CHAPTER 2

The Matrix

IN ORDER to explain the terms applied to the various details of a matrix and the functions of each, refer to the diagrams below.

1. *Teeth*—Projections on the inside of the triangular opening at the top of the matrix. There are seven of these teeth on either side. The teeth which are left in are called the tooth combination. As the matrix travels along the distributor bar it is supported by corresponding teeth on the bar. At a predetermined point the teeth on the bar are cut away. The matrix, being no longer supported, drops through the channel entrance and to its proper place in the magazine. A matrix with all the teeth in is called a "pi" matrix, and passes all the combinations on the distributor bar, falling down the pi chute to the pi stacker.

2. *Bar Point Slot*—This is a slot projecting downward toward the bottom of the matrix. The object is to make all matrices of the same thickness at this one point. The slot registers with the projecting blade on the distributor box bar to prevent the lifting of two matrices at one time into the distributing screws.

3. *Normal Position*—This denotes the character in the regular or normal assembling position of a two-letter matrix.

4. *Auxiliary Position*—This denotes the character in the auxiliary or raised position. Characters on one-letter display matrices 16- to 60-point are also in the auxiliary position.

5. *Lugs*—These are sometimes called "ears." They are made to a certain thickness according to the magazine channel in which the matrix is to run.

6. *Font Slot*—This is a small slot in the bottom of the matrix for use on single distributor machines. In conjunction with the automatic font distinguisher, it prevents wrong fonts from entering the magazine.

7. *Bridge Notch*—A slightly larger opening than the font slot. It is used in con-

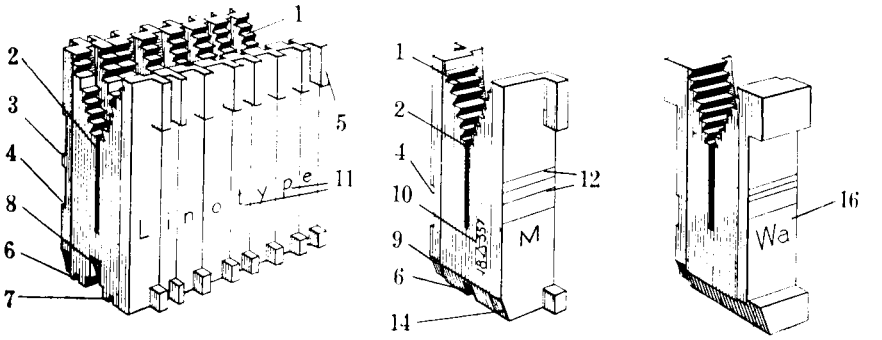

FIG. 1-2. Showing details of two-letter matrices, 14-point and under; one-letter display matrix and logotype.

junction with the matrix bridge on multiple distributor Linotypes to permit the matrix to distribute to its proper magazine.

8. *Bevel Notch*—A notch cut in matrices for Models such as 9, and used to prevent two matrices from entering the distributor screws at the same time.

9. *Clearance Cut*—This is a feature of Linotype matrices. It protects the side walls of the matrices as they are assembled.

10. *Triangle Number*—The triangle is a trade-mark of the Mergenthaler Linotype Company. The number before the triangle indicates the point size of the matrix. The number after the triangle indicates the name of the face.

11. *Reference Marking*—These are characters punched in the reference side of the matrix to enable the operator to read the line of matrices as it is assembled.

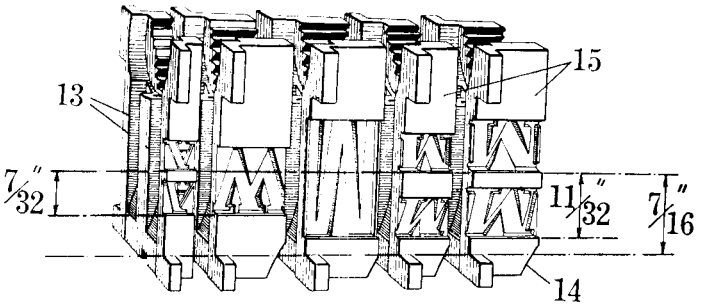

FIG. 2-2. Diagram showing relative alignment of matrices: two-letter 14-point and under; one-letter 16- to 36-point; one-letter 45- to 60-point; two-letter 18-point and two-letter 24-point.

12. *Face Lines*—These are lines cut in the bottom of two-letter matrices (and on the reference side of display matrices) to identify the face.

