Selecting Schemes for Universal Mixer Machines

Five selecting schemes have been devised for Universal mixer machines to suit the notch systems established prior to the development of the new machines. The five mixer selecting schemes are fully adaptable and the new machines will fit readily into existing composing room systems. The essential facts about each selecting scheme and the type of selector used in each case are outlined below.

Mixer Selecting Scheme No. 1 (Setting Disk Selector). This scheme is suitable for composing rooms having two or four magazine F's or G's with or without side magazines *where only two notches are used for selecting purposes.* On some Model F and G machines, the second and third main magazines are not used together. It is possible in such cases to take care of all mixing requirements with two notches, such as 8–11, or 7–10, etc. Regarding the top magazine as the first magazine, a typical notch scheme would be as follows:

Main Magazines		*Side Magazines*	
Top	8	Top	8
Second	11	Second	11
Third	8	Third	8
Fourth	11	Fourth	11

From the standpoint of mixing, either the upper or the lower pair of side magazines may be used with the upper or the lower pair of main magazines. Since only two notches are required for F and G machines used as described, the setting disk selector is supplied because the two notch locations are constant.

Mixer Selecting Scheme No. 2 (Operating Stud Selector). This scheme is a combination of the setting disk selector and the operating stud selector, the latter of which changes the selector settings automatically when the middle pair of main magazines is in operating position. The scheme is suitable for F4 machines without side units in cases where the second and third main magazines are to be used together. A two-notch scheme is used, such as 8–11, or 7–10, etc. If notches 8 and 11 are used, the fonts would be cut as follows:

Main Magazines			
Top	8	Third	8
Second	11	Fourth	11

When the first and second magazines are used together, matrices from the first magazine (notch 8) pass through the front distributor and those from the second magazine (notch 11) through the back distributor. The front selector feeler is set at notch 8 by its setting disk and the back feeler at notch 11 by its disk. The same settings hold true when the third and fourth magazines are used together.

When the second and third magazines are used together, however, the matrices from the second magazine (notch 11) must pass through the front distributor and matrices from the third magazine (notch 8) through back distributor.

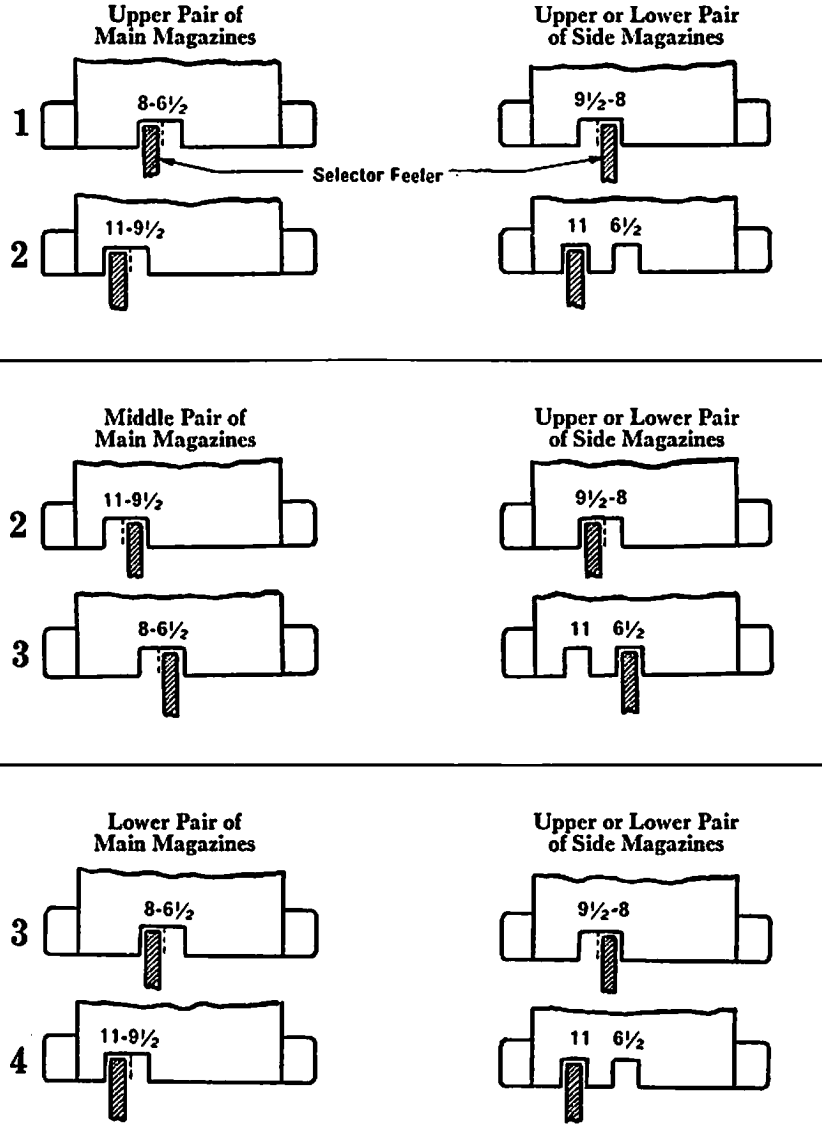

Fig. 215. Diagram of Selecting System for Intertype F4-4s.m. Machines. The double notch system indicated in the diagram enables the operator to mix matrices from any adjacent pair of main magazines with matrices from either the upper or the lower pair of side magazines. The selector feelers are set automatically at the correct notch locations as the main magazines are shifted.

