cycle time is inversely proportional to the drive speed. The discharge figures given below are at normal drive speed with the by-pass valve closed.

To adjust the cam, remove the lubricator from its mounting as in para. 9 and note the number of the hole in which the driving pin is located. Pull out the knob and locate the pin in the hole of the next HIGHER number to INCREASE the delivery and in the next LOWER number to DECREASE it.

CAUTION: Do not adjust the cam by more than one hole at a time and do not make further adjustment for several days.

TABLE 2 — CAM SETTING, CYCLE TIME AND DISCHARGE

Cam Setting	Cycle Time	Average Discharge per Cycle	Average Discharge per Hour	Average Time for One Pint Discharge
8	6¼ mins.	32 cu. cm.	300 cu. cm.	1½ hrs.
7	6¼ mins.	21 cu. cm.	200 cu. cm.	2½ hrs.
6	6¼ mins.	14 cu. cm.	140 cu. cm.	3½ hrs.
5	6¼ mins.	10 cu. cm.	90 cu. cm.	5½ hrs.
4	25 mins.	21 cu. cm.	50 cu. cm.	9½ hrs.
3	25 mins.	14 cu. cm.	35 cu. cm.	14 hrs.
2	25 mins.	11 cu. cm.	25 cu. cm.	19 hrs.
1	25 mins.	8 cu. cm.	20 cu. cm.	24 hrs.

INTERLUBE AUTOMATIC LUBRICATORS TYPE CG32

ORDERING SPARE PARTS

1. Only those items listed in Tables 3 and 4 above are supplied as spare parts.
2. Items comprising Spares Packs and Sub-Assemblies are not supplied separately.
3. Order by Description, Part No. and Quantity specifying the Lubricator Type, Cat. No. and Serial No. — THIS IS IMPORTANT.
4. Details of meter units and installation fittings are contained in Publications AH/21 and AH/22 — available on request.

6(b) By-Pass Valve. Where delivery requirements are critical secondary adjustment of the lubricator discharge volume can be obtained by regulating the by-pass valve installed in the pump chamber. When opened the valve bleeds oil from the chamber and reduces delivery down to 50% of the figures quoted in Table 2, thus enabling very precise adjustments to be made.

To adjust the valve setting remove the cover plate lid (9) and turn the valve stem (13) CLOCKWISE to INCREASE the delivery and ANTI-CLOCKWISE to DECREASE. It is not necessary to stop the machine when making this adjustment.

CAUTION: The valve is normally set in the closed position by the machine manufacturer and should be opened ONLY if the required delivery cannot be obtained by cam adjustment. Do not alter the valve setting by more than one-sixth of a turn at a time and make no further adjustment for several days.

MAINTENANCE

7. The lubricator requires very little routine maintenance but regular attention to the following points is important in order that a high standard of performance is maintained with correspondingly efficient lubrication of the parent machine.

7(a) Oil Level. Check the oil level daily and refill the sump reservoir as necessary. Ensure that the filter cap breather hole is not obstructed.

7(b) Filter. At least once a year dismantle the filter assembly and wash all itmes in clean petrol, renewing where necessary.

To dismantle the filter remove the lubricator from its mounting (para. 9), prise out the snap ring (21) and remove the clamp ring (20), filter disc (19), filter screen (18) and screen support (17) in that order. After cleaning reassemble the filter in the reverse order to dismantling.

7(c) Distribution System. At intervals of approximately one month inspect the system for leakage caused by loose connections or damaged tubing, tightening or replacing as necessary.

REPAIR FACILITIES

8. Where circumstances permit, a lubricator which develops a fault in service should be returned, carriage paid to Tecalemit (Engineering) Ltd. where full repair and testing facilities are available. If return of the lubricator is not possible, or if the fault requiring attention is of a minor nature only, repairs may be carried out on site following the instructions below.

DISMANTLING THE LUBRICATOR

No special tools are required to dismantle the lubricator. The unit must first be removed from its mounting by releasing the distribution line bushing (7) and cone (6), removing the drive shaft coupling and removing the four cover plate screws. Then proceed as follows:-

9(a) Drive Shaft Assembly (5). Remove the drive shaft retaining plate (2) and the cover plate lid (9), together with their gaskets (3) and (10). Drive out the pin securing the worm or gear and withdraw the drive shaft, collecting the thrust washer (4). Removal of the thrust collar is not necessary.