13. *Lightening Grooves*—As the name implies, these grooves are cut in large matrices to lighten them. On extra large matrices a lightening hole is used instead of a slot. (Fig. 2-2.)

14. *Bevel Cut*—Angle cut on large matrices to aid assembling and distribution.

15. *Two-Letter 18- and 24-Point Matrices*—These matrices (also called duplex-display matrices) are punched with the regular characters in the same alignment as the regular character of all two-letter matrices; that is, $\frac{7}{16}$″ from the aligning surface of lower lug to the constant edge of the mold. The auxiliary characters on these matrices are punched in what is known as the 45-point alignment; that is, $\frac{11}{32}$″ lower down on the matrix than the alignment of regular characters. Fig. 2-2, and ⅛″ lower than auxiliary characters of smaller two-letter matrices.

16. *Logotypes*—A logotype consists of two or more characters on the same matrix or two or more matrices riveted together.

The standard matrix is 1.25″ high by .75″ wide, inclusive of the lugs. The top lug is .266″ long and the bottom lug is .125″. On any one matrix all four lugs are of the same thickness, and that thickness is equal to or less than the thickness of the matrix. It is generally .010″ less than the width of the magazine channel in which the matrix runs. The width of the matrix from the casting edge to the reference edge is .562″. The central portion of each side is relieved slightly to facilitate the lock-up during the justification and casting operation. The larger number of matrices in use are two-letter. They are now made as large as 30 point,

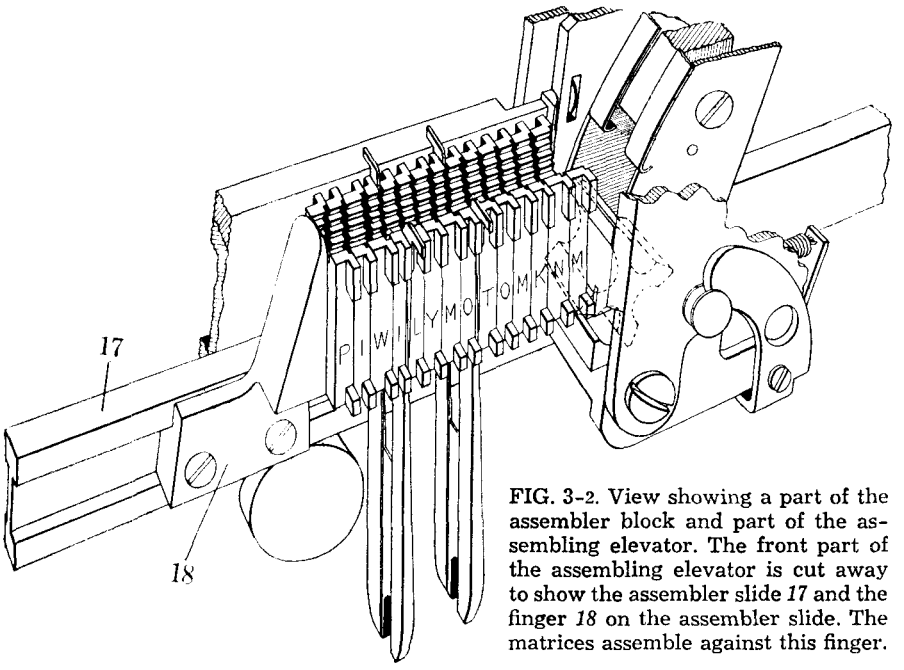

FIG. 3-2. View showing a part of the assembler block and part of the assembling elevator. The front part of the assembling elevator is cut away to show the assembler slide *17* and the finger *18* on the assembler slide. The matrices assemble against this finger.

and one-letter matrices as large as 60 point. Normally, the lugs are flush with the left-hand side of the matrix, when looking at the casting edge, but on some of the larger faces that is not always so. Sometimes the lugs are set somewhat to the right. This is called "back-milling" and allows the magazine to contain larger matrices in various channels than would otherwise be possible, because the matrix can then project over on both sides of the channel instead of only one side as is normally the case.

The standard depth of the character die in the edge of the matrix is .043". The thickness of a matrix is determined by the width of the face of the character punched in its edge and the amount of "side bearing" or "side wall" allowed on each side of the face. The side walls control the spacing of the letters in words and they vary in thickness according to the design and size of the character.

