pinion *24* with cam *25*, therefore, make sure that the keyway in the driving shaft is at the top.

Note secondly in Fig. 181 that the clutch flange screw *14* passes through a slot in the driving shaft *1* and also through a hole in clutch rod *9*. The easiest method of replacing the flange screw is first to turn the cam shaft to normal position. As shown in Fig. 182, this position is reached when the automatic stopping pawl *22* is resting on the upper stopping lever *20*. Insert flange screw *14* in the flange and the slot in the driving shaft *1*. Next, in order to pass the screw through the hole in the clutch rod, it will be necessary to grasp collar *7* and to draw clutch rod *9* slightly to the left. The clutch rod should be moved very gradually because it is possible to locate flange screw *14* in back of the clutch rod instead of through the hole in the rod. If this is done, it will be impossible for the buffers *4* to grip pulley *17* at all. When the flange screw is in its correct position, thread it in the flange and tighten it securely.

Maintenance. Most of the clutch parts requiring lubrication are shown in Fig. 182. A few drops of oil should be applied weekly to the fulcrum pins of the stopping pawls *22*, the upper and lower stopping levers *18* and *20* and the forked lever *16*. The bearings of the vertical starting lever shaft *32* should be oiled and a film of grease should be applied to the surface of lever *18* against which screw *19* bears. Grease fittings are applied to the two bearings of the driving shaft *1* and also to the driving pulley *17*. These points should be kept well lubricated, but excess grease in the driving pulley bearing is detrimental in that it may foul the friction buffers. It is essential to keep a light film of oil on shaft *1* at the point where flange *15* slides. Note also that four oil holes are provided in arm *2* for the rods *5*. These points, as well as the various link and fulcrum pins of the clutch arm, should be oiled sparingly to avoid fouling the driving pulley. *The driving pulley and the friction buffers should be kept clean at all times to insure maximum friction between the parts.*

Intertype Motors

In the preceding description of the friction clutch and driving mechanism, it was mentioned that the Intertype machine may be driven by a line shaft or by an individual motor mounted on the machine itself. The individual motor drive, incorporating a direct transmission of power from the motor pinion to the driving gear pulley, has proved to be the most satisfactory method and is the one most generally in use today. The individual motor is economical because it uses power only while the machine is being operated. A convenient switch located at the front of the machine controls the motor and may be turned on or off as required by the operator.

From the standpoint of mounting the motor on the machine, all Intertype motors may be classified under two general headings, "underslung" and "overhead." The chief difference between the two groups of motors is that the overhead type of motor is supported on the machine by arms which form part of the motor case itself, whereas the underslung type of motor is mounted on a separate bracket. From the standpoint of location, the overhead motor is fastened to the right-hand cam shaft bracket and occupies an elevated position above the driving gear pulley. This is indicated in Fig. 187. The underslung motor bracket is fastened to the right side of the machine column directly in back of the main keyboard and occupies a somewhat lower position with respect to the driving gear pulley. Both types of motors, however, incorporate the principle of direct and positive transmission of power and have operated with a consistently high degree of efficiency for many years.

With regard to motor specifications, Intertype can supply both direct and alternating current motors suitable for any standard commercial electric light or power circuit. Both direct and alternating current motors are available for 110 and 220-volt circuits. In the case of alternating current installations, motors can be furnished for single, two and three-phase 25, 50 and 60-cycle circuits. When ordering motors, always specify the serial number of the machine, the voltage of the line, and in the case of alternating current circuits, specify the phase and cycles.

Alternating current motors which are special as to voltage, phase or cycles are not carried in stock, but quotations will be furnished on request. Although single-phase motors will operate satisfactorily on single, two or three-phase circuits, it is recommended that polyphase motors be used wherever two or three-phase circuits are available.

While Intertype motors are rated for one-third horsepower, their liberal overload capacity is sufficient to drive the machine efficiently under variable load conditions. From the standpoint of operating speed, it has been found that the motor driving gear pulley should turn approximately 71 revolutions per minute when operating the machine at 6½ lines per minute. The ratio of the driving shaft pinion to the mold cam and driving gear is such that 11 revolutions of the driving shaft are required to turn the cam shaft one complete revolution.

Intertype motors are designed to carry their full rated load with efficiency and also have a liberal overload capacity sufficient to overcome any abnormal stresses. Provision is made in the design of the motors to insure constant speed during operation. The alternating current motors are of the induction type and the direct current motors are provided with compound windings. These factors help to maintain uniform speed in spite of normal fluctuations in the line. The overload feature compensates for variable conditions in the operation of the machine.