9(b) Vertical Shaft Assembly (31). Remove the drive shaft as in para. 9(a) above and the filter assembly as in para. 7(b). Remove the four screws (16) and washers (15) securing the pump base (14) and remove the base and pump gears (22) and (23). Drive out the pins securing the gear or worm and the thrust collar, withdraw the shaft.

9(c) Cam Shaft Assembly (30). Remove the cam follower (26) or (27), drive out the pin securing the cam shaft worm gear and remove the gear and thrust washer. Withdraw the cam shaft.

9(d) Secondary Cam Shaft Assembly (28). — Type AB lubricator only. Remove the cam follower (26), drive out the pin securing the cam shaft worm gear and remove the gear and thrust washers. Withdraw the shaft.

9(e) Worm Shaft Assembly (29). Remove the cam shaft(s) as described above. Drive out the pin securing the worm gear remove the gear and thrust washer and withdraw the shaft.

9(f) Outlet Valve (34) and Pressure Relief Valve (32). These valves cannot be dismantled and if faulty must be removed from their respective positions and renewed.

9(g) By-Pass Valve Stem (13). Failure to obtain correct delivery requirements when adjusting the by-pass valve may be due to a scored or otherwise damaged valve stem. This is removed by unscrewing it from the by-pass valve but the valve itself is pressed into the pump body and cannot be removed.

REASSEMBLY

10. Reassembly of the lubricator is a reversal of the dismantling procedure. All items must be thoroughly cleaned and inspected for wear or damage, paying particular attention to the by-pass valve stem (13), the gears (22) and (23) and the gear chamber plate. When replacing the lubricator fit a new mounting gasket (12) and ensure that the drive coupling is firmly secured.

METER UNITS

11. Each bearing served by the lubricator is fitted with a meter unit, a precision fitting which apportions a specified volume of oil to the bearing sufficient to maintain a constant oil film. The meter unit is non-adjustable and requires no cleaning, inspection or other form of maintenance.

If the volume of oil delivered TO A SINGLE BEARING appears incorrect remove the meter unit and replace it with one of the next HIGHER flow rate to INCREASE the volume and of the next LOWER flow rate on DECREASE it.

Note: Each increase in flow rate number doubles the volume of oil delivered.

FAULT DIAGNOSIS

FAULT	CAUSE	REMEDY
1. INSUFFICIENT oil at ALL bearings	1(a). Low oil level in reservoir 1(b). Dirty filter disc (19). 1(c). Cam adjustment incorrect or by-pass valve open. 1(d). Loose connection or damaged tubing 1(e). Faulty outlet valve (34).	1(a). Fill reservoir. 1(b). Clean or renew disc. 1(c). Adjust cam or by-pass valve setting. 1(d). Rectify as necessary 1(e). Renew valve.
2. EXCESS oil at ALL bearings.	2(a). Cam adjustment incorrect.	2(a). Adjust cam setting
3. EXCESS or INSUFFICIENT oil at ONE bearing.	3(a). Faulty or incorrect meter unit fitted.	3(a). Fit replacement meter unit.

TABLE 3 – SPARE PARTS LIST.

