GENERAL INSTRUCTIONS FOR OPERATING AND MAINTAINING A STANDARD 'MONOTYPE' THOMPSON TYPECASTER WITH A RANGE FROM 6 TO 18 POINT

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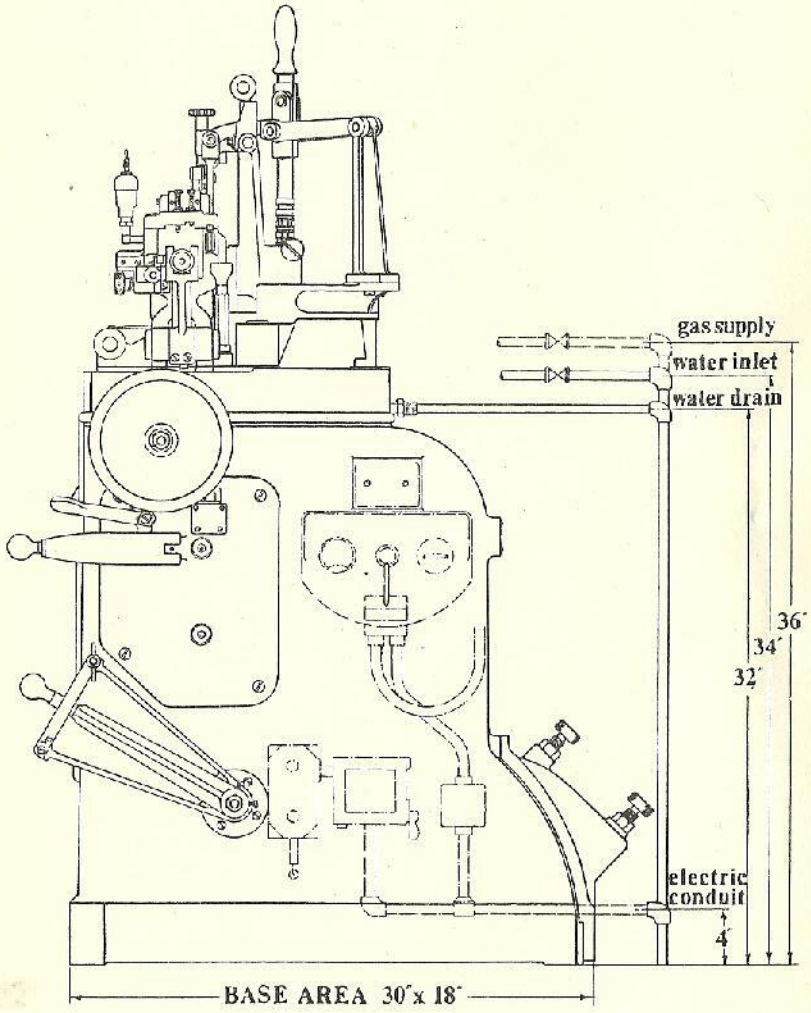

GENERAL INSTRUCTIONS FOR OPERATING AND MAINTAINING A STANDARD 'MONOTYPE' THOMPSON TYPECASTER WITH A RANGE FROM 6 TO 18 POINT

THE MONOTYPE CORPORATION LIMITED
Salfords, near Redhill, Surrey, England

250/11/54.

INDEX

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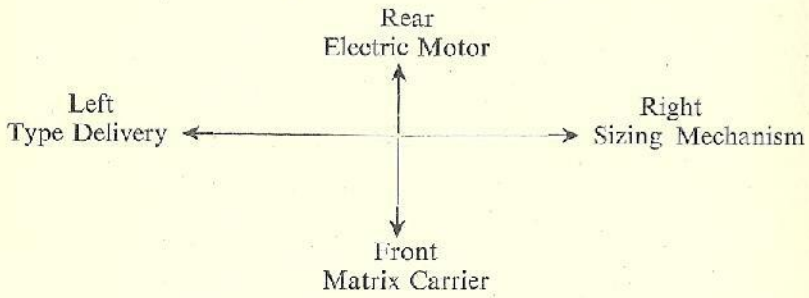
The following instructions 'Right', 'Left', 'Front', 'Rear', are understood to be taken when operative is stationed with matrix carrier in front of him and sizing mechanism on his right.



When referring to a part removed from machine the term 'Right', 'Left', 'Front', 'Rear', is always assumed from this position. The paragraphs relating to the care of the machine adjustments, such as oiling, cleaning, etc., should be read frequently to ensure a thorough understanding of these functions. We are always willing to assist users of a 'Monotype' Thompson Typecaster and to give answers to questions relating to its operation. It is suggested that, before you write to us, these instructions be carefully studied to ascertain if the difficulty being encountered has not already been discussed herein and the remedy provided. When any part of the machine is sent to our Works for repair, attach a label stating the owner's name and address as a means of identification. The correct wording of an order will often save considerable correspondence and unnecessary delay. This book is prepared for the benefit of the operative.

POSITION OF MACHINE

The machine occupies a floor space of 35″ × 39″. The weight of complete machine fully equipped is approximately 9 cwt. It is important that machine be placed in position with a good light showing from either the left- or right-hand side of the operative, when facing the front of machine.

When artificial light is used, it should be placed so it will fall directly upon mould and matrix carrier from overhead, and low enough to illuminate the working parts without affecting the operative's eyes. The machine, if possible, should be placed on a solid surface.

WATER CONNECTIONS

Make water connections as shown on diagram. The Typecaster is water-cooled to carry off excess heat and effect a faster delivery of type. It is important that all water connections be made so that the flow may be easily regulated. The water supply pipe to machine should be copper and need be no larger than quarter-inch. A stop cock is provided and connected to the end of the supply pipe so that it will be convenient for the operative to regulate the flow of water as required without leaving his position in front of machine. A piece of tubing is used to connect the stop cock on the end of supply pipe with inlet pipe on the mould. The quarter-inch waste water drain pipe which extends about three inches beyond back of the machine top base should be connected directly with a three-eighths-inch copper tubing. This should be run into a drain so that waste water will be carried off.

VARIETY OF PRODUCT

The machine is constructed to cast type and high or low spaces in any size from 6 to 18 point, from ·2″, ·4″ and 1″ 'Monotype' and Thompson matrices or Line Composing Machine matrices.

HEATING

The metal may be heated by either gas or electricity. The gas burner for heating the type metal is so constructed that the flames will spread, thus heating the metal only with a minimum amount of gas consumption.

The flame should be blue. A red flame will deposit soot on the bottom of the melting pot, preventing the type metal from becoming correctly heated. The air supply regulator on lower end of air mixer may be turned to the left or right to open or close the holes through which air passes. Too much air will cause the gas to ignite in the mixing chamber ; if this occurs the gas must be turned off and air holes closed a little before again lighting the gas. Nothing smaller than a three-eighths-inch pipe should be used to supply the burner. The gas cock should be large enough to permit a free flow of gas to the burner. The temperature of the metal is controlled by the gas supply and when correctly set the regulator is fully automatic.

'MONOTYPE' AUTOMATIC INGOT FEEDER

The application of this automatic ingot feeder to the Typecaster enables molten metal to be maintained at a constant level with little attention on the part of the operative.

The mechanism consists of a sensitive escapement, actuated by an iron float in the molten metal. As the metal in the melting pot becomes lessened, the float sinks a corresponding degree, causing the attached chain to release the escapement shoe, so that the ingot starts to descend and melts at once. As the molten metal becomes replenished, the float rises causing friction to be applied to escapement brake disc, thus preventing any further descent of ingot until the metal level is again lowered. Moulds are supplied for casting feeder ingots which weigh approximately 10 lb.

BRITISH ROTOTHERM ELECTRIC TYPE METAL HEATER

This apparatus consists of three main parts, viz. : the heater with its terminal box, controller and mounting bracket and the junction box. These units are wired up and connected to each other by asbestos-covered flexible cable incased in a flexible metallic tube. The heater is of the tubular type element formed in such a shape as to make a snug fit in the melting pot. An additional element is employed to convey heat direct to the nozzle end of the melting pot and is 'always on'. It is important that when ordering heater elements the actual supply voltage is stated. The capacity of the electric melting pot is approximately 56 lb., taking about 45 minutes to heat metal to 700° Fahrenheit.

If it is found necessary to remove one or more of the internal elements from melting pot proceed as follows : Switch on current and allow sufficient time for the metal to heat up to casting temperature. Remove the ingot feeder. Make sure the fixing screws holding heater elements and other parts affected have been loosened off and made quite free to remove. Swing back the melting pot and remove piston 68T1 by loosening piston lever pin set screw 69T4 in the top of piston lever 69T1T and pull piston lever pin 69T3 outward and lift piston out of melting pot. Drop a small cake of flux into melting pot and stir thoroughly until dross is well separated from metal ; then skim off the dross. Place the ingot mould under nozzle 94T17 and drain all metal from melting pot by hooking choker tripping tool 3TT7 over choker valve lever rocker arm 8T5 at the point above choker valve lever rocker arm link 8T6T, and press down on end of the choker tripping tool until the metal flows freely out of nozzle into ingot mould. Take out the choker valve lever adjusting screw 8T3 and remove choker valve lever 8T1T. Remove the four screws 38T7 supporting cover plate 38T6. Loosen the piston lever pin set screw 69T4 and take out piston lever fulcrum pin 70T1. Release tension on choker spring rod spring 9T8, take out the two choker valve lever rocker arm trunnion set screws 8T12 and choker valve lever rocker arm trunnion 8T11 and remove rocker arm 8T5. Unscrew the nozzle and clean all metal and oxides from the inside of nozzle. Remove choker valve 94T2 out of the melting pot and clean off all metal or oxides whilst it is still hot. With a wooden stick clean out the choker valve bushing making sure no dirt is left in the bushing or nozzle hole in melting pot, and immediately turn off electric current so the melting pot will cool. Elements should not be switched on uncovered for more than twenty minutes.