It should be noted that the motor pinion and driving gear pulley are provided with helically cut teeth to insure quiet operation, economical transmission of power and uniform speed. The quietness of the drive is due principally to the fact that more teeth are in mesh at one time and the load is more widely distributed. The pinion is made of canvas-base bakelite to insure noiseless meshing of gears. From the standpoint of economy, the gradual transmission of the load from one tooth to another helps to reduce power consumption and to keep the motor operating at a constant rate of speed. The uniform speed of the helical drive is also attributable to the smoothness with which the load is transferred from one tooth to another.

In the process of assembling machines at the factory, a suitable motor pinion is applied to turn the driving gear pulley at its correct speed. The speed of the machine is usually referred to in terms of "slugs per minute," that is, the number ing gear pulley. This is indicated in Fig. 187. The underslung motor bracket is fastened to the right side of the machine column directly in back of the main keyboard and occupies a somewhat lower position with respect to the driving gear pulley. Both types of motors, however, incorporate the principle of direct and positive transmission of power and have operated with a consistently high degree of efficiency for many years.

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If it is desired to increase the speed of the machine, a new motor pinion may be placed on the motor shaft. A motor pinion with a greater number of teeth will increase the speed of the machine. In general, if the new motor pinion has one tooth more than the previous one, the cam shaft will be turned approximately one-third of a revolution more per minute. Note, however, that whenever the speed of the driving gear pulley is increased, the keyboard, assembler, distributor, etc., are also speeded up by reason of the fact that the driving pulley turns these units through power transmitted to the intermediate shaft of the machine. In order to keep these auxiliary units operating at their standard speeds, therefore, it is necessary to apply an intermediate shaft driving pulley larger in diameter than the one previously in use. The part numbers and diameters of pulleys required for the three most commonly used speeds are below:

Slugs per Minute	*Diameter of Intermediate Shaft Driving Pulley*	*Part Number of Pulley*
6½	3¾″	S- 46
7⅓	4¼″	S-396
8⅓	4⅞″	S-517

With regard to the motor and its relationship to the machine, the essential features of the overhead motor are shown in Fig. 187. The motor is fastened on the right-hand cam shaft bracket *1* by screws *2* passing through the upper arms and by screws *3* passing through the lower arms. The driving gear pulley *4* is mounted on the driving shaft *5* and turns freely on the shaft whenever the motor is running. The teeth of the driving gear pulley mesh with those of the motor pinion *6*, which is fastened on the motor shaft by means of a lock nut *7*.

An important feature of the overhead motor is that it is self-aligning in the sidewise direction and requires adjustment in the vertical direction only. As shown in Fig. 187, the lower legs of the motor bank against finished faces on the cam shaft bracket and locate the motor pinion *6* in its correct sidewise position with respect to the driving gear pulley *4*. For the vertical adjustment of the motor, two bushings *8* are provided in the upper arms. These bushings raise and lower the assembled motor in relation to the driving gear pulley and should be set to provide a slight amount of play between the teeth of gear *4* and pinion *6*. All four of the motor fastening screws must be loosened when adjusting the bushings. When fastening the motor in position, the two lower screws *3* should be turned in first until the legs of the motor are banking lightly against the cam shaft bracket *1*. Turn down the upper screws *2*, then tighten the lower screws securely. It is customary when testing the play between the motor pinion and the driving gear pulley to disengage the driving belt from the pulley. Grasp the pulley and shake it slightly. If there is more or less than the required amount of play, reset the bushings *8* and fasten the four motor screws securely.

A gear guard *9,* Fig. 187, is fastened to the motor to afford protection from the gear and the motor pinion. As soon as the vertical adjustment of the motor has been completed, the guard should be applied and should be left on the motor thereafter. It will be noted that the guard is fastened on the motor with two screws and is also supported by a screw passing through bracket *10.* The bracket is held in position by one of the lower fastening screws of the motor and is provided with an elongated slot to permit alignment with the tapped hole in the gear guard.

