PART 2

The main sections of the machine

CHAPTER 8 **Introduction**

CHAPTER 9 **Mould blade sizing mechanism**

CHAPTER 10 **Matrix heads base**

CHAPTER 11 **Composition matrix head**

CHAPTER 12 **Display matrix head**

CHAPTER 13 **Counter bracket and counter mechanism**

CHAPTER 14 **Strip cutting and stacking mechanism**

CHAPTER 15 **Pump mechanism**

PART 2

Key references

Chapter 9

1 Handwheel
2 Wedge screw
3 Wedge
4 Support pin
5 Connecting tube
6 Intermediate lever
7 Fulcrum pin eccentric
8 Plate
9 Pin
10 Driving block abutment
11 Plate
12 Mould blade stop
13 Handwheel lock screw
14 Wedge screw scale
15 Wedge screw scale
16 Screws (3)
17 Wedge indicator
18 Scale screws
19 Wedge screw clamp nut
20 Wedge indicator pin
21 Wedge screw housing
22 Wedge indicator scales
23 Wedge screw housing screws
24 Wedge screw housing base
25 Support pin
26 Mould blade slide
27 Driving block
28 Mould blade slide drive lever
29 Screw
30 Handle
31 Screw
32 Scale
33 Wedge screw nut
34 Screws
35 Pin
36 Nut
37 Ball socket plug lock nut
38 Ball socket plug
39 Ball socket
40 Nut
41 Retaining plate
42 Taper pin
43 Gauge
44 Block
45 Cap
46 Knob
47 Guide rod
48 Adjusting nut
49 Collar
50 Guide rod pin
51 Lever
52 Plunger
53 Lock pin

Chapter 10

1 Thumb screw
2 Type carrier cover
3 Type carrier
4 Fulcrum pin
5 Type pusher
6 Matrix heads base
7 Clamp screw
8 Distance piece
9 Type pusher lever
10 Type channel blocks
11 Lock nut
12 Type pusher lever connecting rod
13 Galley locating block
14 Galley clamp
15 Galley
16 Yoke
17 Cam lever extension
18 Cam lever
19 Type pusher cam lever
20 Type pusher connecting rod nut
21 Lock nut
22 Connecting rod
23 Type support spring cam bracket
24 Cam
25 Type clamp operating block
26 Mould blade
27 Mould coupling hook
28 Crossblock
29 Type carrier guard
30 Taper pins (2)
31 Screws (2)
32 Lever
33 Fixed type channel block latch
34 Screws (2)
35 Hexagon screws (2)
36 Releasing lever latch
37 Adjusting rod
38 Plunger lock pin knob
39 Latch trip plate
40 Plunger
41 Pump driving rod release trip bracket
42 Nut
43 Ball stud
44 Extension eccentric
45 Extension bolts
46 Connecting rod lock nuts
47 Yoke
48 Type carrier connecting rod yoke pin
49 Packing plate
50 Cover
51 Type pusher cover screws (6)

Chapter 11

1 Centring pin coupling head
2 Matrix lifter stop collar
3 Matrix lifter
4 Adjusting screws (2)
5 Stop nut
6 Loading spring
7 Matrix holder
8 Auxiliary loading spring
9 Centring pin
10 Centring pin loading spring bridge
11 Matrix cam lever
12 Lock nut
13 Matrix lifter lever connecting rod
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15 Matrix lifter lever
16 Nuts (2)
17 Centring pin auxiliary loading spring bridge

Chapter 12

1 Spring box yoke pin
2 Lock wedge spring box
3 Yoke pin
4 Lock pin
5 Lifter lever
6 Matrix lifter spring
7 Lifter lever block
8 Lifter lever block spring
9 Matrix lifter lock wedge
10 Matrix holder adjusting pad
11 Adjusting screw
12 Matrix lifter
13 Matrix holder
14 Locating key lever
15 Matrix holder locating key
16 Matrix cam lever
17 Matrix lifter stud nuts
18 Lock nut
19 Spring box rod
20 Spring box cap
21 Handle
22 Matrix head side cover
23 Screws (3)
24 Display matrix bridge

Chapter 13

1 Knob
2 Screws (4)
3 Counter bracket
4 Counter drum
5 Wedge indicator scale
6 Wedge indicator pin
7 Type carrier cam lever extension
8 Yoke
9 Spring rod end pin
10 Jet block driving rod
11 Stacking mechanism
12 Lever
13 Mould lead clamp lever
14 Lead clamp lever
15 Lock wedge
16 Lead clamp intermediate lever rod
17 Screw
18 Bracket
19 Yoke pin clip
20 Counter bracket projections (2)
21 Chain
22 Hook
23 Weight
24 Lever
25 Rod
26 Lead clamp intermediate lever spring box
27 Matrix cam lever
28 Stop lever
29 Pump connection rod
30 Ratchet stop disc
31 Lever
32 Ratchet detent
33 Pawl
34 Ratchet wheel
35 Pawl trip pin
36 Setting latch
37 Blade stop
38 Actuating lever link
39 Lead mould blade stop lever handle
40 Measure gauges
41 Length gauge
42 Screw
43 Sliding jaw
44 Galley
45 Matrix box tray

Chapter 14

1 Link yoke
2 Actuating block link
3 Lead stacker bar
4 Lead stacker
5 Pin
6 Connection rod
7 Lead stacker lever
8 Cutter blade pin
9 Cutter actuating lever
10 Fulcrum pin
11 Cutter blade
12 Bracket
13 Lock screw
14 Fulcrum pin
15 Cutter cam lever
16 Hexagon screw
17 Actuating lever pin
18 Taper pin
19 Screw
20 Bracket
21 Taper pin
22 Screw
23 Rod yoke pin
24 Yoke
25 Cutter setting lever rod
26 Rod yoke
27 Plunger link
28 Lock nut
29 Screws (2)
30 Lead guide bracket
31 Spring
32 Cutter setting lever
33 Cutter blade bracket
34 Lock nut
35 Cutter actuating block
36 Abutment
37 Cutter setting block
38 Actuating plunger
39 Plunger spring
40 Actuating lever
41 Stop lever

PART 2 *(continued)*

Key references

Chapter 15

1 Spring
2 Stop plates
3 Pump body spring rod
4 Lock nut
5 Pump body spring rod lock nut
6 Swing frame post
7 Piston operating rod
8 Piston springs
9 Trip latch
10 Piston operating rod crosshead
11 Pump lever connecting link
12 Pump body lever
13 Pump body lifting lever
14 Pump body lifting lever
15 Pump body
16 Piston
17 Piston lever
18 Link pin
19 Pump bell crank
20 Pump body lifting spring
21 Piston stem
22 Piston stem end
23 Piston stem end lock nut
24 Hat valve
25 Bottom plug
26 Bush (lower)
27 Bush (upper)
28 Fulcrum pin
29 Pump body lifting lever
30 Locating pin
31 Nozzle setting gauge
32 Swing frame adjusting screws (3)
33 Swing frame studs
34 Nozzle squaring post
35 Nozzle gauge
36 Piston spring rod
37 Crosshead stop post
38 Piston crosshead
39 Pump body spring rod crosshead
40 Lock nut
41 Pump body operating rod lever
42 Operating rod
43 Nut
44 Nut
45 Nozzle
46 Crosshead stud
47 Pump body operating rod
48 Nuts
49 Adjusting nut
50 Pump driving rod
51 Actuating rod
52 Pump driving rod link
53 Lock nut
54 Latch stand shaft nut
55 Latch abutment plate
56 Crosshead eye
57 Latch stand shaft arm
58 Piston spring rod eye
59 Pump stop collar
60 Latch stand shaft
61 Latch pin
62 Latch trip plates (upper)

CHAPTER 8

Introduction to the main sections of the machine

The main sections of the machine, covered by Chapters 9 to 15 inclusive, embrace the following:

Chapter 9: The mould blade sizing mechanism

Chapter 10: The matrix heads base

Chapter 11: The composition matrix head

Chapter 12: The display matrix head

Chapter 13: The counter bracket and counter mechanism

Chapter 14: The strip cutting and stacking mechanism

Chapter 15: The pump mechanism

Note: The Varigear unit and gear box are dealt with together with the cams in Part 3 (Chapters 16 and 17); matrices, matrix holders, etc. and an introduction to the moulds being contained in Part 4, while the moulds are dealt with in detail in Parts 5 and 6. Other items which are not standard equipment are listed and described as either attachments or accessories under 'General information' in Chapter 1.

Each of the main sections of the machine (with the exception of the strip cutting and stacking mechanism) is closely concerned with either the sizing or sealing of the mould casting cavity and with the ejection and disposal of the product on completion; the pump mechanism making its contribution by delivering the requisite quantity of metal via the jet in the floor of the mould.

The mould blade sizing mechanism, which controls the set-width of the mould casting cavity (and ejects the cast product on completion), and the pump mechanism, which ensures that the cavity is adequately filled to produce the required cast, are basic essentials of the Super caster and do not have to be attached or removed; though various settings and adjustments are necessary for casting differing products, and pump body, piston and nozzle changes have to be made.

The handwheel scales of the mould blade sizing mechanism are used to adjust the position of the mould blade for the set-width of the cast, thus controlling the extent the blade is withdrawn; provision is also made by means of a mould blade stop for controlling the forward movement of the blade on ejection, when casting strip material or dashes and clumps from the lead and rule moulds. The complete mechanism includes the mould blade slide, the slide drive lever and an intermediate lever; together with a connecting tube which transfers the movement imparted by the cam lever to which it is connected. The connecting tube can be linked with the intermediate lever in any one of nine positions, dependent on the size, set-width or nature of the product being cast. (The pump mechanism is briefly outlined at the end of the introductory section.)

The matrix heads base is used only with the 'type' moulds (moulds fitted with crossblocks) in conjunction with either the composition matrix head or display matrix head; or without a head when casting from the short lead and rule mould or the quad and space mould (or when casting quads and spaces from a composition type mould, using the space-casting attachment). Its functional role is to provide the type carrier which links with the mould crossblock, and the type pusher which pushes the cast product out of the carrier into the type channel after it has been ejected from the casting cavity by the mould blade, and carried out of the mould.

The composition matrix head and the display matrix head are each used as required (with a composition or display mould) mounted on the matrix heads base. The matrix head provides a matrix lifter which receives the matrix holder, whereby the matrix is lowered on to the mould to seal the top of the casting cavity when the metal is injected by the pump nozzle, and raised clear of the mould on completion of the cast to allow the mould blade to eject it into the type carrier.

The counter bracket, used when casting strip material and dashes and clumps (attached direct to the main stand of the machine), is linked with the pump mechanism through the counter mechanism which controls the number of successsive fusing casts in the completed strip, and, in consequence, in conjunction with the mould blade sizing mechanism (which determines the size of each cast), dictates the total strip length. This it achieves when casting from the lead and rule moulds, by actuating the cutter-setting lever of the strip cutting and stacking mechanism when the requisite pre-set number of casts has been completed, which results in the strip being sheared. When casting from the furniture mould (with the cutter blade inoperative) the counter mechanism is also linked to the furniture mould blade stop, which is automatically withdrawn on completion of the required pre-set number of fusing casts; whereupon a longer non-fusing cast results, which produces a break in the cast strip, thus providing separate pieces of the required length.

The counter bracket carries a jet block driving rod which links with the strip mould jet block that provides the jet through which the metal is injected into the casting cavity; together with a lead clamp lever that ensures the cast strip in the mould is firmly clamped in position for each successive fusing cast, and released for its subsequent ejection. A matrix lifter is provided (complete with connections for linkage with its operative cam) for use when casting continuous borders or dashes, when the raising and lowering of a matrix is involved. This is attached to the counter bracket as required.

The strip cutting and stacking mechanism operates in conjunction with the counter mechanism when casting from the lead and rule moulds, the cutter blade being automatically brought into operation on completion of the required number of casts pre-set on the counter bracket. Leads, rules and borders can thus be produced on the galley cut to any desired length, influenced by the mould blade sizing mechanism which determines the size of each fusing cast, and the counter mechanism which, through its linkage with the pump driving rod, controls the total number of casts in each completed strip. The cutter actuating lever which operates the cutter blade is linked with the lead stacker, which moves in unison with the blade and stacks each sheared strip in turn against the lead stacker support blocks, leaving a clear space on the galley for the next strip as it emerges step by step from the mould.

The pump mechanism delivers the molten metal to the mould via the nozzle, which seats itself in the base of the mould when the mould blade is withdrawn to size the casting cavity, and when (in the case of the type moulds) the crossblock and the matrix are sealing both the front and the top of the cavity. The action of the pump mechanism is in consequence precisely timed to synchronise with the moving parts of the mould blade sizing mechanism, the matrix heads base, the matrix head and also the counter bracket, since the same principles apply broadly speaking with all products cast from the strip moulds. The pump mechanism is pivoted on a swing frame post which is attached to the main stand of the machine; it has a swing frame rack in engagement with a wormshaft crank which terminates in a handle, by means of which the metal pot, the pump and the piston, together with other related parts, can be swung into location under the main stand and raised to the casting position; and wound down and swung back again as necessary when the machine is not in operation.

The mould blade sizing mechanism obtains its basic movement from the mould blade cam lever, the type carrier (and the jet block driving rod of the counter bracket) being activated by the type carrier cam lever, while the type pusher is connected to the type pusher cam lever.

The matrix lifter, in the case of both the composition and display matrix heads, is linked with the matrix cam lever, via the upper hole. This applies likewise with the matrix lifter attachment of the counter bracket when used; whereas the lead clamp lever is connected to the same lever, via the lower hole.

The strip cutting and stacking mechanism remains linked directly with the cutter cam lever throughout and is constantly in motion, though it is not operative until it is linked with the actuating lever of the counter mechanism. Similarly, the pump mechanism, which receives its movement from the pump cam lever, is only operative when the pump release lever is engaged. From the above outline description of the main sections of the machine you will readily appreciate how all the several parts are inter-related, how the required movements are obtained from the cam levers; and, in due course, the reasons for the various adjustments and settings to which all the machine sections are subject in order to provide the wide range of products the Super caster is designed to produce, as will be duly explained.

This brief introduction should serve to assist you to a ready understanding of the detailed coverage of the main sections of the machine contained in the chapters which follow.

CHAPTER 9

Mould blade sizing mechanism

The several parts which constitute the mould blade sizing mechanism serve to control the movement of the mould blade, whereby it determines the set-width of the product when casting type, quads, spaces and cored quotations. Similarly, when used in conjunction with the counter mechanism for casting strip material, it controls the length of leads, rules, continuous borders, furniture, mounting material and tie-up slugs (also dashes and clumps). Refer to Chapter 6, 'Basic unit and set'.

The operative mechanism which controls the set-width of the mould casting cavity consists of a wedge and screw combination, the careful setting of which permits extremely fine adjustments to the position of the mould blade, and you will find that, though the wedge screw scales are calibrated both in units of one-thousandth of an inch and one-sixteenth of a point, you will be making adjustments when casting in the order of one-ten-thousandth of an inch. You will be likewise checking the resultant product cast against readings obtained with the micrometer caliper gauge and correcting the wedge screw setting accordingly where necessary. Refer to 7.1 in connection with 'The Micrometer Caliper Gauge'.

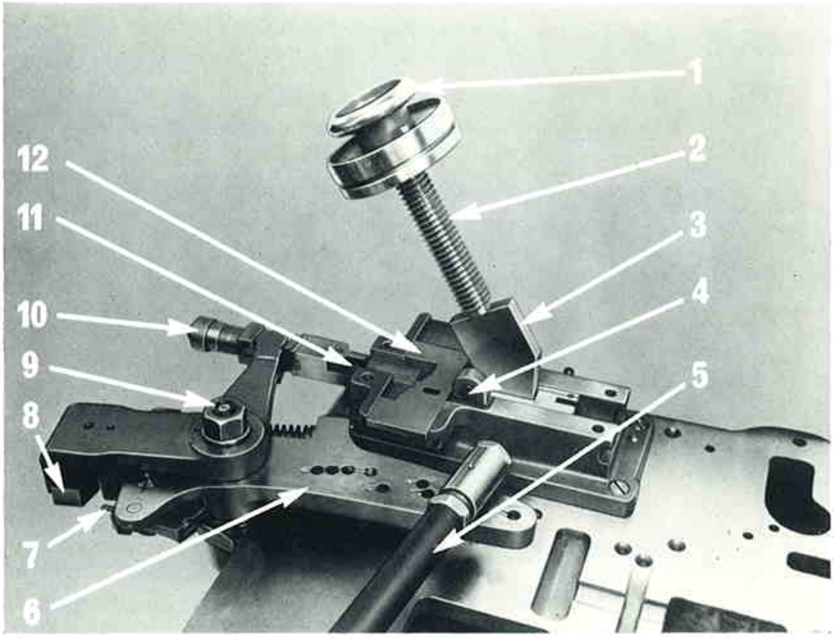
The complete assembly which comprises the mould blade sizing mechanism is made up of the following parts:

a) The wedge (3), the movement of which is controlled by the wedge screw (2), is controlled in turn by a handwheel (1) which, on being turned, registers its degree of movement against a zero mark provided by the edge of the wedge indicator (17) positioned against the two wedge screw scales (15) and (14) which are calibrated in both thousandths of an inch and sixteenths of a point; and by the movement of the wedge indicator (17) in relation to the wedge indicator scales (22), which are marked both in points and ems. The wedge indicator scale is secured to the left-hand side of the wedge screw housing (21) in which the wedge and the wedge screw are contained.

The wedge screw is locked in the desired position by the wedge screw clamp (19).

b) The wedge screw housing base (24), located in position by two taper pins and permanently secured to the main stand of the machine by four screws; to which the wedge screw housing (21) is attached by means of the three wedge screw housing screws (23) and the screw (31) which serves as a pivot for the wedge screw housing cover (21); the cover being a guard for the mould blade slide (26).

The wedge screw housing base provides two support pins (4) and (25) on which the rear edge of the wedge rides; a channel in which the mould blade slide (26) travels; and accommodates a 'stepped' mould blade stop (12) brought into use when casting leads and rules and dashes and clumps, which is set in another channel at right angles to the traverse of the mould blade slide.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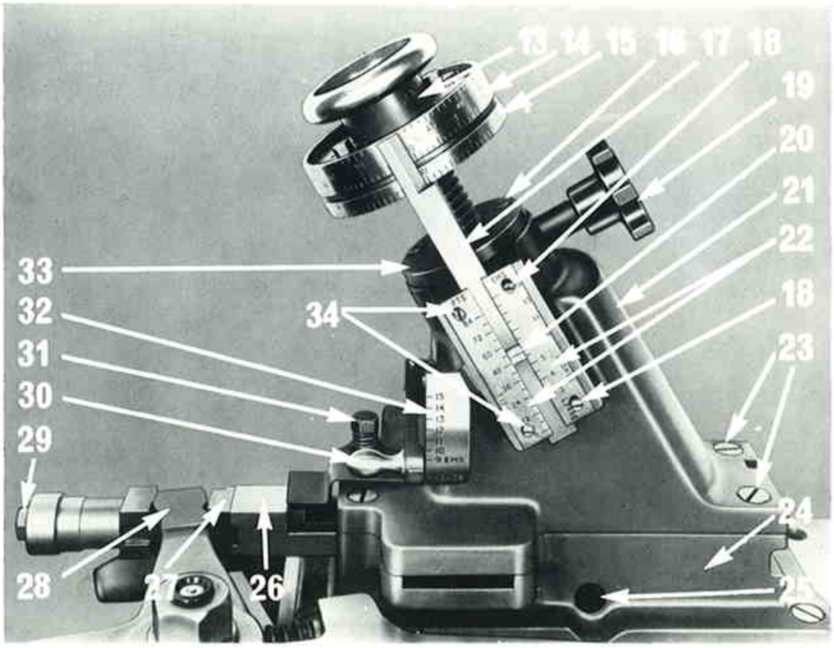
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The mould blade stop is not used when casting product from the furniture mould in predetermined lengths.

The mould blade stop (12) is set, as required, by the lead mould blade stop lever, the outer portion of which protrudes from the rear of the wedge screw housing in the form of a handle (30), which is positioned against its indicating scale (32) as necessary.

c) The mould blade slide (26), which runs through the wedge screw housing, in the channel formed in the base, at the front end of which is a slot through which the wedge screw passes; whereby the front of the wedge (3) is enabled to control the extent the slide is withdrawn to the rear. This in turn controls the distance the mould blade (to which it is connected) is opened and, in consequence, the set-width of the cast, as dictated by the setting of the wedge screw scales (15) and (14).

An abutment plate (11), permanently affixed to the mould blade slide by three screws, controls the extent of the slide's forward movement when casting strip material and dashes and clumps; its traverse being checked when the abutment plate comes up against whichever step of the lead mould blade stop (12) has been positioned across its path. The position of the abutment plate in relation to the lead mould blade stop is determined by the setting of the wedge screw which controls the mould blade slide.

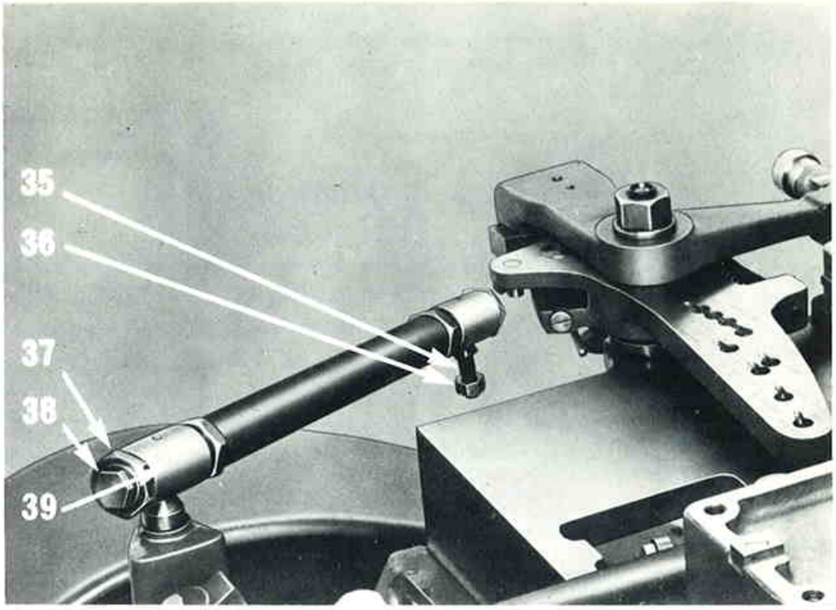
The rear end of the mould blade slide (immediately behind the abutment plate) constitutes the driving block (27), in which is recessed a groove provided to receive the end of the mould blade slide drive lever (28). The axial movement of the mould blade slide drive lever thus imparts the necessary traverse to the mould blade slide.

A reversible driving block abutment (10), located on the extreme end of the driving block, enables the driving block spring to be brought into action to absorb any excess movement of the mould blade slide drive lever when the mould blade opening does not exceed 12 points (0·1660in). This spring can be put out of action by reversing the abutment for all mould blade openings which exceed 12 points.

d) The mould blade slide drive lever (28), which is motivated by the mould blade slide drive lever intermediate lever (6); the two parts operating as one, and on the same axis – pivoted on the mould blade slide drive lever pin (9) located on the main stand of the machine. The intermediate lever (6) obtains its movement from the mould blade slide drive lever connecting tube (5) which is connected to the mould blade cam lever.

The connecting tube is linked with the slide drive lever intermediate lever (6) by means of the ball end nut, which can be engaged in whichever of the nine connecting holes is required, according to the nature, size or set-size of the product being cast. The connecting tube imparts less movement to the intermediate lever when connected to the holes provided at the extreme end than when linked with the holes nearer the lever axis. The connecting holes close to the axis are therefore used when casting products of greater set-width than is required from those which are located further away.

At the other end of the intermediate lever (6) is a plate (8) which, in conjunction with a plunger, constitutes a safety device which separates the slide drive lever (28) from the intermediate lever (6), thus breaking the contact between the cam lever and the mould blade slide, should an obstruction occur in the mould. A special plate is used when casting from the furniture mould.



e) The mould blade slide drive lever connecting tube (5); which transfers the mould blade cam lever movement to the intermediate lever.

The connection to the intermediate lever is made by means of the ball end which is engaged in the required hole, located correctly by means of the ball end snug pin (35) which fits in the groove provided, and secured by the ball end nut (36) from the underside.

The ball socket (39) at the other end of the connecting tube engages with the ball end of the mould blade cam lever; the connection being made secure by the ball socket plug (38) and the ball socket plug lock nut (37), which you should never require to disturb. The ball socket connection allows a degree of 'float' movement of the connecting tube, which assists you in locating the ball end in the connecting holes in the intermediate lever.

9.1 Construction and function of the wedge screw

The combination of the wedge screw (2) and the wedge (3) itself (which, seated in the wedge screw housing base (24), abuts against the two support pins) is such that one complete revolution of the screw adjusts the position of the wedge sufficiently to make a difference of 6 points to the opening of the mould blade. The wedge screw handwheel (1) controls the wedge screw, which must be turned at its upper end where there are no scale markings, and not by means of the two wedge screw scales which are located just beneath it.

The upper of the two wedge screw scales, the 'type' scale, has calibrations around the upper edge of its circumference, each representing one-thousandth of an inch, whilst the divisions around its lower edge represent points and one-sixteenth of a point. This scale is locked in position by means of the scale lock screw and clamp located on the upper surface of the handwheel and clearly marked 'type'.

The lower wedge screw scale, the 'leads' scale (15), is similarly calibrated around the lower edge with divisions representing points and sixteenths of a point. This scale is locked by the scale nut and washer located on the hand-wheel and marked 'leads'.

Keyed between the two wedge screw scales is a wedge indicator (17), the up and down movement of which is controlled by the rotation of the wedge screw (2). The lower end of the wedge indicator runs in a slot in the wedge screw housing (21) and is flanked on either side by a scale (22) headed on one side 'points' and on the other 'ems'; the latter showing one em-scale range for leads and rules, and another for dashes and clumps. The wedge indicator pin (20), passing between the two scales, indicates the opening of the mould in ems or points, whilst the wedge screw scales (15) and (14) are used to obtain and duly indicate fine adjustments in thousandths of an inch or less, and in points and fractions of a point.

One complete revolution of the micrometer wedge screw handwheel will move the wedge indicator 6 points or 0·083 in. This movement can be observed on the wedge indicator scale (22). It therefore follows that, with the mould blade sizing mechanism properly adjusted and set and the wedge screw 'type' scale reading at zero, the wedge indicator (17) should be in alignment with an 'em' line or mid-way between two 'em' lines; one complete em being taken as 12 points.

9.2 The lead mould blade stop

The lead mould blade stop (12) will abut against the mould blade slide abutment plate (4) if it is moved into the path of the mould blade slide. It will in consequence be appreciated that sideways adjustment of the stop across the axis of the mould blade slide (26) can be used when necessary to control its forward movement.