Since the selector setting disks provide a constant setting of 8 at the front distributor and 11 at the back distributor, the operating stud selector is required to move the feelers away from the setting disks to the necessary settings. In the case just outlined, therefore, the operating studs would move the front feeler to notch 11 location and the back feeler to notch 8 location, thereby setting the selector automatically for the middle pair of main magazines. The studs and links of the operating stud selector are shown in drawing *B*, Fig. 217. The links illustrated in the drawing are connected with the same operating levers shown for the operating cam selector in drawing *A*.

Mixer Selecting Scheme No. 3 (Operating Stud Selector). When the F4 machine is equipped with two or four side magazines, the same operating stud selector is used, but due to the increased mixing requirements of the machine, it is necessary to cut a double notch in each font of matrices. If only two notches such as 8 and 11 were used, for example, it would not be possible to use any matrices from the side magazines with the middle pair of main magazines because the selector feelers would be set at 11 (front) and 8 (back) and the side magazine matrices would be distributed to the reverse magazines. For F4-s.m. machines, therefore, notches 6½ and 9½ are used in addition to notches 8 and 11 to insure the return of the matrices to the proper magazines under all mixing conditions.

To understand the F4-s.m. selecting system, it is necessary to bear in mind the notches of the matrices and the settings of the selector feelers when each of the three pairs of main magazines is in operating position. Fig. 215 illustrates the complete selecting system in terms of the feeler settings and the matrix notches in each case.

When the upper pair of main magazines is in operating position, the front selector feeler is set at 8 and the back feeler at 11. Since these notches respectively are provided in the upper pair of main magazines and in both pairs of side magazines, it is possible to use the upper or the lower pair of side magazines with the upper pair of main magazines. Since the same notches (8 and 11) are cut in the matrices of the lower pair of main magazines, the same mixing possibilities with respect to side magazine fonts are present.

When the middle pair of main magazines is placed in operation, the front selector feeler is automatically set at 9½ and the back feeler at 6½. Since these notches respectively are provided in the middle pair of main magazines and in both pairs of side magazines, it is possible to use the upper or the lower pair of side magazines with the middle pair of main magazines. It should be noted also that font 1 has the same notch as font 3, and font 2 has the same notch as font 4 in order to make them interchangeable in these locations. The double notch selecting system, therefore, makes the F4-s.m. machine fully universal as to mixing of fonts and automatic selection.

Mixer Selecting Scheme No. 4 (Operating Cam Selector). This scheme was devised for F4 machines without side units in cases where complete mixing flexibility is necessary. In some composing rooms, a wide range of 90-channel fonts is used on the Universal machine and it is necessary not only that the fonts have a variety of notches but also that the fonts be changed frequently in the magazine frame for mixing purposes. The operating cam selector is supplied for machines of this type because the cam selector is fully automatic with respect to the

matrix notches, no matter what position the fonts occupy in the magazine frame. The matrices from any adjacent pair of magazines may be mixed provided they carry unlike mixer notches.

The essential features of the operating cam selector are shown in drawing *A*, Fig. 217. The selector feelers are set automatically by cams *33* and *34* fastened to the undersides of the main magazines. The cams operate cam levers, which register with linkage at the left side of the main magazine frame. Whenever the magazines in the frame are changed, therefore, or when the magazine frame is shifted into a different position, the selector feelers are set automatically at the proper locations for the matrices in use.

The notches used in this scheme are 6½, 8, 9½ and 11. In addition to the four mixing possibilities provided by the notches themselves, it should be borne in mind that the magazines in the frame can be changed in position. It is possible, therefore, to mix four fonts in six different ways:

6½ with 8	6½ with 9½	6½ with 11
8 with 9½	8 with 11	9½ with 11

Mixer Selecting Scheme No. 5 (Operating Cam Selector). When the four notch system is applied to a Universal F4 machine equipped with side magazines, it is not possible to provide notches for the side magazine matrices which will cooperate with all of the six mixing possibilities of the main magazines. However, in cases where it is not necessary to use the middle pair of main magazines and where protection against wrong fonts is desired, a suitable notch system can be provided to permit mixing of the upper or lower pair of main magazines with the upper or the lower pair of side magazines. The notch system outlined below is particularly suitable for G4-4s.m. machines because the middle pair of main magazines is not used.

Main Magazines		*Side Magazines*	
Top	6½	Top	6½– 9½
Second	8	Second	8 –11
Third	9½	Third	6½– 9½
Fourth	11	Fourth	8 –11

It is apparent from the above that the double notches provided in the side magazine fonts make it possible to use either pair of side magazines with the upper or the lower pair of main magazines.

Setting Disk Selector

The foregoing description dealt generally with the three types of selectors and their relationship to the five mixer selecting schemes for Universal machines. It is necessary now to indicate the mechanical features of the selectors to assist the operator in using the magazines and to indicate to the machinist the adjustable parts provided in the assemblies.

The setting disk selector, shown in Fig. 216, consists mainly of two feelers *3* and *4* fastened to arms *1* and 2. Center arm *5* is pinned to shaft *8* and the selector setting disks *6* and *7* are mounted on the arm. The disks are provided with stepped faces of various heights which locate the selector feelers in the various

positions corresponding to the notches cut in matrices for mixer machines. Screw *9* in arm *1* banks against disk *6* and locates feeler *3* with respect to the matrices passing through the front distributor; screw *10* in arm *2* banks against disk *7* and serves the same purpose with respect to matrices passing through the back distributor. When the notch settings have been made, the setting disks remain in constant positions because generally only two notches are used with the setting disk selector.