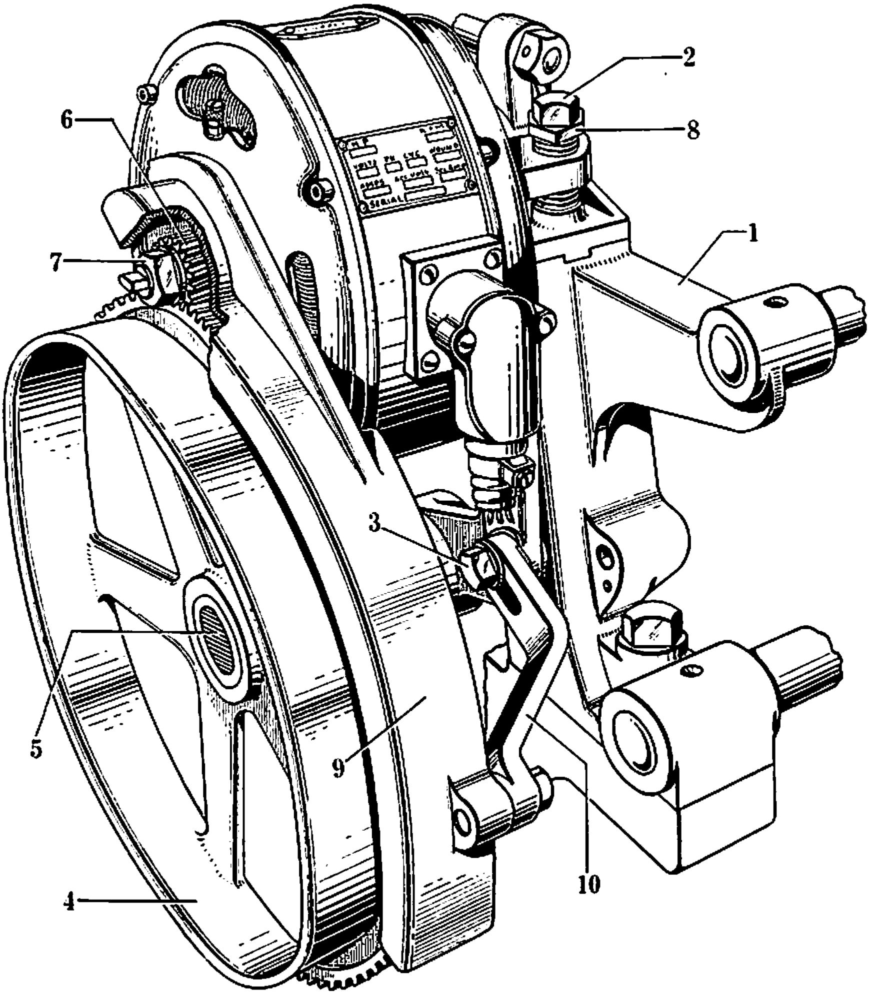


Fig. 187. The Intertype Overhead Motor is fastened to the right-hand cam shaft bracket by screws *2* passing through the upper arms and by screws *3* passing through the lower arms. The motor is self-aligning in the sidewise direction and requires adjustment in the vertical direction only. This adjustment is made by means of bushings *8* in the upper arms of the motor.

Motor Switch. The switch provided with Intertype motors affords complete protection against injurious overloads and conditions tending to stall the rotor. The motor switch is fastened to the base of the machine at the right of the vise frame shaft in a position convenient for the operator. The overload feature of the switch causes all of the poles to open automatically if the rotor stalls, thereby breaking the circuit and preventing damage to the motor.

The operation of the overload device is based upon a heater and a switch tripping mechanism. If the rotor is subjected to injurious overload, the heater causes a locking pinion to release the switch tripping lever and to open the poles automatically. When the heater has cooled sufficiently, the switch is reset by moving the operating lever to the "off" position and then to the "on" position to resume operation. Due to the fact that the overload device is operated by heat generated in the heater coil, it is necessary to permit the coil to cool before attempting to start the motor. The cooling period usually requires at least two minutes.

When the motor switches are assembled, the correct heaters are applied to suit the full load current of the motor. The heaters are selected according to the ampere rating of the motor. Two heaters are used for two and three-phase motors and one heater for direct current and single-phase motors. When one heater is used, the center terminal of the switch and one of the outside sets of terminals are employed for making connections.

If the motor switch is used to control an auxiliary motor, such as a Mohr saw motor, in addition to the driving motor of the machine, the auxiliary motor should be connected ahead of the heaters. The reason for this procedure is that it is possible to protect only one of the motors with the heaters. By connecting only the driving motor in back of the heaters, the full protection of the overload device is confined to that motor.

Maintenance. The chief maintenance requirements of the motor are cleanliness and periodical lubrication. The exterior of the motor should be wiped with a clean cloth occasionally and the internal part of the motor should be blown out with compressed air. Dust and other foreign substances are objectionable because they impair the electrical efficiency of the motor. With regard to oiling, it should be borne in mind that the motor is equipped with the most efficient type of oil-retaining bearings and requires lubrication only once or twice a month. The bearings should be oiled sparingly with a light mineral oil, such as 10-10W Mobiloil.

The Cams and Their Functions

The various cams of the machines have been described already in connection with the respective units which they operate. In each case, the cam was shown in assembly with its mechanism and all of the movements imparted by the cam were illustrated and described in detail. Up to this point, however, the assembled relationship of the cams on the cam shaft has not been indicated. It is essential that this relationship be understood in order to facilitate the removal of an individual cam or the assembled unit.

The assembled cams and cam shaft are shown in Fig. 188 as they appear when viewed from the rear of the machine. Beginning with first-elevator cam at the right, numbers are assigned consecutively from 1 to 10 to identify each cam. The names of the cams and their functions are listed below.