The stop is set in a constant control position for leads and rules, and in varying positions as required when casting dashes and clumps. It is not used to exert control of the mould blade slide when casting from the type moulds, or when casting strip product from the furniture mould in predetermined lengths.

The position of the lead mould blade stop is determined by the setting of the stop lever handle (30) against the scale (32) on the wedge screw housing.

9.3 Adjustments when preparing to cast type

A reversible driving block abutment (10) is located at the rear end of the mould blade slide (30). The correct positioning of this abutment is important in connection with the set-width of the cast. When casting type up to and including 12-points set-width, the large diameter end of the driving block abutment should be positioned at the front. In this setting, the driving block spring is in action under pressure, the effect being to reduce the movement of the mould blade slide drive lever (28). When setting up to cast above 12 pt (0·1660 in) set-width, the abutment must be reversed, thus putting the spring out of action, although it remains on the mould blade slide, concealed by the abutment. The abutment is held in position by the screw (29) which must be removed before any adjustment can be made.

You must now zero the mould blade sizing mechanism to ensure exact adjustment of the mould blade and correct readings on the wedge screw and wedge indicator scales. This adjustment must be carried out with a type mould attached and connected up on the main stand of the machine.

First, place a blank matrix in the matrix holder and turn the machine to 150°. This you will observe is the ejection position, with the crossblock over at the right, and the mould blade right forward against its stop and close up against the crossblock; the starting position for sizing the mould blade opening.

Now loosen the wedge screw clamp nut (19) and screw the wedge right down to its lowest position. Then loosen the two wedge indicator scale screws (34) and adjust the position of the 'points' wedge indicator scale if necessary, so that the 'zero' mark is exactly in line with the mark on the wedge indicator pin (20).

Finally, loosen the scale clamp lock screw marked 'type' located on top of the wedge screw handwheel, and turn the upper handwheel until its zero mark is in line with the knife edge of the wedge indicator (17). Tighten the scale lock screw on completion.

At this stage, the wedge screw being right down in its lowest position, the mould blade right forward and the mould completely closed, one complete turn of the wedge screw handwheel will take the 'zero' mark through one revolution and bring it back in line with the knife edge on the wedge indicator (17), and cause the mould to be opened 6 points. The mark on the wedge indicator pin (20) will similarly move up from 'zero' into line with the 6-point mark on the 'points' wedge indicator scale.

The wedge indicator 'points' scale is calibrated in divisions each representing a 6-point variation of the mould blade opening. Thus the wedge screw handwheel can be turned to bring the wedge indicator pin in line with any required multiple of 6 points on the wedge indicator scale (a zero reading on the wedge screw scale confirming the accuracy of the setting). The mould blade will be opened the amount shown on the scale, and any additional fractional opening required can then be obtained by turning the handwheel further until the extra points or fractions of a point (or decimal fractions of an inch) have been added, and the mould blade opening increased accordingly.

For example: if the set size required is 39 points, give the wedge screw handwheel six complete turns to obtain a mould blade opening of 36 points and a reading showing this amount on the wedge indicator scale. Continue slowly turning the handwheel until the calibration marked '3' on the upper handwheel scale is brought into line with the knife edge on the wedge indicator. This gives the extra 3 points required to open the mould blade up to 39 points, and the wedge indicator scale will accordingly display a reading mid-way between the 36- and 42-point calibrations, indicating and confirming the setting. Similarly, a setting of $35\frac{3}{4}$ points would require you to obtain a reading of 36 points on the wedge indicator scale, and then to move the wedge screw scale back from zero by $\frac{1}{4}$ point for the required mould blade opening.

Since the wedge screw, when initially sizing the mould for casting, will usually be screwed to its lowest point when the mould is comparatively cold, it will be found in practice that when you commence casting and the mould heats up, the wedge screw scale will doubtless require a little extra adjustment, the amount of which will be indicated by the micrometer caliper gauge reading when you 'size' the type cast and check against the correct set-width indicated in the 'Tables of Micrometer Head Settings'.

Briefly, in theory, the cast product, when sized with the micrometer caliper gauge, should coincide exactly with the reading set on the wedge indicator and wedge screw scales, but there will inevitably be some minute variation when the mould, originally sized cold, has warmed up after the first few castings have been made.

After the wedge screw has been adjusted accordingly, and correctly sized type is being cast, the 'type' scale lock screw must be loosened and the upper wedge screw scale finally adjusted to indicate the size obtained. That is to say, the wedge screw scale readings will then exactly match the set-width of the product being cast; after which all further settings should similarly coincide whilst the mould is operating under the same conditions and at approximately the same temperature.

You will find that all these checks and corrections are best done after a number of casts have been made to get the mould warm, or you will be wasting your time and subsequently casting incorrectly sized product, and having to go through the whole procedure again.

The wedge screw can now be moved in either direction during casting to produce type of any other required set-size, but though you may not now have problems related to variations in mould temperature, the settings you make on the wedge screw scales are no indication that the product cast will be correct, since your setting initially will almost invariably prove to be fractionally out of true. The maxim therefore is to meticulously check the set-width of the product with the micrometer caliper gauge after each new setting, and make such fine adjustments to the wedge screw as may be necessary until the cast body size is absolutely correct.

The detailed procedure connected with wedge screw adjustments when preparing to cast type has been dealt with at some length in order to stress its vital importance and the degree of care required. Remember, you will be making settings to a ten-thousandth of an inch with the object of producing a whole range of type bodies of the correct set-width. Refer to Chapter 6, 'Basic unit and set'.

Having finally adjusted the wedge screw to cast correctly sized type bodies, additional adjustments are necessary to ensure that the matrix is properly positioned to cast the character exactly central set-wise on the type body, and that the type, when cast, is in correct alignment. The method of using the 'set' matrix and the type-alignment gauges, used for checking composition type, is explained in Chapter 5, which deals with type alignment, in Chapter 18 concerning matrices and in 23.1 which deals with small type composition moulds.

9.4 Adjustments for casting strip material

The lead mould blade stop lever (30) must be moved down to the position marked 'leads'. This moves the lead mould blade stop into the path of the mould blade slide abutment plate and thereby restricts the forward movement of the mould blade slide. Now take the 6-em border length gauge (43) and insert it between the mould blade slide abutment plate (12) and the lead mould blade stop (11); and then, having first released the wedge screw clamp, screw down the wedge screw to bring the mould blade slide forward until it is stopped by the gauge. The wedge screw should then be carefully adjusted to ensure that the gauge fits accurately between the two stops, without binding.

The 'leads' wedge screw scale (15) must now be turned to zero. Release the scale clamp and screw and lock up again on completion of the zero adjustment; then tighten the wedge screw clamp nut (19) and carefully check again to ensure that the zero setting is still correct and that the border length gauge is still a good fit.

The mould blade is thus set for a 6-em cast, the wedge indicator leads scale (22) indicating this, and the wedge screw 'leads' scale (14) being set at zero. The wedge screw scale (17) can now be adjusted as necessary to set the mould blade to cast strip material in successive casts of any required length up to a maximum of 6 ems. Refer to Chapter 13, 'The counter bracket and counter mechanism'.

9.5 Adjustments for casting dashes and clumps

Turn the machine to 180° and move the lead mould blade stop lever handle to the 'dashes' scale mark setting which corresponds with the length in ems in which you intend to cast. The wedge screw must now be turned, until the wedge indicator pin gives a corresponding ems reading on the wedge indicator scale (confirmed by a zero reading on the wedge screw scale) thus opening the mould the correct distance to ensure that the dashes (or clumps) will be cast to the required length.

It is most important that you should note that the minimum length to which a dash is cast must always exceed the distance from the end of a dash matrix to the opposite end of the character in the matrix. Any attempt to cast dashes in shorter lengths will result in the matrix seating on the character of the previous cast.

9.6 Adjustments for casting continuous borders

You must first gauge the mould blade stroke in the same manner as when making adjustments for casting strip material, using the border length gauge. Continuous border matrices all have a 'casting length' of approximately 6 ems (0·996 in) and it is often necessary to make a minor adjustment to either increase or decrease the length of cast to conform to the matrix design. When this is so, it is because the nature of the border design itself governs the matrix casting length and consequently dictates that each cast should be either a little less or a little more than the gauged mould blade setting, in order to ensure the casting of a perfect continuous border design throughout. Border matrices so affected are marked accordingly either '+' or '−' as the case may be. Therefore when you are using a matrix with marks such as '+013' or '−002' stamped upon it, the corresponding number of divisions must be added or subtracted '+' or '−' on the top scale of the upper wedge screw scale as necessary; the divisions representing thousandths of an inch, and the length of the cast being increased or decreased accordingly.

The setting must be very carefully adjusted and the cast product closely examined, since casts which are incorrectly gauged will result in overlaps in the design, and a splash could result through the matrix not seating properly. If overlapping is evident, the wedge screw must be re-checked and carefully adjusted to correct the error, and the product again closely scrutinised until you are satisfied that perfect continuous border is being produced.

9.7 Adjustments for casting product in predetermined lengths from the furniture mould

Raise the lead mould blade stop lever to its uppermost position, place the 3-em setting gauge between the mould 'fusing stop' and the lower edge of the mould blade, and adjust the wedge screw so that the gauge is lightly held in position; then set the wedge screw scales to zero and check to ensure that the gauge still fits correctly.

Make sure the wedge indicator scale is also reading correctly at 3 ems, adjusting the scale position accordingly if necessary, by loosening the two scale screws (18).

Note: It should be apparent from the foregoing that whenever you are making wedge screw adjustments, any setting, in either ems or points, shown by the indicator pin on the wedge indicator scale, will only be correct if the wedge screw scale is set at zero. It also follows that when adding (or subtracting) any points, fractions of a point, or decimal fractions of an inch on the hand-wheel scale, such additions or subtractions will be accurate only when moving forward or backward from a correct zero handwheel scale reading. Only by referring to the relevant wedge screw scale, therefore, can the wedge indicator pin setting (and, in consequence, the mould blade opening) be finally checked and confirmed.

9.8 Dismantling the wedge screw mechanism

Although it is unlikely that you will ever need to completely dismantle the mould blade sizing mechanism (partial dismantling is necessary when setting up to cast from the Palace script or the italic mould) it is advantageous that you should do so in order to increase your knowledge and understanding of the construction and working of the parts involved. You should proceed as follows:

Remove the mould blade slide driving block screw (29) and take off the block (44), the cap (45), the reversible abutment (10) and the spring. Remove the wedge screw housing cover screw (31) and then the cover itself. Continue by removing the three wedge screw housing screws (23) from the wedge screw housing and lifting the housing off, complete with the lead mould blade stop (12). The mould blade slide itself can now be completely removed.

Now unscrew the wedge rod nut (40), remove the rod washer and the wedge screw spring, and take the wedge right out. The wedge screw, complete with the handwheel and the wedge indicator, can also be screwed out.

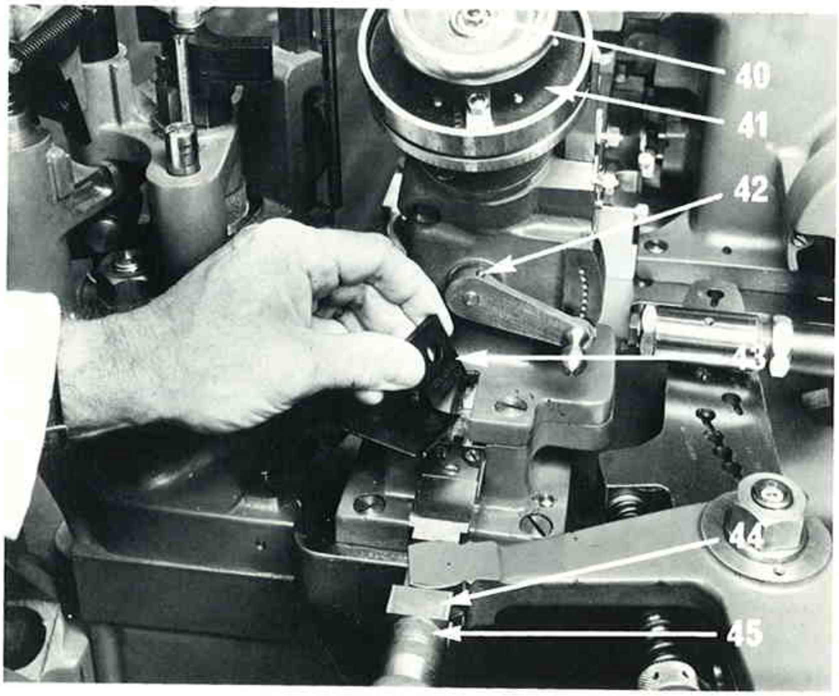
To dismantle the handwheel (1) itself, loosen the handwheel lock screw (19) and remove the wedge screw (2).

Take off the scale clamp nut and remove the washer and bolt; then remove the scale clamp screw and then the clamp itself.

Remove the six screws from the scale retaining plate (41), whereupon the plates and scales will come apart.

To remove the blade stop lever (30), knock out the taper pin (42).

To remove the wedge screw nut (33), take off the wedge screw clamp nut (19), and take out the bolt and the wedge screw clamp.



Remove the three screws (16) from the wedge screw housing, and using a piece of wood, drive out the wedge screw nut (33) from beneath, taking care not to damage the inside threads.

At this point it is emphasised that whilst the mechanism is completely disassembled, the opportunity should be taken to study the working and interaction between the several parts; namely the wedge screw, the wedge, the lead mould blade stop, the mould blade slide and the abutment plate.

9.9 Assembling the wedge screw mechanism

Replace the wedge screw nut (33), taking care to ensure that it is in the right position, otherwise the screws cannot be assembled. Once the nut has been driven home it is very difficult to turn.

Replace the three screws (16) and then the bolt, the wedge screw clamp and the clamp nut (19).

Now replace the lead mould blade stop lever, making sure that the handle spring and the handle spring plunger are in position; and lock up by means of the lead mould blade stop lever taper pin (42).

Replace the scale clamp bolt washer, the bolt and the nut, with the cut-away portion of the washer facing outward; then replace the clamp and the screw which locks it.

Replace the wedge screw plates, with the word 'type' on the scale-retaining plate against the clamp; and secure with the six scale retaining plate screws.

Assemble the wedge screw (2) to the handwheel and lock with the handwheel lock screw (13).

Screw the wedge screw into the wedge screw nut (33) and assemble the wedge indicator (17) and indicator scales (22).

The wedge can now be replaced, complete with spring, washer, and nut (40), and locked tightly in position.

Replace the mould blade slide (26) and the lead mould blade stop (12), ensuring that the narrowed portion of the stop is to the right-hand side of the machine, nearest to the pump, and that the slot is to the front.

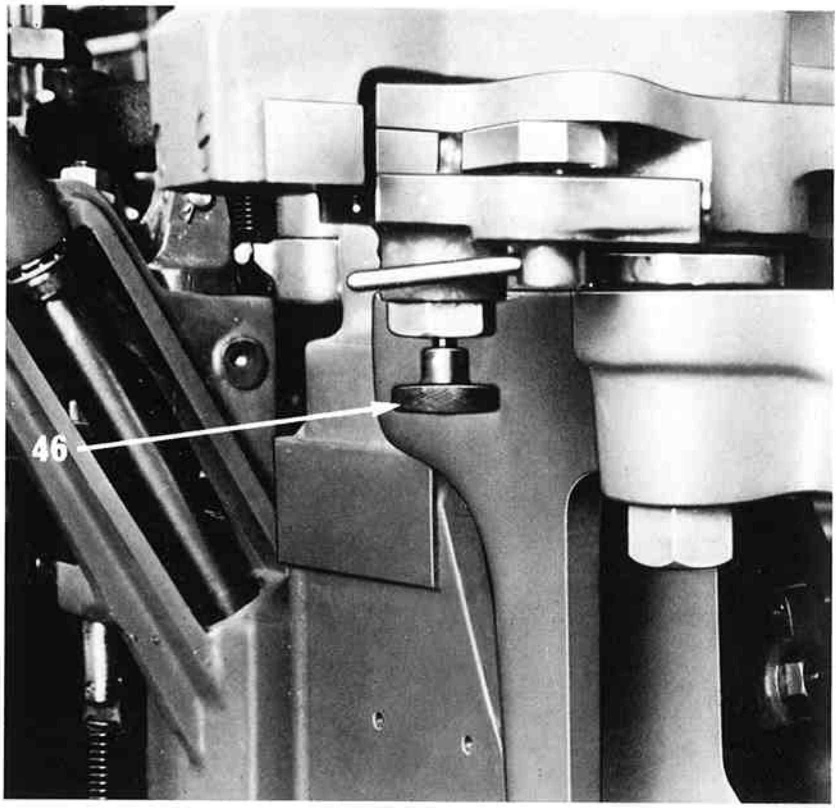
Replace the wedge screw housing (21), ensuring that the lead mould blade stop lever (30) is located correctly in the slot provided in the lead mould blade stop (12), and secure with the three wedge screw housing screws (23).

Now replace the wedge screw housing cover and the screw (31), and lock in position; then, finally, assemble the reversible abutment (10), the spring, the cap (45) and the block (44), and secure to the mould blade slide with the driving block screw (29).

9.10 Mould blade slide drive lever

The function of the mould blade slide drive lever is to impart the necessary traverse to the mould blade. It is operated by the mould blade cam, through the mould blade cam lever, the mould blade slide drive lever connecting tube (5) and the intermediate lever (6). The connecting tube can be attached to the slide drive lever intermediate lever in a variety of positions, each so located as to impart varying degrees of movement to the slide drive lever (28), such as are required when casting different products of varying size or set-width.

To provide against possible damage which could be caused by any obstruction to the movement of the mould blade, the mould blade slide drive lever (28) is constructed in two sections, each working upon the same axis. The two parts (the slide drive lever and the intermediate lever), are held together by a clutch in the form of a friction plunger (52) supported by a spring. Should any obstruction occur, it would overcome the pressure of the spring, causing the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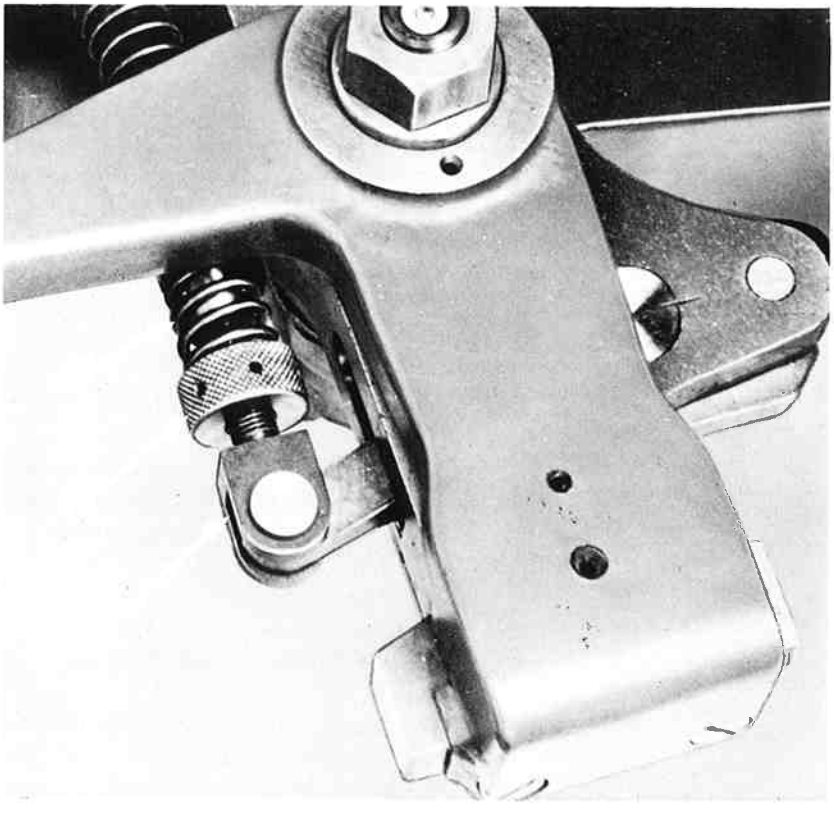


plunger to recede and become locked in an inoperative position, whereby pressure on the mould blade is released.

When the obstruction to the mould blade has been removed, the plunger can be restored to its operative position by withdrawing the lock pin knob (46). The lock pin should be withdrawn only when the machine is at rest and when the plunger (52) is opposite its recess in the plate (8).

In the event that an obstruction should occur whilst casting, and the plunger becomes inoperative as described, you must immediately follow up by putting the pump out of action and stopping the machine; after which you can take steps to locate the cause of the trouble.

9.11 Position of the plunger spring adjusting nut and the fulcrum pin eccentric

When casting furniture, 42–72pt type and 18pt leads and rules, there is obviously greater resistance to the mould blade when ejecting than is the case when casting smaller type or product of any kind; and greater spring pressure is needed on the plunger in consequence. The additional spring pressure required is obtained by turning the plunger lever fulcrum pin eccentric (7) until the line marked 'type 42–72 point' corresponds with the line on the intermediate lever, and by locking the plunger spring adjusting nut (48) forward against the guide rod stop collar (49). The latter you will need to vary as required, and as experience will dictate.

Similarly, when casting from 14–36pt display moulds and the 1–3pt lead and rule mould, the adjusting nut (48) should be against the stop collar (49) as for 42–72pt, but the fulcrum pin eccentric (7) must be placed in the 5–36pt 'small type' position. The adjusting nut can be eased off to reduce the pressure to suit your requirements, after the mould has warmed up.

When casting from composition moulds, a much reduced spring pressure is required. To obtain this, the eccentric must be set in the 'small type' position and the adjusting nut right back against the head of the plunger spring guide rod (47). This again can be varied according to the point-size, to suit your requirements, and as necessary after the mould has warmed up.

9.12 Dismantling the mould blade slide drive lever

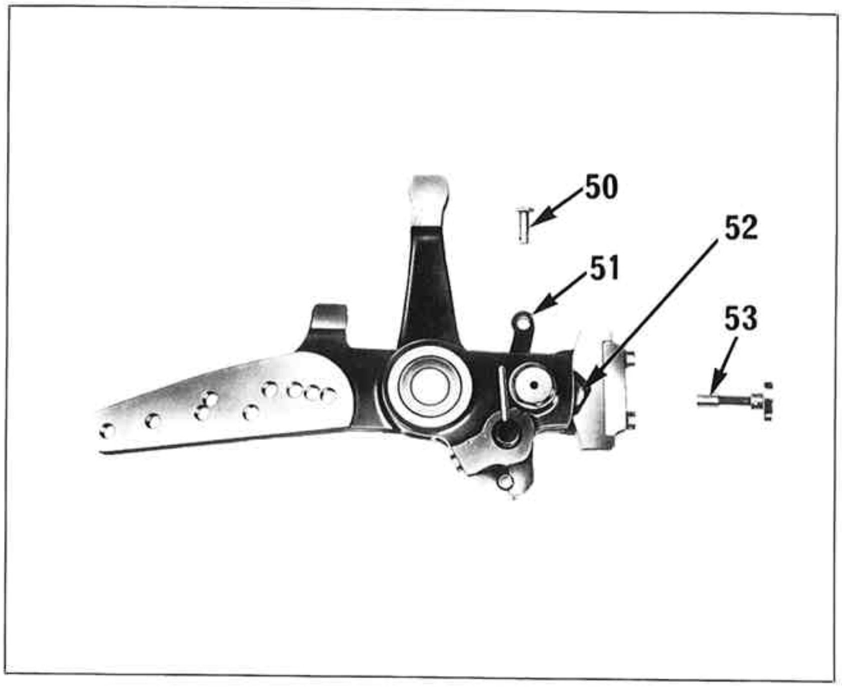
Should you require to dismantle the mould blade slide drive lever (28), it is necessary to separate the two levers (28) and (6). You must first ensure that the plunger lever fulcrum pin eccentric (7) is set in the 'small type' position, as this reduces the spring pressure on the plunger.

Remove the lever from the machine by disengaging the connecting tube (5), removing the driving block abutment (27), and then releasing the large nut which secures the lever to the mould blade slide drive lever pin (9) located on the main stand of the machine.

After removal, place the lever in a vice, letting the jaws grip the slide drive lever plate (8), with the lever (28) to the left. Give the end of the lever (6) a sharp blow; this will cause the plunger to be depressed and the safety catch to lock in its inoperative position. The two parts can then be separated.

9.13 Removing the plunger spring

Hold the intermediate lever (6) firmly by hand, and press the plunger against the edge of a bench until the plunger spring is compressed; then release the plunger lock pin (53) and remove the bush. The plunger can now be removed. This you do by again holding the lever in a vice, with the spring facing upward; taking out the split pin, pushing out the guide rod pin (50) and removing the plunger lever (51).



9.14 Replacing the plunger spring

Place the end of the intermediate lever (6) in a vice, with the spring abutment facing upward. Then (after having cleaned and lubricated all the parts concerned) place the plunger spring over the plunger spring guide rod (47), making certain you have the plunger spring abutment collar (49) at the end of the spring. Check to make sure the eccentric is in the 'small type' position, and then partly insert the plunger lever (51) from underneath, with the semi-circular end and recess facing the pin. Now, press against the eye on the end of the spring guide rod (47), insert the guide rod pin (50), fit the split pin in position and open the ends to secure. The plunger (52) can now be inserted – with the groove facing downwards – after which, the plunger lock pin (53) and bush complete can be replaced, and the plunger pressed back so that the lock pin engages the hole in the plunger. Finally, place the intermediate lever (6) over the boss of the mould blade slide drive lever (28) and release the lock pin (53) so that the plunger engages the recess in the slide drive lever plate (8).

9.15 Preparing the mould blade slide drive lever for casting from the furniture mould

First make sure that the plunger (52) is held back by the lock pin (53). Then remove the mould blade slide drive lever plate (8) and fit the special plate supplied for casting furniture. Take care to ensure that the plate is assembled with the word 'Furniture' uppermost. This special plate must always be used when casting strip in predetermined lengths from the furniture mould, in order to absorb the excess movement of the intermediate lever when the shorter fusing casts are being made. Refer to 40.15, with reference to casting furniture to predetermined lengths, for detailed instructions on the removal of the slide drive lever plate.

9.16 Adjusting the mould blade slide drive lever connecting tube

With a type mould connected up on the main stand, turn the machine to 145° and adjust the mould blade slide drive lever connecting tube (5) just sufficiently to ensure that the slide drive lever plunger (52) moves $\frac{1}{64}$in (0·4mm) away from its normal seating position.