Damage to side walls is caused in various ways. The matrices will sometimes pound each other as they descend into the assembling elevator. Care should be taken that the assembler rails and chute finger are in correct position to direct the matrix into the assembling elevator properly, as described in Chapter 5.

RELATION OF MATRICES TO MOLDS

The following diagrams will serve to illustrate the manner in which matrices contact the mold during the casting operation. The molds shown are those in general use, while the matrices are standard two-letter (4- to 14-point), regular headletter or display, regular and special advertising figures, 18- and 24-point duplex-display, and 60-point matrices.

All two-letter molds have the same alignment in normal position. The process of assembling and casting is identical in each case. See relation of regular two-

letter and duplex-display characters to constant edge of molds, "A," Fig. 4-2. The same relationship is shown in Figs. 6 and 10-2.

Since the characters in the normal position of duplex-display matrices are in the same position on the matrix as those in two-letter faces (4- to 14-point), and regular advertising figures, it can readily be seen that such faces can be cast on the same molds. That is, the character in the normal position of a 10-point matrix can be cast on the 18-24-point duplex-display mold either alone or in the same

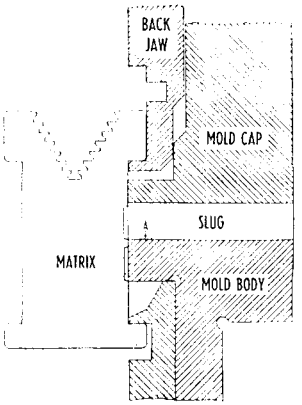

FIG. 4-2. Universal Adjustable Mold (normal position).

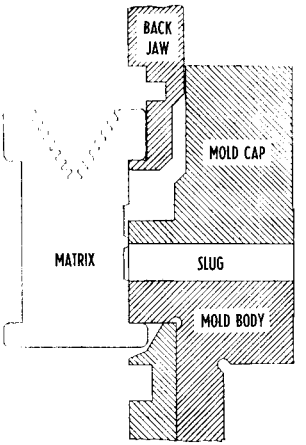

FIG. 5-2. Universal Adjustable Mold (auxiliary position).

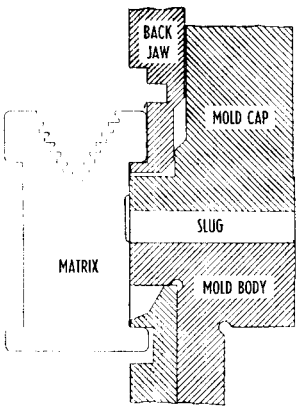

FIG. 6-2. Advertising Figure Mold (normal position).

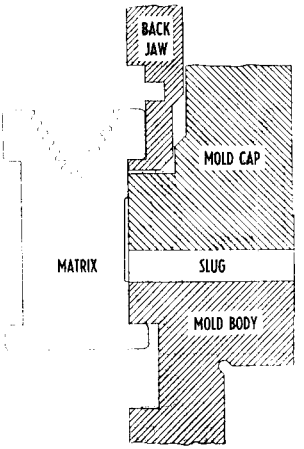

FIG. 7-2. Special Advertising Figure Mold (auxiliary position).

line with the 18-24-point faces. The 18- or 24-point normal position character may also be cast overhanging on a regular advertising figure mold, either alone or in conjunction with two-letter faces (4- to 14-point).

The character shown in Fig. 6-2 may be either a regular advertising figure or a character from the regular position of a duplex-display face.

Attention is called to the fact that the distance from the lower lug of the matrix to the constant edges of mold ("A," Fig. 4-2) represents the regular alignment

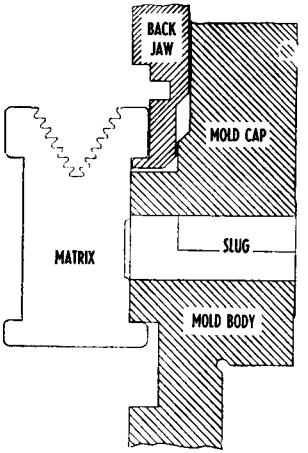

FIG. 8-2. Display Mold, One-Letter (auxiliary position).