1. **The First-Elevator Cam** imparts four movements to the first-elevator slide. After the line of matrices and spacebands has been delivered to the first-elevator jaw, the cam lowers the slide and positions the line in front of the mold; secondly, the slide is raised approximately .010″, lifting the matrix toes against the alignment groove in the mold body and aligning the matrix characters with respect to the mold body; thirdly, the line is raised in the first-elevator jaw to the transfer channel, where the matrices and spacebands are transferred; fourthly, the first-elevator slide returns to normal position with the first-elevator jaw opposite and in alignment with the delivery channel.

2. **The Distributor Shifter Cam** withdraws the distributor shifter slide from the distributor box as the second-elevator bar carries the line of matrices up to the box for distribution. As soon as the second elevator reaches its seat at the distributor, the distributor shifter cam permits the slide to push the matrices into the distributor box.

3. **The Mold Turning Cam** is provided with two segments which turn the mold disk to position for casting and ejection. The short segment turns the mold

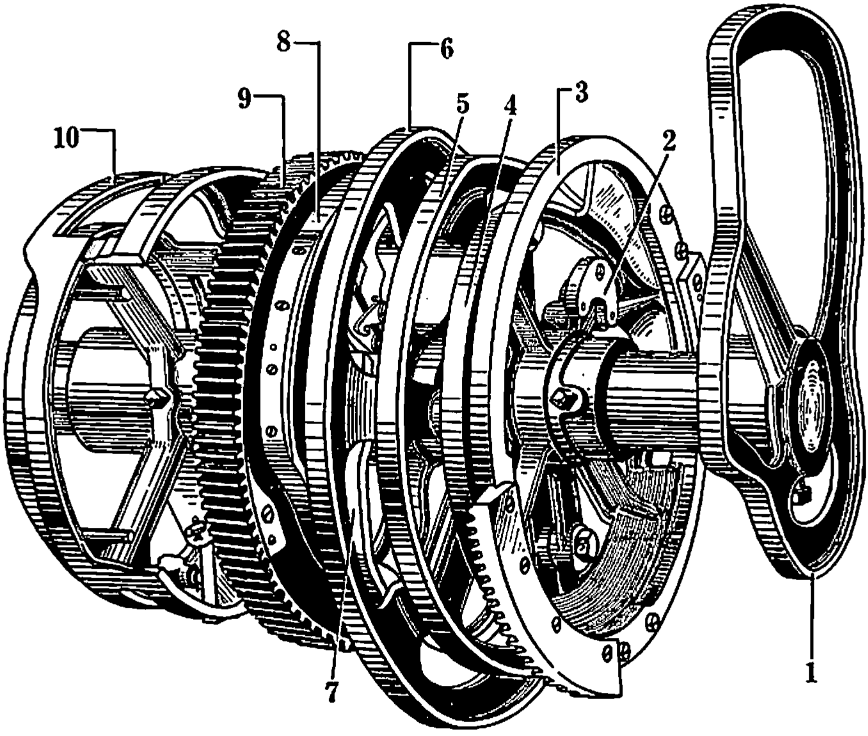


Fig. 188. Cams and Cam Shaft, Assembled. The names of the cams are as follows: 1. First-Elevator Cam; 2. Distributor Shifter Cam; 3. Mold Turning Cam; 4. Vise Closing Cam; 5. Justification Cam; 6. Second-Elevator Cam; 7. Pot Pump Cam; 8. Pot Cam; 9. Mold Cam and Driving Gear; 10. Delivery and Elevator Transfer Cam.

one-quarter of a revolution from normal to casting position. The long segment turns the mold three-quarters of a revolution from casting to ejecting position. It will be noted that the mold turning cam and the vise closing cam are one integral casting.

4. **The Vise Closing Cam** imparts four movements to the left-hand vise jaw through the vise closing lever. First, the jaw is closed to the correct length of line just before first justification occurs; secondly, the jaw is opened slightly to provide freedom for matrix alignment; thirdly, the jaw is closed again to the correct length measurement while the vise justification block is raised for second justification; fourthly, the jaw is opened to permit the first-elevator slide to raise the line freely to transfer position.

5. **The Justification Cam** imparts four movements to the vise justification block through the justification lever. First, the lever raises the block against the spacebands and spreads the line out between the vise jaws during first justification; secondly, it lowers the block to provide freedom for matrix alignment; thirdly, it raises the block again to justify the line for the second time; fourthly, it lowers the block after the cast to relieve the upward pressure on the spacebands and to permit the first elevator to raise the line to transfer position. Note that the justification cam and the second-elevator cam are one integral casting.

6. **The Second-Elevator Cam** lowers the second-elevator bar to the transfer channel so that the matrices can be moved from the first-elevator jaw to the second-elevator bar. Following the transfer, the cam raises the matrices supported by their teeth on the second-elevator bar to the distributor box, from which point they are raised into the distributor and are returned to magazines.