CHAPTER 10

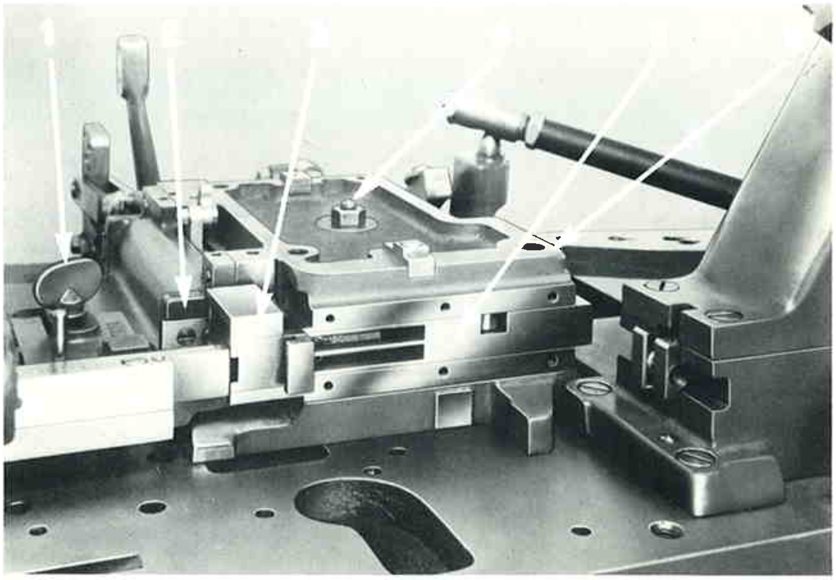
The matrix heads base

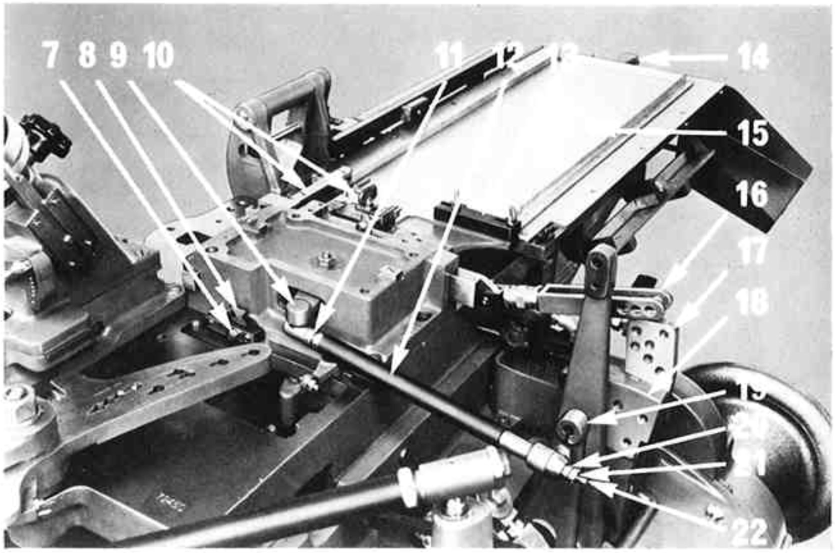
The matrix heads base, which carries the type carrier (3) and the type pusher (5), must be attached on the main stand whenever the machine is being set up with either a type mould, the quad and space mould, or the short lead and rule mould; these moulds being fitted with crossblocks, as distinct from strip moulds which are of basically different construction. The latter differ inasmuch as they are designed to cast product in strip form, which passes right through the mould and continues on its way in one long piece. Type however, on being ejected from the casting cavity, has first to be carried away out of the mould, in a direction at right angles to its line of travel on ejection, and then pushed on, out of the type carrier, into the type channel, parallel again to its original path.

In short, the type when cast, is first pushed forward clear of the casting cavity, then moved to the left, clear of the mould, and finally pushed forward again into the type channel, in the direction of the galley on to which it will duly be delivered, to allow room for the next cast which is following close behind by the same route, as the casting cycle is repeated.

Now, whereas the mould blade itself takes care of the ejection of the product forward out of the casting cavity, the other two movements are performed with some considerable dexterity by, first, the type carrier (3), and then the type pusher (5), both of which are functional parts of the matrix heads base (6).

Both the type carrier and the type pusher must each be connected to their respective cam levers, and set or adjusted as you will be duly instructed, in accordance with the nature and size of the product being cast.





The matrix heads base (6) is integral with the type carrier cover (2) which carries the galley locating block (13). The type channel blocks (10) are also fitted as required. The matrix heads base also carries a locating key distance piece (8) which serves to slightly adjust the position of the base on the main stand of the machine; there being two locating positions, one for casting up to 36pt and one which is used for the 42–72pt mould. This adjustment results in the latter being located approximately 0·10in further forward, which results in an increased blade opening being available to accommodate the wider set-sizes of certain characters of some type faces in the upper range.

The matrix heads base is designed to carry whichever of the two matrix heads is required. Refer to Chapters 11 and 12 which concern the composition matrix head and the display matrix head respectively.

Whilst studying the various parts and functions of the matrix heads base you will find it advantageous if you take an early opportunity to closely observe all the movements of the several inter-related parts covered in this section; simply by setting up the matrix heads base, preferably without a matrix head, attaching and connecting up a type mould, rotating the machine by hand, using the handwheel, and carefully following through all the movements involved. All this of course with the melting pot run down and swung back and the pump disengaged.

10.1 The locating key distance piece

The locating key distance piece (8), which is marked '5 to 36-point' on one side and '42 to 72-point and quotations' on the other, must be positioned in its housing with the required size range on display. It is removed from its housing by releasing the clamp screw (7); but before it is replaced in the reverse position and secured again with the clamp screw, the four matrix heads base screws must be released, to free the base to adjust to its new position. The holes provided in the base to receive the screws are elongated for this purpose.

If a galley (15) is located on the main stand, the galley clamp (14) must be released to allow the matrix heads base (and type carrier cover) to be moved forward if necessary, and to enable it to be clamped in position up against the type carrier cover again, in its new location.

The four matrix heads base screws must be tightened hard down on completion of the adjustment, the galley being clamped in position last.

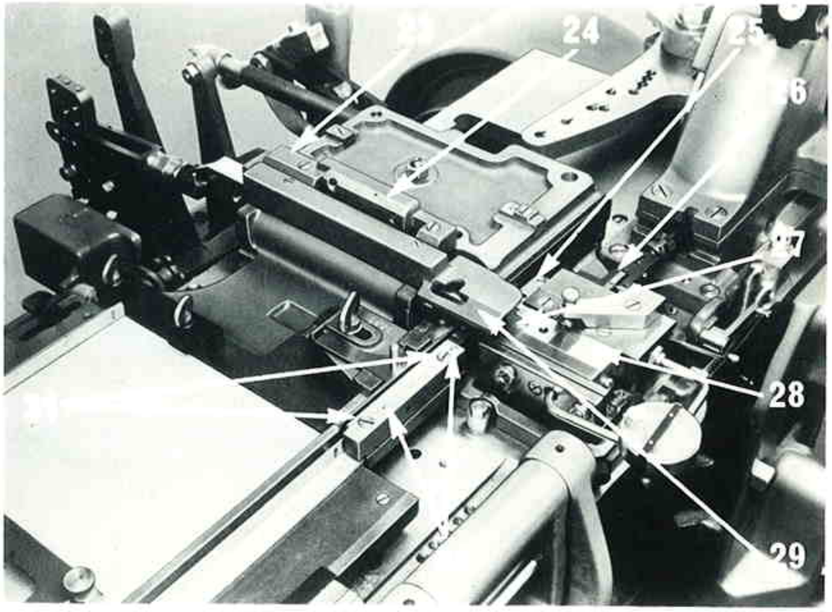
The distance piece is used in the 42–72pt position only with the 42–72pt display type mould. It is positioned for 5–36pt for all other type moulds including the Duplex and Triplex moulds, the italic and the Palace script mould (including 42pt) and for the quad and space and the short lead and rule mould.

For easy reference, the setting positions (except for the short lead and rule mould) are listed under 'Matrix head locating key' in the 'Product Information Table' at the end of the book. This table is also available in card form for use on the machine.

10.2 Type carrier

The type carrier (3) moves back and forth in a channel provided in the type carrier cover on the matrix heads base, and is connected to the mould via the crossblock (28) by means of the mould coupling hook (27), so that, in effect, it not only serves to carry the type out of the mould after ejection, but it also actuates the crossblock itself and is thereby indirectly related to the casting of the product and the shearing of the jet cast or 'tang' – the surplus metal which remains on the foot of the type after casting and is subsequently ejected into the melting pot.

The type carrier obtains its movement from the type carrier cam lever (18) to which it is connected through the type carrier cam lever extension (17), being linked (via the correct hole) by the yoke (16) on the end of the type carrier connecting rod. When the machine is in operation, the cam so controls the movement of the carrier as to provide a period of pause, once in each casting cycle. This pause takes place when the type carrier is located in its left-hand position, and precisely at the moment when the crossblock, having been positioned by the carrier, is in the casting position. It is during this brief pause, and whilst the matrix is sealing the top of the casting cavity, that the cast is made.



After a type has been cast and the matrix has been automatically lifted off the mould, the type carrier is caused by its operating cam to move first a little to the left, and then to the right, in the direction of the pump – taking the crossblock with it. The movement of the crossblock to the left shears the jet tang from the foot of the type body, the jet being virtually cast in the cross-block; whilst during the subsequent movement to the right, the tang is pushed out of the cavity by a linear cam located in the crossblock channel in the base of the mould.

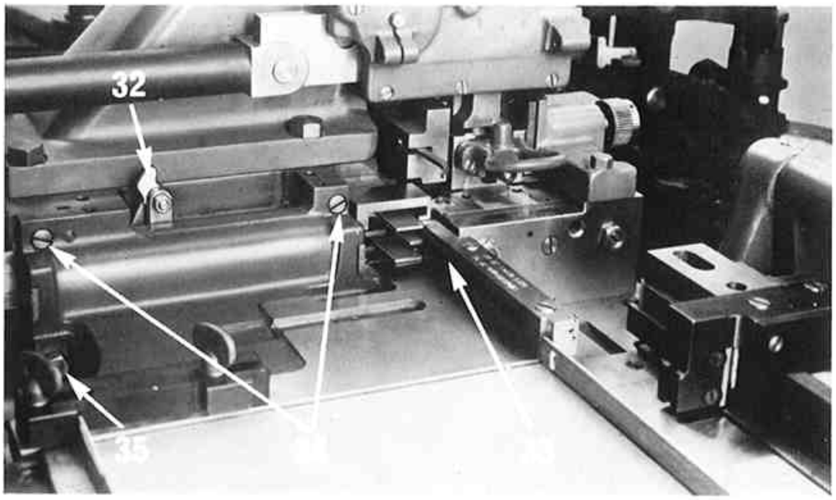
When the crossblock reaches the limit of its traverse to the right, the mould blade (26) ejects the type from the mould casting cavity into the type carrier (3). The type support spring which is positioned in the type carrier, alongside the type clamp, is brought into the path of the type as it enters the type carrier, but the type clamp itself is held back by the type clamp operating block (25).

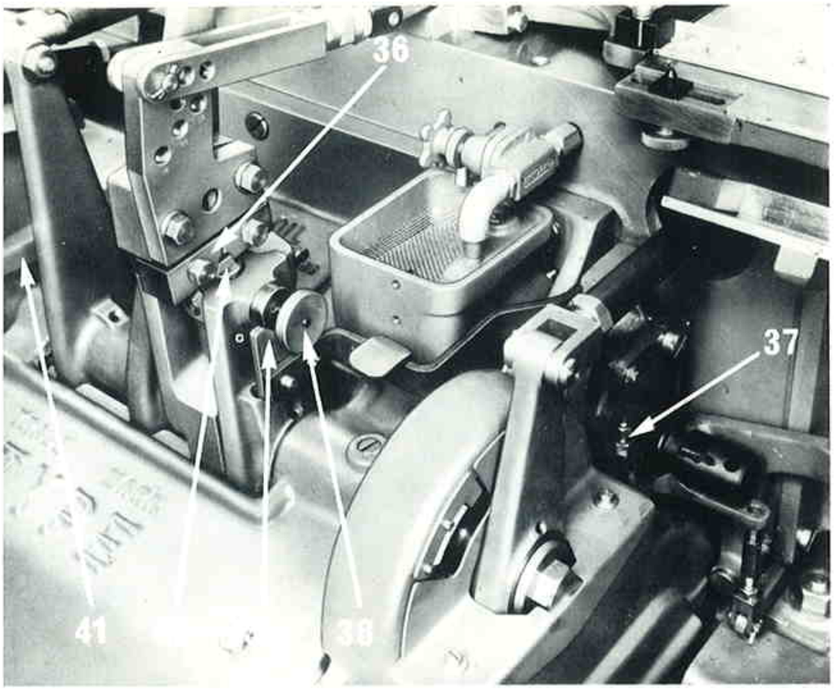
The type carrier then returns to the left to carry the type out of the mould. While on its journey, the type is held steady and upright in the type carrier by the type support spring, until the product is brought into contact with the type clamp (which retains the type in position, in line with the type pusher) whereupon the type support spring withdraws to allow the type pusher (5) to subsequently pass through the carrier to push the type into the type channel (10), on its way to the galley. This it does during the brief period of pause.

The mould crossblock is now located in the casting position, whilst the type carrier is over at the left, as it was when we began – just before the crossblock is caused to make a slight movement to the left to shear the jet tang.

10.3 Removing the type carrier

The type carrier can, if required (or should a difficult blockage occur in the carrier on ejection), be removed from the matrix heads base whilst it is set up on the machine, without taking off either the mould or the matrix head. (It can also be removed this way together with the mould if changing over to cast from the Palace script or the italic mould.) Turn the machine to 30° and remove first the type carrier guard (29) by releasing the two screws and then the mould coupling hook (27). Then disconnect the type carrier yoke pin, take out the two small screws (34) and the two long hexagon screws (35), and remove the type carrier cover (2). The type carrier can then be removed complete.





10.4 Type carrier cam lever plunger

The type carrier cam lever is so constructed that should there be any obstruction in the path of the type carrier during its travel from right to left, a plunger (40) in the upper end of the lever is automatically depressed and held down by a lock pin, which immediately disengages both the type carrier drive and the pump mechanism and brings the machine to a halt.

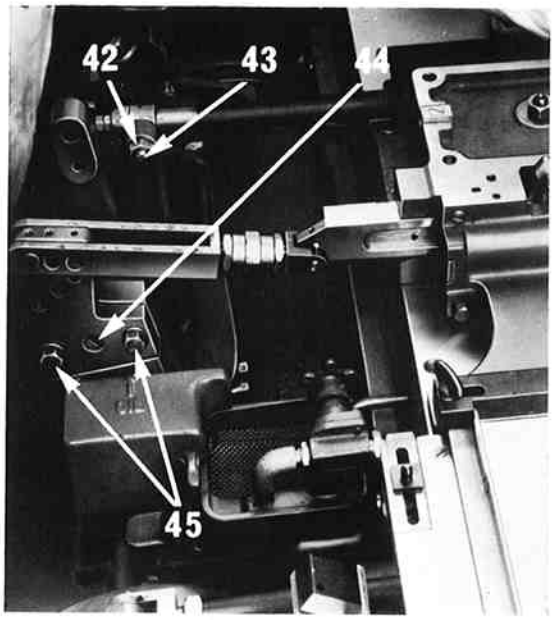
After the obstruction to the type carrier has been carefully removed you will be unable to start the machine again until the plunger (40) has been reset. The plunger lock pin knob (38) must be pulled outward to permit the plunger to re-engage in the releasing lever latch (36). The pin itself can be easily withdrawn at a point just before the plunger reaches the slot in the latch. All this must be carried out with the power supply isolated at the main switch.

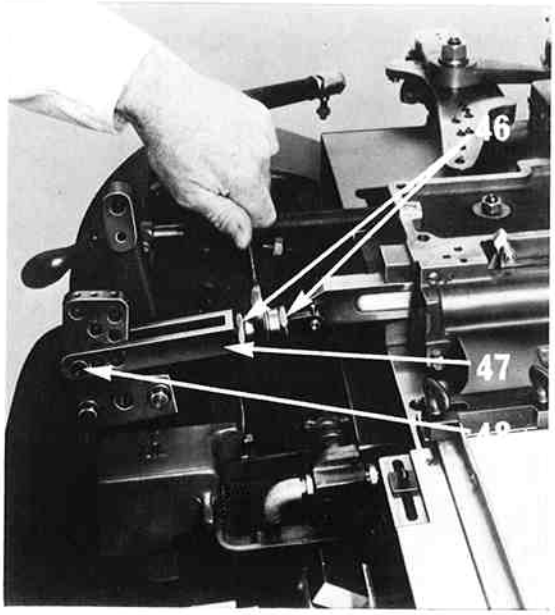
An additional safeguard against breakage is provided in the type carrier connecting rod yoke pin which is so designed that it will shear completely should any undue obstruction occur in the path of the type carrier. The type carrier is thus severed from its connection with its operating cam and will cease to function, even if the machine should continue running.

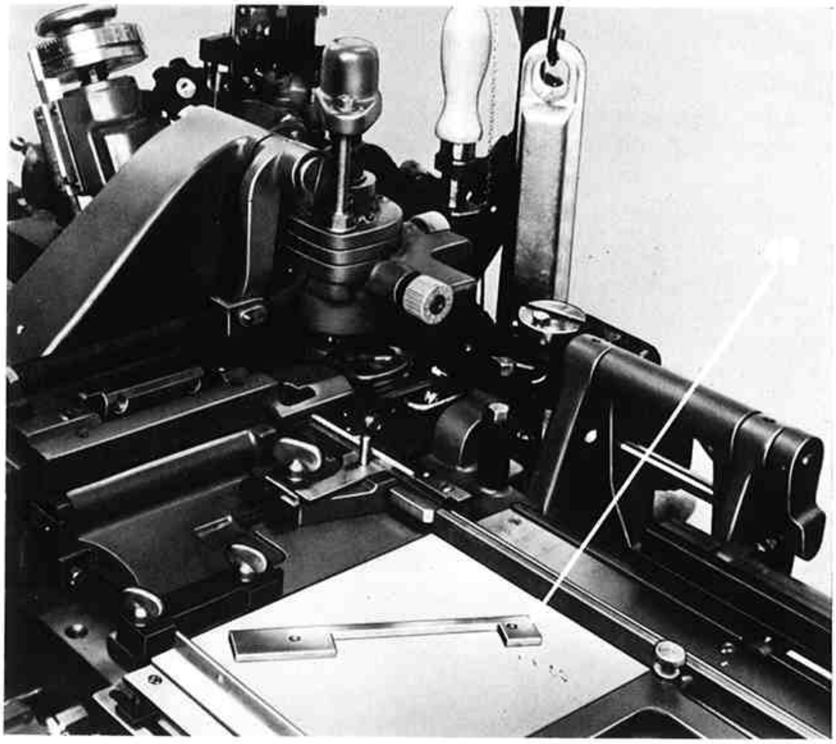
10.5 Adjusting the stroke of the type carrier

To adjust the stroke of the type carrier when necessary, you must first remove the type support spring cam bracket (23). Then place the connecting rod yoke pin in the 72-point hole on the type carrier cam lever extension (17), loosen the extension bolts (45), and adjust the position of the extension by means of the extension eccentric (44), to give the type carrier an overall travel of $2\frac{11}{16}$ in (68·30mm) between the type casting position at 220° and the type ejecting position at 130°/135°.

Complete the adjustment by tightening the extension bolts (45) and carefully checking the setting, making further adjustments if necessary until you are satisfied it is correct.







10.6 **Pausing position**

The pausing position of the type carrier must be precisely set in order to ensure that the type pusher can project the type out of the carrier into the type channel. The type carrier should be adjusted when necessary as follows:

Move the type carrier connecting rod yoke pin (48) to the 12-point hole in the type carrier cam lever extension (17) and turn the machine to 220°.

Ensure that you have the 5–13 pt fixed type channel block in position; then loosen the two connecting rod lock nuts (46) and so adjust the length of the connecting rod, until the inside face of the type carrier is brought up exactly level with the delivery face of the fixed type channel block. The inside face of the type carrier (3) is the face against which the type is pressed by the type clamp when carrying type from the mould. Tighten the lock nuts (using two wrenches) and test again, continuing until the adjustment is correctly completed. You should take care to see that the yoke pin (48) is free after the nuts have been tightened; that is to say, ensure that the yoke itself (47) is not twisted. If the yoke pin is tight, correct the yoke position until the pin is free.

10.7 Adjusting machine stopping mechanism

Since it is vital that the machine should not fail to stop should the type carrier be obstructed in its travel, it is most important that the machine stopping mechanism is correctly adjusted to operate efficiently and bring the machine to a halt when called upon to do so. It is therefore imperative that the setting of this safety device is periodically checked. It is quite simple. First turn the machine to 355°, this being the position in which the stopping mechanism comes into operation when necessary. Now set the latch trip plate (39) in the centre of the adjusting slots and adjust the latch trip adjusting rod (37) until the cam face of the trip plate is brought into contact with the smaller diameter of the locking pin knob (38). Tighten the adjusting rod lock nuts and the adjustment is completed.

On close examination of the setting you will appreciate how the slightest irregularity will influence the trip plate (39) to cause the plunger lock pin knob to release the type carrier cam lever plunger. This virtually separates the cam lever from the cam lever extension and renders it inoperative, and at the same time actuates the pump driving rod release trip bracket (41) which simultaneously disengages the pump.

10.8 Type support spring

The type support spring is operated by a small lever (32) fitted to the body of the type carrier (3). The lever itself is operated by a cam (24) which is attached to a bracket (23) located on the matrix heads base. The effect of the operation of the type support spring cam (24) on the type carrier lever (32), whilst the carrier is sliding in the matrix heads base, is to exert control over the positioning of the type support spring, according to the size and set-size of the type being cast. To achieve this, the cam (24) has to be pre-set according to your requirements.

10.9 Type support spring cam

The type support spring cam (24) does not require any adjustment as such in order to vary its control over the type support spring. The type support spring cam bracket (23) is, however, provided with a packing plate (49) which varies the control of the cam on the lever (32) and can be removed as necessary. This plate, together with the bracket (23), gives us a choice of three settings depending on our casting programme. The settings are as follows:

For all type up to 36-pt body-size, but not exceeding 12-pt set-size	For all type over 36-pt body-size, but not exceeding 12-pt set-size	For all type exceeding 12-pt set-size
Use the bracket without the packing plate	Use the bracket with the packing plate	Remove the bracket complete

10.10 Type channel blocks

The purpose of the type channel blocks is to support the type after it has been pushed out of the type carrier, and to guide it onwards to the galley as it is edged along by each separate type that is pushed into line behind it, as the casting cycle is continuously repeated.

One adjustable block and a range of three fixed blocks are supplied for this purpose, and they are fitted to the type carrier cover in such a manner as to form a channel through which the type passes until it duly reaches the galley. The adjustable block, which forms the left-hand side of the channel, is used when casting all sizes of type or product, its position being adjusted accordingly.

The three fixed blocks, however, are used as follows:

a) The block marked '5–13 type', when casting type in the 5–13 pt range.

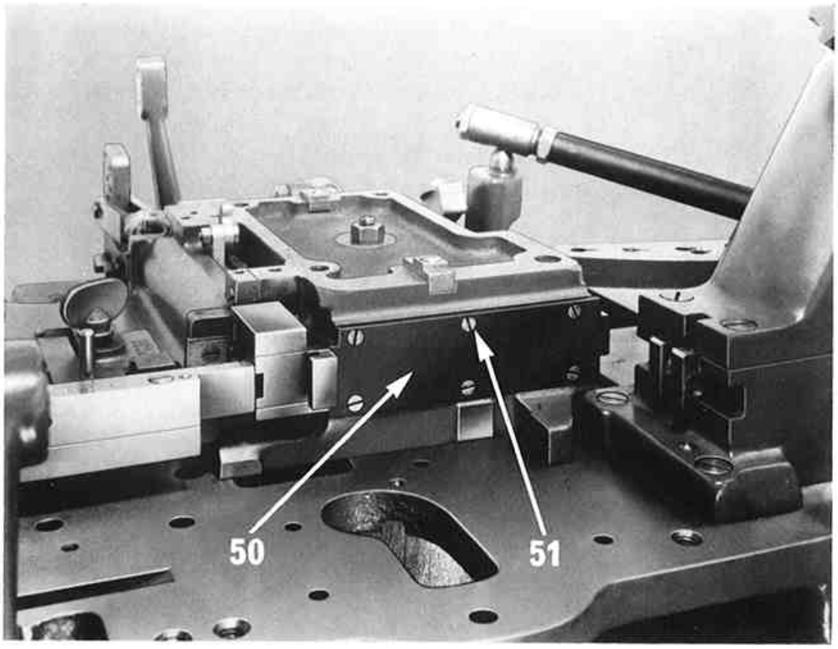
b) The block marked '14–72 solid/36–72 quotations', for solid type in the 14–72 pt range and quotations from 4 × 2 to 6 × 6 12-point ems.

c) The block marked '40–72 light type', for casting cored type in the 40–72 pt range.

The fixed type channel blocks are secured to the type carrier cover by two screws (31). The 5–13 pt block also has two locating taper pins (30).

Once you have attached the correct fixed type channel block, the adjustable block can be located in position opposite the fixed block and adjusted as required. You simply loosen the thumb screw (1) to allow it to move freely; then take some types of the size you are about to cast and place them in the type channel, and push the adjustable block up to them. Now, partly tighten the thumb screw and move the type to both extremities of the blocks to ensure that the type is an easy fit at both ends, and the channel therefore parallel; then tighten the thumb screw to lock the adjustable block firmly in position.

When casting thin spaces from the 42–72 pt type mould, it is advisable to place a quad of the correct point size in the type channel to act as a support as the spaces enter the channel, thus preventing them falling over whilst in transit.



10.11 Type pusher

The function of the type pusher is simply to push the cast type out of the type carrier into the type channel. This it does during the brief period of pause, when the carrier is momentarily halted at the left of its traverse with a newly cast type held in position by the type clamp, and whilst another type is in the process of being cast in the mould.

The type pusher is operated by the type pusher cam lever (19), to which it is connected through the type pusher lever connecting rod (12) and the type pusher lever (9). The latter (which is almost entirely concealed beneath the matrix heads base) pivots on the type pusher lever fulcrum pin (4) and engages in a slot on the type pusher (5). The connecting rod itself is attached to the cam lever (19) by a ball stud (43) and nut (42).

10.12 Removing the type pusher

To remove the type pusher from the matrix heads base, release the six type pusher cover screws (51) and remove the type pusher cover (50); then withdraw the pusher (5), disengaging it from the slot in the type pusher lever (9).

If the matrix heads base is set up on the machine, the mould must be taken off before the pusher can be removed.

10.13 Removing the type pusher lever

The type pusher lever (9) can be removed only whilst the matrix heads base is off the machine. First slacken the connecting rod ball socket lock nut (11) and unscrew the connecting rod (22) from the ball socket until the socket can be removed from the type pusher lever ball stud. Then remove the type pusher lever fulcrum pin nut, knock out the fulcrum pin (4) and remove the lever (9) from the underside of the matrix heads base.