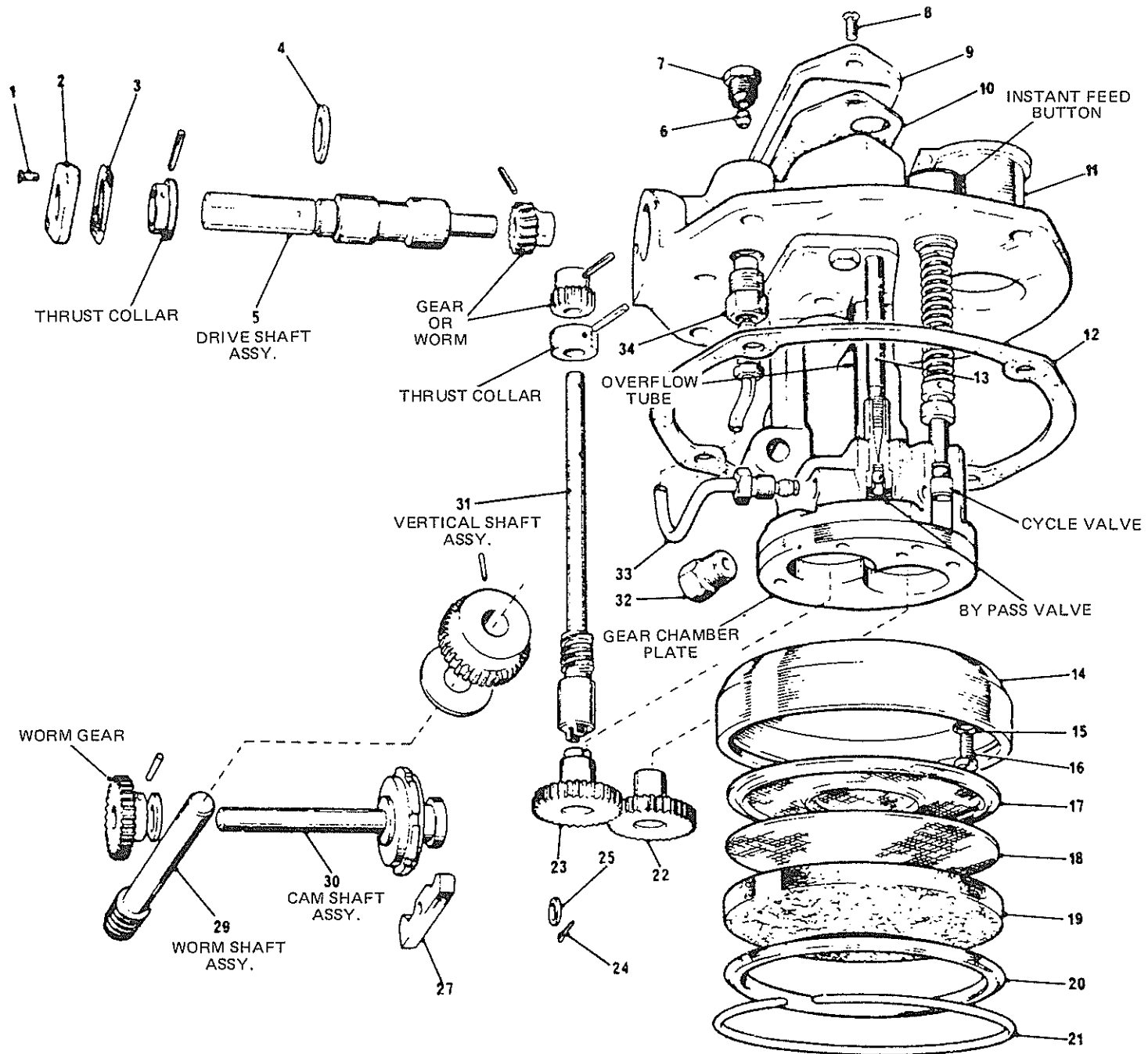
Item No.	Description	Part No.
	LUBRICATOR UNIT, TYPE CG 32	
	SPARES PACK – SEALING GASKETS	
3	1 off, gasket, retaining plate (173140)	
10	1 off, gasket, cover plate (173197)	
12	1 off, gasket, lubricator mounting (173198)	
5	Drive shaft assembly	
11	Filler cap assembly	44141
	SPARES PACK – FILTER ASSEMBLY	
17	1 off, support, filter (175403)	
18	1 off, screen, filter (175404)	
19	1 off, disc, filter (141291)	
20	1 off, ring, clamp (121145)	
21	1 off, ring, snap (175039)	
26	Follower, cam, Type AB lubricator	—
27	Follower, cam, Type AA lubricator	165076
28	Secondary cam shaft assembly	—
29	Worm shaft assembly	71161
30	Cam shaft assembly	71162
31	Vertical shaft assembly	
32	Valve, pressure relief	49077
34	Valve, outlet	49076

TABLE 4 – DRIVE SHAFT AND VERTICAL SHAFT ASSEMBLIES.