Immediately after switching off the electric current, and whilst melting pot is still hot, clean out pump well in melting pot with a wooden stick and rag. If there is an accumulation of oxides in the nozzle or on choker valve, it can be removed by heating them in the flame of a burner or a blow pipe, and then cleaning off the oxides.

Either of the internal elements can now be removed by taking out cover plate screws, retaining screws, element connecting screws and melting pot element clamping screws.

To remove the nozzle heater element the melting pot must be removed from machine, therefore the following additional instructions must be carried out. Loosen screw and remove capillary tube from melting pot.

Loosen the melting pot adjusting screws 38T4 and 38T2, take out melting pot screws and disconnect electric mains lead from junction box ; the melting pot can now be lifted out. Proceed to remove melting pot casing covering the nozzle element, firstly the bottom plate then element clamping plates, and then casing on nozzle side of the melting pot, take out the two element connecting screws and two clamping plate screws ; the element for nozzle may now be removed.

When the element has been replaced, care must be taken to see that all asbestos packing is replaced and the joints packed with fire clay. Re-assemble the parts and adjust to instructions. Refer to 'Connecting and Adjusting Melting Pot', p. 28, 'Sidewise Adjustment of Melting Pot', p. 29, and 'Squaring and Adjusting Forward Position of Melting Pot', p. 29. When filling the melting pot for the first time, the best plan is to use old pieces of loose type as they will lie closer to the elements with less danger of overheating.

DRIVE

The machine is driven by ½-h.p. motor mounted on an adjustable base in the rear of machine. Attached to the motor base is a speed

reduction gear unit which reduces the output speed of motor to 680 r.p.m. To obtain the best results from V-belts, the motor base should be adjusted so that tension is sufficient to give a flexible drive ; too much tension would cause friction and excessive wear.

A handwheel is provided which must always be moved anti-clockwise. A change of speed is made by raising or lowering the speed change operating lever while the motor is running.

THE CAMS

Facing the front of the machine, and counting from left to right, the cams on camshaft have the following actions :—

First is the choker cam 2T2 which operates choker cam lever X6T through which the choker valve lever rocker arm link 8T6T, choker valve lever rocker arm 8T5, choker valve lever 8T1T and choker valve 94T2 are actuated.

Second is the pump cam 2T18T which operates pump cam lever X76T through which the piston lever link 71T1T, piston lever 69T1T, and piston 68T1 are actuated.

Third is the vertical mould blade cam 2T22. This cam operates the vertical mould blade cam lever X53T attached to vertical mould blade lever X52T which moves vertical mould blade up and down at the type discharge end of the mould chamber.

Fourth is the matrix carrier cam 2T12 for operating matrix carrier cam lever 30T1T and matrix carrier cam lever extension 30T2 through which the matrix carrier is actuated.

Fifth and sixth are the mould blade auxiliary cam 2T16 and mould blade cam 2T17 respectively for operating mould blade cam lever 49T1 and mould blade lever 48T1 through which the mould blade slide and mould blade is actuated.

CLEANLINESS

Cleanliness is absolutely essential in a machine required to do the accurate work of typecasting. Small particles of metal, grit, or dirt of every description must be kept away, particularly from mould parts. A soft, clean rag should be used to wipe mould blades, etc., before putting them into the mould. The matrices and mould faces should also be wiped and all metal brushed away when matrices are changed, and if the run is a long one, remove the carrier occasionally and wipe the parts. The entire mould should be removed occasionally and washed with benzine or trichlorethylene and wiped clean, thoroughly oiled and replaced. Keep the oil grooves in the mould free from accumulations of metal. Run a wire through the oil hole connecting

the oil pad with front end of mould. When the mould bodies and similar parts are stored away, coat them with a rust preventative. Wipe the interior faces of the cams to remove grit and do not allow oil to run over the machine surfaces. Always keep the machine clean and covered when not running.

OILING MOULD PARTS

To ensure perfect operation of machine, it is important that correct lubrication be applied. If bearings and surfaces which move in contact are not oiled, the parts soon become heated and carbon is formed, which seizes the metals and causes deep cuts in their surfaces. A rapidly moving part lacking oil may be ruined in a few minutes. It is therefore essential that mould parts be kept well lubricated, and because of the heat near these parts the task is more difficult.

To solve this problem an adequate oiling system is fitted, but all efforts will be in vain unless the operative puts oil into the cups provided for this purpose. Oil should be supplied at least once an hour whilst running.

An oil cup is located in the back wall of mould stand near the water tubes, another above the type receiving shoe and a syphon oiler in mould stand to lubricate the jet blade.

The oilers should be kept full and the drip feed oiler adjusted to feed approximately one drop per minute.

It is recommended that Duckham's Mould Oil W7118 be used for lubricating the mould.

Make certain the oil flows freely into oil holes and bearings. Wipe off surplus oil that may run from them.

CAM ROLLERS

Next in importance are the cam rollers. If these do not revolve freely on their studs they soon wear a flat surface at one or more points. This causes the cast-iron cams to wear rapidly, with the result that all cam lever movements are affected and their accurate timing destroyed. Each of the cam levers 30T1T and X53T have oil holes near the cam rollers. The oil hole for the pump cam lever roller is in the rear end of lever X76T and can be seen only from the back, just above the base top when melting pot is swung back and the pump stop 77T1 is in position under the pump cam lever X76T. This pump cam lever roller must be oiled frequently through the oil hole to prevent roller from wearing flat and consequently cutting the pump cam. The mould blade cam lever roller has an oil hole to lubricate both rollers on the lever 49T1.

CAMSHAFTS

There is one oil hole in each base camshaft bearing cap 1T2 and 1T4, both outside the base.

CAM LEVERS

There is an oil hole for each of the six levers mounted on mould stand, the choker cam lever x6T, pump cam lever x76T, vertical mould blade cam lever x53T, matrix carrier cam lever 30T1T, mould blade cam lever 49T1, and two for mould blade lever 48T1. The segments between the two last-named levers should also be oiled.

OILING GEAR BOX

There are three oil tubes and one oilway, fed from the oil sump situated on right-hand side of machine, two lead to the gear box lower shaft 18T1 and one to the oil way in the gear box upper shaft 17T1. The oil is supplied to the oil sump by means of a drip feed oiler.

MOULD STAND MATRIX CARRIER SLIDES

The mould stand matrix carrier slides 54T31 and 54T27 can be oiled through the two oil holes above them.

SMALL BEARINGS

One oil hole will be found in the top of the melting pot yoke stud 40T1. There is also an oil hole in the square end of adjusting screw 46T1 connecting with the mould blade slide, and another oil hole in the top of mould blade lever 48T1.

STARTING MACHINE FOR CASTING TYPE

Light the gas or switch on electric melting pot about forty-five minutes before starting to cast type. Before the mould is adjusted it should be wiped absolutely clean and must be thoroughly oiled and free from accumulation of dirt or metal : make sure all oil cups are filled. Place matrix holder in matrix carrier and insert matrix into matrix holder, then slide carrier into position. Pull out knob in matrix carrier cam lever extension 30T2 and raise extension fork 30T3T until it fits snugly under handle of matrix carrier. When the metal has been heated to correct temperature, hook the choker tripping tool 3TT7 over the choker valve lever rocker arm 8T5 and press down on the end of choker tripping tool (using a ladle to catch flowing metal) to make sure choker valve will move freely in the nozzle ; this must be done to make sure the metal in nozzle is melted. If the metal is not thoroughly melted at this point, the choker valve will stick in the nozzle and break. Wipe clean the face of the nozzle ; also wipe clean the opening in nozzle plate and set the latter closely against mould. Raise piston lever 69T1T, swing melting pot against mould and lock in casting position.

Turn handwheel several times to make sure all parts are moving freely.

The clutch shifter lever 10T8 is located on the right-hand side of machine base, directly above speed change operating lever 11T13. To shift the machine from neutral position into gear, the clutch shifter lever 10T8 must be moved to the right or left to allow the clutch detent arm 10T2T to engage in its annular groove in clutch detent head 10T15. To stop machine, shift to neutral by pressing down clutch detent arm 10T2T. Start the motor, allow it to run about half a minute, then with the right hand take hold of handwheel and turn it in its casting direction ; at the same time, with the left hand, operate the clutch shifter lever 10T8. The machine is now in gear and ready to cast type.