10.14 Adjusting the position of the type pusher

To adjust the type pusher (5), first turn the machine to 310°. Then release the type pusher connecting rod nut (20) and the lock nut (21). You can now adjust the type pusher lever connecting rod nut until the end of the pusher stands 0·010in (0·254mm) in front of the fixed type channel block latch (33). Tighten the lock nut again on completion, and then turn the machine once more to 310° and check again that the adjustment has been correctly made.

It will be appreciated that an incorrectly positioned type pusher could cause trouble if it failed to deliver the type correctly into the type channel.

CHAPTER 11

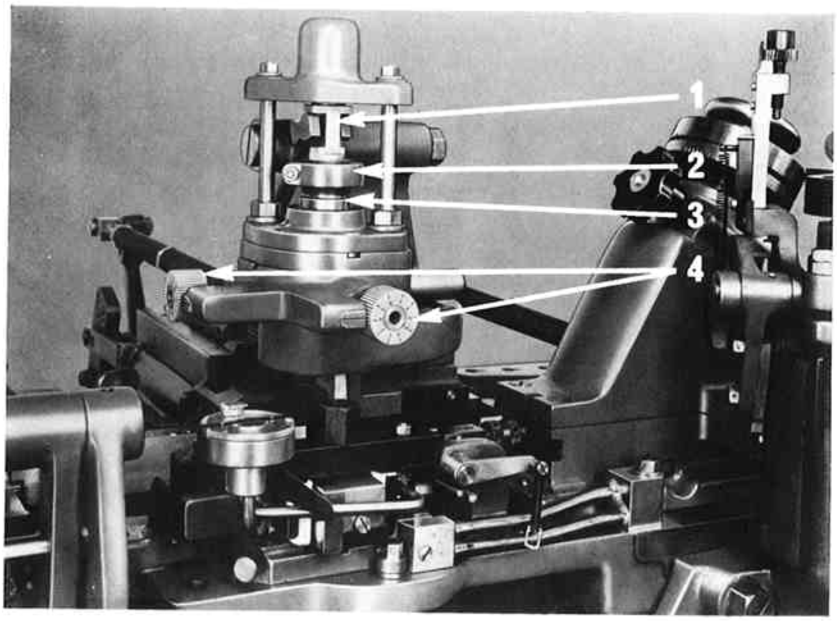
Composition matrix head

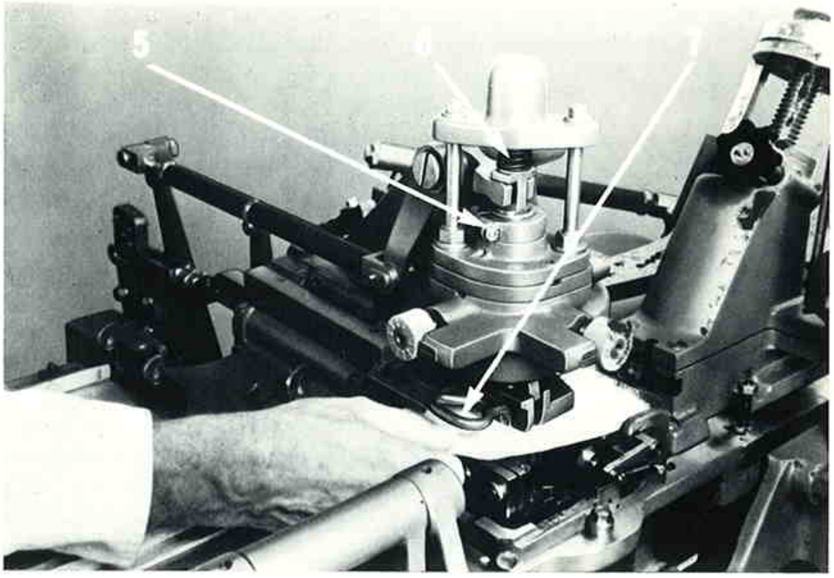
The function of the matrix head is to control the lowering and raising of the composition matrix holder and centring pin. The matrix (in the holder) is lowered on to the top of the mould, and is held clamped in position over the casting cavity by the centring pin, completely sealing the top of the cavity and ensuring a metal-tight fit during casting. The centring pin and matrix are similarly lifted off the mould when the cast has been made, thus allowing the mould blade to subsequently push the type out of the casting cavity into the type carrier.

The centring pin (9) is housed in the matrix lifter (3) and is induced, by the action of the loading spring (6), to cause the matrix to seat tightly on the mould during casting. The loading spring bridge supplied with the machine is for 0·2in matrices only, but an alternative bridge with an auxiliary loading spring is available for use with 0·4in matrices.

The centring pin is operated by the matrix lifter lever connecting rod (13), which is actuated by the matrix cam lever (11) to which it is attached. The connecting rod operates the matrix lifter lever (15), which is in engagement at its upper end with the centring pin coupling head (1), located at the top of the centring pin (9).

Movement of the matrix lifter lever (15), actuated by the connecting rod (13), causes the centring pin to move up and down, during which movement it carries the matrix lifter (3) along with it. On the downward movement of the matrix lifter, the centring pin is not pressed down by the matrix lever as might





well be thought, but by the action of the centring pin loading spring (6), in which the upper end of the centring pin is seated. The descent of the matrix lifter lever (15) presses the centring pin loading spring upon the coupling head (1), beneath which is located the centring pin guide spring which terminates on the matrix lifter (3).

The centring pin (9), the coupling head (1) and the matrix lifter (3) consequently all move down as one piece under pressure of the centring pin loading spring (6), until the matrix lifter holder guide is eventually stopped by the matrix lifter stop collar (2). The matrix holder (7), seated in the matrix lifter (3), is depressed in this manner, together with the centring pin, until the matrix descends within 0·005 in (0·127 mm) of the upper surface of the mould. In fact it is almost in contact with the mould, being a mere five-thousandths of an inch away.

Although the matrix holder is virtually stopped before actual contact with the mould, the pressure of the centring pin loading spring (6) induces the centring pin (9) to continue the downward movement, thus clamping the matrix firmly over the mould casting cavity in readiness for the cast to be made.

On completion of the cast, the matrix lifter lever (15) returns to its former position, and in so doing presses upon the coupling head (1) bolted to the centring pin, overcoming the pressure on the centring pin loading spring; whereby the centring pin itself is raised until a shoulder on the lower end of the coupling head comes into contact with the matrix lifter (3). This causes the matrix lifter to raise the matrix clear of the newly cast type in the mould, leaving it free to be ejected by the mould blade.

The matrix head itself (14) has two adjusting micrometer screws (4) which are positioned at right angles to each other, their purpose being to make fine adjustments to the positioning of the matrix holder which they control, both 'pointwise' and 'setwise', in order to ensure that the matrix is correctly aligned over the mould casting cavity.

Refer to Chapter 5 in connection with type alignment, in which the purpose and adjustment of these two micrometer screws are fully explained.

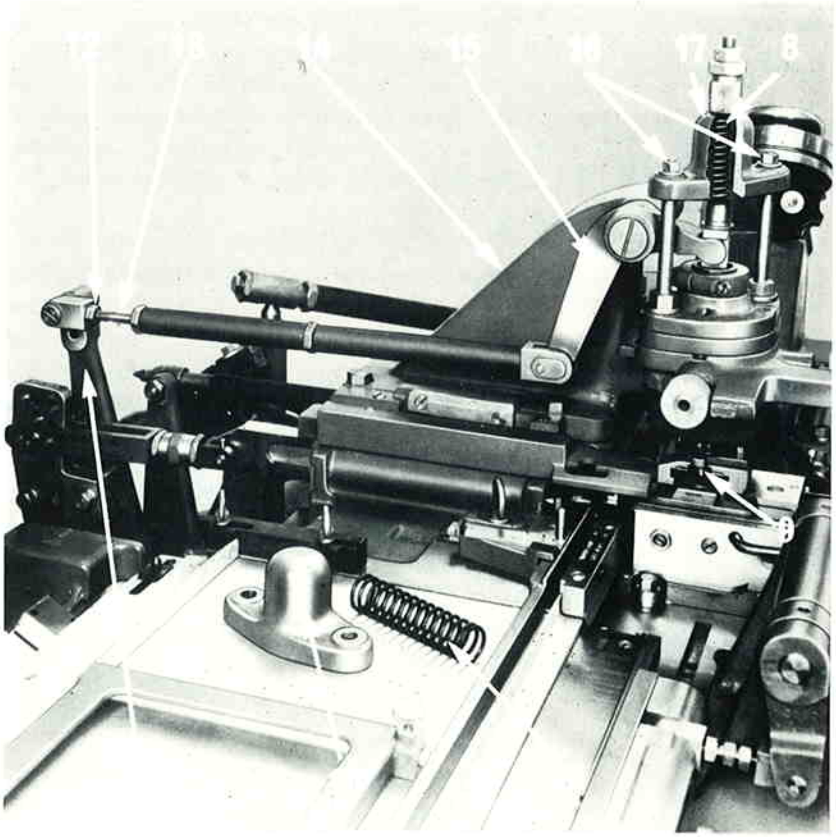
11.1 **Adjusting the composition matrix head**

The object of the adjustment is to ensure that the matrix lifter is properly set to bring the matrix to a point exactly 0·005 in (0·127 mm) from the mould, and the centring pin similarly adjusted to bring the matrix down on top of the mould to secure the exact metal-tight fit required.

First, attach a composition mould to the machine. This is most important, because, not only is a mould necessary for the adjustment to be checked anyhow, but should you not put the mould on first, the machine could be rotated and the matrix holder damaged in consequence.

Now fit the matrix head (14) on to the matrix heads base, attach the matrix lifter lever connecting rod (13) to the matrix cam lever (11) and turn the machine to 180° to raise the matrix lifter (3) well clear of the mould. Take a matrix (preferably a blank one), place it in the matrix holder (7) and insert the holder in the matrix lifter. Then turn the machine again, this time to the casting position at 220°, to seat the matrix over the mould casting cavity; taking care as you do so, to ensure that the matrix lifter lever (15) does not foul the top of the matrix lifter (3).

You must now release the connecting rod eye lock nut (12) and adjust the rod so that the matrix lifter lever raises the centring pin yoke (1) $\frac{1}{64}$in (0·397 mm). Turn the machine to 10° to raise the matrix, and place two thicknesses of 'spool' paper on the mould, to represent the 0·005 in (0·127 mm) clearance required, and then turn the machine to 214°, in which position the matrix lifter, under pressure from the upper spring (6), is brought almost into contact with the mould, until the matrix holder guide (3) is stopped by the matrix lifter stop collar (2).



The matrix lifter stop collar must now be released and carefully adjusted so that the paper is just (and only just) free to move between the mould and the matrix. You must then lock the stop nut (5) and check the setting again (this time, checking with three thicknesses of paper, which should just hold) adjusting accordingly if necessary until it is correct.

Now remove the paper and turn the machine once more to the casting position at 220°.

The matrix lifter lever connecting rod (13) must now be adjusted, until in this instance, one piece of paper, representing 0·0025 in (0·0635 mm) can just be passed between the top of the matrix lifter lever (15) and the centring pin coupling head (1), on each side of the head. Lock the connecting rod (13) and check the setting as before. Note also that this latter adjustment should be carried out with the upper end of the cam lever (11) pressed to the right, in order to ensure that the cam lever roller is in contact with its cam.

11.2 Preparing the composition matrix head for 0·4 in matrices

The centring pin auxiliary loading spring bridge (17) must be fitted to the composition matrix head when casting from 0·4 in matrices in the 14–24 pt range. The auxiliary loading spring (8) is required to impart the extra pressure required to seat the 0·4 in matrix on the mould, against the increased pressure of the molten metal injected into the mould for the larger type sizes.

First, take off the 0·2 in centring pin loading spring bridge (10) by removing the two bridge support nuts (16) and washers.

Now remove the centring pin coupling head screw a2SE7 and replace with coupling head screw b2SE7.

Replace the 0·2 in loading spring (6) in the 0·2 in loading spring bridge and put them away for safe keeping.

Assemble the centring pin auxiliary loading spring bridge (17) with the auxiliary loading spring (8), the cut-out rod, the knurled cut-out rod nut and the lock nut, and attach complete in place of the 0·2 in bridge; replacing the washers and nuts (16) to secure it in position on the composition matrix head.

To bring the auxiliary loading spring (8) into operation for casting 14–24 pt type, the knurled nut must be locked at the top of the cut-out rod. Before commencing to cast, rotate the machine by hand and check carefully to make certain that there is a clearance between the under side of the knurled nut and the top of the bridge (17), when the centring pin (9) is seated in the matrix on the mould.

It is important that the auxiliary loading spring should be locked out of action altogether if it is used at any time with 0·2 in matrices, otherwise the extra pressure will cause excessive wear on the matrices and moulds. To do this, screw down the knurled nut until the centring pin auxiliary loading spring (8) is solid, and then lock with the nut. In this position the spring is inoperative.

CHAPTER 12

Display matrix head

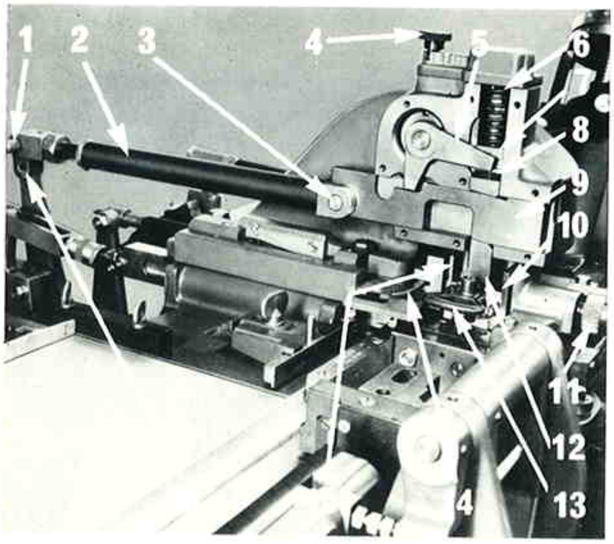
The function of the display matrix head is to raise and lower the matrix and to clamp it to the mould whilst the cast is being made, in a manner similar to the composition matrix head; except that display matrices are much larger and of somewhat different construction, and there is no centring pin to take into consideration. The display head also raises, lowers and clamps the core that is used when casting quotations.

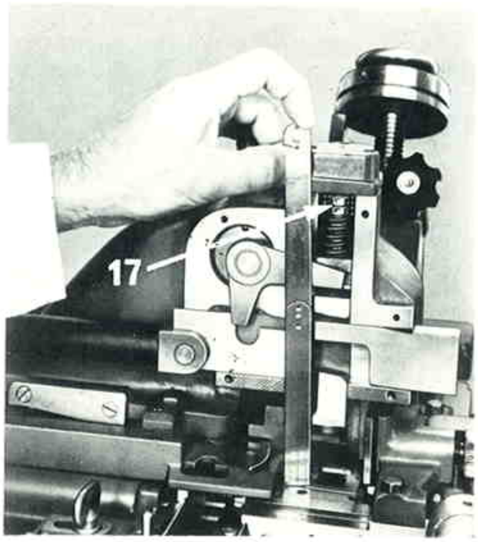
The display matrix, in the matrix holder (13), is controlled by the display matrix lifter (12), through the matrix lifter lock wedge (9) and the lock wedge spring box (2), which are actuated by the matrix cam lever (16).

The spring box is connected to the matrix lifter lock wedge (9) by the yoke pin (3). Influenced by the cam lever, the spring box causes the lock wedge to slide back and forth, by which means it raises and lowers the matrix, and clamps it on to the mould when the cast is being made.

The forward stroke of the spring box (2) operates the display matrix lifter (12), which in turn compresses the matrix lifter spring (6), thus lifting the matrix off the mould. The movement of the spring box on its return stroke releases the pressure on the lifter lever (5), and the matrix lifter spring comes into operation again and takes the matrix down once more on to the mould. At this point, the action of the lock wedge (9), sliding over a projection on the matrix lifter (12), finally clamps the matrix firmly in position for casting.

When quotations are being cast, the matrix lifter must be given increased movement to permit the core to be withdrawn clear of the mould when the cast has been made. This you do by lifting the knob of the lifter lever shaft lock pin (4), turning the shaft lever handle (21) to the left, and releasing the knob again to lock the handle in position.





This adjustment causes the matrix lifter lever to be brought into operation by the traverse of the matrix lifter lever lock wedge, much earlier than is the case when casting type; and it similarly gives a greater degree of movement to matrix lever, thereby raising both the lifter (12) and the core the required distance to permit the product to be ejected from the mould.

When using the display matrix head, the matrix is correctly positioned over the mould by means of the display matrix bridge (24) which has to be attached on top of the mould, or conversely on to the adaptor base if you are using moulds originally designed for use on the type and rule caster.

12.1 Adjusting the display matrix head

You will readily appreciate that the distance between the matrix lifter and the mould must be strictly controlled, and you will in consequence understand the importance of the adjustment required to correctly set the distance between the two parts, should you of necessity have to do so at any time.

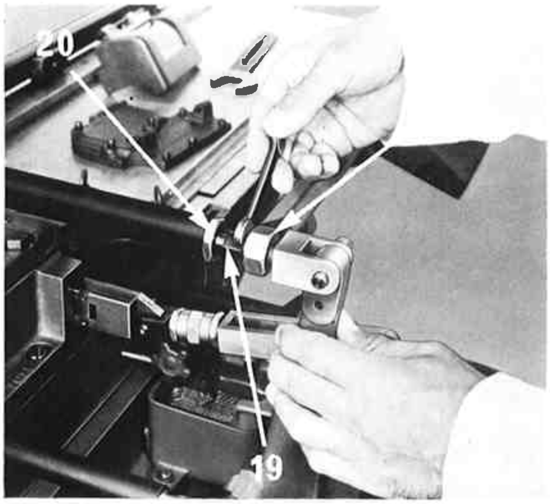
The matrix lifter (12) is pre-set with a gap of 0·10in between the lifter lever block (7) and the lifter lever block spring (8). Should this setting be in any way disturbed, or if a new matrix lifter is fitted at any time, the setting should be adjusted as follows:

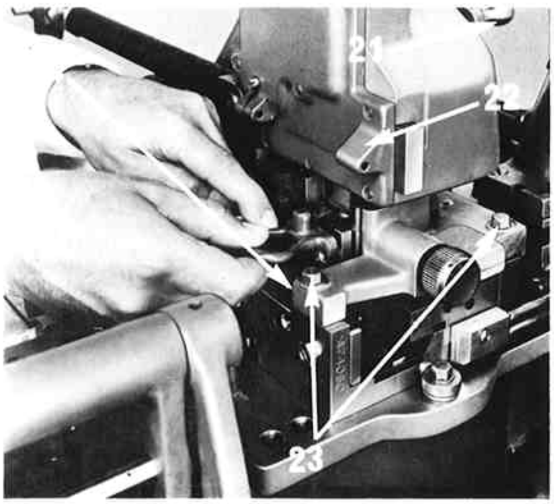
First, set up the machine, with the display matrix head and the 14–36pt display mould, complete with display matrix bridge, securely located in position, and turn the machine to 10°. Turn the matrix lifter shaft lever handle (21) to the right – the position it occupies when casting type.

With the machine thus set, the distance between the lower end of the matrix lifter (12) and the top surface of the mould should be $1\frac{1}{16}$in (26·988mm).

Should the setting prove to be incorrect, the matrix lifter can be either raised or lowered as necessary by carefully adjusting the matrix lifter stud nuts (17), ensuring meanwhile that your actions are moving the matrix lifter (12) in the required direction and as near as possible the right amount. In order to do this, however, you must first remove the matrix head side cover (22), the spring box yoke pin (1), the matrix lifter lever (5), the lock wedge (9) and the matrix lifter (12) and spring (6).

Turn the machine to 240°. The spring box rod yoke lock nut (18) must now be slackened and the spring box rod (19) adjusted to give $\frac{1}{8}$in–$\frac{3}{16}$in (3·175mm–4·763mm) compression on the spring. This you can measure whilst adjusting





the nut, by checking the distance between the lock nut (18) and the spring box cap (20).

The gap between the lock nut and the cap will confirm the compression on the spring. On completion of the adjustment, replace all parts which have been removed, and make sure all screws and nuts are tight.

12.2 The display matrix bridge

The display matrix bridge is secured to the mould (or to the adaptor base if it is being used) and located correctly in position by means of the bridge locating strip (1SE1). The bridge is attached to the Super caster display type moulds 14–36pt and 42–72pt by means of the three (only two are visible in the illustration) 1in screws (23). If the adaptor base is being used in conjunction with moulds not specifically designed for the Super caster, two 1in screws and one $\frac{7}{8}$in screw are required. The latter one should be fitted on the crossblock side.

The purpose of the bridge is to correctly position the matrix over the mould and in this capacity it acts as a guide. The object is achieved by pushing the matrix holder (13) against the matrix holder adjusting pad (10), by means of the matrix holder locating key (15), thus permitting characters to be cast to the correct alignment. The position of the adjusting pad (10) for purposes of alignment can be controlled within extremely fine limits by means of the pad adjusting screw (11). Refer to Chapter 5 which deals with type alignment.

The matrix holder (13) is inserted in the bridge by pulling back the matrix holder locating key lever (14), which automatically withdraws the locating key and permits the holder to slide into position. After making sure the matrix holder is inserted in the bridge to its fullest extent, the locating key lever can be released; whereupon the locating key (15) will engage the slot in the matrix holder (13) and secure it in the correct position. Refer to Chapter 19 which deals with the matrix holders.

12.3 Dismantling the display matrix bridge

Remove the pad adjusting screw (11) together with the adjusting pad (10), whilst taking care that the plunger and plunger spring do not fly out as you do so and possibly put you to some inconvenience. Complete the dismantling by knocking out the lever fulcrum pin from the underside of the bridge and removing the locating key lever (14), the spring and finally the locating key (15). This you would require to do only if the bridge needed cleaning.

12.4 Assembling the display matrix bridge

Place the locating key (15) and spring in position and insert the locating key lever (14) under the pin through the aperture in the locating key; taking care meanwhile to ensure the lever is correctly located before driving the fulcrum pin back in position. You can now replace the adjusting pad (10), keeping the relieved side to the rear, that is to say, the smooth side to the front. The adjusting screw (11) can also be replaced, but before you commence to do so, take a piece of 3pt lead and place it between the head of the adjusting pad and the face of the bridge. Now, firmly push the head of the pad (10) against the 3pt lead, replace the plunger and spring, and then screw the adjusting screw (11) back into position.

CHAPTER 13

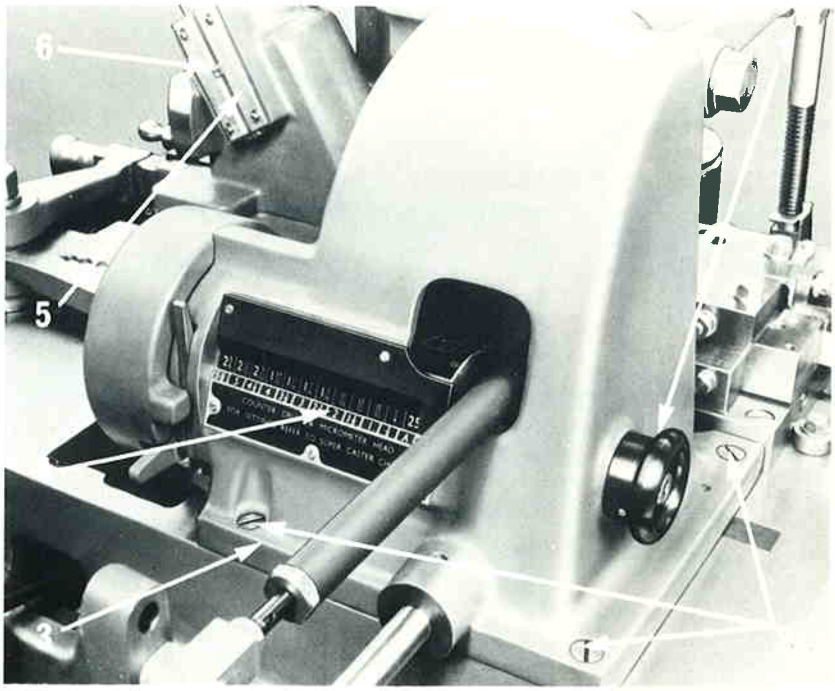
Counter bracket and counter mechanism

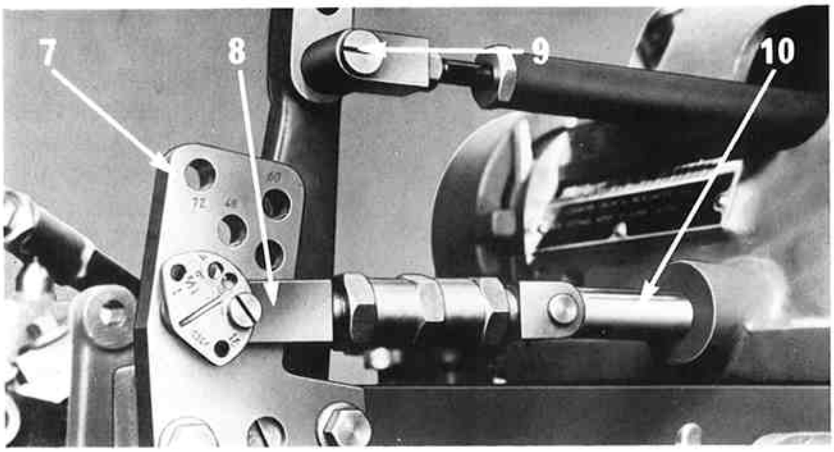
The counter bracket fulfils a role which is in part somewhat similar to that performed by both the composition and display matrix heads, though it is however a little more complex. It is used on the Super caster in conjunction with the strip moulds for casting strip material, namely high and low leads, rules and tie-up slugs which can be sheared to the required length; furniture, plate-supporting material and tie-up slugs cast to a predetermined length; clumps in single casts, and continuous borders and dashes which involve the use of a matrix lifter.

The counter bracket is attached direct to the main stand of the machine, positioned by two locating keys and secured by four screws (2) (only three are visible on the photograph). The base of the counter bracket (3) has two projections (20) (only one is visible) against which the strip moulds are positioned. The principal parts of the counter bracket are as follows:

a) The jet block driving rod (10); which must be connected to the strip mould jet block which it controls; the connection being made by engaging the hook of the mould jet block with the hook located on the slide formed by the end of the jet block driving rod (10).

The jet block driving rod is connected to the type carrier cam lever extension (7) by the jet block driving rod connection yoke (8).