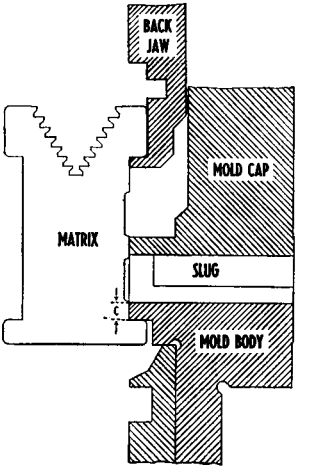

FIG. 9-2. Display Mold, Two-Letter (auxiliary position).

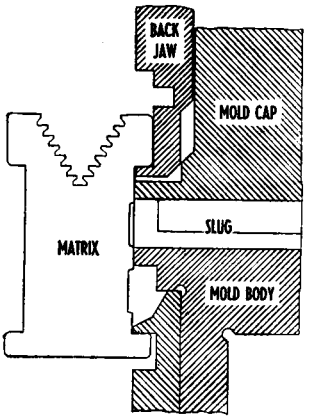

FIG. 10-2. Display Mold, Two-Letter (normal position).

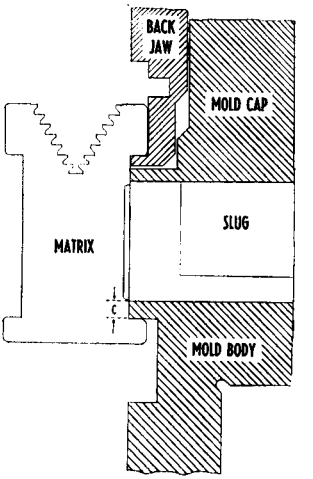

FIG. 11-2. Display Mold, 45-Point (auxiliary position).

position. All characters line up at the top of the slug, which is represented in the diagram by the constant edge of the mold ("A").

Figs. 5, 7 and 8-2 show the auxiliary position character as it contacts the mold. These may be characters in the auxiliary position of 4- to 14-point two-letter matrices, one-letter display matrices, or special advertising figures. The correct molds, of course, must be used. Note that the auxiliary position character of duplex-display matrices cannot be cast on this type of mold.

Figs. 9 and 11-2 show the matrix contacting the mold in the 45-point alignment position. The term "45-point alignment position" means that the top of the character is the same distance from the lower lug of the matrix in all faces, 45- to 60-point, and the auxiliary position of 18- and 24-point duplex display.

Referring to Fig. 9-2, notice that the body section of the mold marked "C" is not as wide as the same section on all other molds and is the same as the 45-point mold. Since the auxiliary character is located closer to the lug of the matrix to provide room for a full size 24-point character, it will not cast on any mold except the duplex-display mold.

As the aligning position of the auxiliary character of the duplex-display matrix is the same as that of 48-, 54- and 60-point faces, the same first elevator slide filling piece is used for both conditions. This filling piece is supplied in the form of a combination attachment that will cover the entire range of Linotype one- and two-letter display faces. It consists of two separate filling pieces which can be placed in operative position by a simple turn of the control knob. When the auxiliary position of 4-14-point two-letter and 18-36-point one-letter faces is used, the regular filling piece is placed in position. When casting from the auxiliary position of 18- and 24-point duplex display and 45-point one-letter faces, a second filling piece is simply added. Both filling pieces can be placed in or out of position instantly.

Slugs cast from duplex-display molds, 18- or 24-point, are standard body sizes, the same as cast from corresponding one-letter display molds.

MAINTENANCE

Preventing "Hair Lines"—Care should be taken to preserve the side walls of matrices. When they are damaged "hair lines" will show in the printed matter.

One of the most common causes of damaged side walls is the excessive use of oil on the felt of the back mold wiper or around the machine where it comes in contact with matrices. In a perfectly justified line there is always a slight amount of air space between the matrices, but not enough to permit metal to pass through. Hot oil, however, has a peculiar capillary attraction for hot metal. Oil from the back mold wiper will flow ahead of the hot metal, through the mold and into the small air spaces between the matrices. The hot metal under pressure of the plunger will follow this track of hot oil between the matrices and in time adhere to the side walls. The accumulation on the side walls will gradually build up until they are crushed, and then fins or hair lines will appear between the characters.

If the spacebands are not cleaned regularly, and metal is allowed to accumulate on the sleeves at the casting point this metal will press against the side walls of the matrices, crushing them during the process of justification when the line is wedged tight between the vise jaws, and a font of matrices may be ruined in a very short time. The spacebands must be cleaned at least once during every eight hours of operation.