The speed change operating lever 11T13 is located on the lower right-hand side of the machine base and is for the purpose of regulating the speed of the machine. This is explained under 'Casting Speeds', below.

When all adjustments for casting are correctly made, pull out pump stop 77T1 on upper left-hand of the machine. After making the first cast, remove type from the mould, break off jet and place type, with its nick up alongside the lining standard on alignment gauge to ascertain whether it is of the correct alignment. If not, follow instructions under the heading 'Adjusting the Alignment', p. 15. After running the machine for at least one minute, turn on the water. When casting type of the smaller body sizes, only a little water is required to keep the mould cool, but when casting the larger sizes of type a good flow of water is necessary to keep the mould sufficiently cool to maintain a maximum casting speed. If machine is stopped for a minor adjustment, turn off water to prevent the mould and nozzle cooling.

CASTING SPEEDS

The standard machine is designed to cover a range of type sizes from 6 point to 18 point. The speed at which type may be cast on a 'Monotype' Thompson Typecaster is limited only by the length of time required to fill the water-cooled mould solidly with metal and give it sufficient time to chill before it is discharged. The time required to chill the metal varies with the size of type being cast and the grade

and quality of type metal in use. When a Typecaster is operated at a speed too fast to permit the metal to solidly fill the mould chamber, the result will be hollow type. The recommended speeds for obtaining best results from 9% tin, 19% antimony and 72% lead are as follows :—

6 point—130 to 150 casts per minute
8 point—110 to 130 casts per minute
10 point— 85 to 110 casts per minute
12 point— 65 to 90 casts per minute
14 point— 50 to 70 casts per minute
18 point— 35 to 50 casts per minute

The first figures in the above table are the number of casts per minute of em set characters, the larger figures are those at which the thinnest characters such as the lower-case 'i' and punctuation marks may be cast, but it is suggested these speeds be regarded as a basis, as in some circumstances it may be found possible to obtain better results by an increased speed, while in others a slight reduction in speed may be necessary.

The operative will soon learn the speeds that will give best results for different sets with the particular grade of type metal in use. Before trying to set machine for correct speed at which to cast type, the operative should thoroughly familiarise himself with the means of changing the speed of machine as set forth in the following directions.

A 'Monotype' Thompson Typecaster is designed so that any speed between the high and low limits can be readily obtained. This is accomplished by means of a variable speed cone drive and gears. The speed change operating lever 11T13 is situated on the right-hand side of the machine base. Raising the lever reduces the speed, lowering the lever increases the speed. Suitable speeds are obtained when motor is running by loosening speed change bracket strip stud wing nut 11T8 and raising or lowering the lever ; then tighten wing nut to hold firmly.

Small type should be cast at high speed ; large type should be cast at low speed. Large type cannot be cast as fast as small type as it takes longer for a large volume of metal to cool and solidify than for a small volume. If the machine is run faster than the interior of the type can solidify, the type will swell or explode upon being ejected from the mould. Type will have a 'frosty' face if cooled too quickly. It is, therefore, absolutely necessary that the water supply to the mould is not too great. When the water flowing out of the mould is lukewarm to the touch, the correct amount is being supplied.

ALIGNMENT GAUGE

The type alignment slips should be used in conjunction with the type alignment gauge 6TT1. If the line of the type does not accurately agree with the alignment slip, correct the alignment as in the following procedure.

ADJUSTING THE ALIGNMENT

Put the capital 'H' matrix of the face and body about to be cast into the matrix carrier and place the carrier into position on the machine. Do not connect to matrix carrier lever, as it is desirable to move it from the mould by hand to ascertain whether the alignment position of matrix is approximately correct. If necessary, turn the graduated knob on top of matrix carrier x27T to bring the bottom edge of the matrix face in line with bottom side of mould cavity. Connect matrix carrier to lever and cast one or two pieces of type by turning the machine by hand. Place the type on alignment gauge with alignment slip to test for alignment. If the line is high or low, bring the matrix up or down by turning graduated knob on carrier to bring matrix in correct position. When using Line Composing Machine matrices, use existing type as an aligning slip.

To move the matrix sideways, release both the matrix carrier wedge clamp screw 27T18 and the matrix holder lever clamp screw 35T14. Rotate the wedge adjusting screw 27T17 to higher or lower the wedge 27T16 to give the desired movement. Tighten the wedge clamp screw 27T18, matrix holder lever clamp screw 35T14 and lock nut 35T15.

NOTE.—It is essential that the matrix holder clamp lever 35T12 is sufficiently free when moving the wedge downwards.

CASTING LOW SPACES AND QUADS

The equipment for casting low spaces and quads consists of low spaces and quad mould blades and a blade cover plate to be used in the type mould, also a low space cap. To use this equipment, proceed as follows : remove the mould, as explained under the heading 'To Remove Mould', p. 20. Take out the two small screws that pass through the mould front wall ; this releases the blade cover plate, which can now be withdrawn from the mould. Replace this with the blade cover plate for space and quad mould blades, by sliding it into the place against the mould front walls. Fasten firmly in position with the two screws. The blade cover plate for space and quad blades is thicker than the one for type blades and makes up the difference in height between the space and the type blades, so the space blade and jet blade will fit correctly between the mould back wall and the blade

cover plate against the mould front wall. Slide the mould blade slide into the mould, put the jet blade and blade cover plate and quad blade, of the desired size, into the mould and move them backwards and forwards to make certain they are not too tight. If they bind, it indicates there is dirt between some of the parts just assembled ; all dirt must then be removed before the mould is placed into the mould stand. Replace the mould on machine as instructed under the heading 'To Replace Mould', p. 21. Only one low space cap is required to cast all set sizes of low spaces and quads for any one blade. Select the low space cap for the size blade in the mould. Take the matrix carrier cam lever extension fork 30T3 out of the matrix carrier cam lever extension 30T2, as it must not be left on the machine while casting spaces and quads. Proceed by loosening off the mould top block sufficiently high to allow the low space cap to be brought into the mould opening. Turn the machine by hand until the vertical blade is at top of stroke. Place the desired low space cap in position against the vertical blade and bring the mould top block down to bearing on the mould blade and adjust the mould block adjusting screw. In this position the low space cap is only resting on its toe and, as it is slightly smaller than the point size of the mould blade, this adjustment should in no way clamp the low space cap in the mould. Place the space cap holder in the matrix carrier slide, making sure the low space cap is positioned correctly and up against the adjusting wedge. Check carefully, then tighten up the space cap holder device wing bolt, and secure the low space cap on the mould.

Make sure that the low space cap is slightly inside the left-hand surface of mould and clears the vertical mould blade on its upward stroke. If further adjustment of the low space cap is required in relation to vertical mould blade, loosen the locking screw then raise or lower the adjusting wedge by the adjustable screw to the desired position. Make certain the low space cap is seating against the wedge, then tighten locking screw. The low space cap must never be allowed to protrude over vertical mould blade, otherwise serious damage will occur. If the low space cap is away from vertical blade, a fin will be produced on product. Make the setwise adjustment as explained under the heading 'The Micrometer Set Adjusting Device and the Mould Blade Slide Adjusting Screw', p. 17.

CASTING HIGH SPACES AND QUADS

To change from low to high product necessitates the removal of mould from machine to enable the mould blade and blade cover plate to be changed.

The high space cap is located in the space cap holder in a similar manner to the low space cap, but in this instance only one cap is required for all high spaces of body sizes from 6 to 18 point.

To change from low to high product follow the instructions as explained in 'Casting Low Spaces and Quads', p. 15, but substitute the high space equipment in place of low.

TEMPERATURE OF METAL

The correct casting temperature depends on the grade of type metal used. Therefore whatever form of heating is employed a suitable thermometer such as the 'Rototherm' should be used with the machine so as to enable temperatures to be checked occasionally. If old type foundry metal is used, the temperature should be about 735° Fahrenheit ; good type metal purchased from a first-class metal maker should also be run at about the same temperature. If a softer grade of metal is used, the temperature should be lower ; slug machine metal, for example, should be run about 600°-650° Fahrenheit. The temperature may be reduced when casting large type. A good rule is to run the metal at the lowest temperature possible to get good sharp faces and solid bodies. It is of the first importance and essential to successful results to use metal at the correct temperature and not to damage by overheating.

CLEANING METAL

The metal in the melting pot of the Typecaster should be cleaned once every day. Just before commencing operations, skim and stir up the metal around the top of melting pot and remove any dross that may be collecting. If the metal is very dirty, place the required amount of metal cleaner into molten metal and stir vigorously and skim off the dross. This treatment improves the metal.

THE MICROMETER SET ADJUSTING DEVICE AND THE MOULD BLADE SLIDE ADJUSTING SCREW

The set size of type can be easily made and held accurate by a thorough understanding of the above-mentioned devices. The matrices of the chosen fount should be sorted according to set size starting with the larger set matrices and working down to the smaller set size. The movement of the mould blade to the right or set size position is controlled by the position of micrometer set adjusting stop 41T13 which acts as a stop for mould blade slide. The mould blade slide connection adjusting screw 46T1 connected to the mould blade slide by mould blade slide connecting pin is operated by the mould blade

lever 48T1 and serves to hold mould blade slide against micrometer set adjusting stop as type is cast. Three simple but important procedures are necessary to correctly adjust both devices to take care of any set size.