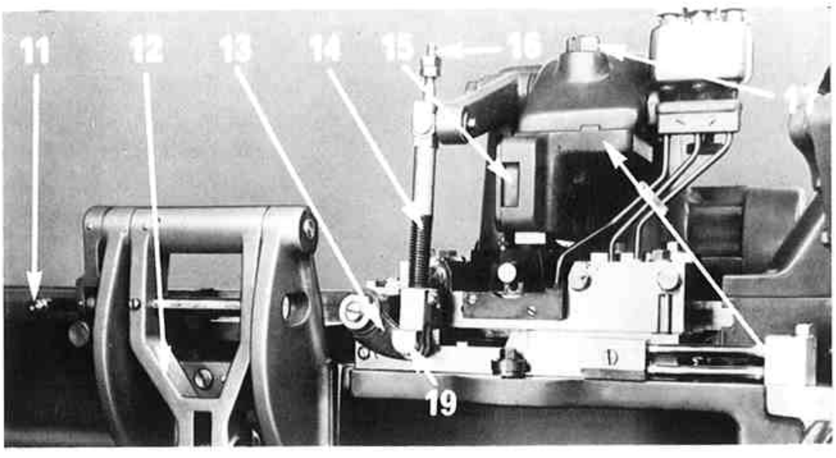
b) The intermediate lead clamp lever (14); a complex lever and rod, which connects to the lead clamp lever (13) located on the mould, its function being to clamp the cast strip in the mould and hold it firmly in position whilst the next fusing cast is being made immediately behind it.

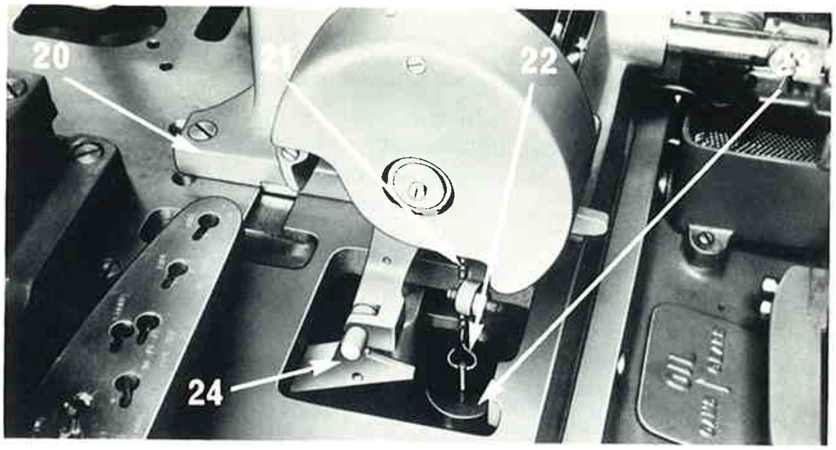
The lead clamp lever obtains its movement from the matrix cam lever (27), to which it is connected by engaging the spring rod end pin (9) in the lower of the two cam lever holes. The pin is secured in position with the nut.

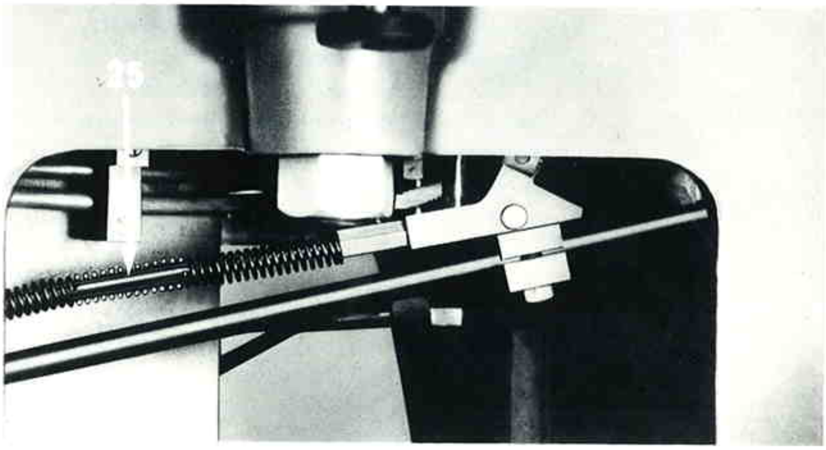
The lead clamp intermediate lever rod (16) is linked to the mould lead clamp lever (13) by the yoke pin, which is retained in position on the rod by the rod yoke pin clip (19).

The combined movement of the lead clamp lever and the lead clamp causes the clamp to hold the cast strip in the mould during casting and to release it after each successive cast, thus permitting the mould blade to push the product forward to make room for the next cast, as the process is repeated; the finished strip emerging from the mould and advancing step by step on to the galley.

c) A matrix lifter attachment, consisting of a bracket (18), a lock wedge (15) and a spring box, for raising and lowering dash matrices and continuous border matrices after each cast has been completed. In the case of continuous borders, this allows the cast strip to be pushed forward clear of the casting cavity, sufficiently for the next cast to be made behind it and to fuse with it to







produce the continuous strip. The matrix lifter attachment connects with the matrix cam lever (27), via the upper of the two cam lever holes. It is fitted to the counter bracket as required, being passed through the aperture in the bracket to the rear of the lead clamp intermediate lever spring box (26). The matrix lifter bracket (18) is secured to the counter bracket (3) by the $\frac{1}{2}$in hexagon screw (17).

d) The actual counter mechanism itself; which consists of several parts, including a rotating drum (4), a weight and ratchet device and a setting latch (36), provides the means whereby all strip material can be automatically sheared, or cast to a predetermined length as necessary.

The counter mechanism can be so controlled that the device (which is linked to the pump driving rod) will ensure the production of strip material either by successive even casting in continuous strip, which can be delivered sheared automatically to the required length; or, in the case of products from the furniture mould, which are of more solid construction, provide separate complete cast strips as required, by the automatic introduction of a longer non-fusing cast at predetermined intervals in the casting sequence.

The actuating lever (24) of the counter mechanism is linked with the pump by the actuating rod (25), whilst the weight (23) which is used to reset the ratchet is connected to the hook (22) on the end of the chain (21) which is anchored to a pin on the ratchet wheel (34).

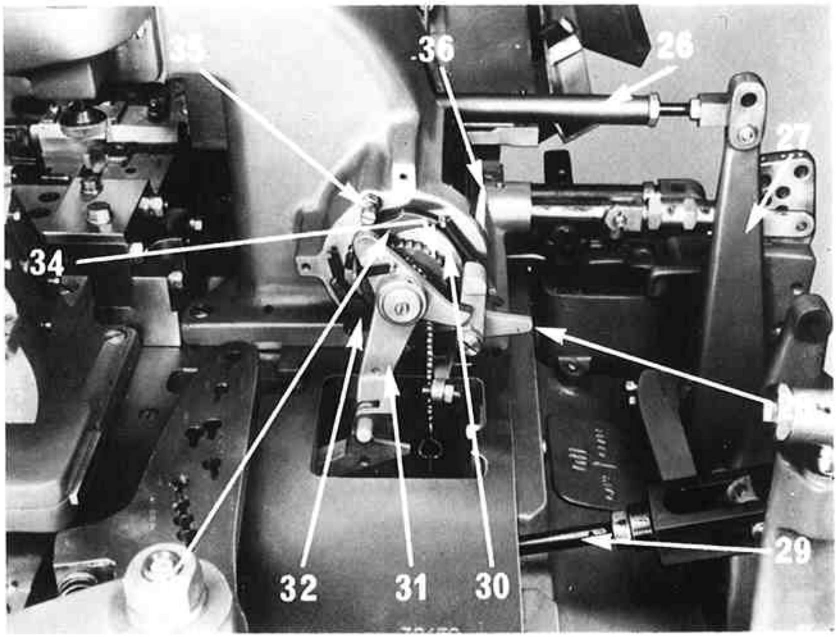
13.1 Function of the counter mechanism when casting leads, strip rules and continuous borders

Fitted inside the counter bracket housing (3) is a drum (4) which can be rotated by means of the drum shaft knob (1). Wrapped around the circumference of the drum is a plate which displays a line of figures grouped horizontally, ranging from 1 to 25. These figures are used to control the number of casts in each strip. The counter drum (4) can be locked in position as required, to display any desired figure in the window on the counter bracket, according to the total number of casts required.

The counter drum is mounted on a shaft which acts as a spindle, on the end of which is a disc to which is attached a ratchet wheel (34). The purpose of the ratchet wheel is to control the number of successive casts in relation to the desired length of strip, before bringing a trip mechanism into action which automatically operates the cutter blade which accordingly shears it and presents it on the galley (44), cut to the required length. Here the stacking mechanism (11) takes over and pushes the sheared strip aside, providing a clearance on the galley for the cast strip which is following behind, as the continuous process of casting, ejection and shearing proceeds. Refer to Chapter 14 in connection with the strip cutting and stacking mechanism.

The counter drum (4) and the ratchet wheel (34) work in conjunction with a weight (23) to control the automatic shearing of the cast strip on completion of the requisite number of successive fusing casts. The weight is attached to the hook (22) on the end of the chain (21) which is anchored to a pin on the ratchet wheel. On the end of the counter drum is a stop, against which a projection on the ratchet stop disc (30) is returned by the action of the falling weight, which is released automatically each time a shear is made.

As each cast is made, the actuating pawl (33) winds the ratchet away from the drum stop in an anti-clockwise direction, one tooth at a time. The ratchet, on being pushed forward by the actuating pawl, is held in position by the ratchet detent (32). This is repeated as each successive fusing cast is made, until the required pre-set number of casts have been completed, whereupon the pawl is released and the ratchet wheel (34), influenced by the action of the



weight, is automatically returned to its starting position, with the ratchet stop disc projection up against the drum stop; whilst at the same time the strip is sheared. The actuating pawl (33) is operated by an actuating lever (31) which is connected to the pump connection rod (29), by means of which, as each cast is made, the ratchet wheel is rotated and advanced one tooth, and simultaneously winds up the weight, which rises step by step as the ratchet wheel is advanced one tooth at a time. The weight is automatically released when the required pre-set number of casts have been made, and this will coincide with the number on the drum (4) displayed in the 'window' on the counter bracket.

It will be appreciated that the number which you set in the 'window' to control the number of casts will dictate the distance or number of teeth that the drum stop is positioned from the ratchet release, and that therefore the higher the number in the window the greater will be the number of teeth (and the greater the number of casts) before the ratchet wheel is automatically returned by the weight to its starting position as the next shear is made.

The repetitive action which frees the weight, which on falling resets the ratchet wheel in the starting position, will continue automatically until the required length of strip is complete, up to a maximum of 25 casts. (This can be exceeded by disconnecting the actuating lever from the pump connecting rod, thus putting the counter mechanism out of action.)

The counter mechanism is linked with the cutter mechanism through the actuating lever (12), in such a manner as to ensure that the shearing of the strip will take place at the required intervals as dictated by the setting of the drum. The cutter operating mechanism is brought into operation by the action of the actuating lever, the normal movement of which is limited by a stop lever (28). On completion of the required pre-set number of casts, the ratchet stop disc performs a secondary duty and moves the stop lever out of the path of the actuating lever (31), whereby it is given a longer stroke. This lengthened stroke of the actuating lever causes it to strike against the cutter setting lever which is part of the cutter mechanism, which in turn actuates the cutter setting block; whereupon the cutter cams cause the strip to be sheared. This is explained in detail in Chapter 14, which deals with the strip cutting and stacking mechanism.

The additional movement which is given to the actuating lever (31), when the stop lever (28) is moved out of its path, causes the actuating pawl trip pin (35) to disengage the actuating pawl (33) from the ratchet wheel (34), and allows the driving end of the actuating pawl to release the ratchet detent (32); thus permitting the action of the falling weight to return the disc (30), together with the ratchet wheel back to the starting position in which it was initially set. The shear blade of the cutter mechanism is thereby caused to act at the end of a given number of casts as dictated by the setting of the drum.

As the ratchet wheel (34) is returned to its original position by the action of the weight, the stop lever (28) also returns to its operative position and limits the stroke of the actuating lever (31) until the requisite number of successive casts have again been completed, when it is again given the additional movement which results in the strip being sheared; and so the process is repeated.

Refer to Chapters 28, 38 and 39 for detailed information on the lead and rule moulds, and 38·41 and 39·49 respectively for suggestions on the casting of satisfactory product.

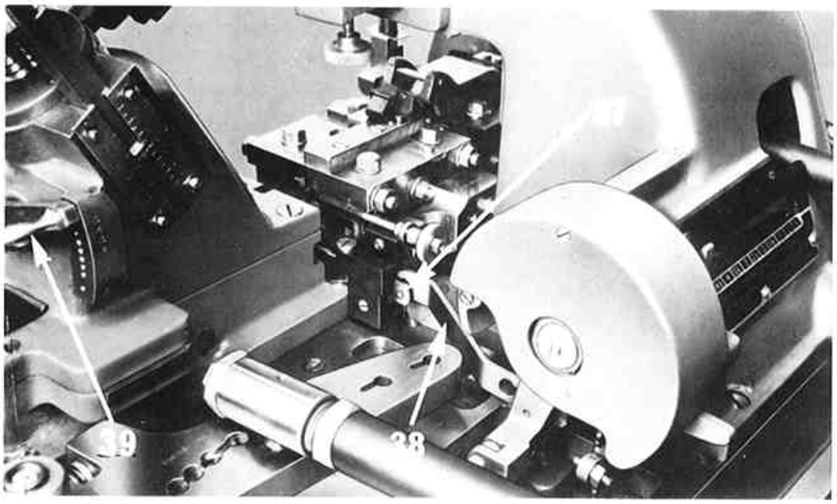
Note that an extension of the stop lever (28) enables you to operate the shearing mechanism by hand should you wish to do so at any time.

13.2 **Function of the counter mechanism when casting furniture**

When casting furniture, the counter mechanism functions the same as for leads and strip rules, except that the product is not sheared in lengths cut from one long strip, but cast in separate lengths of the required measure. In order to do this it is necessary to interrupt the sequence of successive fusing casts, to obtain a break in the cast strip at regular predetermined intervals.

The length of each successive fusing cast is normally between 5 and 6 pica ems, though shorter casts are sometimes necessary with overall measures of less than 30 pica ems. To obtain the break necessary to produce furniture cast in lengths of the required size, the first cast of each separate completed strip is increased in length by 5 pica ems, which results in a non-fusing cast. To achieve this, the cast furniture strip in the mould is automatically pushed forward out of the mould an additional 5 ems to make room for the extra length of the non-fusing cast which will be formed in the casting cavity immediately behind it.

The action necessary to produce the longer non-fusing cast is obtained by connecting the actuating lever (31) to the blade stop (37) located at the rear of the furniture mould, using the actuating lever link (38); by which means the blade stop is automatically withdrawn each time the actuating lever is required to make a longer stroke.



The mechanical action of the stop lever (28), the ratchet, the weight and the actuating lever itself is precisely the same as when casting leads and strip rules as already explained, except that the longer stroke of the actuating lever which results in the blade stop being withdrawn does not in this case operate the cutter cams.

The number of casts in each separate cast strip of furniture, and consequently the frequency of each non-fusing cast, is all once again controlled by the counter mechanism and determined by the setting of the drum (4). Refer to Chapter 40 for detailed information on the furniture mould.

Note that the lead stacker must always be placed out of action when casting in predetermined lengths from the furniture mould since it cannot be stacked like sheared product, as it does not always emerge from the mould in completely separated lengths. It is often necessary to separate the strip at the break (the front of the non-fusing cast) by tapping with another piece of product as it runs on to the galley.

13.3 Strip cutting and furniture mould tables

The counter drum is used in conjunction with the mould blade sizing mechanism, in order to set the machine to cast strip material and produce it on the galley, either sheared to the required length or cast in separate pieces of predetermined length. The mould blade sizing mechanism is dealt with in detail with regard to strip material, in 9.4.

When casting continuous borders, the drum is positioned to display the number of casts required. The standard border matrix casting length is 6 pica ems (0·996 in). The length of each cast (which is governed by the matrix design) is indicated by the markings on the matrix, which show, as necessary, the extent to which the standard length is to be either increased or reduced. Continuous borders are therefore cast to approximate overall lengths as required. When casting dashes and clumps, the drum is set for one cast only. Refer to 9.5 and 9.6 for details concerning setting of the mould blade sizing mechanism when casting continuous borders, dashes and clumps. Both continuous borders and dashes are also dealt with in detail in 13·7 and 13·8.

We will now consider the specially prepared tables which provide both drum and wedge screw settings required for any length of strip, up to a maximum of 25 casts. There are two of these tables, one of which gives detailed settings for shearing strip material such as leads and strip rules, whilst the other deals with the casting of furniture in predetermined lengths.

We will deal first with leads and strip rules, in which connection we shall concern ourselves in some detail with the means whereby the exact number and size of casts required to produce any given sheared length can be obtained from the table provided for this purpose, and the consequent settings and adjustments of the wedge screw of the mould blade sizing mechanism.

First, we must bear in mind that strip material is made up of a succession of casts, all fused together to make one long piece, and that, in the case of leads and strip rules, no cast under any circumstances must exceed 6 pica ems. To do so could cause a splash, or possibly result in a non-fusing cast. Casts for continuous borders, however, sometimes exceed 6 ems by up to an additional 0·015 in (0·381 mm) this being the extreme permissible limit.

13.4 Casting leads and strip rules with the aid of the strip cutting table

We will begin by taking a look at the 'Strip Cutting Table', which is reproduced at the end of the book.

The table, which you will see ranges from a 5-em measure at the beginning, to a measure of 144 ems at the end, is made up of four colums. The column on the extreme left in each row gives you the total length of the strip, whilst the other three columns grouped under the heading 'Adjustments' give you first the number of casts to be set on the counter drum scale, then the basic setting in ems and half-ems on the wedge indicator scale (5), and finally, wherever necessary, the additional adjustment to the wedge screw handwheel scale over and above the em scale setting, expressed as a decimal fraction in thousandths of an inch.

To relate the table to the machine itself, we will demonstrate by means of a simple straightforward example: assume you wish to cast and shear strip in lengths of 127½ ems measure. Refer to the table and you will see, ranged alongside '127½' in the first column, the figures '22', '5½' and '0490'. This tells us that to cast strip of this measure we must first set the figure '22' on the drum, for the total number of casts; then (after setting the mould blade for a 6-em cast with the aid of the 6-em standard border length gauge) adjust the wedge screw, initially to display 5½ ems on the wedge indicator scale (5). Then, after checking that the wedge screw scale is showing a zero reading, we must turn the handwheel and add on to the original $5\frac{1}{2}$ ems setting an additional forty-nine thousandths of an inch (0·0490in) reading it off on the top edge of the upper handwheel scale which is marked in thousandths of an inch. Refer to 9.4 regarding the use of the standard border length gauge.

Set the above example on the machine and visually check it out to your satisfaction. (Remember always, when adjusting the wedge screw, to tighten the wedge screw clamp on completion of the setting.)

Bearing in mind that the wedge screw scale markings are calibrated in thousandths of an inch for decimal settings; with adjustments such as 0·0415in you have to estimate the final half-thousandth when making the setting, and you will be frequently called upon to estimate to a tenth of a thousandth of an inch. You will discover, however, that the original wedge screw scale setting, after the first trial casts, will invariably have to be adjusted a little in any event if you are to get your overall measure exact. Shrinkage on cooling will obviously have some initial effect on the strip measure, whilst further variation either way can often be attributed to slight visual error when setting the wedge screw scale.

You will therefore find that if you need an exact measure, you will be called upon to make some minor adjustment to the wedge screw scale if your first trial casts (after the mould has warmed sufficiently) prove to be of incorrect overall measure. In order to do this, you must calculate how much each cast requires to be either increased or decreased accordingly, and to do so you must divide the overall size difference of the total measure by the number of casts in the measure, to obtain the adjustment figure you need. For example; assume you are casting 67 ems overall measure, made up of 12 casts of a basic $5\frac{1}{2}$ ems plus an additional 0·0138in per cast, and the product, checked when cool, proves (or is estimated to be) 6 points short. You would divide the 6 points by 12 casts, which would tell you that you must add a further $\frac{1}{2}$ point on the wedge screw scale to increase each cast by this amount in order to correct the length of the strip overall.

The above example is a simple one, but it is possible, especially for a beginner, to get a little confused when dealing with an overall discrepancy such as, say, 2 points in 19 casts. Here you would require to make an adjustment of two-nineteenths of a point to each cast, and you would inevitably be guessing. To avoid this as much as possible, and to aid you in quickly making correct adjustments, you are referred to the 'Strip Casting Correction Table' which covers all the information you could possibly require up to a total of 25 casts, embracing a possible overall error of up to 12 points.

You will note that, in the 'Correction table', in instances where points adjustments are given which include fractions of a point, they are given only to the nearest thirty-second of a point, whilst the equivalent decimal figure shown above it is more accurate, being correct to the nearest ten-thousandth of an inch. The one exception to this is in cases where the total number of casts in the strip is sixteen. All fractions expressed in points in the '16 cast' column are exact.

Care must be taken when setting this additional adjustment on the wedge screw scale, since you are not now making a simple fractional adjustment moving forward from a zero mark as when you made the original setting in the first instance. You will be either adding to or deducting from an existing fraction already set on the handwheel scale.

Finally, never assume that a correction, however carefully made, will automatically result in the production of strip of the correct measure. Always check the strip again after each correction, until you are satisfied it is as it should be according to your requirements at the time. This is not to imply that the machine is in any way inaccurate or unreliable, but as a reminder to be aware always of our own human failings, since generally speaking, in checking the product, we are checking ourselves and the accuracy of our own work, for if there is any discrepancy, the fault will almost invariably prove to be attributable to ourselves and not the machine.

13.5 Casting from the furniture mould with the aid of the furniture mould table

When casting from the furniture mould, you must refer to the special table which lists the counter drum and wedge screw settings for casting predetermined lengths from the furniture mould. The table is reproduced at the end of the book. You use the table to obtain information on the number of casts and the basic ems setting and adjustments for any given length of furniture, exactly as in the case of leads and strip rules; setting the number of casts on the drum in the 'window' on the counter bracket as before, checking the product cast, and correcting the overall length as necessary to adjust for shrinkage on cooling (in this case) by means of an adjustable stop which controls the length of the non-fusing cast – not by adjusting the micrometer wedge. Throughout this section, when referring to 'furniture', all comments and instructions apply to all product obtainable from the furniture mould.

Refer to 40.1, which deals with the control of the length of strip cast from the furniture mould, by means of the adjustable stop.

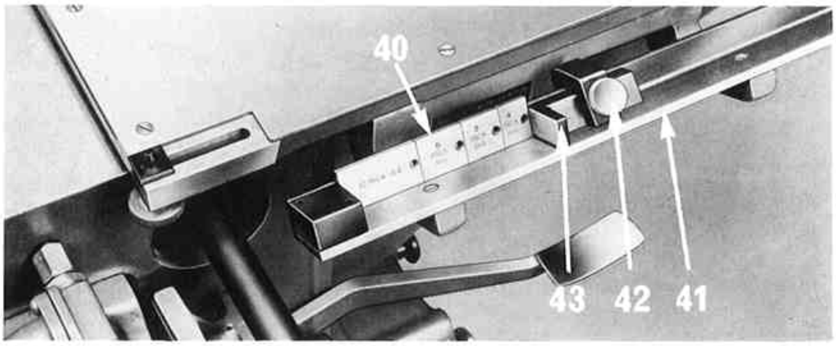
Furniture, as already explained, is not sheared to the required measure, but cast in separate lengths, by means of the periodic introduction of a longer non-fusing cast. This longer non-fusing cast, being an additional 5 ems in length, is taken into account in the 'Furniture Table', inasmuch as the indicator scale and micrometer wedge settings shown under 'Adjustments' will in every instance give a total overall measure which is 5 ems less than the total measure given in the first column under the heading '12 pt ems'. For example, note the very first setting for 8 ems which tells you to make 1 cast of 3 ems. The drum, on being set to produce one cast only, will give you one non-fusing cast which is automatically increased by 5 ems, thus giving you 8 ems in all. The same will be observed to be the case throughout the table, the longer non-fusing cast being the first cast in the completed strip in each instance, as determined by the setting of the drum which controls the counter mechanism. The mould blade, incidentally, is set for a 3-em cast when using the furniture mould; the 3-em setting gauge being used in this instance.

To sum up, it will be appreciated that the tables of detailed settings supplied both for leads and strip rules and for furniture, which are provided for your information and guidance, should be used in preference to any other method which involves mental calculations, the tables being provided for your convenience, with maximum productivity in mind.

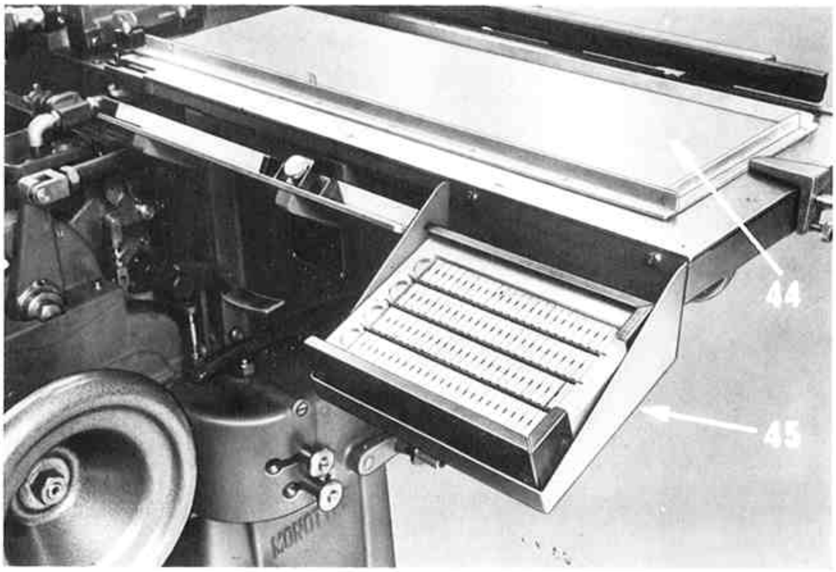
Refer to Chapter 40 which deals in detail with the furniture mould, with special reference to Section 18 which explains how the mould blade is set for a 3-em cast, using the 3-em setting gauge.

13.6 Checking the strip measure

A set of point measure gauges (available as an accessory) are provided as an aid in measuring the cast strip; they are invaluable when an exact measure is required. These consist of a set of precisely machined stainless-steel gauges (thirteen in all) mounted on a wooden carrier, from which any measure in $\frac{1}{4}$pt, $\frac{1}{2}$pt or complete 12pt ems can be obtained (gauges for $\frac{1}{2}$pt, 1pt, 2pt, 3pt and 6pt being included, permitting definite amounts from $\frac{1}{2}$ point to 11 points to be added).