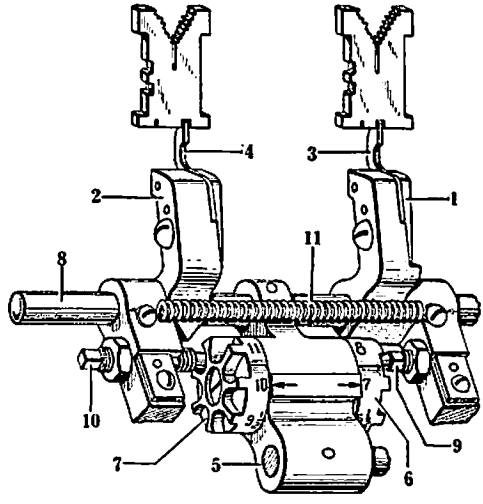

Fig. 216. The Setting Disk Selector is applied to two or four-magazine F and G machines with or without side magazine equipment *in cases where only two notches are used for selecting purposes.* The two notch locations are obtained by means of the disks *6* and *7*.

Screws *9* and *10*, Fig. 216, are adjustable and are set so that selector feelers are located centrally with respect to a definite mixer notch in a matrix, after which all other notch locations are obtained simply by turning the selector disks until the desired notch number comes to position opposite the arrow on center arm *5*. Spring *11* fastened to arms *1* and *2* holds screws *9* and *10* against the setting disks. To change the setting disk locations, it is necessary simply to pull the selector arms far enough away to clear the disks, make the settings, then permit the arms to return to position.

Operating Stud Selector

The links and studs of this selector are shown in drawing *B*, Fig. 217. It should be understood that the same assembly of selector operating levers is used for the operating cam selector and the stud selector. In referring to drawing *B*, therefore, it is understood that link *13* is connected with lever *25*, and link 12 with lever *23*. The basic difference between the operating stud selector and operating cam selector is that the links *12* and *13* of the stud selector are operated by studs *14* and *15* only when the middle pair of main magazines is in operating position. The studs are fastened in constant positions at the left of the magazine frame and automatically set the selector feelers to correspond with the notches of the matrices in the middle pair of main magazines. When the upper or lower pair of main magazines are in operating position, the font selector arms are permitted to bank against the selector setting disks in the regular way for the notch locations of the matrices in use.

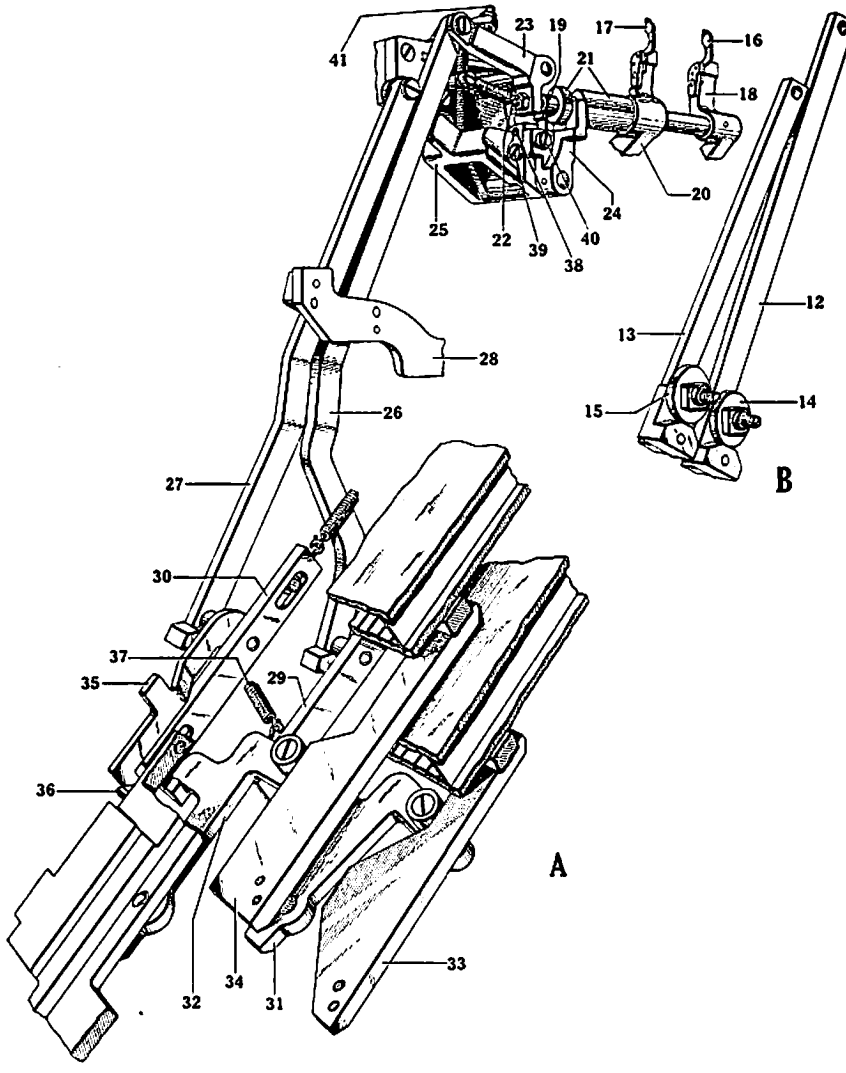

Fig. 217. Operating Stud and Operating Cam Selectors. The operating stud selector, shown in drawing *B*, is applied to machines on which matrices from the middle pair of main magazines are mixed. The studs *14* and *15* automatically set the selector feelers at the correct locations when the middle pair of main magazines is moved into operating position.

The operating cam selector, shown in drawing *A*, is applied to F and G machines in cases where complete mixing flexibility is required. If fonts with a wide range of notches are to be used on the machine and if the fonts are to be changed from one location to another in the magazine frame, it is necessary that the magazines themselves determine the selector feeler locations. This is accomplished by cams *33* and *34* fastened to the undersides of the main magazines. The cams set movable slides *29* and *30* and set the feelers automatically through the linkage illustrated.