7. **The Pot Pump Cam** permits the pot pump plunger to descend in the crucible well and to force molten type metal into the mold at the time of the cast, then the cam raises the plunger to normal position. Note that the pot pump cam and the pot cam are one integral casting.

8. **The Pot Cam** imparts four movements to the metal pot. After first justification has occurred, the metal pot presses the mold against the matrices, aligning them facewise; secondly, the pot withdraws to provide freedom for second justification; thirdly, the pot locks against the mold and the plunger descends, casting the slug in the mold; fourthly, the pot withdraws from the mold and moves back to normal position.

9. **The Mold Cam and Driving Gear** turns the assembled cam shaft and also imparts five movements to the mold through the mold disk slide. The teeth in the periphery of the cam mesh with the driving shaft pinion and turn the cams whenever the friction clutch arm engages the driving pulley. The mold cam consists of a formed groove on the left side of the driving gear (viewed from the rear of the machine). This cam advances the mold to within .010″ of the matrix line just before first justification. After second justification is completed, the mold is advanced the additional .010″ and is locked tightly against the matrix line. Following the casting of the slug, the mold is withdrawn so that the slug can be turned to ejecting position. The mold then advances to the vise frame and the slug is ejected. Following the ejection of the slug, the mold is withdrawn from the vise frame to normal position.

The mold cam and driving gear is also provided with two small cams known as the pot return cam and the ejector cam. The pot return cam is provided to withdraw the pot from the mold in case the mouthpiece is chilled and adheres to the back of the slug. When the mouthpiece is at its correct temperature, however, it separates readily from the slug and the pot returns to normal position simply by following the contour of the pot cam. The ejector cam draws the ejector lever forward at the correct time when the slug is to be ejected from the mold.

10. The Delivery and Elevator Transfer Cam actuates the delivery slide and the transfer levers. From the standpoint of the delivery slide, the delivery cam moves the delivery slide back to normal position after the line of matrices and spacebands has been carried into the first-elevator jaw. The delivery cam is also provided with a dwelling surface, which holds the delivery slide in the delivery channel when a line is sent in before the cam shaft has completed its revolution.

From the standpoint of the transfer levers, four movements are imparted by the elevator transfer cam. First, the levers are permitted to move together in order to transfer the line of matrices and spacebands from the first-elevator jaw to the transfer channel. Secondly, the levers withdraw to permit the second elevator to raise the matrices out of the channel. Thirdly, the levers move together again so that the spaceband pawl can engage the spacebands. Fourthly, the levers move back to normal position and the spacebands are returned to the spaceband box.

It should be noted that the delivery and elevator transfer cam also bears two pawls which stop the machine at normal and transfer position. The automatic stopping pawl stops the cams after they have made one complete revolution. The automatic safety pawl stops the machine at transfer position if the second-elevator lever is held up at the distributor by a matrix stop or if recasting work is being done. When regular composition is being carried on, that is, when lines are being sent in and are being transferred in the usual way, the automatic safety pawl is pushed clear of the stopping mechanism by the elevator transfer cam roll lever and does not stop the machine.

Two auxiliary functions are served by the delivery and elevator transfer cam. A lug on the cam bears against the ejector lever and returns the ejecting mechanism to normal position. There is also a pad on the cam which operates the second-elevator safety pawl and permits the second-elevator lever to descend to the transfer channel. If a distributor stop holds the second-elevator lever up at the distributor, however, the pawl prevents the lever from falling with an impact upon the transfer channel when the stop is cleared.

Sequence of Machine Actions

It will be helpful at this point to summarize in their correct sequence all of the automatic actions imparted by the cams after the line of matrices and spacebands has been delivered to the first-elevator jaw. While the actions of the individual cams have been outlined previously, it is necessary now to correlate the actions of all the cams in order to present a composite picture of the machine's operation during one complete revolution of the cam shaft.

Preceding the automatic cam actions numbered below, the starting point in the operation of the machine is the assembling of the line of matrices and spacebands by the operator. As the operator depresses the keybuttons of the keyboard, the required matrices are released from the magazine and are carried in their correct order to the assembling elevator. As each matrix word group is assembled, the operator depresses the spaceband key, which causes a spaceband to drop into the assembling elevator. When the length of the assembled line is correct, the operator raises the line in the assembling elevator to the delivery slide. The slide carries the line through the delivery channel to the first-elevator jaw and then returns to normal position, ready to receive the next assembled line. In the meantime, the operator has started to set the next line while the line just delivered to the first elevator is handled automatically from this point on as is described below.

1. The first elevator descends with the line of matrices and spacebands in the first-elevator jaw. The line is lowered between the two vise jaws and comes to rest in a position directly in front of the mold.