Lubricator Unit	Drive Shaft Assembly (Item 5)	Vertical Shaft Assembly (Item 31)
AH. 5010	71151	71138
AH. 5011	71152	71139
AH. 5012	71153	71140
AH. 5013	71154	71141
AH. 5014	71155	71142
AH. 5015	71156	71143
AH. 5018	71159	71146
AH. 5019	71160	71147
AH. 5016	71157	71144
AH. 5017	71158	71145

TYPE CG 32 LUBRICATOR UNIT

- 1 THRUST COLLAR
- 2 DRIVE SHAFT ASSEMBLY
- 3 GEAR OR WORM
- 4 THRUST COLLAR
- 5 VERTICAL SHAFT ASSEMBLY
- 6 WORM GEAR
- 7 CAM SHAFT ASSEMBLY
- 8 WORM SHAFT ASSEMBLY
- 9 OVERFLOW TUBE
- 10 GEAR CHAMBER PLATE
- 11 INSTANT FEED BUTTON
- 12 CYCLE VALVE
- 13 BY PASS VALVE



TYPE CG 32 LUBRICATOR UNIT

**SUPPLEMENT TO OPERATORS HANDBOOK
FOR
ELECTRO-MAGNETIC FEED CLUTCH & BRAKE**

CONTROLS

Controls on Drum Housing

The following remarks apply only to standard machines. For some applications the control system is changed considerably and it is not possible to cover these special cases here.

Front Push Button Panel

The following controls are fitted:
Front (A) and Rear (B) selector switch.
Main motor START/JOG and STOP push buttons.
Feed START/JOG and STOP push buttons with green pilot light.
LH repeat cycle push button. Cancel cycle push button.
Yellow repeat cycle pilot light.
Spindle Run and Brake push buttons.
Chuck Open and Close push buttons. (2 Pairs are provided on double indexing machines for individual control of chuck opening and closing).

The Selector Switch

When set to the same position (A or B) as the rear selector switch on the back of the drive housing ensures that the motor can only be started, the feed engaged and the repeat cycle button operated from that side of the machine selected and therefore acts as a safety precaution when making adjustments or setting the tooling.

' MAIN MOTOR START/JOG AND STOP ' Push Buttons

The knurled sleeve around the motor START/JOG push buttons at front and rear of the machine may be turned to select ' RUN ' or ' JOG ' before the button is depressed. It should be noted that both push buttons must be set to ' RUN ' before the motor can be run. If one is set to ' JOG ' EITHER button will only ' JOG ' the motor. Depressing the motor stop button at front or rear will result in the motor running to a halt and

the feed brake being applied; this serves as an emergency stop and machines built from 1976 approximately have a detented button fitted which must be pulled out before the main motor can be restarted.

' REPEAT CYCLE ' Push Buttons

A button is provided on the front control panel and another on the front of the drive housing. Both buttons must be depressed together in order to set the relays, start the spindle and allow the spindle drum to index. This is normally done after the completed workpiece has been unloaded and the new piece loaded. When the buttons are pressed the spindle clutch engages and the yellow signal lights show. The machine will then continue through its normal cycle, index and start the next feed brake will be applied before the machine indexes. If this happens it is necessary to press the repeat cycle buttons and when the spindle is running to press the feed button to initiate the new cycle.

' CANCEL REPEAT ' Push Button

If it is desired to stop the machine after the repeat buttons have been pressed and before indexing, the ' CANCEL REPEAT CYCLE ' button should be pressed to release the repeat relay. The yellow signal lights will then be extinguished but the spindle will remain running and may be braked if desired using the brake push button.

CONTROL ON DRIVE END OF MACHINE

Rear Push Button Panel. A push button box is mounted on the rear of the main drive housing and comprises the following.

Front (A) and Rear (B) selector switch
Main Motor START/JOG and STOP push buttons.
Feed START/JOG and STOP push buttons and green pilot light.

Repeat and cancel push buttons and yellow pilot light.

The operation is as described for the Front Control Panel with the exception that there is only one repeat cycle button.

A repeat cycle button is mounted on the front of the drive housing for use in conjunction with the one on the Front Control Panel.

The Hydraulic Pump Motor STOP/START Push Buttons are mounted on the control panel door. A green pilot light adjacent to the start button illuminates when sufficient pressure has been attained. The main motor cannot be started until this pressure is reached.

If the ' JOG ' button is pressed for longer than 13 seconds the motor will change from ' STAR ' to ' DELTA ' but will stop on release of the button.

On pneumatic chuckers the motor cannot be started or jogged until the air line pressure reaches at least 75 lbs/ins².

On hydraulic chuckers the motor cannot be started or jogged until (i) the hydraulic pump is started by means of a push button mounted on the main control panel door and (ii) the oil pressure has reached 5/6ths of the pump and chucking operating pressure at which point a green light adjacent to the push button is illuminated.