Since the same assembly of selector operating levers is used for the operating stud selector and the operating cam selector, the following outline of adjustments applies to both selectors.

Adjustment of Font Selector Feelers. When the font selector feelers *16* and *17*, Fig. 217, are operated by their respective levers, they should be located centrally with respect to the notches in the matrices. Since the locating parts are fastened to the main magazine frame, make sure that the frame is fully seated in its supporting blocks before beginning the adjustment. The back feeler *16* is set by adjusting screw *22* in lever *23*. Remove a matrix from the lower magazine in position, make sure that the distributor box is opposite the back distributor and insert the matrix in the box. Open the channel entrance and place an extension light in front of the distributor box so that the relationship between the back feeler and the notch in the matrix can be seen by looking through the distributor box. Adjust screw *22* until the feeler is centrally located with respect to the matrix notch, then tighten the lock nut securely.

The front feeler *17*, Fig. 217, is adjusted by means of screws *38* and *39* in a manner similar to procedure outlined previously. Before the adjusting screws are turned, locking screw *40* should be released slightly. If fork *24* is to be moved toward the back of the machine, screw *39* should be backed off and screw *38* should be turned in. When the front feeler is centrally located with respect to the matrix notch, tighten locking screw *40*.

A stop screw *41*, Fig. 217, is provided to limit the movement of lever *23* when stud *14* is away from the shoe on link *12* in the course of a magazine shift. A similar screw is also provided to limit the movement of lever *25* when stud *15* is away from link *13*. The stop screws should clear the operating levers by at least 1/32″ when the selector parts are in operation so that there will be no interference to the location of the selector feelers.

Operating Cam Selector

The operating cam selector is shown in drawing *A*, Fig. 217. The back selector feeler *16* is mounted on arm *18*, which is pinned to shaft *19*, and front feeler *17* is fastened to arm *20*, which is pinned to sleeve *21*. Shaft *19* and sleeve *21* are free to move in bearings in the font selector bracket and as they are operated by their respective links, the sidewise position of the feelers with respect to notches in the matrices is automatically set. The location of the back feeler *16* is controlled by shaft *19*, which is operated by screw *22* in lever *23*, and the location of the front feeler *17* is controlled by sleeve *21*, which is operated by fork *24* and operating lever *25*.

The operating levers *23* and *25*, Fig. 217, are connected with links *26* and *27*, which slide in a guide fastened to the left-hand magazine shutter cam *28*. At the lower ends of the operating links are fastened shoes which engage pins in the font selector operating slides *29* and *30*. The slides are mounted on the left sides of the magazine frames and are provided with elongated slots so that they can be located in various positions by the operating cam levers *31* and *32*. The cam levers are operated by cams *33* and *34* fastened to the undersides of the main magazines. While only two operating cam and slide assemblies are shown for the two

magazines in operating position, it is apparent that duplicate assemblies are provided for the other two main magazines of a four-magazine machine.

From the connections outlined above, therefore, it is obvious that the operating cams fastened to the magazines determine the notch locations of the font selector feelers. Cam *33*, Fig. 217, on the lower magazine in operating position sets back feeler *16* through lever *31*, slide *29*, link *26*, lever *23* and shaft *19*; cam *34* on the upper magazine in position sets the front feeler *17* through lever *32*, slide *30*, link *27*, levers *25* and *24* and sleeve *21*. When the middle or lower pair of main magazines are in operating position, the font selector operating slides move the links in a similar manner and set the feelers at the proper locations for the matrices.

A lock *35*, Fig. 217, is applied to upper operating slide *30* to permit the cam lever *32* to move to the left in an inoperative position. Spring *37* pulls the cam lever to the left. In many cases, a split magazine is used in the top position of the magazine frame. Since it is possible to remove such magazines simply by lifting them from the magazine carriage and to replace them in a similar manner, provision is made to hold the roller on lever *32* to the left so that it will clear cam *34* as the magazine is placed in position. The lock *35* serves this function when it is pulled forward and engaged with pin *36*. When the magazine is in position, the lock should be released so that the cam lever *32* will bank against cam *34* and set the parts which locate the front feeler *17*.

All adjustments for the operating cam selector, as previously mentioned, are the same as those of the operating stud selector because the same assembly of selector operating levers is used in each case. For adjustments of the operating cam selector, therefore, see the preceding section dealing with adjustments of the operating stud selector parts.

Distributor Signal Light

The purpose of the distributor signal light is to indicate the presence of matrices in the distributor box or on the distributor bar. When a line of matrices is in the process of distribution, the signal light flashes on and remains lighted until the last matrix drops off the distributor bar. When the light goes out, the operator knows definitely that the distributor is clear of matrices and that the channel entrance may be opened to permit shifting of magazines from one position to another. Wrong font matrices are thereby eliminated and magazine changes are speeded up by the signal light.

The distributor signal light assembly applied to the latest Universal double distributor machines with power channel entrance device is shown in Fig. 218. The signal light *1* is mounted on the front of the machine to the right of the channel entrance operating lever 2. This convenient location permits the operator to look at the light as he reaches for the lever. The power inlet to a suitable transformer *5* is connected with a 110 or 220 volt alternating current source, whichever is available. The transformer *5* steps down the line voltage to a voltage suitable for the operation of lamp *1*.