To clean spacebands, use a soft pine board sprinkled with Dixon's Graphite No. 635, and rub the sleeve of the spaceband to remove any metal that might show at

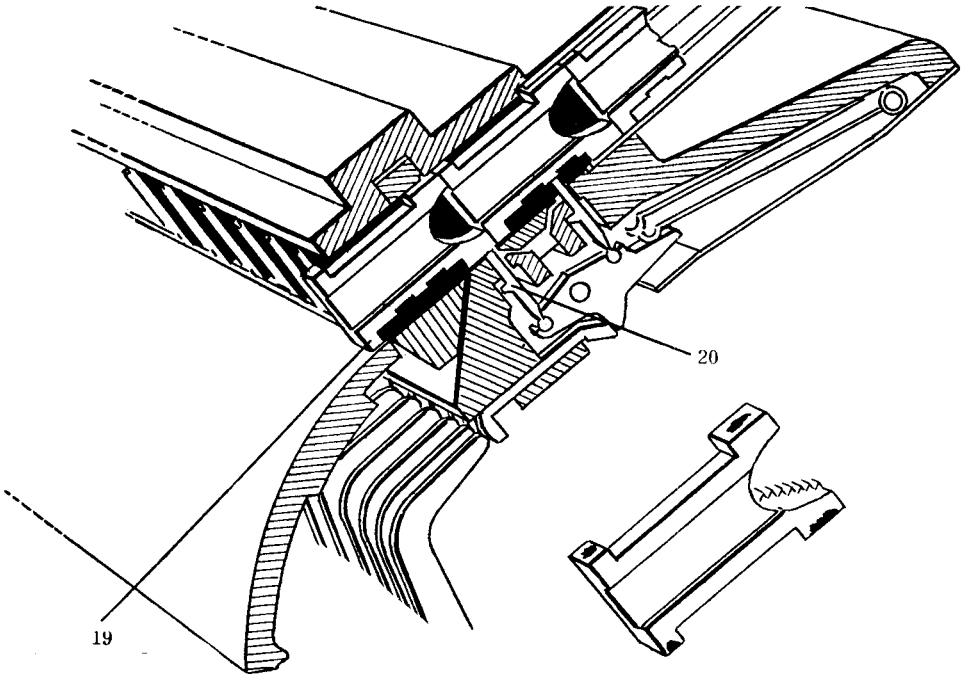

FIG. 12-2. View of a portion of a magazine, the escapement and escapement levers, and an enlarged view of the matrix, showing where dirt and gum may accumulate on the matrix lug and prevent its smooth, quick action. The matrices must be kept clean. The lower lug of the matrix is shown at *19*. The original dimension of the lug from front to back is .125″. If this lug is sheared or worn too much, when it passes over the hole through which the escapement pawl *20* works, it is apt to fall into the opening and prevent the matrix from dropping.

the casting point. If the metal does not rub off easily, scrape with a piece of brass.

Damaged side walls may also be caused by loose lines in combination with an imperfectly adjusted pot pump stop which is actuated by the right hand vise jaw. See that the pot pump stop is adjusted to prevent casting unless the line is tightly justified (Chapter 13).

If tight lines are sent in, the inside lugs of the matrices will be sheared or burred when the mold comes against them, especially if the setting of the vise automatic should not be perfect and the machine goes too far ahead before throwing out the clutch. If a tight line is sent in and stops between the jaws, it should be possible to lift the first elevator slide to remove a matrix from the jaws without turning the machine backward. The instructions for setting the vise automatic are given in Chapter 10 and should be carefully studied as a great many matrices may be damaged at this point.

Care of Matrix Teeth—To preserve the combinations, or teeth, of the matrices, is another important matter, for when these are damaged or worn they will cause trouble when going through the distributor and it will be almost impossible to make them drop in the right channels.