THE ' FEED START/JOG & STOP ' Push Buttons

The knurled sleeve around the feed START/JOG buttons at front and rear of the machine may be turned to select ' RUN ' or ' JOG ' before depressing the button. Both push buttons must be set to ' RUN ' before the feed can be engaged. If one button is set to ' JOG ' either button will only ' JOG ' the feed. Depressing the feed ' STOP ' button will apply the feed brake, leaving the main motor running. Handwinding can only be accomplished when the feed is braked. This is dealt with under the section covering feed drive.

' CHUCK OPEN/CLOSE ' Push Buttons

These are arranged so that the chuck can only be operated when the spindle is braked. The spindle is normally braked by operation of the ' BRAKE ' cam switch which releases the ' REPEAT ' relay and extinguishes the yellow signal lights. It is not necessary to hold the push buttons down as relays retain the circuits initiated by the buttons.

' HAND RUN AND BRAKE ' Push Buttons

These are arranged so that they will operate provided the repeat signal lamp is not illuminated. The spindle cannot run unless the chuck is closed. The buttons do not need to be held down, as relays retain the circuits initiated by the buttons.

Conveyor Push Buttons are mounted in the control panel door and control the conveyor independently of the main motor. The conveyor can be run separately to evacuate swarf.

Fast/Slow Clutch Levers are fitted at front and rear of the main drive housing for use when setting up. Each lever is free on the cross shaft and must be pulled outwards to engage the slot in the shaft ends. These are two positions, ' UP ' to engage feed and ' DOWN ' to engage fast motion. There is no effective neutral because of the roller over-running clutch in the feed drive.

Commencing on Inspection No.16348 (6 $\frac{1}{8}$ "- 6) and Inspection No.15665 (5 $\frac{1}{8}$ "- 6), these levers have been omitted for safety reasons, but the bosses at front and rear are provided with a hole into which a tommy bar can be inserted if required for setting up purposes.

Feed Drive Levers are fitted at front and rear of the main drive housing for selection of power feed or hand wind. In ' Feed ' these levers are positioned nearly horizontally and it is impossible to fit the hand-wind

crank to its shaft. As long as these levers are horizontal the dog clutch which transmits the feed drive is engaged and feed and braking by means of the push buttons is possible. Once the feed is braked by means of the push button the lever may be lifted into its overcentre positions, physically and electrically disengaging the feed and also releasing a mechanical interlock which allows the handwind shaft pinion to be engaged for handwinding.

The Handwind Crank can be fitted to the handwind pinion shaft at either front or rear. The handwind pinion is engaged by sliding the pinion shaft across the machine. This can only be done with the feed drive lever in its ' UP ' position. Handwinding is not possible unless electrical power is energising the machine controls or unless the electro magnetic spring applied brake is released by means of special tensioning screws used when electrical power is not available. See instruction plate on brake access cover.

The following faults affect the feed and motor circuits.

The feed will disengage, the fail-safe spring brake will be applied and the motor will stop and cannot be restarted until the fault due to the following circumstances has been corrected:

- a) Air line pressure has dropped below 60 lb/in².
- b) Hydraulic pump pressure has dropped below safe working pressure.
- c) Feed slipping clutch disengages.
- d) Threading return check switch not closed on completion of attachment return stroke.
- e) Spindle location unit (if fitted): Spindle is still located by spindle location unit after check cam has tripped.

When the feed trip cam switch operates, the feed will disengage and the brake will be applied, leaving the motor running until the fault due to the following

circumstances has been corrected:

- a) Failure to press repeat cycle buttons.
- b) Spindle is still braked by stopping unit.
- c) Clutch testing unit lever is in test position.
- d) One repeat cycle button is held down when a check cam switch operates.

Index Clutch Levers

Are provided so that the index clutch can only be dis-engaged during the slow feed period of the cycle. Because the index clutch is spring loaded into engagement, latches are provided adjacent to the index clutch levers to hold the clutch out against the springs. These latches must be dis-engaged to allow the indexing clutch to be engaged.

FEED DRIVE

The feed drive is taken from the centre shaft by gears to the first feed pick-off gear shaft and through the pick-off gears to the second pick-off gear shaft. Feed pick-off gears are mounted on taper shafts and an extractor is supplied in the tool kit.

The second pick-off gear shaft carries the feed slipping clutch which protects the machine from excessive overload during the feed period of the cycle. The slipping clutch is arranged to disengage completely and to operate an adjacent limit switch which opens the feed retaining circuit, thus disengaging the feed, applying the brake and stopping the main motor. Before re-engaging the slipping clutch the cause of the overload must be located and corrected.