Wire *7*, Fig. 218, connects the transformer *5* with the front distributor bar *9* and with switch plate *16*. Jumper wire *10* connects the distributor bars *9* and *11*. If the machine is equipped with a side magazine unit, similar jumper wires con-

nect the front and back pairs of distributor bars. Since all the distributor bars are connected together, current can flow to any point on the bars. The distributor bars are insulated from the distributor beam by suitable plates and by bushings through which the distributor bar screws *17* pass. The distributor signal light switch plate *16* likewise is insulated from contact *13* by a plate *12* and from the distributor box arm by two bushings. Contact *13* is held away from plate *16* by screw *15* when the shifter slide *14* is in normal position. *It is important to note*

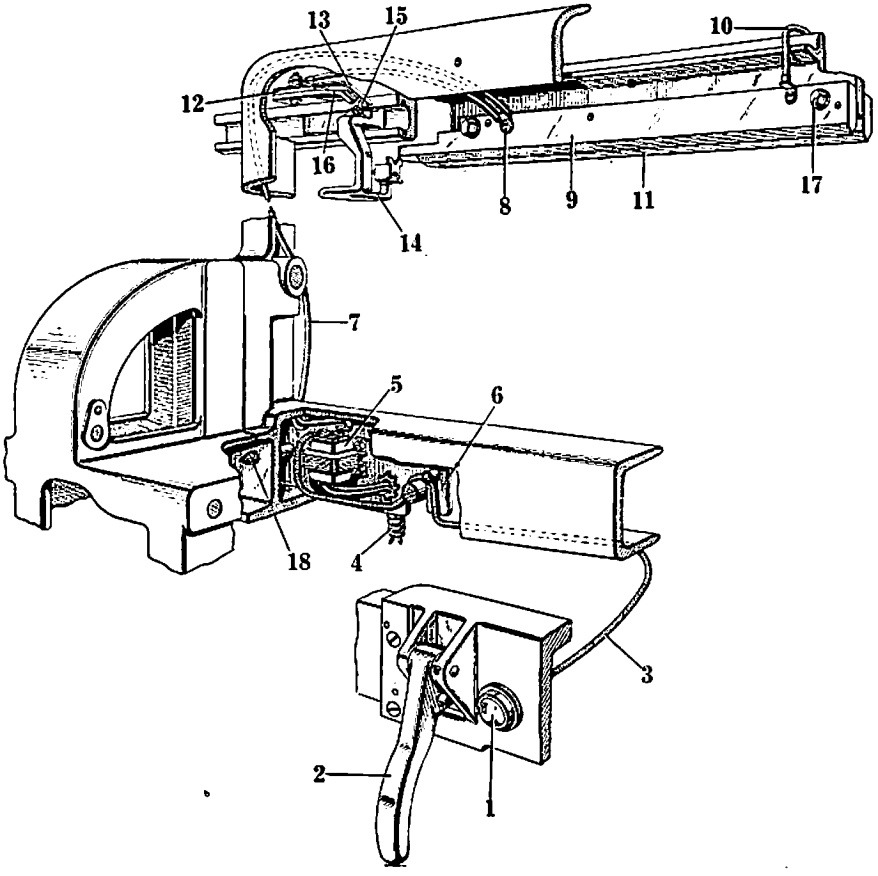

Fig. 218. Distributor Signal Light for Universal Double Distributor Machines. The light *1* at the right of the channel entrance operating lever *2* flashes on while matrices are in the distributor box or on the distributor bars and remains on until the last matrix drops off the bar and returns to the magazine.

The signal light for machines equipped with manual channel entrance operating devices operates on the same principle. The signal for such machines differs from the assembly shown above principally in that the light is mounted on top of the distributor bracket.

that the distributors bars and the switch plate are completely insulated from the frame of the machine. It is upon this fact that successful operation of the signal light depends.

Operation of Signal Light. One terminal of the housing of the signal light *1* is connected to the transformer *5*, Fig. 218, by wire *3*. The other terminal is connected to the frame of the machine. When the second elevator bar carries matrices up to the distributor, the shifter slide *14* is retracted, permitting contact *13*, which is not insulated from the frame of the machine, to touch plate *16*. This closes the electric circuit and the light goes on. The light will remain on as long as contact *13* touches plate *16*, that is, until the shifter slide has pushed all of the matrices through the distributor box. As the last matrix leaves the distributor box, the shifter slide screw *15* raises contact *13* away from plate *16*, but the signal light will remain on because the matrices on the distributor bar contact the distributor screws and thereby close the circuit. The light will remain on until the last matrix drops off the distributor bar. When the distributor box and the distributor bars are entirely clear of matrices, the current cannot flow because the distributor bars and the switch plate *16* are completely insulated from the frame of the machine. The signal light, therefore, goes out and the operator may safely open the channel entrance and shift the magazine frames.

Adjustment: Distributor Shifter Slide Contact Screw. Screw *15*, Fig. 218, holds contact *13* away from plate *16* when the distributor shifter slide *14* is fully to the right in normal position. While it is necessary that the contact be separated sufficiently so that the signal light will not be operated inadvertently, it is also desirable to set the contact screw *15* finely enough to indicate the presence of matrices in the distributor box. If matrices stall in the distributor box, for example, the signal light should indicate their presence in order to prevent them from distributing into the wrong magazine after the magazines are shifted and the next line is sent through. To set the contact screw *15*, therefore, make sure that the distributor box and the distributor bars are clear of matrices. Disconnect the distributor driving belt and insert a thin space (.028″ thick) in the distributor box. Make sure that the distributor shifter slide is pushing the matrix against the stops at the right-hand end of the distributor box rails. Adjust screw *15* until it almost touches contact *13* and tighten the lock nut. The signal light should remain on because the electric circuit is closed through contact *13* and switch plate *16*. When the distributor is started, the thin space will be raised into the screws. As the matrix drops off the distributor bar, the signal light should go out. If the light stays on, contact screw *15* was not set close enough to contact *13*. Care must be taken not to disturb the setting of the contact screw when tightening the lock nut.