These measure gauges (40) are used in the length gauge (41) which is mounted just off the left-hand edge of the galley, adjoining the matrix box tray (45). They are used in the required combination to produce the desired measure (up to a maximum of 60 ems), the sliding jaw (43) being moved into position against the gauges (which must be an exact 'sliding' fit) and locked with the knurled clamp screw (42); the strip then being checked and measured in the gauge as illustrated.



13.7 Settings for casting continuous borders

There remains one kind of strip product which we have not yet dealt with under this section; namely continuous borders. These are distinct from rules in that they consist of a wide range of intricate and ornamental designs.

Continuous borders are cast from matrices, as are the rules, but because of the nature of the varied designs, the continuous border matrices have to be lifted off the mould after each cast to allow the product to be pushed forward through the mould to make room for the next fusing cast. Furthermore, the strip cutting table is not used as it is with other strip material. You do, however, set the number of casts you require on the drum, as with other products, in order to ensure the automatic shearing of the border at the total overall length needed to fulfil your requirements. This you can easily estimate, as each cast in the case of continuous borders is always approximately 6 ems long, a factor which is determined by the actual border design itself, which results in some being less than 6 ems and others being more. The variation is only in thousandths of an inch, and it is clearly indicated on the matrix itself for your information.

Having gauged the mould blade stroke with the aid of the standard 6-em border length gauge, the difference '+' or '–' as marked on the border matrix must be taken into account and either added to or subtracted from the already pre-set 6-em adjustment on the wedge screw, in order to ensure the production of perfectly cast border bearing a continuous and uninterrupted design.

Refer to 9.6 'The mould blade sizing mechanism' in connection with adjustments for casting strip borders.

13.8 Casting dashes

The counter bracket is also used for the casting of dashes (and clumps) which are not strip material. They are cast from the 4–18 pt lead and rule mould.

Dashes are separately cast in one piece, the rear end of each cast remaining in the mould, acting as the front wall whilst the next dash is being cast. Each cast is therefore somewhat similar to (though much larger than) the non-fusing cast which produces furniture in separate pieces from the furniture mould.

Since dashes are covered in both Chapter 14, which deals with the strip cutting and stacking mechanism, and Chapter 39, which is concerned with the 4–18 pt lead and rule mould, we need only concern ourselves with the following at this point:

Dash matrices are used in special dash matrix holders which slide into position on the matrix lifter; the cutter blade is reversed and used to stack the product, and the drum is set for one cast only; whilst the required 'dash' connecting hole on the mould blade slide drive lever intermediate lever must be used. The lead mould blade stop lever handle (39) must be set at the mark corresponding with the length in ems of the dash to be cast, and the wedge indicator pin (6) must be similarly set to indicate this measure on the wedge indicator scale (5); whilst the wedge screw handwheel scale must be set at zero.

Refer also to 9.5 concerning mould adjustments for casting dashes or clumps, and the warning thereto regarding dash minimum length; and 14.4 with regard to the method whereby the cutter blade is used to stack the dashes on the galley.

CHAPTER 14

Strip cutting and stacking mechanism

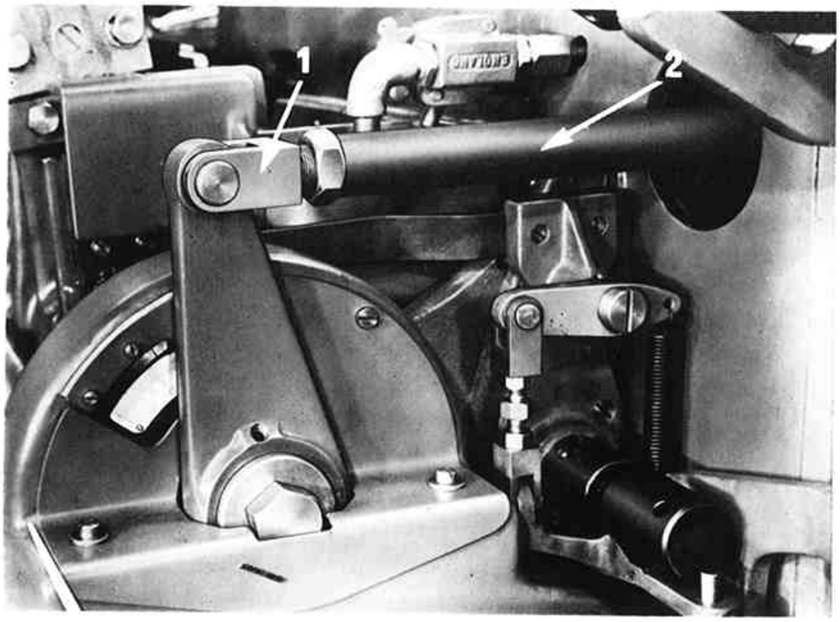
The purpose of the strip cutting and stacking mechanism is to shear strip material produced from the strip moulds into the appropriate required lengths, and to stack the finished product on the galley, ready either for immediate use or for disposal to storage against future requirements. The cutter is brought into action and controlled automatically by the counter mechanism.

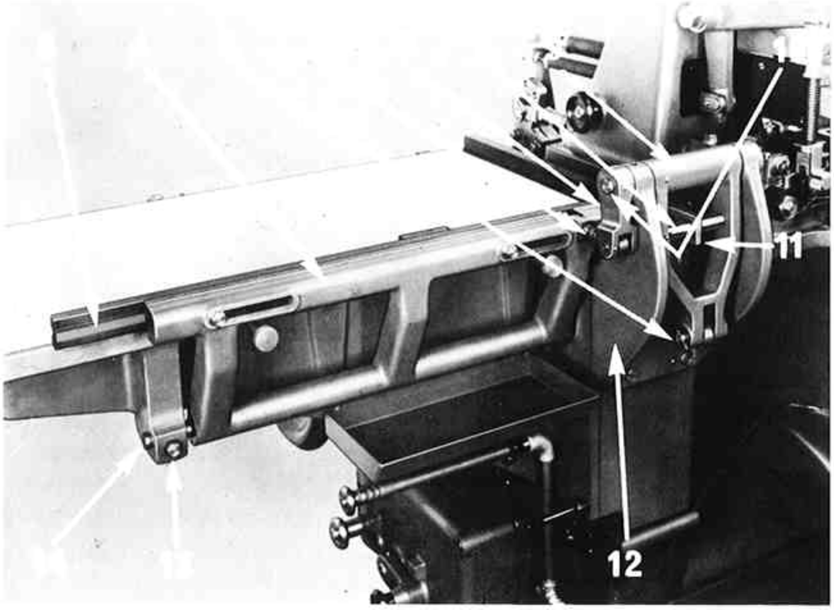
The position of the cutter actuating lever and the cutter blade bracket should be adjusted so that the cast strip will be sheared mid-way between each fusing mark.

14.1 The cutter mechanism

The several parts which comprise the cutter mechanism are connected to the cutter cam lever (15) through the link yoke (1) of the cutter actuating block link (2). The cutter actuating block (35), located at the other end of the actuating block link (2), is therefore caused to reciprocate continuously back and forth without restriction, in a slot provided in the end of the cutter actuating plunger (38), and this it does all the time the machine is in operation.

Thus positioned, the entire cutter mechanism is out of action, and when casting from the lead and rule moulds it will remain inoperative in this manner whilst fused strip material continues to emerge from the mould on to the galley, until such time as it is necessary for the cutter blade (11) to be brought into operation to shear the strip, as controlled by the setting on the drum scale of the counter mechanism.





The cutter mechanism is brought into action when the actuating lever (40) of the counter mechanism is induced to make a longer stroke on completion of the requisite number of successive fusing casts for the required length of strip. In making this longer stroke, the actuating lever of the counter mechanism presses against the cutter setting lever (32), the movement of which is translated through the cutter setting lever rod yoke (24) to the cutter setting lever rod (25), which controls the positioning of the cutter setting block (37). The cutter setting block is thereby pulled by the rod into the path of the cutter actuating block (35), and it is this movement which puts the cutter mechanism in action; since as the actuating block advances, it now butts up against the setting block, which in turn pushes on the cutter actuating plunger (38); in consequence of which, both actuating block (35) and actuating plunger move as one piece.

The movement so given to the cutter actuating plunger, when the cutter mechanism is thus brought into action, is transmitted through the cutter actuating plunger link (27) to the cutter actuating lever (9), to which it is connected by means of the plunger link pin (5). The cutter blade itself (11), positioned on the cutter blade pin (8), is consequently moved forward and duly shears the strip against the shear blade located on the cutter blade bracket (33), which is attached in position on the main stand of the machine.

Note: The cutter actuating plunger link (27) has two connection holes. These holes are provided to engage the cutter actuating plunger (38) with the cutter actuating lever (9), by means of the cutter actuating lever link pin (5). When making the connection, the link pin is passed through the 'inner' hole for cutting strip up to 12pt, and through the hole at the extreme end of the link for product over 12pt.

14.2 **Lead stacker**

The lead stacker is linked with the cutter mechanism through the lead stacker lever (7) when leads, rules and continuous borders are being cast from the lead and rule moulds; whereas when casting dashes, which are produced in separate pieces, the cutter is reversed and used as a means of stacking the dashes on the galley. When casting in predetermined lengths from the furniture mould, the cutter is placed out of action, and both the cutter blade bracket and the lead stacker bar are removed.

The following briefly outlines the procedure in each case:

14.3 Casting strip material

The lead stacker lever (7) is fixed to the same shaft as the cutter actuating lever (9), and connected to the lead stacker (4) through the lead stacker connection rod (6); as a result of which, each time the cutter actuating lever (9) moves forward and the cutter blade (11) shears the strip, the lead stacker is likewise carried forward and pushes the cast product against the stacker support blocks; leaving space on the galley to receive the next strip.

After the cutter blade has sheared the strip, the pressure is automatically released from the cutter setting block (37), causing it to be pulled out of engagement with the cutter actuating plunger (38) and its abutment (36), by the action of the cutter setting lever spring (31). At the same time, the cutter actuating plunger is also returned to its original position by the cutter actuating plunger spring (39). The cutter mechanism is thus once again thrown out of action and the cutter actuating block (35) resumes its 'free-wheeling' reciprocal motion in the slot of the cutter actuating plunger (38), until such time as the next shear is made and the whole process is repeated.

14.4 Casting dashes

When casting dashes, the front of the shear blade (11) must be set to the mark on the galley plate which corresponds to the length of the dash being cast. The galley plate is marked in 12pt ems. Correct shear blade positioning ensures unobstructed stacking of the product on leaving the mould. The cutter blade, not being required for shearing, must be removed from the cutter actuating lever, removed from the cutter blade bracket (33), replaced in the bracket with the blade cutting edge to the front and replaced in the cutter actuating lever. In this position it still operates, but only as a stacker for the dashes on the galley; the position of the cutter blade bracket being adjusted accordingly, to align the cutter blade with the required mark on the galley plate.

14.5 Casting from the furniture mould in predetermined lengths

When casting from the furniture mould in predetermined lengths, the cutter actuating lever pin (5) must be removed, to disconnect the strip cutting mechanism from the counter bracket. The lead guide bracket (30), the cutter blade bracket (33) and the lead stacker bar (3) must likewise be removed.

14.6 Dismantling the strip cutting and stacking mechanism

To remove the cutter blade bracket (33), turn the machine to 360° and loosen the cutter actuating lever lock screw (19). Then push the cutter actuating lever (9) inwards until the actuating lever pin (17) can be withdrawn through the hole in the cutter actuating lever bracket (20); after which you can similarly withdraw the cutter blade (11).

The two screws (29) which secure the lead guide bracket (30) to the main stand must then be removed, together with the hexagon screw (16) from the elongated slot of the cutter blade bracket (33). Both cutter blade bracket and lead guide bracket can then be removed together.

14.7 Removing the cutter setting lever and stop

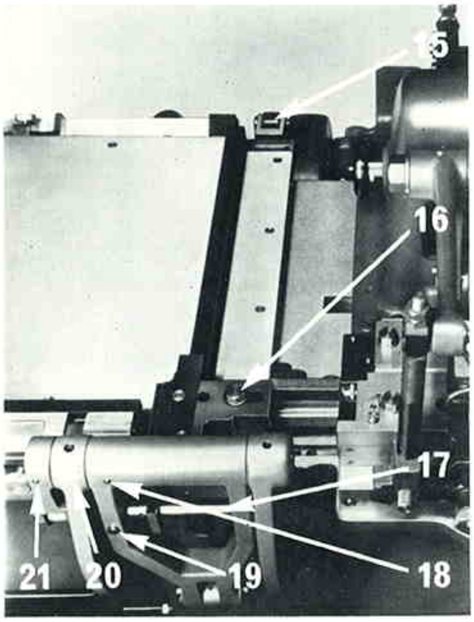
Disconnect the cutter setting lever spring (31) from the cutter setting lever spring post which is located on the underside of the main stand. Remove the split pin and the rod yoke pin (23). The cutter setting block (37), complete with the rod (25) and the rod yoke (26), can then be removed.

Now knock out the taper pin from the cutter setting lever and remove the cutter setting lever group complete.

14.8 Removing the cutter actuating block

First turn the machine to 350°. You can now remove the cutter actuating block (35) and the cutter actuating plunger (38), complete with the cutter actuating block link (2), and the link yoke (1). This you do by removing the yoke split pin and taking out the link yoke pin from the yoke of the cutter actuating block link (2); after which you likewise remove the cutter actuating lever pin split pin and take out the cutter actuating lever pin (5).

The cutter actuating block (35) and the cutter actuating plunger (38) are now completely disconnected at both extremities, and you need only now disconnect the cutter actuating plunger spring (39) from the spring post, and the complete unit can then be withdrawn through the aperture in the main stand.



14.9 Removing the cutter actuating lever

To remove the cutter actuating lever (9) and the lead stacker lever (7), slacken the eye lock nuts and disconnect the lead stacker connection rod (6); then knock out the two taper pins (21) and (18), and drive out the actuating lever fulcrum pin (10).

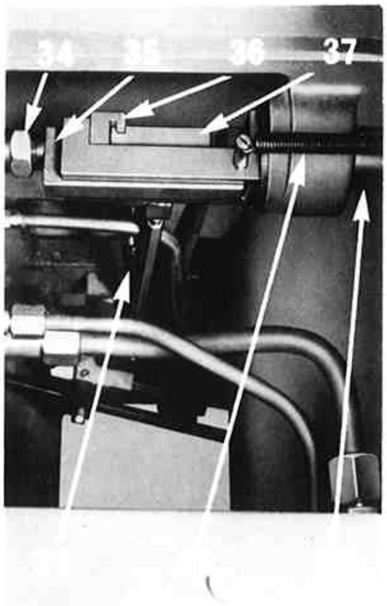
14.10 Removing the lead stacker

To remove the lead stacker (4), loosen the fulcrum pin lock screw (13) and then pull the lead stacker towards the front end of the machine – that is, to your left as you stand behind it. As the stacker is moved, it will carry the lead stacker fulcrum pin (14) with it, which will thus enable the lead stacker to be completely withdrawn.

14.11 Assembling the strip cutting and stacking mechanism

Replace the lead stacker (4), push in the lead stacker fulcrum pin (14) and lock in position with the lock screw (13).

Assemble the cutter actuating lever (9) and the lead stacker lever (7); drive in the actuating lever fulcrum pin (14) and secure in position with the taper pins (21) and (18). In doing so, you will observe that the fulcrum is a tight fit,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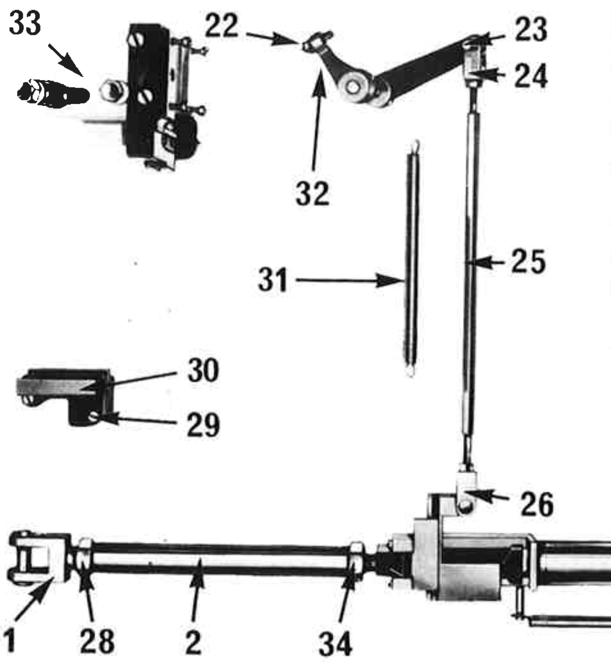
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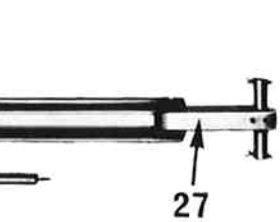
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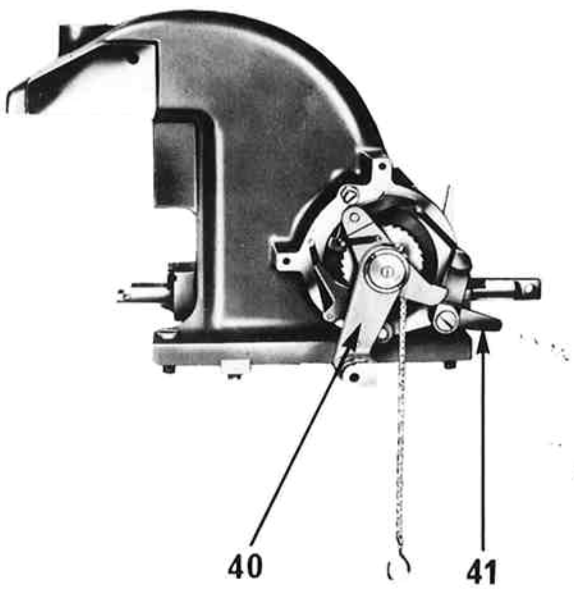
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and you must therefore take care to ensure that the taper pin holes are correctly aligned to receive the pins, before you drive the fulcrum back in position.

Connect up the lead stacker connection rod (6) and tighten the lock nuts.

Take the cutter actuating block (35) and the cutter actuating plunger (38), complete with the link and the link yoke (1), and insert the complete unit through the aperture in the main stand, as you did when you withdrew it. Connect the link yoke (1) to the cam lever (15) with the link yoke pin, and the cutter actuating plunger link (27) to the cutter actuating lever (9) with the actuating lever pin (5). Complete by connecting the cutter actuating plunger spring (39) to the spring post beneath the main stand.

You can now replace the cutter setting lever in position, complete with the rod yoke (26) and the rod (25) together with the cutter setting block (37).

Now push the cutter setting lever fulcrum pin up through the special hole provided in the main stand; then assemble the cutter setting lever and secure with the taper pin.

Complete the assembly beneath the main stand by re-connecting the cutter setting lever spring (31) to its spring post.

Both the cutter blade bracket (33) and the lead guide bracket (24) must now be replaced on the main stand of the machine, secured with the hexagon screw (16) and the two lead guide bracket screws (29).

Finally, assemble the cutter blade (11) in the cutter actuating lever bracket (12), by pushing on the actuating lever (9) until the actuating lever pin (10) can be passed through the hole in the bracket, as you did when you removed it initially. Connect the cutter blade pin (8) with the cutter blade (11), and complete by locking the pin in position with the pin lock screw (19).

14.12 Adjusting the position of the cutter setting block and the cutter actuating block link

Engage the pump driving rod release lever and depress the extension of the counter mechanism stop lever (41) by hand, so that the actuating lever (40) can make a longer stroke. Now turn the machine by hand to 270°, in which position the actuating rod yoke is in contact with the main stand casting. Adjust the screw (22) in the cutter setting lever (32) so that the lever has $\frac{1}{16}$in (1·588mm) of free movement before reaching its stop plate, which is located beneath the main stand.

With the mould in position, engage the pump handle and with the extension of the stop lever (41) depressed once more so that the actuating lever (40) can make a longer stroke, turn the handwheel again to bring the machine to the casting position at 220°. Now slacken the lock nuts (34) and (28) (which have left-hand and right-hand threads) and adjust the cutter actuating block link (2) to give a $\frac{1}{32}$in (0·794mm) clearance between the end of the cutter actuating block (35) and the cutter setting block (37).

Finally, disengage the pump release lever, return the machine again to 270° and adjust the cutter setting lever rod (25) until the cutter setting block (37) can be moved $\frac{1}{32}$in (0·794mm) towards the rear of the machine – that is, towards the driving pulley – before contacting the side of the cutter actuating block (35). Ensure that the assembly is free on completion of the adjustment.

14.13 Adjusting the lead stacker

The lead stacker connection rod (6) must be so adjusted that when the cutter blade (11) is drawn into contact with the cast strip for shearing, there is a clearance of $\frac{1}{64}$in (0·397mm) between the product and the face of the lead stacker bar (3). If there is not sufficient clearance, the lead stacker bar could move into contact with the product, to stack it, before it is sheared.

CHAPTER 15

The pump mechanism

The object of the pump mechanism is to supply molten metal under pressure, to the mould. This it must do in sufficient quantity, at the required temperature, and at precisely the right moment, to ensure that the mould casting cavity is supplied with the requisite volume of metal necessary to produce correctly cast product of the required size. The metal is delivered in synchronisation with the movement of the mould blade sizing mechanism and other related moving parts involved in the control and sealing of the mould, during the brief period of pause in the casting cycle.

Briefly, with the type moulds, the mould blade withdraws to establish the correct set-width of the casting cavity, and the crossblock is moved into position to seal the front of the mould, whilst the matrix, in the matrix holder, descends to seal the top of the casting cavity; whereupon the pump body is caused to rise, to seat the nozzle in the conical recess in the mould base, and the piston descends to force molten metal into the sealed casting chamber.

Now consider the pump and the mechanism which operates and controls it.

The essential components are the body of the pump, the piston, the nozzle for directing the jet of metal into the mould, and in the case of the $\frac{7}{8}$ in pump, a valve to limit the return flow of the metal during the upstroke of the piston on completion of the cast. Most of these parts are normally submerged in the molten metal in the melting pot and therefore maintained at the same temperature throughout. On the other hand, the mould (with which close contact must be made by the pump nozzle) has to be kept cool in order that the metal may solidify as quickly as possible, to maintain maximum speed of production and to prevent the mould overheating, and the consequent casting of imperfect type.

This requirement is met by arranging for the nozzle to be withdrawn from the mould for a large part of the cycle of operations, and brought into contact with it only whilst the molten metal is being injected, followed by a brief period during which the metal is solidifying.

For this purpose the whole pump assembly is raised vertically in comparatively rapid motion until the nozzle makes contact with the mould, at which point a slower but more forceful action, achieved by directing the downward pressure on the piston against the lift on the pump body, brings nozzle and mould into a firm union, capable of withstanding any tendency for the molten metal to escape at the areas of contact. This is accomplished by a firm balance of forces, and timely absorption of motion in a system of rods, springs and reciprocating links; motion for the whole arrangement being imparted by the cam lever to which the pump mechanism is linked.

A nozzle seating timing attachment, which provides an independent adjustment for delaying the seating of the pump nozzle, reduces metal heat loss to a minimum by keeping the nozzle in close contact with the molten metal as long as possible when the machine is operating at very slow speeds (at 22 r.p.m. and under).

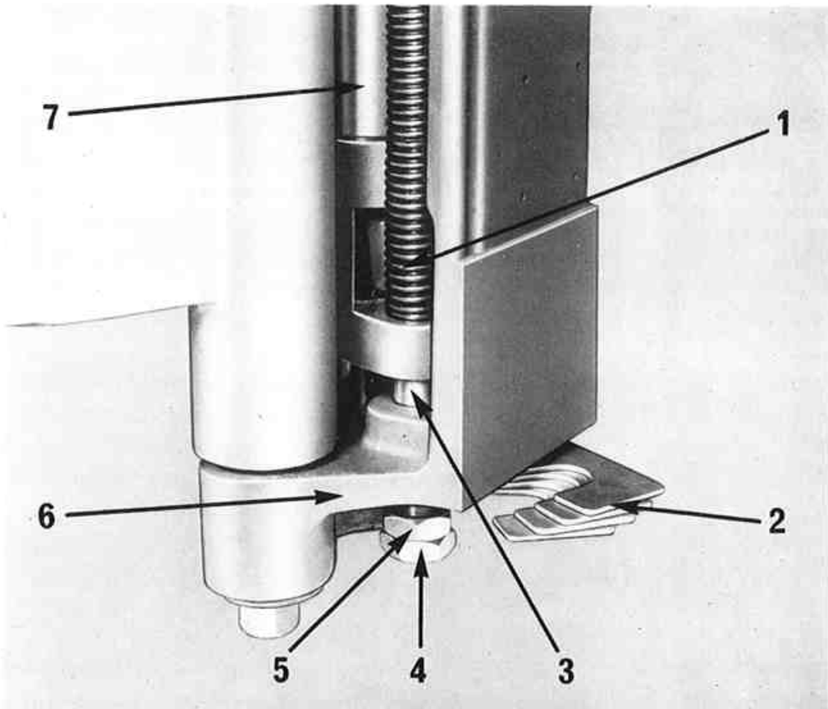
The pump is provided with a manual control, by means of which it can be linked with or disengaged from its operating cam lever at will. In effect, this means that the machine can be started up and all the working parts set in motion on the main stand of the machine, except that the pump will be inoperative and no casting will take place. The pump is engaged and brought into operation, only when all the other working parts have been checked and confirmed as functioning properly. The pump is connected to the pump cam lever by means of the pump driving rod release lever which provides a positive linkage when duly engaged.

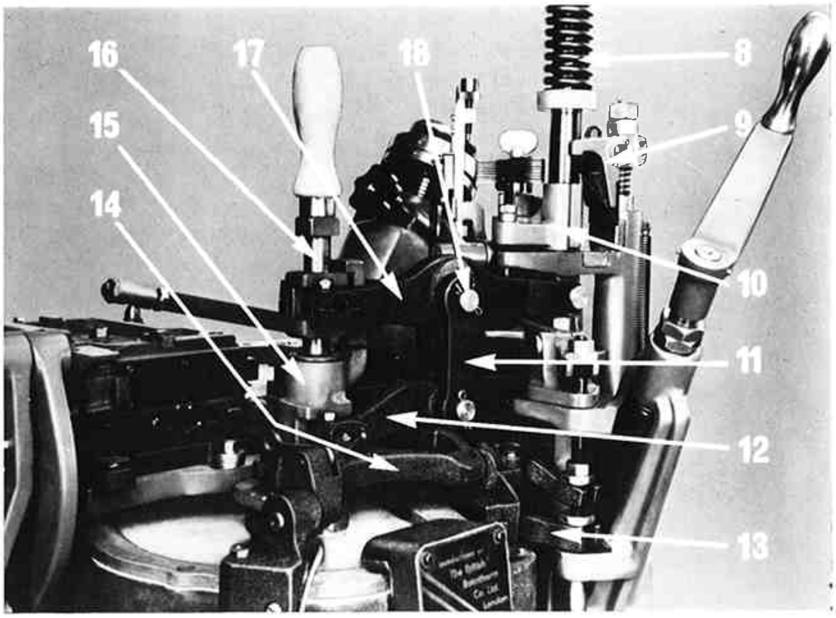
As the pump is in this manner engaged last when commencing to cast, so it is always disengaged first by the same means when the machine is no longer required to cast. The pump driving rod release lever can be quickly and easily knocked out of engagement in emergency. There are, however, various safety devices which render inoperative any of the moving parts affected in the event of any obstruction occurring during casting which could damage the machine; together with one on the type carrier cam lever extension which automatically disengages the pump and brings the machine to a halt at the same time.