The machine *must* be in casting position whilst making the following adjustments. This position can be determined when the mould blade lever has reached its furthest position to the right and the indication mark is at its lowest position on the handwheel. Any deviation from the correct location of indication mark on handwheel will result in serious damage to machine. Firstly loosen outside lock nut 46T3 with pin wrench 3TT6 and loosen off inside lock nut 46T4. Also loosen off adjusting screw nut 46T2. This will release the tension of mould blade slide against micrometer set adjusting device stop 41T13.

Secondly. The micrometer set adjusting device 41T1assd. is located at the right end of the mould on mould stand. The micrometer set adjusting device stop 41T13 is movable through its micrometer measuring screw 41T4 along the set adjusting device body 41T1 within the range of set device body scale and can be locked in any position by tightening the set adjusting device stop clamp screw 41T14. When the indicator line '0' on the set adjusting device stop 41T13 is in line with zero line of scale on the set adjusting device body 41T1 and the indicator line on the right end of set adjusting device body 41T1 lines up with zero line on the scale of set device measuring screw collar 41T5, the left end of mould blade is flush with vertical mould blade and the set size will be zero and no opening will exist in mould.

The scale attached to the micrometer set adjusting device body 41T1 is marked in points and inches, each division representing 3 points. The micrometer set adjusting device measuring screw collar 41T5 has two graduated scales on its periphery. The scale next to the body represents points and eighths of points. One complete turn in a clockwise direction of the knurled knob of measuring screw collar gives an opening of mould blade from zero position of 3 points approximately (·0415″). Therefore one-third of a turn gives 1 point approximately (·0138″). One twenty-fourth of a turn is ·0017″. When the set size of type is known, any dimension in point size or fraction of points can be set (refer to table, p. 39). The outside scale of knurled knob is divided into 41½ divisions, representing thousandths and half-thousandths, and is known as the remainder scale. Where set sizes required cannot be obtained from the points scale, set to the nearest point size, then the remainder can be adjusted in thousandths on the remainder scale. Once the set size of type has been obtained, lock micrometer set adjusting device stop clamp screw 41T14.

Thirdly. The mould blade slide connection adjusting screw 46T1 holds the mould blade slide firmly against the set adjusting device stop 41T13 as type is being cast. Move the mould blade slide connection adjusting screw nut 46T2 clockwise until mould blade slide is brought up firmly against its stop 41T13, taking up all the play in the mould blade slide and mould cam lever. Tighten the inside lock nut 46T4 and outside lock nut 46T3 to complete locking of the device, using pin wrench 3TT6. Turn the machine by hand slowly to check this adjustment. Should the machine prove hard to turn, the mould blade slide connection adjusting screw nut 46T2 is too tight and should be readjusted.

TO CHANGE MOULD BLADE AND JET BLADE AND ADJUST FOR BODY-SIZE

Swing melting pot away from mould and remove nozzle plate.

Remove matrix carrier, etc., and type receiving shoe.

Loosen the mould stand cap adjusting screw nuts and raise screws 54T18, 19, 21 and 22 in mould stand cap so that lower ends are level with underside of cap.

NOTE.—While it may not always be necessary to remove the jet blade for each change of mould blade, it is recommended this be done so that all components can be wiped perfectly clean prior to assembly.

Raise the top jet block and mould block to underside of cap by turning the eccentrices 54T10 and 14 by means of the pin wrench 3TT6.

Insert the sharp end of lifting tool 3TT4 in groove in underside of jet blade and mould blade. Disengage mould blade slide, raise each part separately, push to the left, and lift out of mould.

Carefully clean all surfaces and smear working parts with clean mould oil.

Place ejector blade in position before inserting mould blade, and make sure both parts are engaged with mould blade slide.

Turn eccentrices 54T10 and 54T14 so that top blocks are lightly contacting ejector and mould blades.

Screw down jet block adjusting screw 54T21 into light contact with jet block and tighten nut. Turn machine slowly backwards and forwards to test adjustment. The jet blade should be just free.

Screw down mould block adjusting screw 54T18 and proceed as in previous paragraph.

Screw down the right-hand adjusting screws 54T19 and 22 into light contact and tighten nuts. Exercise care in making these adjustments as excessive pressure will cause the product to be tapered point-wise.

While excessive clearance will cause 'fins' and product that is oversize body-wise, it must be clearly understood that excessive tightness will result in heavy scoring of the mould surfaces. As the difference in dimension between excessive clearance and tightness is considerably less than ·001", it will be appreciated that the greatest possible care must be taken when obtaining accuracy of body-size.

To increase the body-size, make a slight movement of the adjusting screws, followed by a movement of the eccentric to raise the mould block into contact with the new position of the screws.

FELT OIL PADS

To carry oil direct to the mould blade and jet blade, the Typecaster mould is provided with three oil pads. One of these is located in the mould bottom block, one in the mould top block and one in upper jet block. When through long and constant use these oil pads shrink so they are no longer in contact with the blade and jet blade, they will not properly lubricate the parts and mould may become scored or cut.

TO CHANGE FOOT PLOUGH

When the jet blade is changed it is necessary to change the foot plough 16T1. Two thicknesses of foot ploughs are furnished, corresponding to the different thicknesses of jet blades. Be sure the foot plough bracket 16T3 is perfectly clean so the foot plough will be in correct position for grooving the type. The foot plough 16T1 should be adjusted to cut no deeper than just enough to remove the rough portion left on foot end of type where jet was removed.

TO REMOVE MOULD

Turn machine until mould blade slide abuts against micrometer set adjusting stop 41T13 and vertical blade is in its lowest position.

Swing melting pot away from mould and remove nozzle plate.

Remove matrix carrier, etc., and type receiving shoe.

Loosen lock nut and slacken off adjusting screw 53T2 on vertical mould blade cam lever X53T.

Raise pump cam lever yoke 76T8 and slide vertical mould blade lever X52T to the left, drawing lever block 52T2 out of recessed portion of vertical mould blade.

Release adjusting screw 54T4 and lift out vertical mould blade. The screw 54T35 should not be disturbed as it is correctly adjusted to position mould in relation to riser.

Remove mould blade slide connecting pin screw and withdraw pin.

Loosen adjusting screws 54T18, 19, 21 and 22 until ends of screws are level with underside of mould stand cap. Raise the top jet block and mould block to underside of cap by turning eccentrices 54T10 and 14 by means of wrench 3TT6.

Remove rubber water pipe connection from brass water pipe and blow out water from both blocks.

Remove jet block and mould block lifting studs.

Remove mould stand cap screws 54T24 and mould stand cap complete.

Lift out mould top block and jet block.

Insert sharp end of lifting tool in underside of jet blade and mould blade. Disengage mould blade slide, raise each part separately, push to the left and lift out of mould.

Remove mould from mould stand and, in doing so, care should be exercised to prevent damaging mould components.

TO REPLACE MOULD

Before replacing mould, all surfaces in mould stand should be carefully cleaned.

Place mould into mould stand, press down firmly against mould locating screw 54T35.

Smear surfaces of jet and mould blades with a light coating of mould oil and place jet blade in position before inserting mould blade. Make sure that both blades are engaged with mould blade slide.

Replace jet block together with mould block and press down firmly into position.

Replace mould stand cap 54T9 together with screws 54T24 and lightly tighten.

Replace jet and mould block lifting stud yokes, securing with the four screws.

Move the mould blade slide to the right, until it abuts against micrometer set adjusting stop 41T13.

Smear surfaces of vertical mould blade with a light coating of mould oil and place in position pressing down firmly on to stop screw 85T1.

Release mould stand cap screws 54T18 and tighten vertical mould blade adjusting screw 54T4 to ensure location of mould against locating screw 54T35.

Firmly tighten mould stand cap screws 54T24. Release vertical mould blade adjusting screw 54T4, push vertical mould blade lever X52T to the right until lifting block engages in recessed portion of vertical mould blade. Press pump cam lever yoke 76T8 into its locked position.

Tighten upper adjusting screw 53T2 until it secures mould blade lever X52T and lock adjusting screw by means of the lock nut 53T3.

Connect mould blade slide adjusting screw 46T1 to mould blade slide with connecting pin and secure by means of the screw.

Turn machine until vertical mould blade is in its upper position and adjust vertical mould blade adjusting screw 54T4 to correctly seat vertical mould blade against end of mould. This adjustment should ensure a metal-tight fit without undue pressure. Secure the adjusting screw by means of its locking ring 54T5.

Turn eccentrices 54T10 and 54T14 so that top blocks are lightly contacting ejector and mould blades.

Screw down jet block adjusting screw 54T21 into light contact with jet block and tighten nut. Turn machine slowly backwards and forwards to test adjustment. The jet blade should be just free.

Screw down mould block adjusting screw 54T18 and proceed as in previous paragraph.

Screw down the right-hand adjusting screws 54T19 and 22 into light contact and tighten nuts.