Maintenance. Routine cleaning of the distributor bars and screws is generally sufficient to insure proper operation of the signal light. The switch plate *16* and contact *13*, Fig. 218, should be cleaned whenever there is an accumulation of dust or gummy substances around the contact areas. If the insulated parts are removed from the machine, it is essential that the insulation plates and bushings be carefully replaced when the parts are put back. Note that any metallic objects, such as matrices, screws, washers, or even metal chips and filings, inadvertently left in the distributor in such a manner as to form a connection between

the distributor bar and distributor beam will close the electric circuit causing the signal light to remain on continuously. Should it become necessary to inspect the transformer *5* or the wiring inside of plate *6*, the assembled unit may be removed by taking out the three large cover plate screws *18*.

Forty-two-Em Intertypes

The mechanism of the various Intertype models has been described up to this point wholly in terms of the 30-em machine, which is the most widely used type of line composing machine today. For certain classes of newspaper and trade composition, however, slugs up to 42 picas in length are both a necessary and a desirable feature on the standard line composing machine. The most obvious advantage of the 42-em machine is that it eliminates the need for "butting" two or more slugs to obtain lines up to 42 ems in length. Single-line composition in the wide measure effects a very appreciable saving in operating time, facilitates subsequent handling of the slugs in makeup and promotes greater uniformity in the printed job.

Intertype 42-em machines are designed on the same basic principles of standardized construction as those embodied in the 30-em group. Although the extra 12-pica feature involves changes in several parts of the machine, it is noteworthy that Intertype 42-em single and double distributor machines respectively are as standardized in their own field as the corresponding models in the 30-em category. One concrete manifestation of this fact is the wide degree of conversion possibilities characteristic of the 42-em models—a degree of conversion achieved by the same method of unit design as that set for the basic 30-em machine.

From the standpoint of equipment and operation, the 42-em machine is as versatile and as efficient as the 30-em unit. Single and double distributor 42-em machines are available with from one to four main magazines of both the 72 and the 90-channel types and with up to four side magazines of the 34-channel type. The magazines are shifted rapidly into position and the wide selection of type faces is used with the same speed and convenience as on the 30-em machine. Changes incidental to line composition are made in the usual manner on the 42-em machine. The assembler slide, vise jaws, liners, knife block and ejector blade are set in the same manner as on the 30-em machine and fit in naturally with the operator's accustomed methods and procedures. The slug body and the type face sizes obtainable from the 42-em machine are fully universal in range. Slugs from 5 to 48 points in body thickness are obtainable in measures from 4 to 42 ems in length. Type faces as small as 5 points are cast as simply as cap fonts in 60-point sizes.

While the extra 12-pica feature of the 42-em machine involves in some cases a number of new parts and in other cases an adaptation of existing mechanism, it should be noted that the basic function and operation of the various parts are the same as those of the 30-em machine. To illustrate this point, it will be noted that while the assembling elevator of the 42-em machine is adapted to receive 12 more picas of matrices than that of the 30-em machine, the function of the elevator is still to receive the matrices and spacebands as they are assembled and to raise the completed line to the delivery slide. From this standpoint, the duties of

the operator and the machinist are in no sense increased nor made any more complicated by the mere inclusion of the 42-em feature.

The mechanisms which require adaptation to suit the 42-em operation quite naturally comprise those parts related to the length of the matrix line and of the slug. From the standpoint of the matrix line, the following are the main parts affected by the increase in the length of the line: the assembler slide, assembling elevator, delivery slide, delivery channel, first-elevator jaw, vise jaws and vise justification mechanism, first-elevator slide guide, transfer slide and channel, second-elevator bar and distributor box. With respect to the length of the slug, the main parts requiring adaptation are the molds, mold disk, metal pot, mold disk slide, ejector mechanism, knife block, knife wiper, slug lever and slug galley. Since most of these adapted parts differ from the corresponding 30-em units only with respect to length, it is obvious that the description of function, operation and maintenance outlined previously for the 30-em machine applies equally to the 42-em machine. With regard to adjustments, all of the 42-em parts which function in the same manner as the corresponding 30-em parts are set by means of similar adjustable members and in the same way except, of course, that basic length dimensions must be increased 12 ems or 2 inches.

The mold disk of the 42-em machine is similar in construction to that of the 30-em machine and is operated by the same basic train of mechanism. The diameter of the 42-em disk, however, is made larger in order to accommodate the four 42-em molds. The molds are mounted in the same way on the disk and the caps are held in position by the conventional type of swivel bolt. The range of 42-em molds is as wide in body sizes as that of the 30-em group and changes in the lengths of slugs are made with equal ease and speed. Molds for solid slugs are available for 5 to 14 point sizes; recessed molds will produce slugs from 10 to 48 points in body thickness; advertising figure molds, of both solid and recessed slug types, are available for all of the conventional classes of overhang casting up to 60 point cap and figure faces. Changes in the length of the slug are made by means of the regular type of liner. It is necessary only to remove the mold cap, insert the desired liners and fasten the cap in position. Slug lengths may vary from single-column measure or less up to the maximum of 42 ems.