15.1 Function of the pump mechanism during casting

The pump mechanism obtains its motion from the pump cam lever through the pump driving rod (50). It is thus caused to operate in precisely timed unison with all the other parts involved in the casting process.

The movement of the pump driving rod likewise causes the pump bell crank (19) to rise. This in so doing takes with it the piston operating rod (7), the lower crosshead of which compresses a spring (1) which encircles the pump body spring rod (3); whereby the spring rod itself is caused to rise, by the spring acting against a shoulder at its upper end. The piston operating rod (7) and the pump body spring rod (3) each have a crosshead attached at their



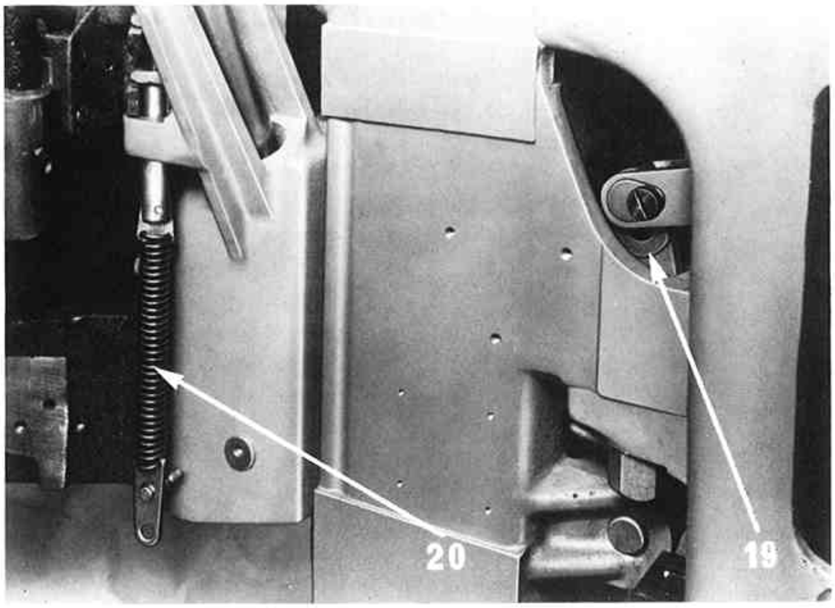


upper end. Two levers are connected to these crossheads; the lower lever, the pump body lever (10), being connected to the crosshead on the pump body spring rod and terminating in the pump body (15), while the upper lever, the piston lever (17), connects with the piston operating rod crosshead (10) and operates the piston. As the piston operating rod and the pump body spring rod rise together, activated by the pump bell crank, a point is reached where the upward movement of the pump body spring rod (3) is checked by the pump body spring rod nut (5) coming into contact with the swing frame post (6), or with any of the pump body spring frame stop plates (2) which may have been brought into use for this purpose.

There are four of these stop plates (2) (generally termed 'pressure plates' or 'leaves') attached to the bottom of the swing frame post, and they are brought into use as required, in accordance with the 'Product Information Table', depending on the product being cast. They are located by sliding them into position as required, between the pump body spring rod nut (5) and the bottom of the swing frame post (6). The effect is to check the rise of the pump body spring rod somewhat earlier, and this will naturally vary, depending on how many of the stop plates are used.

At this point, although the pump body spring rod (3) is thus prevented from rising further, the piston operating rod (7) continues to do so until its upward movement causes the piston springs (8) to rock the piston lever, whereby the piston (16) is itself caused to descend. The upward motion of the piston spring rod lifts the piston lever (17), and since it is connected to the pump body lever (12) by means of the pump lever connecting link (11), it has a tendency to lift the pump body lever (12) at the same time.

At the other end of both the piston lever (17) and the pump body lever (12), the piston (16), to which they are linked, is opposed, as it descends, by the pump body (15), which is at the same time trying to rise. The pump body and the piston are therefore working against each other. Were it not for the opposing action of descending piston and rising pump body, the pump nozzle would be forced away from the mould, because the pump body lifting spring



(20) would not be strong enough to withstand the pressure exerted by the piston.

When the piston has duly delivered to the mould the full quantity of metal required to form the product being cast, the piston operating rod (7) will not have completed its stroke, and its surplus motion is therefore absorbed by the piston springs (8).

The pump body (15) is supported at each end upon two separate pump body lifting levers (13) and (14), one at the piston end and one beneath the nozzle. Thus supported, the pump body rises in a perfectly vertical direction when properly seated on the levers, and with the nozzle end correctly located on the pump body locating pin (30). The pump body lifting levers are themselves operated by the pump body lifting spring (20) which is in turn operated by the pump body operating rod lever (41), terminating under the piston lever (17). As the piston lever rises, the operating rod lever (41) is released and the pump body lifting spring (20) elevates the pump body until the nozzle (45) becomes firmly seated in the conical recess in the base of the mould.

On completion of the cast, the piston lever descends, depressing the pump body operating rod lever (41) and causing the pump body to recede from the mould, keeping the nozzle out of contact until such time as the whole process is repeated and the nozzle is again automatically seated in the mould, ready to deliver the molten metal for the next cast.

After the molten metal has been injected into the mould, a brief period of pause follows, during which the various parts controlling the mould remain stationary, and the metal solidifies in the casting cavity. This momentary pause, which naturally varies according to the running speed of the machine, effects, with the exception of the type pusher, all the inter-related parts assembled on the main stand of the machine which are involved in the sizing, casting and subsequent ejection of the cast product from the mould.

The running speed of the machine is largely governed by this period of pause, which varies with the amount of metal injected into the mould, and this, in turn, upon the size of the type or the nature of the product being cast.

This is why large type or product must be cast more slowly than the smaller sizes.

The completion of the pump's working cycle consists of all the component parts returning to their original rest positions in the reverse order of the operations described above. Since in so doing, the withdrawal of the piston could tend to empty not only the nozzle, but also the passage leading directly to it, the bulk of the return flow of the molten metal (in the case of the $\frac{7}{8}$in pump body) is checked by the pump body hat valve, which is automatically drawn up to its seating at this point, thereby ensuring that a full charge of metal is allowed to remain in the body of the pump in readiness for the next injection. The $1\frac{1}{4}$in pump is not fitted with a valve.

All pump connections should always be kept working freely and sufficiently, though not excessively oiled. The piston must always slide freely in the pump body. The piston, the pump body and the nozzle must be kept clean and free from any form of obstruction, but under no circumstances whatsoever must they be filed or cleaned with any form of abrasive.

Detailed instructions on the correct method of cleaning, maintaining and adjusting the various parts of the pump, and the tools supplied for this purpose, will be found under the section headed 'Maintenance of the pump mechanism', which follows.

15.2 Maintenance of the pump mechanism (and the casting of good type)

The following deals with the cleaning of the pump body, the piston and the nozzle. It is also necessary in relating these parts to the casting of good type, to touch on the matrices and the mould, as they are intimately associated with the end product to which the pump is directed, and would similarly, if dirty, damaged or neglected, result in the casting of faulty product. Some brief reference in this respect, concerning both matrices and moulds, will therefore be found in Sections 19 and 20 at the end of this chapter.

15.3 Pump nozzle

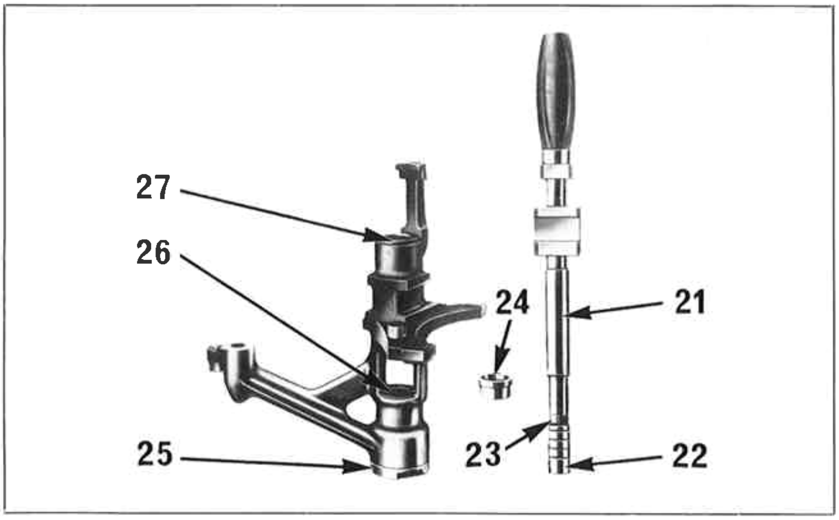
The smaller sized nozzles (those used with the $\frac{7}{8}$in pump) should be drilled every day when in constant use, whether they appear to need it or not; to ensure that the metal passage is at all times free and unobstructed by deposits of metallic impurities, known as 'dross'. The larger nozzles should be carefully examined and drilled regularly too.

The metal passage (the 'bore') of some of the nozzles used with the $\frac{7}{8}$in pump has two diameters, the larger diameter starting at the nozzle base and running almost the full length of the nozzle, whilst the smaller diameter bore is located at the nozzle tip. When drilling these nozzles you must always put a limiting mark on the drill before cleaning the larger diameter hole, to ensure it does not penetrate too far. When dealing with the other end, you must be careful not to let the drill slip right through on clearing the smaller bore, in order to avoid the risk of the hand brace chuck damaging the tip of the nozzle.

A trace of piston paste may be applied to the thread of the nozzle, and the thread then burnished with a brush before returning it to the pump body; but do not use excessive force in tightening it. When a nozzle becomes worn or damaged it must be discarded and a new one substituted. Piston paste left on the nozzle can accentuate nozzle wear considerably.

15.4 The piston

In a normal working day, the piston should be withdrawn from the pump and cleaned at least once. The piston stem (21) must be cleaned with a brass wire brush, polished with piston paste and then burnished to remove all traces of



free paste. Once every week the piston should be completely stripped for a thorough cleaning. First, tap out any stray metal, then slacken the piston stem end lock nut (23) above the piston stem end (22), and undo the piston stem end screw with the special cleaning tool, the shoulders of which are also used for cleaning the washer seating. The other component parts of the piston must be cleaned with a wire brush, whilst special attention should be paid to the slots in the washer, and the inside of the stem end. The various parts must be reassembled, using just a little piston paste, and with the washer slots upwards. Tighten the piston stem end screw, then slacken it half-a-turn and secure it with the lock nut (23) before burnishing the end as previously instructed.

15.5 **Pump body**

Under normal running conditions, the pump must be stripped down for cleaning every week or, say, after every 40 hours' running. After first detaching the nozzle, the pump body should be lifted from the pot, stray metal quickly tapped out, and the bottom plug (25) unscrewed without delay, before the residual metal cools. You will experience little difficulty in doing this provided the plug was previously replaced correctly and not unduly tightened. You must bear this in mind when reassembling, and remember to heat the pump body in the pot before you do so.

The arm of the pump body, which rests on the pump lever, must likewise be regularly cleaned to ensure free passage for the molten metal, right through from the base of the body to the nozzle seating with the correct size long-shank well-arm drill. A special tool is provided for cleaning the threaded nozzle seating at the end of the arm. The seating should also be checked for wear to ensure that the nozzle fits 'metal tight', as there must never be any risk of metal escaping at this point. Clean the thread itself with the correct $\frac{1}{2}$in or $\frac{5}{8}$in tap as necessary from time to time, to ensure the nozzle can be properly engaged and firmly seated. Another tool is provided for cleaning the space below the thread.

The bore of both the upper (27) and the lower (26) bushes of the pump body must be cleaned with the round wire brush. On the $\frac{7}{8}$in pump body, the base of the lower bush forms the seating of the pump hat valve (24). When the pump body has cooled, this seating must be cleaned with the appropriate tool provided.

Make sure that the upper face of the hat valve flange will make good contact with the lower pump bush (26). The central escape hole of the hat valve should be cleaned (but not enlarged) with a 0·059in drill.

The pump body lifting lever (29) should be examined periodically to ensure free movement. If necessary remove the fulcrum pin (28) and clean thoroughly. The locating pin (30) should also be checked to see that the head is domed and not flat.

15.6 Pump mechanism adjustments

The Super caster will produce work of a consistently high quality, and go on doing so indefinitely; but only if a high standard of general working conditions is maintained, and provided the various working parts are preserved in correct adjustment. This is nowhere more important than in the case of the pump mechanism, which, perhaps because of the seemingly messy business sometimes involved in its stripping, maintenance and general handling, could tend to be overlooked until such time as it might possibly cease to work with maximum efficiency and be in obvious need of attention.

It is your responsibility to ensure that no fault is allowed to develop unchecked, and therefore, rather than wait for one to become apparent, you should, apart from regular cleaning, make occasional routine checks of all the more important pump adjustments. Experience will in due course aid you in deciding how often this needs to be done.

The full sequence of pump adjustments should be checked and performed as necessary, in the following order:

a) Centralising the nozzle.
b) Squaring the nozzle.
c) Crosshead (piston).
d) Pump body operating rod and lever.

15.7 Centralising the nozzle

The nozzle must be correctly positioned in relation to the conical recess in the base of the mould, in order to ensure efficient filling of the casting cavity without unnecessary wear or strain being imposed on the parts concerned.

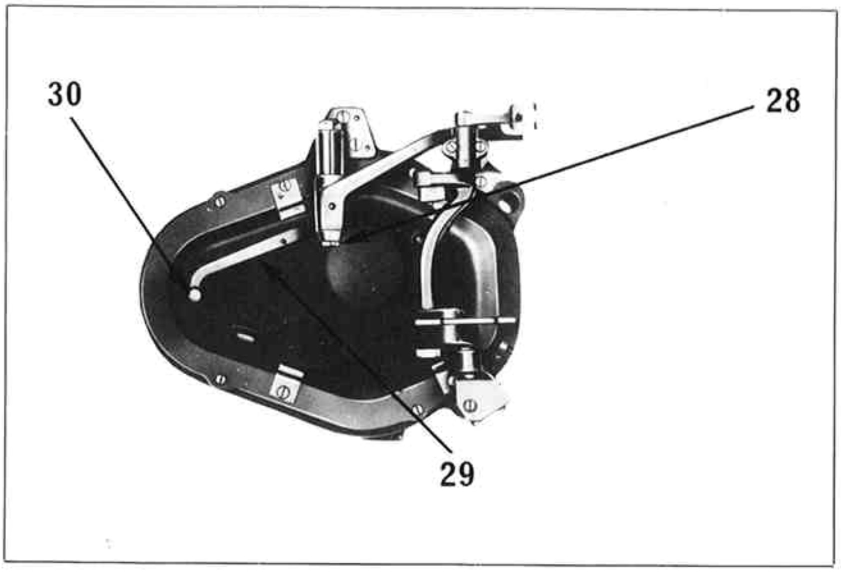
Before checking the adjustment, make sure you fit a good nozzle, using either number 5 with the $1\frac{1}{4}$in pump, or number 3 with the $\frac{7}{8}$in pump; then remove the metal ingot and reduce the level of the metal in the pot. Make certain the element remains covered however.

Ensure that the trip latch is placed out of action and that none of the pump body spring rod stop plates is in position.

Now remove the piston and pump levers (17) and (12), complete with the pump lever connecting link (11).

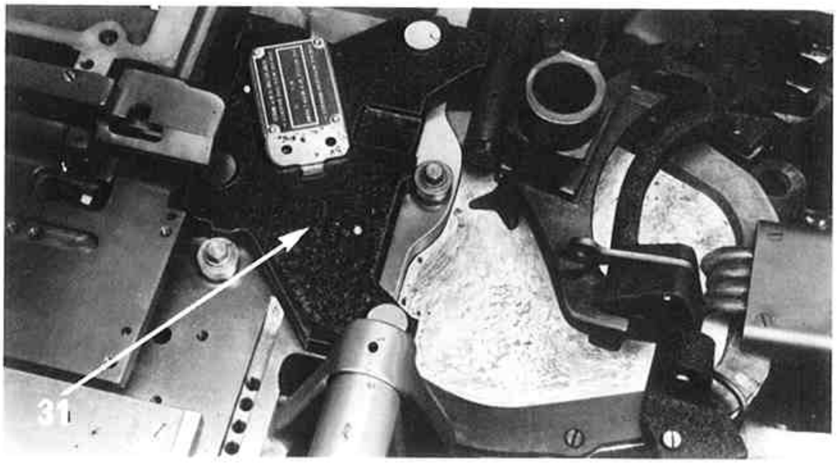
At this point, check the positions of the nuts (43) and (44) on the pump body operating rod (42). The distance from the top of this rod to the base of the bottom nut (44) should be approximately $5\frac{1}{8}$in (130·175mm) and that between the intermediate nut (43) and the bottom nut (44) should be about $\frac{13}{16}$in (20·638mm) but this is subject to final adjustment when squaring the nozzle as detailed in the sub-section which follows. At the same time, take advantage of the reduced level of the metal in the pot to make sure that the domed pin at the end of the nozzle-end lifting lever (13) is clean and showing no visible signs of wear.

To check the adjustment, attach the nozzle setting gauge (31) in place of the mould, rotate the machine by hand to bring it to the casting position, and run the metal pot up into the normal position for casting. While raising the pot, depress the free end of the pump operating rod lever (41) to avoid possible damage to the nozzle; then allow the nozzle to rise gently into the cone hole in



the gauge, and see that it seats quite freely in the setting gauge without binding, when the operating rod lever is released again. If the nozzle is not seating central in the setting gauge, note carefully the direction in which the metal pot requires to be moved to bring the nozzle into the desired position. Lower the metal pot and slacken the two casing stud units (33) and then carefully raise the metal pot into position again. The nozzle can now be centred in the gauge by adjusting the three swing frame adjusting screws (32) to re-locate the pot on the swing frame table, whereby the nozzle can be brought into the desired position. The two outside adjusting screws (32) bear up against the lug of the melting pot casing and control its transverse setting, whilst the centre screw, impinging on the table, affects the endwise setting of the melting pot casing. Before any adjustment is made to either of these screws to re-position the pot, the other two must first be slackened off.

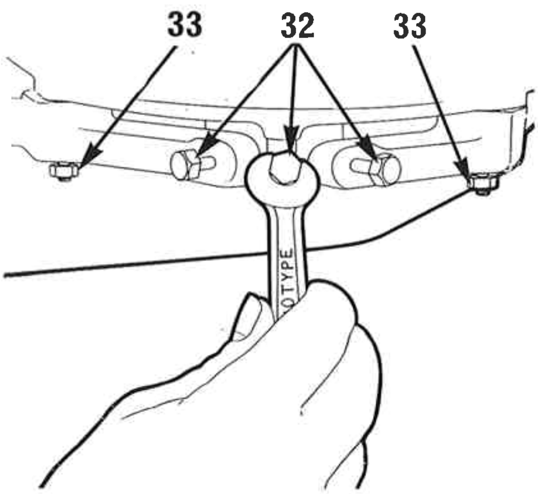
When the nozzle is correctly located in the setting gauge, re-tighten the melting pot casing studs (33), confirm that the nozzle is still centrally seated, then carefully tighten the three adjusting screws (32). The adjusting screws, it will be observed, have a mutual binding action.

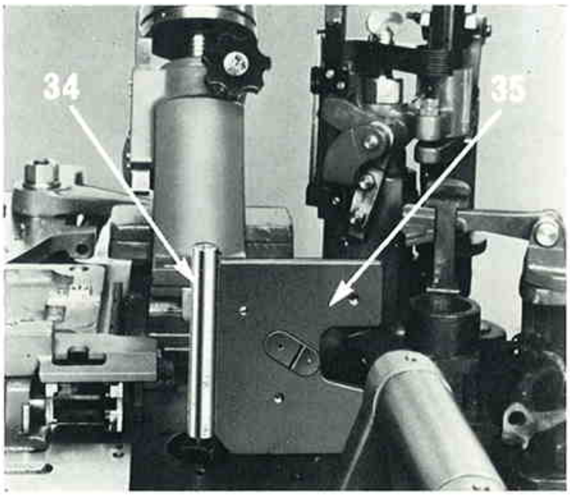


15.8 Squaring the nozzle

Whilst the melting pot is raised and the nozzle still centred in the cone hole of the gauge, insert just sufficient packing to fill the gap between the stand support and the pump body lifting lever (13), so that the pump will retain its position relative to the pot when the pot is lowered. Lead strip or a tapered wooden wedge provides good packing material for this purpose. Then lower the pot, take off both the nozzle and the nozzle setting gauge, and raise the pot again to the casting position whilst the packing is still in the gap.

Attach the correct size nozzle squaring post (34) in place of the nozzle, avoiding downward pressure in order not to disturb the packing; taking care to ensure the post is seated firmly and squarely in position. Check that the post is upright back and front, either by using the nozzle gauge as supplied for the composition caster, which is ideal for this purpose, or by means of an engineer's square. Any error revealed, whereby the nozzle squaring post leans either





forwards towards the galley, or backwards in the opposite direction, could be due to wear of the pump body lifting lever (14) or its bearing; and replacement of the affected part will be required.

If the squaring post stands incorrectly the other way, leaning either towards the pump or the cams, reset the intermediate nut (43) on the pump operating rod, after slackening its lock nut. This adjusts the position of the pump body lifting lever (14), lifting the piston-end of the pump. You will find that this adjustment will affect the position of the nozzle, and that you will have to reset it with the aid of the nozzle setting gauge. You must re-tighten the lock nut, however, before you check the nozzle position, but you should first ensure that there is working clearance between the rod and the yokes of the lifting levers; if necessary tapping the rear end of the melting pot sideways, after slackening the nuts (33). There is sufficient play round its pivot screw to allow this and, with care, this itself should not disturb the position of the nozzle.

As a final check, lower the pump just sufficient to hold the nozzle about $\frac{1}{32}$in (0·794mm) clear of the gauge, and ensure that the tip can move freely and equally all round the conical hole, without disturbing the pump bearings.

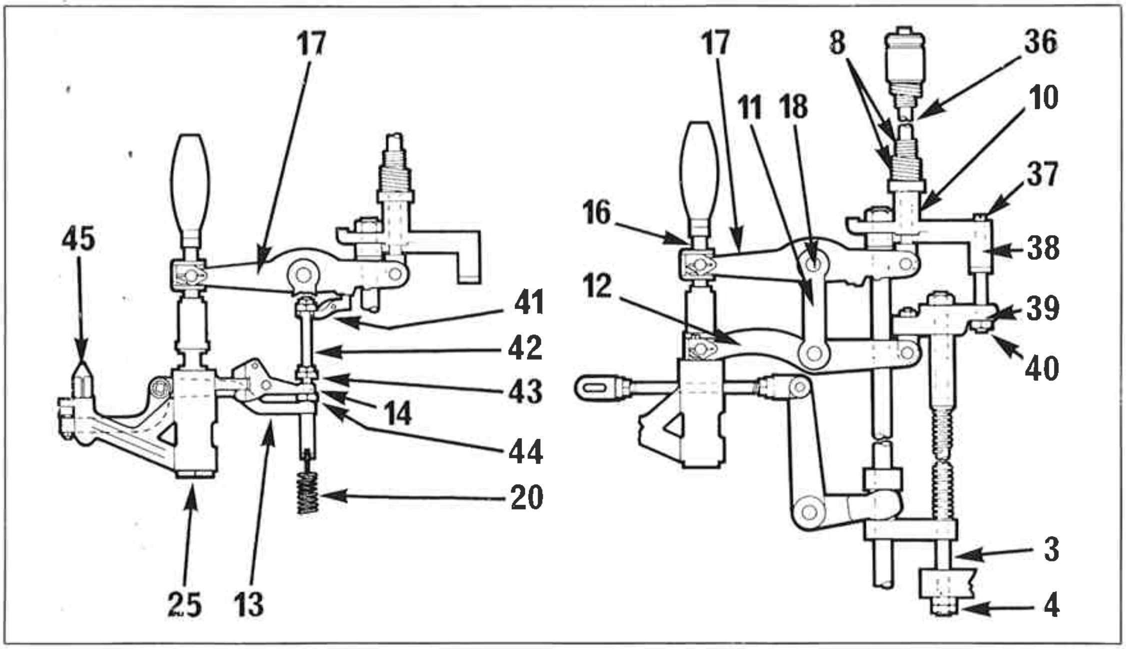
The piston and pump levers, and the pump lever connecting link, must be replaced on completion of the adjustment, and the metal ingot must be replaced to restore the level of the metal in the pot.

15.9 Crosshead (piston)

This adjustment must be carried out with a mould set up on the machine.

Insert the piston in the pump body, raise the metal pot to the casting position and carefully engage the pump release lever as if you were about to cast; manœuvring the machine into position by hand. Ensure that the pump body spring rod stop plates (the lower 'leaves') are disengaged, also the latch (9). With the stop plates out of action, screw down the pump body spring rod lock nut (5) located at the lower end of the spring rod (3), until the two nuts are well clear of the swing frame post (6), and make absolutely certain they remain clear throughout the operation.