Great care must be exercised when making these adjustments to ensure correct body-size without using excessive pressure on the adjusting screws.

After replacing the mould, its position should be checked in accordance with the information given under heading 'To Check Mould Position', below.

TO CHECK MOULD POSITION

When the mould is in place on machine, and held against its mould locating screw 54T35 by pressure of the vertical blade and held down lightly by the mould stand cap screws 54T18, the opening between the left side of the vertical mould blade and the riser should be ·008″ as measured by a feeler gauge. To establish this position, move the mould locating screw 54T35 in or out to re-position the mould. When re-checking, make sure the vertical mould blade is held tightly against the left mould face by adjusting screw 54T4 and tighten the mould stand cap screws 54T18 to hold mould in place. This adjustment applies to vertical blades of stock size ·498″. Should the vertical mould blade become scored or damaged and require regrinding, determine its present size with a micrometer and any amount in thousandths of an inch under the stock size ·498″ must be added to the standard feeler size of ·008″.

Example : ·498″ — ·495″ = ·003″. This ·003″ added to standard size ·008″ = ·011″ size of feeler gauge to use.

TYPE RECEIVING SHOE ADJUSTMENT

When one size mould blade is changed for another size, the top type receiving shoe must be adjusted so the size type to be cast will fit under it without being too tight or too loose. First remove the top type receiving shoe, then turn the handwheel until the end of mould blade is at the extreme end of its stroke outside of the left-hand end of mould. Place a type of the same size as the blade in the mould on top of the lower type receiving plate 79T1 and at its extreme left end ; then put the type receiving shoe back on the mould stand 54T1. The right end of the receiving shoe will then rest on the projecting end of mould blade and the left end will rest on the type. Tighten the type receiving shoe adjusting screw 80T3 using the pin wrench 3T16 to fasten firmly. If the top type receiving shoe is not down in proper position, the foot plough 16T1 will not properly trim the type, also the type stripper spring 80T7 will fail to strip the type from the mould blade and hold it. If pressed down too tightly, the end of the mould blade may be damaged, or the top type receiving shoe, or the type receiving plate 79T1 may be cut by the end of mould blade. It is good practice to place a piece of tissue paper on top of mould blade when setting the top type receiving shoe to prevent damage to those parts. This tissue paper passes through the receiving shoe with the type as they are cast.

IDENTIFICATION NICK CUTTERS

These are provided for cutting nicks in the same surface as the body nick is formed.

The cutters required should be adjusted to cut as shallow as possible, consistent with clearly defined nicks. If the cutters are set to cut too deeply, difficulty will be experienced with bending and breaking of type bodies.

VERTICAL MOULD BLADE ADJUSTMENT

Three equally important adjustments are necessary to correctly control the movement of vertical mould blade.

Firstly, to control the position of vertical mould blade on completion of its downward stroke to ensure clearance of ·004″ between the top of vertical mould blade and underside of mould blade.

With mould clamped securely in position by mould stand cap 54T9, remove all dirt and oil from end of mould. Loosen lock nut on vertical mould blade stop screw 85T1 and turn stop screw clockwise into main stand.

Clean the vertical mould blade, place in position and bring up to a light bearing against mould by means of adjusting screw 54T4. Press vertical mould blade down to stop screw 85T1 and turn machine slowly by hand until mould blade projects about a quarter of an inch beyond end of mould. In this position check the clearance between top of vertical mould blade and underside of mould blade by inserting a ·004" feeler gauge. Raise vertical mould blade by moving stop screw 85T1 anti-clockwise until correct clearance of ·004" is effected. Tighten stop screw lock nut 85T2 and re-check the clearance. Any variation from this ·004" clearance will result in faulty delivery of type and serious damage to mould components.

The second adjustment relates to the vertical mould blade being correctly held in its lower position by the mould blade lever X52T.

With the vertical mould blade still disconnected from mould blade lever X52T, turn machine until cam lever is at the top of its stroke. Release clamping screw 53T5 and slacken lower adjusting screw 53T4. Release lock nut 53T3 and slacken upper adjusting screw 53T2.

Turn machine by hand until mould blade lever X52T is at bottom of its stroke and mould blade projects about a quarter of an inch beyond end of mould. Move vertical mould blade lever X52T to the right until lifting block 52T2 is fully engaged in recessed portion of vertical mould blade and press pump cam lever yoke 76T8 into its locked position.

Turn upper adjusting screw 53T2 so that it forces vertical mould blade down to stop screw 85T1. Take out all play between levers X52T and X53T by adjusting the lower screw 53T4, using the adjusting tool 3TT5. Tighten the upper adjusting screw 53T2 securely with pin wrench 3TT6 to simulate operating conditions. Lock the upper and lower adjusting screws with lock nut 53T3 and clamping screw 53T5.

Great care should be exercised in making this adjustment to ensure there is no play at the point where both adjusting screws clamp vertical mould blade lever X52T and also the clearance of ·004" between top of vertical mould blade and underside of mould blade is maintained.

As the vertical mould blade is now adjusted, the machine can be turned by hand for checking. Should the machine be difficult to turn, the vertical mould blade is being held too tightly against stop screw 85T1 and should be relieved by loosening the upper adjusting screw slightly and tightening the lower adjusting screw to take up play between both levers. But if the checking reveals that insufficient clearance exists between vertical mould blade and mould blade, it will be necessary to loosen the lower adjusting screw slightly and tighten the upper adjusting screw to remove play between levers.

The third adjustment is essential to ensure a clean seal between end of mould and vertical mould blade and to resist the pressure of metal entering the mould.

With vertical mould blade in its upper position—the position it occupies when a cast is being made—loosen the lock nut 54T50 on supporting plug set screw 54T49.

From the rear of machine, place the index finger of the right hand in contact with both the lower end of vertical mould blade and mould stand. With the left hand, move the vertical mould blade supporting plug set screw into the mould stand 54T1 until a movement of the vertical mould blade is felt. At the point where movement is first sensed, lock supporting plug set screw 54T49 with the lock nut 54T50.

If this adjustment is not correctly made, metal will collect between face of mould and vertical mould blade and so cause the oil holes and channels to be choked, with subsequent damage to faces of mould and vertical mould blade.

MATRIX CARRIER CAM LEVER ADJUSTMENT

The correct seating of matrix against the mould front face is controlled by the action of matrix carrier cam lever 30T1T. Two adjustments are necessary to control the movement of matrix carrier X27T.

Firstly—To ensure proper seating of matrix on mould face as metal enters the mould cavity.

Procedure: Locate the matrix in matrix carrier holder and the matrix carrier X27T on machine. Couple the matrix carrier to matrix carrier cam lever 30T1T by engaging the extension fork 30T3T. NOTE: Correct engagement of the extension fork with matrix carrier is determined by the movement of extension fork releasing pin knob 30T6 to the rear, as the inner end of the releasing pin engages the annular groove in the bottom of extension fork. Turn the machine to casting position (indication mark on handwheel 2T7 in lowest position) and adjust the matrix carrier cam lever spring bolt 30T12 located just below the releasing pin knob. Loosen the nut 30T13 on the spring bolt and move the spring bolt in or out until $\frac{1}{64}$" clearance exists between the washer 30T14 and spring bolt 30T12 as the matrix seats against the mould face and is taken up as soon as the matrix carrier is moved away from the mould. Lock the nut and re-check the clearance.

Secondly—To hold the matrix firmly against the mould front face, under sufficient spring pressure to withstand pressure of metal entering the mould chamber.

Procedure: With the matrix carrier coupled to the matrix carrier lever, turn machine to casting position. The spring pressure can be varied by loosening the spring pin nut 30T17 on the spring pin 30T15 and moving this pin in or out. Lock nut 30T17 when finally adjusted. Should trouble be experienced in keeping the matrix or mould seat clean or should the pressure of metal entering the mould chamber force a separation of the seal between the mould seat and matrix, additional pressure can be applied by moving the pin clockwise and locking the nut. Experience will be gained as to the correct amount of spring pressure required.

THE PUMP STOP

The pump stop 77T1 stops the action of both the choker and the piston when it is in its rear or off position, thus stopping the flow of metal to mould. It is located on the main stand 23T1 just under the left end of the cam lever shaft 5T1.

When it is in its rear position the fingered end holds the choker valve lever rocker arm link 8T6T out from connection with choker cam lever X6T and its stop pad rests under the pump cam lever X76T preventing lever from operating.

The pump stop is actuated in its forward and rear movement by two springs. To put the stop in operation, pull the grip handle straight forward and lock it by a slight movement to the right. This will place the choker and pump in operation. To move the stop to the rear in order to shut off the pump, strike the grip lightly to the left and its spring will move the pump stop to the rear, arresting the action of the choker and piston.

PISTON SPRING ADJUSTMENT

To increase the tension on piston spring turn the crank on piston spring tension pulley shaft ratchet 74T6 located on left-hand side of base about six inches above the floor, in anti-clockwise direction. To decrease tension, turn it in a clockwise direction. In order to turn piston spring tension pulley shaft ratchet 74T6 in a clockwise direction, first release it by raising the lever end of piston spring tension pulley pawl 75T1 high enough to clear top of ratchet teeth; this must not be done, however, unless the handle of the piston spring tension pulley shaft ratchet 74T6 is securely held. After the tension is correct, the lever end of tension pulley pawl 75T1 must be lowered to again engage teeth of pulley shaft ratchet. The proper spring tension is easily arrived at after a little experience.