2. While the first elevator is descending with the line, the mold disk is turned one-quarter of a revolution, bringing the mold in use to a horizontal position in front of the matrix line.

3. The mold disk slide moves the mold disk forward until the face of the mold is within .010″ of the matrices.

4. The vise closing lever rises, closing the left-hand vise jaw to the length of line being cast.

5. The justification lever rises, lifting the vise justification block in an inclined position. The spacebands are pushed upward consecutively by the justification block, spreading the line of matrices out against both vise jaws. This action is referred to as first justification.

6. The justification lever descends, relieving the upward pressure of the vise justification block from the spacebands.

7. The vise closing lever descends, permitting the left-hand jaw to withdraw slightly from the matrix line.

8. The first-elevator slide rises, lifting the toes of the matrices against the aligning groove in the mold body and thereby aligning the matrices vertically with respect to the mold.

9. The metal pot advances and moves the mold against the matrices, pressing the matrices against the first-elevator front jaw adjusting bar. This action aligns the matrices facewise in relation to the mold.

10. The metal pot withdraws from the mold to provide freedom for second justification.

11. The vise closing lever rises, closing the left-hand vise jaw to the length of line being cast.

12. The vise closing lever continues to move upward until it contacts the second vise justification rod collar, causing the vise justification block to be raised to a horizontal position. Then the justification and the vise closing lever rise together, lifting the vise justification block on a horizontal plane and pushing the spacebands upward until the line of matrices is spread out tightly be-

tween the vise jaws. This final justification action is referred to as the second justification.

13. The metal pot advances and locks tightly against the back of the mold, pressing the face of the mold against the previously aligned and justified line of matrices and spacebands. This action is commonly referred to as the "lock-up."

14. The pot pump plunger is permitted to descend in the crucible well, forcing a stream of molten metal upward through the throat of the crucible, through the jets or holes in the mouthpiece, into the mold against the characters punched in the matrices. The molten type metal solidifies instantly in the mold, forming the slug with a line of raised type characters reproduced from the punched characters of the matrices.

15. The pot pump lever is raised in preparation for the withdrawal of the metal pot.

16. The upward pressure with which the first-elevator slide aligned the matrices vertically is now released as the first-elevator lever link spring is permitted to open slightly. This action relieves the upward pressure of the matrix lugs from the aligning groove in the mold body.

17. The justification lever and the vise closing lever descend, lowering the vise justification block and relieving the spacebands of the upward pressure.

18. The metal pot withdraws from the mold, then the mold disk slide moves the mold back from the matrix line, withdrawing the face of the slug out of the punched characters of the matrices.

19. The mold disk slide stops when the mold disk is clear of the vise frame and the pot continues to move back until it reaches normal position.

20. The mold disk is turned three-quarters of a revolution, carrying the slug in the mold to a vertical position in front of the left and right-hand trimming knives preparatory to ejection. While the mold is being turned to ejecting position, the back knife trims the base of the slug.

21. During the preceding action, the first-elevator slide raises the line of matrices and spacebands to the transfer channel while the second-elevator lever descends and positions the second-elevator bar within the channel.

22. The elevator transfer lever and the spaceband lever move together to transfer the line. The transfer slide finger moves the line of matrices and spacebands out of the first-elevator jaw into the transfer channel. The teeth of the matrices engage the teeth of the second-elevator bar and the lugs of the spaceband sleeves enter a groove in the transfer channel front plate.

23. The elevator transfer lever and the spaceband lever withdraw, permitting the second-elevator bar to lift the matrices out of the transfer channel. The matrices are supported by their teeth on the bar while being lifted to the distributor. As soon as the matrices are clear of the transfer channel, the elevator transfer lever and the spaceband lever move together again. The transfer slide finger pushes the spacebands under the spaceband lever pawl and when the levers return to normal position, the pawl draws the spacebands to the right through the transfer channel to the spaceband box, where they slide down to position for use in subsequent lines. It should be noted that this last action related to the return of the spacebands occurs during and after ejection of slug.

24. During the preceding action, the mold disk slide moves the mold disk forward until the locking studs enter the stud block bushings on the vise frame. This action locates the slug in the mold in its correct position with respect to the left and right-hand knives. The ejector cam moves the ejector lever forward, causing the ejector blade to push the slug out of the mold and between the two knives. The slug is trimmed to its correct point size and is moved forward by the ejector blade through the galley chute, from which point it slides down onto the galley in its correct sequence with the slugs delivered previously.

25. While the slug is being ejected and trimmed, the first-elevator slide and the second-elevator lever are returned to normal position. The first-elevator slide descends from the transfer channel and comes to rest when the first-elevator jaw is opposite and in alignment with the delivery channel. The second-elevator lever continues to raise the line of matrices to the distributor box. As the elevator approaches its seat at the distributor, the distributor shifter slide moves out of the distributor box until it is clear of the second-elevator bar. As soon as the bar is in position opposite and in alignment with the distributor box bar, the distributor shifter slide moves over to the right and pushes the matrices into the distributor box.