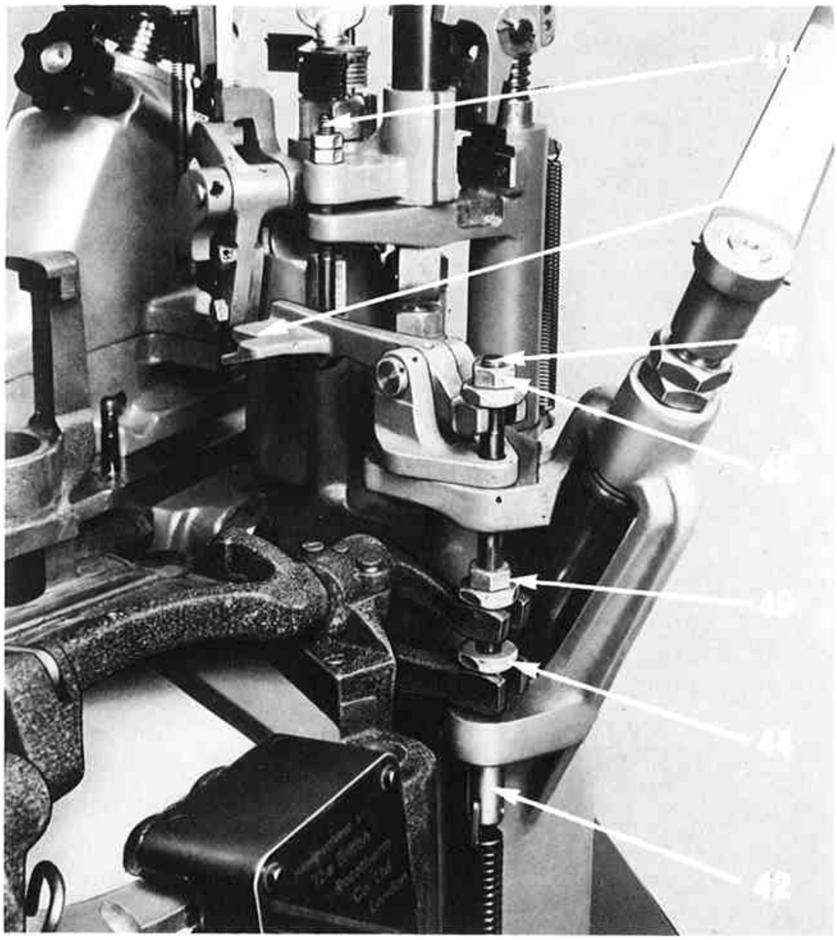
The machine can now be turned by hand to the casting position at approximately 220°.



The adjustment is concerned with the piston operating rod upper crosshead (38) and the pump body spring rod crosshead (39), the relative positions of which regulate the amount of clearance between the upper pin (18) of the pump lever connecting link (11), and the piston lever (17). Slacken the lock nut (40) at the lower end of the pump body spring rod crosshead stop post (37), then, using a screwdriver, turn the crosshead stop post in a clockwise direction, screwing the post down into the pump crosshead until its shoulder is just free from the piston crosshead (38) and the pump lever connecting link pin (18) is quite free in the hole in the pump lever connecting link (11).

Now screw the crosshead stop post (37) up again by turning it anti-clockwise until the connecting link pin (18) just binds on commencing to make contact with the piston lever (17). Whilst in this position, screw the stop post down again just half-a-turn in a clockwise direction to give the pin (18) the required clearance, and then lock in position again with the lock nut (40).

Finally, with the machine still at approximately 220°, adjust the pump body spring frame nut at the lower end of the pump body spring rod (3) until it contacts the swing frame post (6); then turn the machine to 100°, so that the nut (5) and the lock nut (4) can be secured firmly in position again.



15.10 Pump body operating rod and lever

The clearance between the free end of the pump body operating rod lever (41) and the machined seating in the lower face of the piston lever (17) should be approximately $\frac{1}{32}$ in (0·794 mm). This can be checked with a feeler gauge, but first you must place the four lower stop plates (2) in position on the pump body spring rod. The trip latch (9) must also be placed in position. Then remove all the upper 'leaves' (the latch trip plates) (62), engage the pump release lever in the position as for casting, place the operating lever (41) under the deep groove in the piston lever (17) and turn the machine to approximately 225°; in which position the pump nozzle is firmly seated in the mould ready for casting.

If the clearance requires correcting, adjust the nuts (48) at the top end of the pump body operating rod (47). The position of the intermediate adjusting nut (49) is determined when adjusting the nozzle angle, whilst the bottom nut (44) should be seated firmly on the shoulder of the operating rod (42).

The yoke clearances between the rod (42) and the yokes of the lifting levers (13) and (14) should also be checked as detailed in the adjustments for correcting the nozzle angle.

15.11 Additional adjustments

The following additional points in connection with the pump mechanism will call for regular examination and attention or adjustment from time to time.

15.12 Pump body hat valve ($\frac{7}{8}$ in pump only)

The hat valve (24) of the $\frac{7}{8}$ in pump, and its seating in the pump body, should always be clean, and the valve should have a clean and unobstructed hole through its centre, as already pointed out. Regular examination when cleaning the pump will ensure this.

The function of the hat valve is to check the return flow of the metal from the nozzle on the completion of a cast, but if too much metal remains in the nozzle due to the valve being obstructed, stop-casting is likely to result: that is, metal will solidify in the nozzle itself and prevent subsequent jets of molten metal passing through the nozzle to the mould. The small hole in the hat valve allows a limited quantity of metal to return during the up-stroke of the piston, by which means all the metal in the pump is retained at the correct temperature in between casts, and stop-casting thereby prevented. On the other hand, if the hole in the hat valve becomes enlarged, insufficient metal will remain in the nozzle and metal channel, and defective types will be cast.

To regulate the inlet of metal beneath the piston, which is controlled by the slots in the stem end screw washer, slacken the lock nut (23) a half-turn just above the piston stem end (22), then turn the stem end screw in or out as required, and lock in position again with the nut.

15.13 Pump release

Turn the machine to 120° to bring the pump operating cam lever to its extreme right-hand position, towards the main stand, and adjust the length of the pump release by means of the adjusting screw so that there is approximately $\frac{1}{64}$ in (0·397 mm) clearance between the abutment faces of the release and the cam lever.

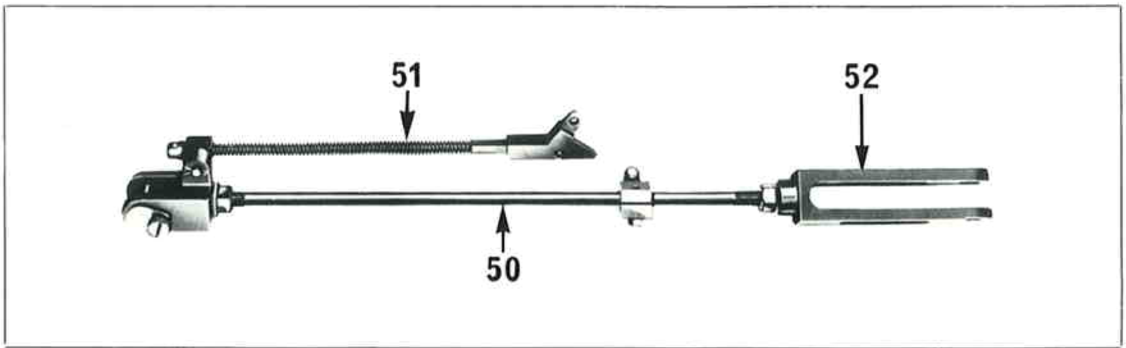
The screw, holding the two parts together, must be well slackened off to allow the adjusting screw to be rotated.

When locking the parts together again, make certain that the adjusting screw head and one face of the hexagon release lock screw are correctly positioned on the lower half of the release.

15.14 The pump driving rod

Turn the machine to 120°, in which position the pump operating cam lever is in its extreme right-hand position, and the piston operating rod crosshead (38) is resting on the pump stop collar (59). The pump driving rod (50), which has a right- and left-hand thread at the ends, must now be adjusted so that there is $\frac{1}{64}$ in (0·397 mm) clearance between the end of the slot in the pump driving rod link (52) and the pump cam lever pin.

Attached to the pump driving rod is an actuating rod (51) which has to be connected to the actuating lever of the counter mechanism head when casting strip material, including furniture; its function being to rotate the



CORRECT POSITION
STD
75H
FOR FULCRUM PIN

ratchet wheel of the counter mechanism one tooth each time the pump driving rod moves forward and a cast is made, thus enabling the counter mechanism to control the number of casts in each complete strip, in accordance with the setting of the counter drum scale.

15.15 The piston operating rod crosshead stud

The piston operating rod crosshead stud (46) allows the nozzle to seat in the cone hole of the mould just before the cast takes place, and takes it away just after the jet cuts off (see also details of the trip latch and the nozzle seating timing mechanism which follow in connection with the casting of large product at slow running speeds).

First ensure that all the 'leaves' are out of action; both the eight latch trip plates and the four pump body spring rod stop plates. Turn the machine to 360° and adjust the stud (46) so that it just contacts the pump body operating rod lever (41).

This adjustment may be varied as necessary according to the quality and temperature of the metal, which may be dictated by circumstances outside your control, in order to prevent stop-casting. You must, however, at the same time, take care to ensure that the nozzle is not withdrawn from the mould before the jet of molten metal is cut off, in order to avert splashing around the nozzle, and other attendant troubles which could follow.

15.16 The latch, the upper and lower 'leaves' and the piston spring rod

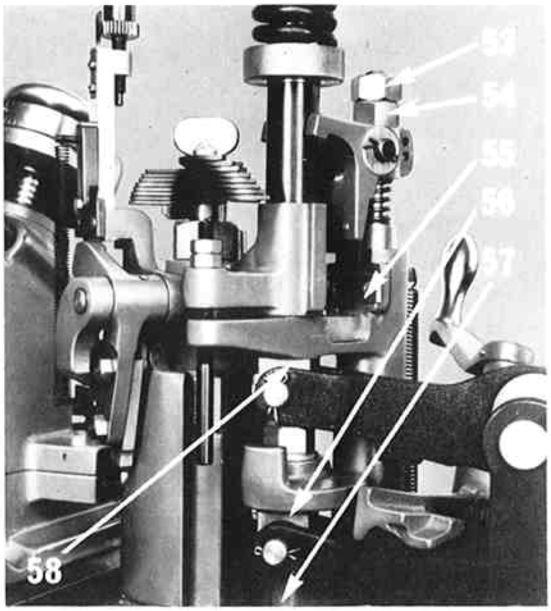
From the general introductory remarks and outline description of the pump mechanism, together with the various adjustments dealt with in some detail, it will be understood that the piston stroke, which supplies the jet of molten metal to the mould, will commence immediately the pump body spring rod nuts (4) come into contact with the swing frame post. This can be said to summarise the action that takes place when casting small type in the composition range, but improved results are obtained when casting large type and other bulky product if the piston is caused to make a more sudden descent.

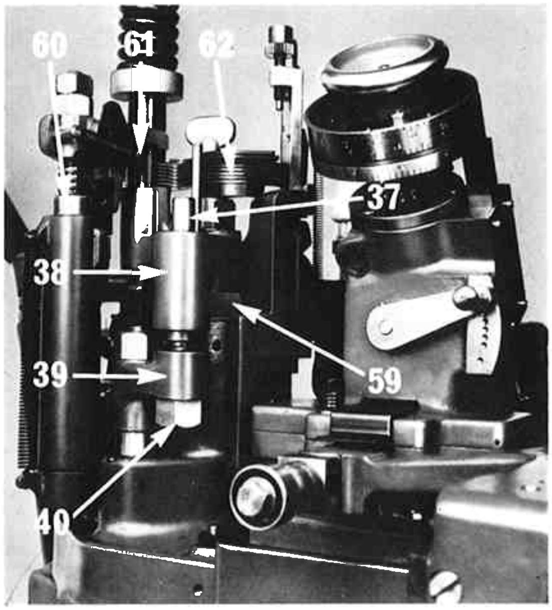
To provide for these conditions, the pumping mechanism is fitted with a latch (9), together with eight latch plates (62) and four pump body spring rod stop plates (2), generally known as the upper and lower 'leaves', by means of which the piston springs (8) may be further compressed and suddenly released, causing a stronger and more rapid pressure to be applied to the piston.

The trip latch (9) is attached to the latch stand shaft (60), the lower end of which is fixed in the latch stand shaft arm (57), guided by a stud running from the lower end of the pump body spring rod crosshead eye (56). Running on the latch stand shaft (60) is a latch abutment (55), with an arm on its upper end which rests on the piston spring rod eye (58).

When the trip latch (9) is placed in action, the piston springs (8) are prevented from operating until the latch is eventually tripped. Therefore, when the upward movement of the pump body spring rod (3) is arrested by the nut (4) coming into contact with the swing frame post, or any 'leaves' which might have been positioned to arrest it earlier than normal, the piston rod itself continues to rise, carrying with it the piston operating rod crosshead (38). The crosshead compresses the piston springs (8), but the piston is prevented from descending by the trip latch (9) which holds up the latch abutment (55), which itself holds up the piston spring rod (36).

As the piston crosshead continues to rise, it eventually trips the latch, whereupon the piston springs are released, causing sudden pressure to be placed on the piston which is now able to descend.





As both the length and the strength of the piston stroke require to be varied according to the cubic content of the product being cast, the group of eight latch plates (62) are located near the trip latch (9), so that one or more of the plates can be inserted between the piston operating rod crosshead (38) and the trip latch as necessary, thus causing the latch to trip earlier than is normal when plates are not used. The latch plates are hinged on a stud in the upper end of the piston operating rod and therefore rise as the piston operating rod rises: consequently, the greater the number of plates placed in position, the earlier will the piston spring rod be tripped.

Adjusting the trip latch, when necessary, is a simple matter. The latch stand shaft nut (54) and lock nut (53) located at the upper end of the latch stand shaft (60) should be adjusted so that there is a slight clearance between the latch (9) and the latch abutment plate (55), whilst to place the latch in or out of action, it is only necessary to move the latch pin (61) up or down as required.

Each of the lower leaves causes the piston operating rod to be checked earlier, whilst each of the upper leaves causes the latch to be tripped earlier, in addition to which, the compression of the piston springs (8) can be varied by adjusting the piston spring rod nut and lock nut located at the head of the piston spring rod.

15.17 **Nozzle seating timing mechanism**

In addition to the variable pumping conditions obtainable by adjusting the upper and lower plates and the piston spring rod nut, there is also the nozzle seating timing mechanism, a device which assures a consistently high output of good quality solid display type, and is applicable to type bodies requiring casting speeds of less than 25 r.p.m.

This mechanism provides an independent adjustment for the seating of the nozzle, as distinct from the usual method where the seating is subjected to a relatively small variation by the use of the pump body spring rod stop plates.

The adjustment of a trip screw, in conjunction with the latch trip plates, permits the seating of the nozzle to be delayed until the descending stroke of the piston is about to commence. This delaying action enables the nozzle to be kept in close proximity to the molten metal and reduces heat losses to a minimum, whilst the sudden release of the nozzle into the mould ensures a more accurate seating.

A very wide range of pumping conditions is therefore made possible by the different combinations available in connection with:

a) The latch trip plates.

b) The pump body spring rod stop plates.

c) The adjustment of the piston spring rod nut.

d) The nozzle seating timing mechanism.

15.18 The product information table

A 'Product Information Table', included in the tables at the end of the book, contains information covering data in respect of all products obtainable from the moulds used on the Super caster. The table, which is also provided in card form for use on the machine, gives you detailed settings for the piston spring rod nut and the number of pressure plates (upper and lower 'leaves') you are required to bring into use for casting the various products. It also gives you, amongst other things, pump body, piston and nozzle sizes relevant to all products; together with pump body lifting spring plate settings, instructions on the use of the latch and the nozzle seating timing mechanism, and guidance as to casting temperatures and operating speeds.

You will find with experience in due course of time that the instructions contained in the 'Product Information Table', especially in relation to the piston spring compression and the 'pressure plates', should not be accepted as hard-and-fast rules, as it is possible for the quality of type metal to vary considerably; whilst worn pistons and pump bodies will give results different from those obtainable on new machines. When you have had some experience at the machine and the opportunity to study carefully the effects obtained by the use of different numbers of 'pressure plates' and different degrees of compression on the piston springs, you will be able to make adjustments to the pumping mechanism best suited to your individual requirements.

15.19 Matrices

It is impossible to cast good type from imperfect matrices. You must therefore ensure that all matrices are always in good sound condition and properly cleaned. This especially applies in respect of the composition matrices, where dirt or any other imperfection could more easily escape detection.

Matrices must be correctly seated on the mould to ensure perfect sealing of the mould orifice during casting. Grit or any other irregularity on the face of the mould will prevent this, and allow metal injected by the pump into the mould to escape and produce a 'splash' which would not only result in faulty product but could also entail considerable stripping down and cleaning up, with consequent waste of time and effort.

The same equally applies in respect of the recess formed by the character punching of the matrix, since any imperfection here, or stray metal, such as a broken serif remaining in the cavity, can similarly result in faulty type which may perhaps be difficult to discern whilst casting.

Any stray metal on the matrix must therefore be carefully removed, especially after a splash, should one inadvertently occur; using a piece of soft lead product to aid you in doing so if necessary. Be careful not to scratch the matrix, taking particular care with the composition matrices, and never under any circumstances use abrasives, and only use lead rule with extreme care or irreparable damage will result. Be especially careful when removing obstructions of any kind from the recess of the matrix character punching.

After removal of dirt and stray metal, matrices should be carefully cleaned with a soft brush and a volatile oil solvent which will evaporate quickly. 'Trichlorethylene' is strongly recommended for this purpose, and in absolute emergency benzine. After cleaning, finish off with an air blast to drive away any dirty residue. Ample fresh air and complete absence of naked lights are essential precautions to be observed when thus involved.

The cone hole of the composition matrix should also be examined, as any dirt or obstruction here could prevent the matrix lifter centring pin seating properly, and result in the casting of type incorrectly aligned, and excessive wear and distortion of the hole, which would render the matrix useless.

Finally, always clean and examine every matrix after use, store it carefully, examine it again before use and remove any dust or oil that it may have collected. Refer also to Chapter 18 which deals with matrices.

15.20 The mould

Apart from other factors, and the detailed instructions relating to the various moulds fully dealt with elsewhere in the manual, our immediate concern here in connection with a mould's relation to the pump is that you should make certain that the cone hole in the mould base is clean and free from tinning and that the edge of the nozzle aperture is not damaged. Only thus can you ensure that the nozzle will be central in its seating in the mould, making a positively sealed joint, avoiding additional tinning from metal loss, and ensuring that the mould casting cavity will be properly and efficiently filled.

Both the base of the mould and the seating on the mainstand where the mould is positioned must be perfectly clean and free from burrs, as any unevenness can cause distortion of the mould. This means that you must examine both the base of the mould and the adaptor base as necessary. A few moments spent making certain on these points is well worth while, as mould distortion can result in water leakage, possible seizure, and other costly troubles involving other parts of the machine.

15.21 The mould crossblock

Finally, we conclude with a brief reference to the mould crossblock, which plays an equally important role in the casting of good type.

Faulty positioning of the crossblock during injection may cause obstruction to the flow of metal, resulting in turbulence in the casting cavity, which causes porous type and 'frosty face'. Similarly, faulty crossblock travel arising out of faulty type carrier adjustment can interfere with the passage of the type into the type carrier on ejection, and subsequently out of the type carrier into the type channel.

Check to make sure that there is no undue play between the hook and the carrier, as any slackness here would make accurate adjustment impossible.

If the connection between the mould and the type carrier gives no cause for complaint, you must remedy the fault by checking and adjusting the stroke and pausing positions of the type carrier as instructed in 10.5 and 10.6 in connection with the matrix heads base.

15.22 General working conditions

The following is a very brief summary of the various factors which have some considerable bearing on trouble-free casting, mainly in respect of the pump and its related parts, and the molten metal which is by way of being its life blood. In this, we shall touch on, in outline only, some new ground which is dealt with fully elsewhere in the manual, and in passing, briefly make reference to some points already covered in some detail in this same chapter.

For further reference you should turn to: 'The automatic ingot feeder' – Chapter 1, Section 5; 'The electric melting pot attachment' – Chapter 42, Section 18; 'The production of good type' – Chapter 41 and 'Type metal' – Chapter 42.

15.23 **Caster room**

Whilst adequate ventilation is required in the caster room, draughts should wherever possible be avoided, particularly in climates which suffer extremes of cold weather, in order to avoid chilling the metal pot. Adequate space must always be available round the caster to enable adjustments to be made, and a bench, with a vice and cleaning accessories, should be readily accessible.

15.24 **Spare pump body**

Considerable production time can be saved by putting into service a spare pump body, complete with piston, when routine or emergency pump cleaning becomes necessary. The pump which has been removed can receive attention at any convenient time, provided of course that it is properly re-heated first; whilst in the meantime, production continues without unnecessary delay.

15.25 **Cooling the mould**

The supply of water to the mould for cooling purposes calls for some careful planning when the caster is being installed.

Hard water, which carries heavy deposits of lime, causes furring up of the mould's water passages, whilst water that is soft may increase the tendency to rust. The water passages could therefore eventually become blocked and result in inefficient cooling. Wherever possible, in order to avoid this, a closed-circuit cooling system should be used, but in any event, direct water supply from the mains should be avoided.

The temperature of the mould is controlled by the rate of the flow of the water. Keep the flow from the mould down to a gentle trickle for the smaller composition type sizes, increasing it to a steady flow for the larger sizes, and for the display type moulds and the strip moulds accordingly. Thus the water flow controls the mould temperature according to the nature of the product being cast, and this may need to be varied considerably with local conditions. A general guide in this respect is given in the 'Product Information Table'.

15.26 **Casting temperature**

The tin and antimony components of the alloy used in casting tend to separate from the melt at temperatures somewhat below 315°C (600°F), forming an obstructive scum, which likewise tends to upset the balance of composition in the remaining liquid metal. Correct casting temperatures for the Super caster range between 315°C and 387°C (600°F and 730°F) according to the product being cast, in respect of which a general guide is given in the 'Product Information Table'.

15.27 **Melting pot**

The contents of the melting pot should always be the correct alloy for the class of product being cast, without any impurities, and it should be kept clear of dross or scum by regular skimming at working temperature. The alloy in the pot must be maintained at the correct level by replenishing the metal in small quantities, or preferably by means of the automatic ingot feeder attachment, thus ensuring that the heating element is always kept covered. Any accumulation of jet tangs from the mould should be prevented by stirring them in from time to time, since a quantity of type, or a supply of coarse-grained metal, will create a heavy crust in the pot, and as this does not respond to increased temperature it must be skimmed off to prevent obstruction of the pump.

15.28 Metals required for casting Lead forms the bulk of the metal for casting on 'Monotype' machines; it is blended with specified amounts of tin and antimony which may vary according to requirements. No other metal should be present in the alloy, and additives of any kind are unnecessary.

15.29 Injurious metals A brief note on the re-melting of type metal appears in Section 33 at the end of this chapter, and it is also dealt with in some detail in 42.8 which deals with the handling of molten printing metals.

Re-melting of type metal must be carried out with scrupulous care if the inclusion of injurious metals is to be avoided, and the following will give you a general guide as to their detection should they be accidentally included:

Aluminium produces a persistent skin in the melting pot, obstructing the flow from pump to mould. Copper can be tolerated only in very minute quantities, since like nickel, its presence can cause blockage in the nozzle. When present in appreciable quantities, copper imparts a pinkish-blue tinge to the metal. Finally, zinc, which is apt to be more commonly found in the alloy than aluminium, also forms a similar persistent and obstructive skin, and the most minute quantity can render the alloy useless. Zinc, you should regard as your mortal enemy when preparing to re-melt type metal.

15.30 The nozzle A nozzle that is clean, both inside and out, and correctly centralised and squared is absolutely essential to satisfactory casting.

15.31 General cleanliness Particular care must be taken to ensure that the metal passages of the pump, the tip of the nozzle, the mould surfaces and the matrices are free from all foreign matter, both when setting up the machine and at all times during casting. Care must likewise be taken to ensure the cleanliness of the piston and pump bushes.

15.32 Machine running speeds Casting speeds are largely governed by the amount of heat in each cast, which must be dispensed to enable the product to solidify. Production speeds are therefore dependent on both the volume and temperature of the metal injected into the mould. The information given in the 'Product Information Table' and in the 'Speed Table for Display Matrices', in respect of casting speeds for the full product range available from the Super caster, will be seen to bear this out. The 'Speed Table for Display Matrices' is given at the end of the book. It is also reproduced on the reverse side of the 'Product Information Table' provided in card form for use on the machine.

You will observe that the smaller composition type sizes in the 6–8 pt range, which are cast at a high temperature, can be produced at higher speeds than the larger type sizes; whereas, as the products listed increase in size, so, generally speaking, are both the speed of casting and the temperature likewise reduced. You will also observe, for instance, that a quotation cast to 6 ems × 3 ems can be produced at twice the speed of a 6 ems × 6 ems quotation which is twice its size; all quotations being cast at the same temperature.

The temperature and running speed relationship will be seen to equally apply in the table bearing product information for the lead and rule moulds, both the temperature and running speed being less as the volume or cubic content of each class of product increases. In the case of furniture and mounting material, however, where nothing is cast either above or below 332°C (630°F), only the speed of casting is varied, according to the point size.

Furthermore, the running speeds and temperatures given in the 'Product Information Table' must only be regarded as a general guide, and experience will dictate how you will in due course interpret the figures given and vary them slightly according to your particular needs at the time. Nowhere is this more true than in respect of the figures given for the full type range from composition sizes to display, where both running speed and temperature are based upon the half-em body in each instance, and you are therefore (except with display typefaces) free to decide for yourself as to increases in both speed and temperature for smaller set-size type bodies, and consequent decreases likewise where the set-size is greater than the half-em quoted in the table as a general guide. The 'Speed Table for Display Matrices' gives you the running speed relative to the matrix marking (which is related to the set-width of the type body) and you are only required to determine the consequent metal temperature.

15.33 **Re-melting of type metal**

Scrap type and other product from the Super caster should be re-melted, preferably in batches of about 200/300lb each, according to the size of the furnace. The furnace should be so designed as to reduce the supply of free air and thereby minimise oxidation. This is important as both the tin and antimony constituents of the alloy will oxidise and dissipate at a much lower temperature than will lead, if exposed to the air, and the balance of the composition of the metal alloy could thus be destroyed and rendered useless.

First ensure, when preparing your batches for re-melting, that the material is not contaminated by the inclusion of aluminium, brass or other alloys containing zinc or copper, or anything else not consistent with the approved specification of the type metal. The presence of copper, as already stated, can be indicated by a pinkish-blue tinge in either the cast type or the metal ingot, whilst a persistent skin on the melting pot even after skimming can indicate the presence of zinc, or possibly, though less frequently, aluminium.

When re-melting, use only a simple wax printing metal flux, and reviving metal only as recommended by the metal suppliers, in accordance with their analysis of the type metal to be treated – and follow this routine:

Bring the metal quickly up to 371–399°C (700–750°F).

Add the flux and stir thoroughly with a perforated ladle for several minutes, until it has been consumed.

Skim off the finely powdered dross which remains, then stir the metal again and skim off any dross which rises to the surface.

Add the right amount of reviver and stir it well in for several minutes, to restore the natural losses of tin and antimony.

Reduce the temperature to about 343°C (650°F).

Pour off into cool clean moulds to ensure that the metal solidifies rapidly, in order to avoid coarse-grained ingots which could lead to trouble on the machine.

Any metal found to be contaminated by the presence of unwanted metals must be immediately segregated from other stocks and returned to the supplier, as even slight traces of 'foreign' metals will result in continuous casting troubles.

15.34 **Analysis of type metal**

From time to time, as a matter of routine, samples of cast type and part of a re-cast ingot should wherever possible be submitted to the metal suppliers, to ensure that the quality of the metal you are actually using agrees with the specification stipulated for the class of work involved.