Slipping clutches are assembled with the minimum number of springs and plungers necessary to transmit the torque. Spare plungers, springs and screwed plugs are supplied in the equipment kit and can be fitted if necessary. It is strongly recommended that the number of plungers in use is kept to a minimum.

The gear on the slipping clutch drives a gear on the 'slow' side of the 'fast-slow' clutch. A roller over-running clutch is built into the boss of the gear to take up the drive when the clutch is in neutral as it shifts from 'slow' to 'fast'.

The gear on the fast side of the 'fast-slow' clutch is driven from the constant speed pulley shaft through the fast motion slipping clutch. The number of plungers and springs used in this clutch is also varied to suit requirements. When the fast motion slipping clutch disengages due to overload, the drive is taken up by the over-running clutch and the feed slipping clutch which in turn disengages and operates the limit switch and trip mechanism.

At one end of the fast motion clutch shaft a gear transmits the fast or slow drive to the feed clutch gear which is integral with the electro-magnetic feed clutch spider. With the feed clutch energised the feed is transmitted via the clutch plates and through a dog

clutch which drives the feed shaft. Bevel gears at the front end of the shaft drive the main camshaft via a worm and wormwheel. A sprocket and chain at the rear end of the shaft drive the upper camshaft via a worm and wormwheel.

Mounted at the rear end of the feed shaft is the spring applied electro-magnetic brake which brakes the feed drive to the camshafts when either the feed stop button is depressed or when a signalled fault occurs.

The 'fast-slow' clutch is operated by dogs fitted in the tee-slot of the upper wormwheel. The timing of the dogs is set according to requirements, normally shifting the clutch at the start of feed period (1120°) and at the end of the dwell (268°) as shown on the timing dials located at front and rear of the drive housing top covers.

The fast motion control shaft carries bosses at the front and rear of the machine into which a tommy bar can be inserted to operate the fast-slow clutch by hand.

Clutch adjustment is made by tapping round the serrated disc, a serration at a time with the clutch disengaged. Clutches should not be set so slack as to cause slip nor so tightly as to require excessive force to operate the clutch by hand.

The electro-magnetic feed clutch is self adjusting and is engaged by depressing the 'feed' push button on either front or rear push button boxes.

The electro-magnetic spring applied feed brakes requires periodic adjustment of the air gap. See the instruction plate mounted on the brake housing cover. The brake can be applied by depressing the 'feed stop' pushbutton or will be automatically applied in the case of a signalled fault as described on sheet.

The upper camshaft drive chain tension is adjusted by means of a jockey sprocket on an eccentric stud. Adjust the sprocket to 'trail' on the chain.

To vary the timing of the main and upper camshafts in relation to each other, handwind the upper camshaft

to 0° (Vee notches on the periphery of cam discs vertically above the centre of the shaft). Disengage the dog clutch on the rear end of the upper wormshaft by slackening the hexagon nut and sliding the dog clutch out of engagement. Handwind the main camshaft to 0° (keyway and vee notches in discs and drums horizontal to the front of the shaft centre) and re-engage the dogs.

The handwind pinion on the handwind shaft is engaged with the gear on the front end of the main camshaft wormshaft by sliding the handwind shaft end-wise. This is possible when the feed drive lever is moved into its 'up' position thus disengaging the feed dog clutch, de-energising the feed clutch and applying the feed brake. Raising the feed drive levers moves an interlock arm from in front of the handwind pinion enabling the handwind shaft to be moved axially to engage the pinion for handwinding.

The action of sliding the handwind pinion into mesh trips a switch which releases the feed brake to permit handwinding. If electrical power is not available handwinding can only be achieved when the brake is released by means of special brake release screws. See the instruction plate on the brake housing cover. These screws **MUST** be removed from the brake before electrical power is connected to the machine.

An interlock switch mounted on the brake and set to operate half way through the stroke of the brake armature plate when releasing the brake ensures that the feed clutch is disengaged before the brake is released. It also prevents electrical engagement of the feed clutch should the brake be physically held off by the non-removal of the brake release screws.

Lubrication of the mechanical clutches is provided by internal drillings of the fast motion shaft while lubrication of the electro-magnetic clutches is provided by external drip feeds.