MOULD STAND MATRIX CARRIER SLIDE ADJUSTMENTS

If the matrix carrier X27T is not fitting between the mould stand matrix carrier slides 54T31 and 54T27 in mould stands 54T1 and 54T2, it will affect alignment of the type. When necessary to adjust, proceed as follows.

In making adjustments to mould stand matrix carrier slides, do not interfere with left-hand slide 54T31 and mould stand matrix carrier slide gib 54T33. Loosen the clamping screw 54T30 which passes through the right-hand forward extension of front wall of mould stand 54T2 into the mould stand matrix carrier slide 54T27 midway between short slide adjusting screw 54T29 and long slide adjusting screw 54T28. Turn the short slide adjusting screw 54T29 and long slide adjusting screw 54T28 to the right; this drives right-hand mould stand matrix carrier slide 54T27 toward the matrix carrier X27T. Turn these screws just enough to allow the matrix carrier to slide forwards and backwards freely without binding and without any side play. Be sure the matrix carrier is not tighter between the slides at one end than the other, then tighten the mould stand matrix carrier slide clamping screw 54T30, thus pulling the slide 54T27 firmly against the ends of adjusting screws 54T29 and 54T28 and locking it.

CHOKER CAM AND CHOKER CAM ROLLER ADJUSTMENT

The choker cam 2T2 should be adjusted so it will bring the choker valve 94T2 against its seat in the choker valve bushing at the instant the piston 68T1 is ready to drop. To make the above adjustment, proceed as follows.

Unlock the melting pot, swing back away from the mould, release tension of piston spring so it will give only a slight pull in pump cam lever, then pull forward the pump stop so the roller on pump cam will drop into recessed portion of cam when camshaft is rotating in an anti-clockwise or casting direction. Turn the handwheel very slowly until pump cam lever roller drops into recessed part of pump cam. Then turn handwheel back in a reverse direction until the end of the pump cam lever butts against the recessed portion of the cam. In other words, pull the handwheel backward until the cam is brought to an abrupt stop by the lever. The machine is then in position for making the choker cam adjustment.

Loosen the hexagon-headed cap screw which passes through the slot in choker cam 2T2 and move cam either forward or backward until choker cam lever roller is in contact with top of cam at the end

nearest the operative. Fasten the hexagon-headed cap screw firmly. Once this adjustment is correctly made, no change is necessary for all sizes of type.

To adjust the choker cam lever roller 6T2 to bring the choker valve against the seat in choker valve bushing, with just enough pressure to prevent leakage, proceed as follows.

Put the matrix carrier into position, lock the melting pot in its casting position against the mould and have all adjustments made as when ready to cast type, and pull out the pump stop. Turn machine by hand until choker cam lever roller 6T2 is in contact with choker cam 2T2; then loosen the hexagon lock nut 6T7 on the choker cam lever roller yoke adjusting screw 6T6. Hook the choker tripping tool 3TT7 over choker valve lever rocker arm 8T5 right above the rocker arm link 8T6T, and press down on the end of choker tripping tool as far as it will go until the choker valve 94T2 is pressed against its seat in choker valve bushing just tight enough to prevent leakage of metal between the seat when piston drops. With a small screwdriver, loosen the choker cam lever roller yoke adjusting screw 6T6, to make sure it is not too tight, and then tighten it until the choker valve is pressed against its seat in choker valve bushing just tight enough to prevent metal leakage and ensure the casting of solid type, but without any unnecessary pressure or strain on choker valve or choker valve lever as this would cause breakage of these parts.

CONNECTING AND ADJUSTING MELTING POT

Switch on electric current for melting pot elements or light the gas about forty-five minutes before machine is required for casting. The melting pot must not be locked into casting position against mould until the metal has reached the required casting temperature.

Prior to locking the melting pot in position against the mould, the choker valve should be moved backwards and forwards to ensure it does not stick in nozzle 94T17 or choker valve bushing. Hook the choker tripping tool 3T17 over choker valve lever rocker arm 8T5 at the point above choker valve lever rocker arm link 8T6T. Holding a ladle in front of nozzle to catch molten metal, press on end of choker tripping tool until metal flows freely from nozzle ; release pressure on choker tripping tool to allow choker to seat in nozzle.

See that nozzle, nozzle plate and mould are free from type metal or dirt. Turn melting pot yoke lock handle 39T5 sufficiently to allow toe of melting pot yoke 38T1 to pass beneath flat side of melting pot yoke lock 39T1T, swing melting pot towards the mould and at the same time

raise the piston lever 69T1T to allow opening in lower end of piston lever link 71T1T to engage end of pump cam lever X76T. Turn melting pot yoke lock handle to lock melting pot in position. With melting pot locked in position, take hold of nozzle plate handle 63T2 and move nozzle plate with a rocking motion between nozzle and mould to confirm if the melting pot is correctly positioned against mould. The nozzle plate should be tight enough to prevent leakage of metal without imposing excessive pressure on vertical mould blade or jet blade and so causing damage during the operation of machine.

SQUARING AND ADJUSTING FORWARD POSITION OF MELTING POT

It is usually necessary to re-adjust position of melting pot after nozzle has been replaced.

With type metal heated to required casting temperature, swing melting pot into casting position, loosen lock nut 38T3 and slacken adjusting screw 38T2. The two melting pot screws 94T20 must be loosened sufficiently to allow moving the melting pot forward without permitting it to be raised.

Tighten rear melting pot yoke adjusting screw 38T2 until the nozzle is a snug fit in nozzle plate bearing against the mould. Sufficient pressure should be applied to ensure a metal tight joint between nozzle and nozzle plate, and nozzle plate and mould.

It is essential for nozzle to be square with mould to ensure an unrestricted entry of molten metal into the mould. This can be ascertained by measuring the gap between right-hand side of nozzle and nozzle plate and comparing with the left-hand side of nozzle and nozzle plate by using feeler gauges.

When the position of melting pot is correctly adjusted, lock the two hexagon-headed screws 94T20.

SIDEWISE ADJUSTMENT OF MELTING POT

In order to obtain perfect product, it is essential for the opening in nozzle to align correctly with the jet opening in mould. This setting can be checked by casting product 12 points in width and noting the nozzle impression on the foot of jet. This impression should be central setwise.

When it is necessary to adjust position of melting pot in order to align the hole in nozzle and nozzle plate in correct relation to jet opening in mould, proceed in the following manner.

Lock melting pot in casting position, loosen hexagon-headed melting pot screws 94T20 and release choker valve lever adjusting screw until it only just grips choker valve lever. Move the melting pot to right or left by loosening melting pot yoke adjusting screw 38T4 on that side of melting pot to which it is to be moved and tightening melting pot yoke adjusting screw on the opposite side until the desired result is obtained. Tighten the screws 38T4, 94T20, and choker valve lever adjusting screw 8T3.

It is advisable to check the forward position and squaring of melting pot before attempting to cast type.

CLEANING CHOKER VALVE, NOZZLE AND PUMP

Swing melting pot away from mould. Loosen piston lever pin set screw 69T4, disengage piston lever pin 69T3 from piston 68T1 and lift from melting pot. Place a small piece of flux metal cleaner in melting pot, stir metal thoroughly to separate dross and skim surface of molten metal.

Place ingot mould under nozzle, hook choker tripping tool 3TT7 over choker valve lever rocker arm 8T5 at the point above choker valve lever rocker arm link 8T6T, and holding a ladle before the nozzle, guide the molten metal into ingot mould, press on end of choker tripping tool and allow metal to flow from nozzle. When melting pot is emptied, turn off electric current or gas supply.

Loosen locking screw 9T10 and turn choker spring rod knob 9T6 in a clockwise direction until all compression on choker spring is released.

Remove choker valve lever adjusting screw 8T3 and take out choker valve lever 8T1T. Place nozzle wrench on nozzle and, with a sharp tap on end of wrench, loosen nozzle from melting pot. Remove nozzle and, using cleaning tool 3TT2, clean all metal and oxide from inside of nozzle.

Remove choker valve 94T2 from melting pot and clean off metal and oxides while it is still hot. With a wooden stick and piece of rag, clean inside of pump well in melting pot and choker valve bushing, making sure no type metal remains on choker valve seating.

If difficulty is experienced in removing piston from well, apply a small quantity of piston paste on the piston and again insert the piston in the well. Move the piston up and down with a circular motion to remove the obstructing oxides. Clean the piston and well after the oxides have been removed. In no circumstance must a grinding compound or emery cloth be used for this operation.

Examine choker valve seating in nozzle and in bushing. If the seatings are not perfectly smooth, they must be re-seated together before re-assembling.

GRINDING CHOKER VALVE SEATINGS AND ASSEMBLY

If the seat in choker valve bushing or its corresponding seat on choker valve require attention, apply a small quantity of oil and fine emery powder or suitable grinding compound to the rear seating on choker valve and insert shank of choker valve into choker valve bushing.