To avoid excessive wear and prevent damage to the matrix teeth, follow instructions set forth in Chapter 17, which describes the transfer of matrices from

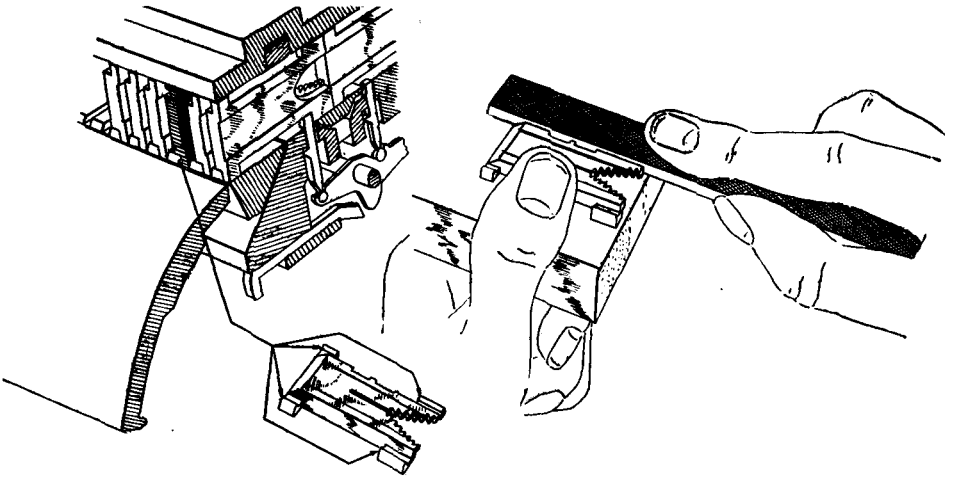

FIG. 13-2. View of a portion of magazine and matrix, showing ear burred or a sharp edge thrown up which prevents rapid and smooth sliding of matrix through the channel in the magazine. In this view the burr, or projection in the matrix, is exaggerated. At the right in this view, is shown a board, a matrix, and the method in which the burr, or projection, can be removed with a fine file. In using a file in this way, only one with a safety edge should be used, and care must be taken not to file away the body, or main portion of the ear, but only the raw edge or burr upon the ear. If too much is filed away, especially on thin matrices, the lugs will probably catch in the escapement verge pawls.

the first elevator jaw to the second elevator. This setting must be as near perfect as possible, so as to allow the matrices to pass through without the slightest friction; otherwise the teeth of the matrices will gradually wear. The second elevator bar must be smooth, and its end must be in perfect alignment with the distributor box bar when up in normal position.

Repairing Damaged Lugs—If the lugs of the matrices become bent, straighten them with a pair of parallel jaw pliers. If a hammer is used to straighten them, care should be taken not to hammer them hard enough to distort their shape.

Cleaning Matrices—The buffer and matrix holder shown in Fig. 14-2 are sold by Mergenthaler Linotype Company. The buffer is made of very fine wire, is about five inches in diameter and is designed to fit on the arbor of any standard compos-

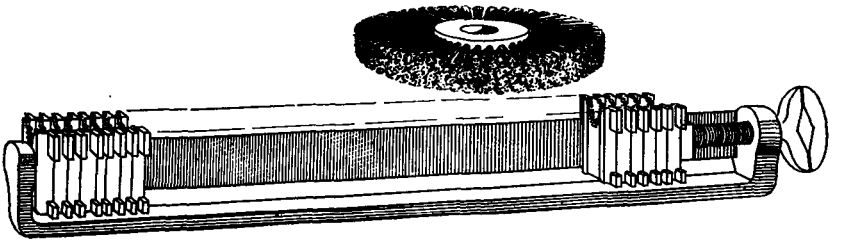

FIG. 14-2. The wire buffer and matrix holder may be used for cleaning matrices. The buffer may also be used for polishing various other machine parts without damage to them, such as the keyboard cams and yokes, key levers, trigger ends, verge escapements, assembler slide, etc.

ing-room saw. The holder for the matrices is 20 inches long. With this equipment a font of matrices can be cleaned in a very short time, and by turning the holder at right angles to the buffer it is possible to clean the gum from the sides of the lugs, except on the thin matrices. The buffer is available with a ½″ hole (X-1673), and with a $\frac{11}{16}$″ hole (X-1674). The holder is listed as X-1672.

Another method of cleaning matrices is with Dixon's Matrix Reference Cleaner (X-1604). Place a row of matrices on a type galley and polish the reference side; reverse the matrices and polish the lower lugs. If the lugs have gum on the sides, it may be necessary to rub the matrices over a soft felt to remove it.

Graphite should never be used on the matrices or in the magazine. It may make the matrices drop well for a short time but in damp weather it is likely to cause gum to accumulate.

The principal cause of gum on the matrices and magazines is *the excessive use of oil,* particularly on the distributor screw bearings. At no time should oil show on the screws, as it eventually gets on the matrices and into the magazines. If a good quality of oil is used, one drop in each bearing every two weeks should be sufficient.