26. While the matrices are being moved into the distributor box, the ejecting mechanism is returned to normal position by the ejector lever and the mold disk slide withdraws the mold to normal position.

27. The final automatic process of the machine—the distribution of the matrices to their respective magazine channels—is now carried out by the matrix lift and distributor screw mechanism. Each matrix is lifted into the distributor screws and engages the teeth of the distributor bar. The matrices are moved along the bar supported by their teeth until they reach the points on the bar directly above their respective channels in the channel entrance. As each matrix reaches its releasing point, there is a gap in the teeth of the distributor bar opposite each of the supporting teeth of the matrix. The matrix is thereby released and drops off the distributor bar into its channel in the channel entrance, from which point the matrix is guided into its channel in the magazine.

The foregoing outline represents the complete sequence of actions imparted by the cams during one complete revolution of the assembled cam shaft. It should be noted that if a line of matrices and spacebands is raised to the delivery slide before the cams have completed their revolution, the delivery cam will hold the line in the delivery channel until the cams reach normal position. The line, commonly referred to as a "waiting line," will then be delivered to the first-elevator jaw and will be cast and distributed exactly as outlined in the list of machine actions.

Removal of Main Cams

If it is necessary to remove the assembled cam shaft and cams from the machine, the work will be facilitated by following the sequence of steps outlined below. Before proceeding with the removal, note that the driving shaft friction clutch arm is parallel to the floor when the machine is in normal position. When the cams are replaced, it will be necessary to mesh the mold cam and driving gear with the driving shaft pinion in such a position that the friction clutch arm will be restored to its original parallel position. The reason for the parallel location of the arm is to insure clearance between the leather buffers and the driving gear pulley when the machine is stationary at normal position. If the arm were permitted to rest at an angle, the lowest buffer would rest against the pulley and would be subjected to unnecessary wear.

1. Remove the pot pump plunger. 2. Remove the pot pump spring rod. 3. Place a block of wood between the vise cap and the first-elevator slide in order to relieve the weight of the slide from the first-elevator cam. Remove the first-elevator auxiliary lever and the first-elevator cam. If the machine is equipped with a quadding and centering device, note that there is a roller on a pin in the first-elevator cam. Be careful not to lose the roller when removing the cam. 4. Loosen the second-elevator weight lever set screw and remove the weight lever. Obtain a brass rod and drive the second-elevator shaft out of its bearings, then lift off the second-elevator lever. 5. If the machine is equipped with a quadding and centering device, remove the vise jaw lever from the mold gear arm. 6. Disconnect the distributor shifter slide, remove the shifter lever spring and remove the assembled distributor shifter from the mold gear arm by withdrawing the shaft from the hub. 7. Disconnect the first-elevator lever link from the first-elevator lever, remove the block from under the first elevator slide and lower the vise frame to second position. 8. Remove the ejector lever link, depress the mold cam lever handle and pull the mold disk slide forward. 9. Disconnect the mold disk slide safety lock link from the safety lock. 10. Remove the pot pump lever. 11. Remove the mold cam lever. 12. Remove the pump stop bracket and rod. 13. Remove the pot pump bracket. 14. Withdraw the first elevator and ejector lever shaft until the ejector lever is free, then remove the ejector lever by lifting it upward between the cams and the justification lever. 15. It is necessary now to lock the vise closing lever spring and the justification lever spring. This is usually accomplished by having one person depress the levers at the front of the machine while another person at the rear inserts large nails or rods through the holes in the spring collars and rods. If the justification lever cannot be depressed far enough to align the holes, it may be necessary to push the spring rod down with a suitable lever at the rear of the machine. Another method of rendering the justification and the vise closing levers inoperative is to depress them and to wire them down to the vise frame shaft at the front of the machine. If this method is used, *make sure that the levers are held securely by the wire or rope.* 16. Remove the pot lever eyebolt wing pin at the bottom of the pot, loosen the pot lever shaft set screw and remove the pot lever shaft stud. Place a small block of wood between the pot pump cam and the pot jacket, then withdraw the pot lever shaft and lower the pot lever out of the machine. Next, obtain a suitable block of wood and insert it between the base of the machine and the bottom of the pot to hold the pot forward clear of the cams. *Make sure that the pot is blocked up securely.* 17. Remove the assembled mold gear arm. If the machine is equipped with an overhead motor, remove the fastening screws and lift the motor off the machine. Remove the right-hand cam shaft bracket tie rod and cap. 18. Remove the locating plate fastened between the delivery and elevator transfer cam and the mold cam and driving gear. Loosen the delivery and elevator transfer cam set screw, then move the cam