Place grinding tool 3TT8 on end of choker valve, taking care not to damage the point, turn the grinding tool with a circular motion, pressing the valve against its seating in bushing. Repeat the operation until clean smooth seatings are obtained on choker valve and bushing.

Thoroughly clean the valve and bushing and remove all traces of the grinding compound and oil from the components.

If the seat on point of choker valve or its corresponding seat in nozzle require attention, place the shank of choker valve into nozzle grinding tool 3TT1 and apply a small quantity of grinding compound to the seat on point of choker valve.

Screw the nozzle firmly into grinding tool and holding shank of choker valve, turn it with a circular motion, pressing the valve against its seating in nozzle, until clean smooth seatings are obtained.

Remove the nozzle and valve from grinding tool and clean thoroughly.

Place the choker valve into position in choker valve bushing.

Using a small quantity of piston paste on nozzle threads, screw the nozzle into position in melting pot and tighten by means of the wrench 2TT6.

Replace choker valve lever 8T1T and secure in position with adjusting screw 8T3 allowing $\frac{1}{64}$" clearance between choker valve lever tooth 8T2 and bottom of tooth recess in choker valve.

Turn choker spring rod knob 9T6 in an anti-clockwise direction until approximately $\frac{3}{8}$" compression of choker spring is obtained, then lock the abutment 9T9 with locking screw 9T10.

Fill melting pot with type metal and turn on electric current or gas supply. When metal has reached the required casting temperature, heat the piston by placing it in the molten metal. When the piston is sufficiently heated, brush the lower end with a stiff brush and then insert the piston in the pump well.

Push the piston lever pin 69T3 through the holes in piston links 68T3 and secure with the set screw 69T4.

Before swinging the melting pot into position, make sure the nozzle is tight against its locating face on melting pot.

FITTING CHOKER VALVE POINT TO NOZZLE PLATE

After a new choker valve has been fitted or a choker valve has been re-ground, it should be fitted to nozzle plate as follows.

Hold nozzle plate 63T1assd. in position against nozzle. If the point of choker valve extends beyond face of nozzle plate, carefully dress the point of valve until it is level and parallel with face of nozzle plate.

If choker valve is allowed to protrude beyond face of nozzle plate, the valve will be prevented from reaching its seating in nozzle during the operation of machine. Great care must be exercised in performing this operation, because if too much metal is removed from point of valve a cavity will be formed between point of valve and mould which will allow type metal to collect and so prevent free entry during the casting period.

HOLLOW TYPE AND SPACES BEING CAST

The cause of hollow type and spaces being cast of small setwise dimensions is usually a combination of two or more adjustments being incorrectly made. Thin spaces and characters are usually the most difficult to cast solid. The length of time required for type to cool is directly proportional to the ratio between the volume of metal entering the mould and the area of inside walls of mould. In the case of thin spaces and characters of small setwise dimensions, the area of the walls of mould cavity is large whilst the volume of metal required to fill the cavity is comparatively small. For this reason, the ratio is small and the time of cooling is very short. In order, therefore, to cast solid spaces and type of small setwise dimensions, the metal must be injected into the mould as quickly as possible and the temperature of mould must not be kept too low. In order to accomplish this, the following should be done.

1. Increase the speed of machine. This results in the complete casting operation being done very quickly and does not allow much time for cooling.

2. Decrease water and oil supply. This allows for the temperature of the mould to go up, with the result incoming metal will not be cooled too quickly.

3. Increase the temperature of metal in the melting pot from 25° to 30° Fahrenheit above normal casting temperature. This increases

the amount of heat that will be conducted from the metal by the mould and the water circulating through it, consequently the time required for the type metal to solidify will be greater.

4. Increase the piston spring pressure slightly. This will cause the metal to be forced into the mould more positively and with greater speed, and will therefore allow the mould to be filled before the metal has had too much time to cool. The pressure should not be increased excessively, especially for smaller body sizes. Excessive spring pressure is as bad as too little.

5. Carefully adjust the melting pot to right or left so that there is a maximum opening of the nozzle to the mould. If the opening is too small, metal will enter the mould too slowly, with the result it may start cooling before the mould cavity has completely filled. From the above it will be seen the casting of narrow spaces and type of small setwise dimensions is dependent generally upon heat and upon the time required for cooling of the metal as it enters the mould.

Incorrect seating of the choker valve on the choker valve seat may also be the cause of hollow type. Leakage at the choker valve seat may be due to incorrect seating because of wear. In this case it will be necessary to regrind the valve to a seat. This will be found necessary only after the machine has been in use for some time. Do not grind the valve unless it is absolutely necessary, and then proceed in accordance with the directions given under the heading 'Grinding Choker Valve Seatings and Assembly', p. 31.

Hollow type will also be produced by the machine if the temperature of the metal is too high. On the other hand, if the temperature of the metal is too low, the metal will not be sufficiently fluid to flow into and completely fill the mould, with the result the face will not be sharp and perfect. See 'Temperature of Metal', p. 17. Hollow type may be the result of incorrect location of the melting pot. If the melting pot is too far to the right or the left, the opening in nozzle plate 63T1assd. may be obstructed by part of the jet blade or the vertical mould blade to such an extent that it is impossible for sufficient metal to enter the mould. Correct method of making left and right melting pot adjustments are given under the heading 'Sidewise Adjustment of Melting Pot', p. 29.

TYPE EXPLODING AS MOULD OPENS

Type explodes when ejected from the mould if it has not cooled sufficiently prior to opening of the mould. This may be due to an insufficient supply of water circulated through the mould, or may be

the result of running the machine too fast. A combination of the above may also be the cause of the trouble. If trouble is experienced, refer to 'Casting Speeds', p. 13.

THE CAUSE OF AND REMEDIES FOR METAL SQUIRTING OR SPLASHING

Squirting and splashing occur through incorrect adjustment of various parts because of dirt or foreign matter being lodged between any of several parts and allowing an opening through which metal can escape. If the vertical mould blade does not bear evenly against the end of the mould, an opening may be left that will result in a squirt. When making this adjustment, care should be taken to see that no dirt or foreign matter becomes lodged between the parts. See 'Vertical Mould Blade Adjustment', p. 23. Foreign matter on the front side of the matrix will prevent it from correctly seating upon the mould. This may cause burrs on the face of type. Too much spring pressure will also cause burrs on the face of type cast. See instructions for 'Matrix Carrier Cam Lever Adjustment', p. 25. If the jet block or the mould top block are not down on the jet blade or the mould blade, either due to incorrect adjustment or due to foreign matter having lodged between them, there will be an opening through which metal will escape. For the correct method of adjusting these parts, see 'To Change Mould Blade and Jet Blade', p. 19. Dirt or foreign matter on the front side of the nozzle plate 63T1assd. will prevent its seating correctly against the mould. This will leave an opening through which metal may be forced. Dirt or foreign matter on the nozzle 94T17, or in the part of the nozzle plate 63T1assd. which receives the nozzle, will prevent a tight joint being made between these parts, with the result that there may be a squirt. If the melting pot is not tightly locked up, or if the adjustment of the melting pot is not correct, the nozzle plate 63T1assd. will not completely fill up the space between the nozzle 94T17 and the mould, with the result that an opening will be left through which metal may be forced. For instructions as to making the correct melting pot adjustment, see 'Fitting Choker Valve Point to Nozzle Plate', p. 32, and 'Squaring and Adjusting Forward Position of Melting Pot', p. 29. The cause of a squirt is always quite easily located by looking for the place from which the metal escapes.

FINS ON TYPE BEING CAST

A fin on a piece of type is a miniature squirt. The causes and remedies are identical. Dirt lodged between parts of the mould or

incorrect mould adjustments are always the cause. Whenever a fin appears on any part of the type or on the jet, it is positive evidence there is an opening between parts of the mould. The cause of the trouble can always be located by observing on what part of the type or its jet the fin appears. If a fin appears on the left-hand side of type as it comes from the machine, it indicates that there is an opening between the vertical mould blade and mould. To remedy, clean the parts thoroughly and adjust according to the instructions under the heading 'Vertical Mould Blade Adjustment', p. 23. Horizontal fins on either the top or bottom of the right-hand side of type as it comes from the machine indicates there is an opening between the mould blade and either the mould top block or the lower part of mould. The remedy is to remove the mould blade and the jet blade, thoroughly clean them and the parts of the mould with which they come in contact, and then replace the parts and adjust them in the manner described under the heading 'To Change Mould Blade and Jet Blade', p. 19. A fin on the shoulder of the type indicates that there is an opening between the matrix and the mould. This may be due to dirt or metal being lodged on the face of the matrix or on the part of the mould with which the matrix comes in contact. It may also be due to incorrect adjustment of the matrix carrier cam lever spring bolt 30T12. In this connection, see 'Matrix Carrier Cam Lever Adjustment', p. 25.