The outstanding change in the 42-em metal pot is the introduction of a double plunger arrangement designed to increase the amount of type metal forced into the mold. The two plungers are operated by the conventional type of pot pump lever and are moved downward simultaneously in the crucible wells at the time of the cast. This provides an adequate supply of type metal for the cast and insures the production of solid slugs with clear, sharp type faces. It should be noted that besides increasing the capacity of the 42-em crucible itself, the standard type of Intertype external pot heaters are used in the 42-em electric pot. The heaters are mounted around the sides of the crucible and under the throat and are held in position by the regular type of cover. This method of external heater mounting makes it possible to carry considerably more type metal in the crucible and insures more uniform temperature conditions. From the standpoint of control equipment, the standard Intertype control box and ther-

mostat are used for the 42-em electric pot. In the case of the gas pot, the assembly of heaters and the governor are essentially similar to the 30-em equipment.

The only other 42-em mechanism requiring a special note at this point is the transfer slide. It should be noted first that the elevator transfer cams and the transfer levers of both the 30 and 42-em machines are the same with respect to stroke. In the case of the 42-em machine, however, the extra 12-em movement necessary for shifting a full-length matrix line from the first-elevator jaw to the second-elevator bar is obtained by interposing a gear between the transfer slide and a rack fastened to the face plate of the machine. The geared arrangement provides the full movement necessary for a 42-em line and shifts the matrices to the second-elevator bar with a uniform stroke and in the correct time with respect to other movements imparted by the cams.

The transfer slide is timed in relation to the elevator transfer gear. If the slide is removed from the machine, it is necessary to time the rack and the gear when the parts are replaced. From the standpoint of adjustment, there should be 7⅝" space between the right side of the transfer slide finger and the left side of the first-elevator jaw duplex rail return plate when the machine is in normal position. This adjustment is made by setting the elevator transfer cam roll lever at the rear of the machine exactly as described previously in connection with the 30-em transfer slide.

Intertype Hard Metal Machine

The Intertype hard metal machine produces slugs suitable for work printed directly from the slugs, such as telephone books, directories and listings of similar nature. The machine is a standard line casting unit, incorporating the same basic principles of design and operation characteristic of all models of the Intertype machine. While the special requirements of slugs for direct printing entail several adaptations in parts of the casting mechanism, it is noteworthy that all the basic details of standardization and interchangeability have been retained.

The principal reason for this desirable advantage is that the exclusive Intertype baffle crucible is a universal slug casting assembly. Whether heated by gas or by electricity, the baffle crucible produces superior slugs for all classes of work, including hard metal slugs as well as the conventional type of slug used by newspapers and by jobbing establishments. The effect of the baffle is to retard the flow of the type metal momentarily and thereby to facilitate displacement of air from the mold. The baffle also promotes a skimming action and prevents hard dross particles from entering the mold.

In the operation and care of a hard metal machine, the operator and the machinist should bear in mind that the same factors which promote superior results from the conventional machine are of equal importance in the maintenance of a hard metal machine. These factors include chiefly those relating to cleanliness of the metal pot, efficient wiping of the pot crucible mouthpiece, correct operating temperature of the type metal and mouthpiece, suitable adjustment of the metal feeder insofar as it affects the temperature of the type metal and accurate control of the parts provided for cooling the molds while in use. The degree to which these various factors are correctly balanced determine, to a great extent, the relative efficiency of the hard metal machine.

Pot Crucible Mouthpiece Wiper. The most important factor in casting solid, close-grained slugs suitable for withstanding pressure in direct printing is efficient ventage of air from the mold each time a slug is cast. In the design of the pot crucible mouthpiece, ventage of air is provided for by vertical cuts in the mouthpiece between the jets. The vents permit the air and a slight amount of type metal to escape as the cast occurs, and in the normal process of operation, the ventage of air is quite efficient.

In the case of a hard metal machine, however, it should be noted that the type metal has a very marked tendency to adhere to and to smear on the face of the mouthpiece. The mere provision of mouthpiece vents, therefore, is not in itself a guarantee of good ventage—the face of the mouthpiece and particularly the vents should be wiped clean of type metal every time a slug is cast.

An automatic mouthpiece wiper is provided to perform this all-important function. The wiper blade is pivoted on the front of the metal pot and is operated automatically at ejecting position by a lever held in contact with the pot pump cam. When the mold disk is forward at ejecting position, the wiper operating lever moves the wiper to the right across the face of the mouthpiece and then back to normal position to the left.

Several facts should be borne in mind with respect to the mouthpiece wiper. It is essential first that the asbestos wicking be lubricated with beef tallow or a similar compound during operation. The tallow acts as a flux when transferred to the mouthpiece and prevents type metal from accumulating on the mouthpiece or in the vents. The solidity of the slugs is almost wholly dependent upon the cleanliness of the vents. If metal can be prevented from clogging the vents or smearing on the mouthpiece, solidity of slug body can be maintained consistently and the slugs will withstand the normal pressure applied in direct printing.

Related to the fact just described, the face of the wiper wicking should be inspected and cleaned occasionally. Particles of type metal may adhere to the wicking and will impair its efficiency unless removed. The wicking itself should be replaced from time to time as the heat of the mouthpiece hardens the wiping surface. The wicking is held on the blade by a simple clamping arrangement and may be removed with speed and convenience.

Type Metal. The next major factor related to solid slugs and more particularly to the clearness or sharpness of the type characters is the fact that *only virgin type metal should be used in the metal pot.* When subjected to the normal melting operation, hard metal shows a distinct difference in action compared with conventional type metal. This difference is that the elements of hard metal separate to a greater extent when in a molten state and will combine properly only once when solidified in slug form. Once the type metal has been cast in slug form, its various elements can be recombined properly only by the melting and toning operation used by the type metal manufacturers. All the discarded hard metal slugs, therefore, should be sent to the type metal company for remelting, toning and pigging—the slugs must never be used for a second time in the metal pot of the machine.