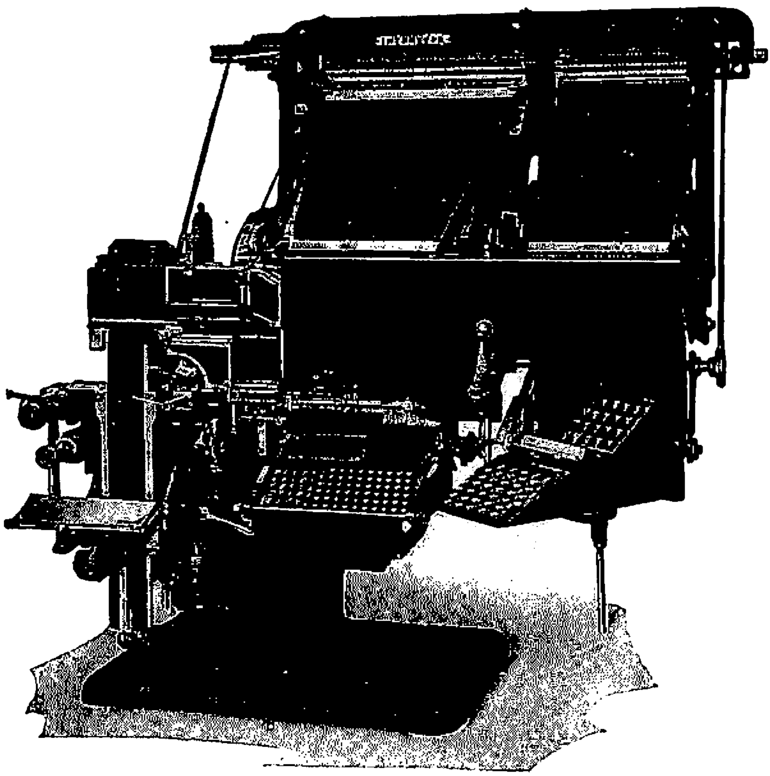
toward the mold cam and driving gear. 19. Shift the assembled cam shaft toward the left (viewed from the rear of the machine). This will provide side clearance and will permit the assembled cams to be lifted freely out of the cam shaft bearings.

After the cams and shaft have been lifted off the machine, any cam may be removed by taking out the four long cam bolts and loosening the set screws in the cams. The cams should be cleaned thoroughly before they are replaced and particular attention should be given to the surfaces where the cams join. Apply a light film of oil to the cam bearings as they are placed on the shaft.

In replacing the assembled unit, reverse the procedure used for removal. Note that when the cams are replaced, the teeth of the mold cam and driving gear should be meshed with the driving shaft pinion so that when the cams are in normal position, the driving shaft friction clutch arm will be parallel to the floor. To obtain this result, first place the cams in the machine and turn the cams until the automatic stopping pawl is resting on the upper stopping lever. The cams will then be in normal position. Observe the position of the friction clutch arm. If the arm is not parallel to the floor, it will be necessary for two persons to lift the cams until the mold cam and driving gear is clear of the driving shaft pinion. A third person should then turn the friction clutch arm to its correct position, then the cams may be lowered and the replacement procedure may be continued. When replacing the pot lever, centralize it between the mold cam and driving gear and the pot pump cam.

Maintenance. The chief maintenance requirement of the cams is cleanliness of the surfaces contacted by the cam rolls. Gum and greasy substances on the cams may cause the cam rolls to slip and may result in flat spots. An efficient and safe method of cleaning the cam surfaces is to wrap a cloth pad around a stick, dip the cloth in kerosene and hold the cloth against the cams while another person holds out the starting and stopping lever to keep the cam shaft turning. The kerosene should be wiped off the cams with a dry cloth after the surfaces have been cleaned. The use of machine oil on the cams as a lubricant is not recommended because dust and dirt adhere to the oil and cause cam roll slippage. Intertype has recently designed a set of covers for the main cams to protect them from dirt and other injurious substances. The covers are available for application to streamlined machines at extra charge.

The importance of lubricating the cam rolls has been indicated already in the description of the various assemblies actuated by the cams. For convenience of reference, the various levers having cam rolls are listed herewith: first-elevator auxiliary lever, vise closing lever, justification lever, second-elevator cam lever, pot pump lever, pot lever, mold cam lever, elevator transfer lever and the delivery lever. The cam rolls should be inspected at regular intervals and oiled when necessary. It is essential to keep the oil holes for the cam rolls clean so that the oil will flow freely to the cam roll pins. This can be attended to simply by running a wire in the holes before applying the oil.



Model C4-4s.m. Intertype

WITH CHAIN SHIFT

Single-distributor machine equipped with four 90-channel main magazines and four side magazines. See table on page 357 for a complete list of Intertype models and various equipment combinations.