A fin at the base of the jet indicates that there is an opening between the nozzle plate 63T1assd. and the mould. This may be due to the melting pot being incorrectly locked up, dirt, or to incorrect melting pot adjustment. In this connection, read 'Squaring and Adjusting Forward Position of Melting Pot', p. 29.

TYPE OVERSIZE IN BODY DIMENSIONS

Type that is oversize in the body dimension is the result of dirt being lodged between the mould blade and the mould, or of the mould top block not being far enough down. It must be in actual close contact with the mould blade. The best remedy for type oversize in body dimension is to remove the mould blade, thoroughly clean it and the mould cavity, replace and carefully adjust in accordance with the directions given under 'To Change Mould Blade and Jet Blade', p. 19.

DEFECTIVE TYPE FACES

One of the commonest type face defects is known as a 'frosty face'. This is caused by sudden cooling of metal as it enters the mould. The first few pieces of type cast on a cold machine usually have frosty

faces. This difficulty will disappear after the mould has had time to warm up unless too much water is circulating through the mould. If the water leaving the mould is warm to the touch, it is correctly adjusted. If it is cold, cut down the supply and the difficulty will disappear. If the mould is flooded with oil, imperfect faces will also result. There is a difference in the appearance of frosty faces and faces defective because of too much oil. Too much oil prevents the hot metal from flowing evenly over the surface of mould cavity and matrix. With a little experience it will be easy to recognise type made imperfect because of excessive oil. The remedy is to cut down the oil supply and run the machine, casting type, until the oil is worked out of the mould. Care should be taken not to cut down the oil supply so far that the mould will not be sufficiently lubricated. To do so is liable to cause damage to the mould by cutting and scoring. If the type is cast with too low a temperature of the metal, it will be solid but will be imperfect in face and body. Type with uneven surfaces and rounded edges is often the result of worn out or poor metal. Tin in the type metal makes it fluid. If the metal has been overheated, or has been used over a period of time, the proportion of tin becomes low through a process of oxidation. It may also become low due to skimming the metal from the top of the melting pot. The metal should always be separated from the oxides or dross by putting a little flux into the melting pot and stirring well. Dross or oxides always appear as a black powder.

METAL LEAKING OUT OF NOZZLE

Leaking of metal out of the nozzle is liable to happen during the time that the metal is being melted. It does not indicate, however, that anything is wrong. If the leak does not stop after the metal is molten and up to casting temperature, hook the choker tripping tool 3T17 over the choker valve lever rocker arm 8T5 at a point above the choker valve lever rocker arm link 8T6T, hold the ladle in front of the nozzle 94T17 and pull downward on the end of the choker tripping tool. This will open the choker valve and allow the metal to run from the nozzle 94T17. Release the pressure on the end of the choker tripping tool, thereby allowing the choker valve to close suddenly. Application of flux to the choker valve point and nozzle has a tendency to disperse dross and stop dripping. If the leak does not stop, it indicates that the choker valve is incorrectly seating in the nozzle. This may be due to insufficient pressure on the choker spring rod spring 9T8. To increase the pressure, turn the choker spring rod knob 9T6 in an anti-clockwise direction. Care should be taken not

to tighten the choker spring rod spring 9T8 excessively. To do so will produce undue strain and may damage the forward seat in the nozzle 94T17. About $\frac{3}{8}$" compression of the choker spring rod spring 9T8 is usually sufficient.

If any of the above means of stopping the leak prove ineffective, it is clear the nozzle 94T17 and the choker valve 94T2 are hindered in their operation by an accumulation of oxides or the choker valve needs grinding. To correct these difficulties proceed as directed under 'Cleaning Choker Valve, Nozzle and Pump', p. 30. If the desired result is not then accomplished, proceed to grind the choker valve as directed under 'Grinding Choker Valve Seatings and Assembly', p. 31.

CHOKER VALVE STICKING

A sticking choker valve 94T2 is invariably caused by dirt or oxides becoming lodged in the nozzle 94T17 and on the choker valve. To remedy, proceed as directed under the heading 'Cleaning Choker Valve, Nozzle and Pump', p. 30.

If choker valve lever 8T1T is incorrectly adjusted, it may cause the choker valve to bind in choker valve bushing. There should be $\frac{1}{32}$" clearance between bottom of tooth recess in choker valve and choker lever tooth. To obtain the necessary clearance, slacken off choker valve lever adjusting screw 8T3 until it only just grips lever and permits the lever to be raised sufficiently to give the required clearance.

PISTON STICKING

As in the case of a sticking choker valve, a piston that sticks is the result of a collection of oxides or dirt in the pump well or on the piston. To correct, follow the directions given under 'Cleaning Choker Valve, Nozzle and Pump', p. 30.

MOULD WORKING TOO TIGHT

The mould may work tight as a result of the lack of oil or of being set too tight at the beginning. If the mould runs tight as a result of insufficient oil supply, the result is liable to be serious. Insufficient oil is the cause of a scored mould. Hardened steel parts, such as the moulds are made of, will always score if run together without oil. The remedy is obviously to supply the oil. Care should be taken, however, not to supply an over amount. To do so will result in imperfect faces. See 'Defective Type Faces', p. 35. The mould may actually be set too tight at the beginning and still work freely. It works

tight as the result of the expansion of the mould parts due to heat, the mould being cool at the time it is originally set. After a few casts have been made, the incoming metal will heat up the mould sufficiently to cause the several parts to expand and work tight. The remedy is to stop the machine and reset the mould as directed under 'To Change Mould Blade and Jet Blade and Adjust for Body-Size', p. 19.

ADJUSTING MATRIX CARRIER ADJUSTING BLOCK

When a 'Monotype' Thompson Typecaster leaves the factory, all adjustments are correctly made. If, however, the parts of the matrix carrier should work loose through wear, the correct adjustment can be easily made as follows.

Remove the matrix carrier x27T from machine, then turn the graduated knob to the left until matrix carrier adjusting block is almost out of matrix carrier x27T. The small headless set screw that passes through the back of matrix carrier adjusting block, against the split bronze bushing, must now be tightened to compress the split bronze bushing tight enough to apply no lost motion of the matrix carrier adjusting screw by the split bronze bushing. The adjustment is correct if the matrix carrier graduated knob can just be turned with the fingers.

GENERAL HINTS

When the machine is not being used, swing the melting pot away from the mould until the centre toe of melting pot yoke still rests on the base top.

When leaving the machine with melting pot swung away from the mould, make certain the choker valve is correctly closing the nozzle. Otherwise when re-heating, the metal will flow out of the nozzle until the metal heats sufficiently to allow the valve to close.

Allow the machine to stand a few minutes with the melting pot connected before starting work, to permit the mould to become heated sufficiently to make a good cast. Swing the melting pot away from mould; then hook the choker tripping tool 3TT7 over choker valve lever rocker arm 8T5 and move choker valve backwards and forwards, as explained under the heading 'Starting Machine for Casting Type', p. 12, to make sure no chilled metal remains in the nozzle.

This should be done whenever the machine has been at rest for a short time. Do not turn machine handwheel and permit the pump cam lever x76T to drop when melting pot is disconnected. The blow may break the lever. Have the pump stop 77T1 in its off or rear position to support the lever and prevent damage.

If the choker cam is set too far forward or too far back, it will not operate the choker valve in correct time to allow the pump to force metal into the mould. It can be readily shifted to find the best location. The type stripper spring 80T7 should be adjusted to support and grip any size type when ejected by mould blade into the top type receiving shoe at the moment when mould blade is being withdrawn. As the adjustment is difficult to make, try smearing the edge of spring with a coating of marking material to test point of contact of spring on the type cast. The point of contact should be ·015" from forward edge of type. Never use pliers on the knurled screw heads. If gas is used, do not leave machine with the jet blade exposed to flame of the melting pot. Turn the machine so as to withdraw the blade into the mould.

TYPE BODY AND SET DIMENSIONS

The following table gives the equivalent of the various points in thousandths of an inch:—

Points	*Inches*	*Points*	*Inches*
¼	·0034	9½	·1314
½	·0069	10	·1383
1	·0138	10½	·1453
1¼	·0173	11	·1522
1½	·0207	11½	·1591
2	·0276	12	·1660
2¼	·0311	12½	·1729
2½	·0346	13	·1798
3	·0414	13½	·1867
3¼	·0449	14	·1937
3½	·0484	14½	·2006
4	·0553	15	·2075
4¼	·0588	15½	·2144
4½	·0622	16	·2213
5	·0692	16½	·2282
5¼	·0726	17	·2352
5½	·0761	17½	·2421
6	·0830	18	·2490
6½	·0899	18½	·2559
7	·0968	19	·2628
7½	·1038	19½	·2697
8	·1107	20	·2767
8½	·1176	20½	·2835
9	·1245	21	·2905

Points	*Inches*	*Points*	*Inches*
21⅓	·2974	31	·4288
22	·3043	32	·4426
22½	·3113	33	·4565
23	·3182	34	·4704
23½	·3251	35	·4842
24	·3320	36	·4980
25	·3458	38	·5256
26	·3597	40	·5534
27	·3735	42	·5810
28	·3874	44	·6086
29	·4012	46	·6364
30	·4150	48	·6640

The Standard Height of type is ·918″

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