Cleaning Mouthpiece and Crucible. Due to the active separation of hard metal elements when in a molten state, cleanliness of the pot crucible and the mouthpiece is of paramount importance. The regular pot cleaning procedure as

outlined for the pot crucible should be performed once for every eight hours of operation. This procedure, usually carried out by the operator, includes removing the pot pump plunger from the crucible, cleaning the plunger and crucible well with suitable wire brushes and cleaning the crucible well intake holes with the pointed end of the mouthpiece wiper. Dross on the plunger or in the well is objectionable because it impairs the stroke of the plunger as it descends to cast the slug.

From the standpoint of the machinist, the jets and vents of the mouthpiece should be inspected and cleaned at regular intervals. Accumulations of oxidized substances in the mouthpiece jets reduce the flow of metal into the mold and the same substances in the vents, especially at their lower ends, impair the efficiency of air ventage. Foreign substances in the jets are removed easily and quickly with a No. 52 drill. The drill should be dipped in oil after each jet is cleaned to prevent the drill from breaking off in the mouthpiece.

Oxide or dross in the vents is usually removed with a scriber or similar tool. The lower ends of the vents should be given particular attention because the air escapes from these points as the cast occurs. Care should be exercised, however, not to open the vents too much because the leakage of type metal will be too great and it will be difficult to keep the throat heater shield clean.

After the machine has been operating for a long period, it may be necessary for the machinist to remove the mouthpiece from the crucible in order to clean the crucible throat. The Intertype baffle mouthpiece is fastened to the crucible with a number of screws. Since the four lower screws are located in back of the mouthpiece bulb, it will be necessary to remove the throat heater shield and the bulb, then all of the mouthpiece screws may be removed. After the mouthpiece has been taken off the crucible, dross and other accumulations can be loosened with the crucible cleaner (W-2455). The cleaner is a double-edged, serrated blade curved to fit the shape of the crucible throat. When the throat has been cleaned with the tool, a metal pan or an ingot mold should be blocked up under the crucible mouth and the pot pump plunger should be depressed *slowly* by hand. The dross and oxide which has been freed by the throat cleaner will then flow out of the crucible with the type metal into the pan.

Before replacing the mouthpiece, the crucible face should be cleaned and the mouthpiece should be scraped free of all metal. It is advisable to apply a thin coat of white lead between the parts to insure a metal-tight union. It is essential also that a paste made of graphite and linseed oil be applied to the threads of the mouthpiece screws to facilitate their removal at subsequent periods.

Double Thermostat Pot Control System. The Intertype double thermostat pot control system is standard equipment for all electric pots and is applied also to hard metal machines. The outstanding feature of the control system is that the operation of the metal pot heating units is completely automatic: *the heat of the mouthpiece is regulated automatically by a bulb and thermostat assembly and temperature of the type metal is controlled automatically by a similar assembly.*

The principle of operation incorporated in the thermostats is the expansion and contraction of an operating liquid within the control bulbs as the temperature of the type metal or the heat of the mouthpiece rises and falls. The bulb leading to the crucible thermostat is immersed in the molten type metal and the

bulb leading to the mouthpiece thermostat is inserted in a recess in the mouthpiece. As variations in heat conditions occur, the bellows at the ends of the bulb assemblies lengthen and shorten and cause the thermostat contacts to snap on or off.

When the machine is in the process of assembly, both thermostats are set for their basic operating ranges by means of the adjusting screws. The crucible thermostat at the rear of the supporting bracket is set for a basic operating range of 710-730 degrees F. in the temperature of the type metal. The front themostat, which controls the heat of the mouthpiece, is set for a range of 560-580 degrees F. Both of these temperature ranges are checked respectively with a thermometer and a pyrometer. *Once the proper operating ranges have been set, no further adjustment is necessary because the thermostats will function automatically as heat changes occur.*

Due to the automatic heat control feature incorporated in the mouthpiece, it will not be necessary to adjust this assembly once it has been set for the correct range. When a mold is first placed in operation, for example, the mouthpiece tends to lose heat when it contacts the cold mold surfaces. The mouthpiece bulb, being mounted within the mouthpiece and in contact with the throat heater, responds to the drop in mouthpiece heat and causes the thermostat contact to close the throat heater circuit. The heat of the mouthpiece is thereby restored and the thermostat contact remains closed until the temperatures of the mouthpiece and the mold are equalized. When the mold becomes warm due to repeated contact with the mouthpiece and the entrance of molten type metal into the mold, the thermostat contact opens and cuts off the current flowing through the throat heater. From the foregoing details of operation, therefore, it is apparent that the heat of the mouthpiece is continually adjusted to that of the mold by the automatic assembly just described.

Molds and Related Parts. The molds applied to the hard metal machine are of a standard Intertype recessed design. The purpose of the recessing is to decrease the amount of type metal used in casting the slug and consequently, to facilitate the process of "chilling" or solidifying the molten metal into slug form. The recessed type of mold also decreases metal expenses in cases where type is kept standing for long periods.

It will be noted that a double-acting mold disk turning segment (S-256, assembled) is applied to the mold turning cam to permit alternate casting in each of two molds. As matrix lines are sent in to the casting mechanism, the first slug is cast in one mold and the succeeding slug in the other. Each slug, therefore, is ejected after the succeeding slug is cast. The use of two alternate molds is desirable because neither mold becomes excessively hot and the quality of the slugs is improved.

A duplex mold cooling attachment is supplied to help maintain proper mold temperature. The two blower outlet tubes are located directly opposite the normal position of the mold. One of the outlets is threaded in the right-hand vise locking stud above the mold and the other is fastened to the starting and stopping lever bracket at the lower end of the mold. By this arrangement, two efficient streams of air are constantly blowing across the face of the mold and preventing undue overheating.