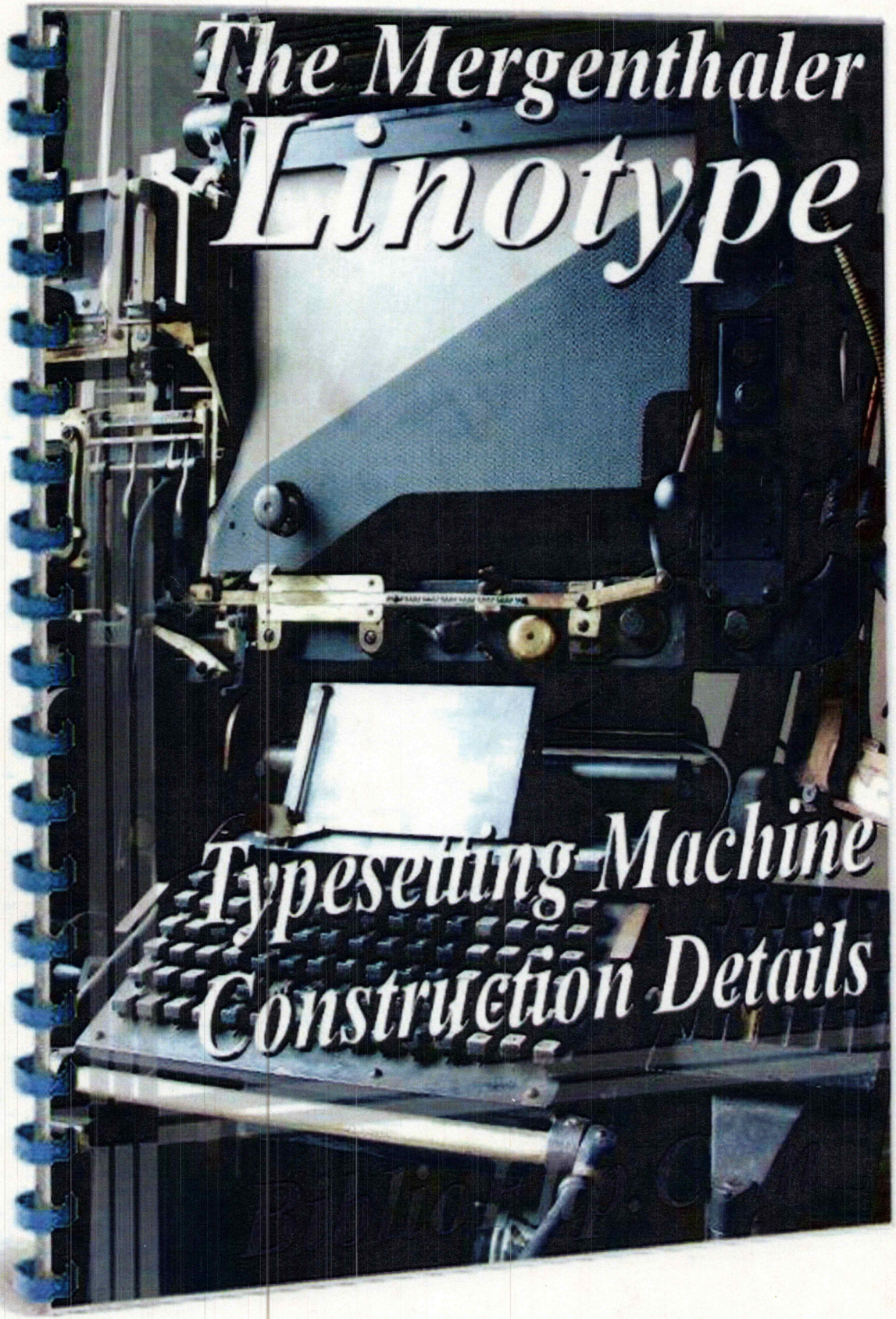

The Mergenthaler
Linotype
Typesetting Machine
Construction Details

LEGAL NOTICE

BiblioFlip.Com (BIBLIOFLIP) and it's licenser's retain all ownership rights to this electronic reprint. Use of this information is governed by applicable copyright law.

All rights reserved. No part of this information may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or by any information storage and retrieval system, without the written permission of the publisher **BiblioFlip.Com**. Making unauthorized copies, adaptations, or compilation works is strictly prohibited and constitutes a punishable violation of the law.

BiblioFlip.Com may revise this documentation from time to time without notice.

THIS INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND. IN NO EVENT SHALL BIBLIOFETISH OR IT'S OWNERS BE LIABLE FOR ANY LOSS OF PROFITS, LOSS OF BUSINESS, LOSS OF USE OR DATA, INTERUPTION OF BUSINESS, OR FOR INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OF ANY KIND, ARISING FROM ANY ERROR IN THIS DOCUMENTATION OR USE OF THIS INFORMATION. THE READER ASSUMES ALL RESPONSIBILITY FOR THE USE OR MISUSE OF THIS INFORMATION AND SHALL HOLD BIBLIOFLIP.COM AND ITS OWNERS HARMLESS IN ANY AND ALL CIRCUMSTANCES.

BIBLIOFLIP DOES NOT IMPLY NOR GUARANTEE THE AVAILABILITY OF ANY MATERIALS, TOOLS, OR PARTS MENTIONED OR SUGGESTED IN THESE PLANS, NOR DO WE HAVE ANY RESPONSIBILITY FOR THE COST ASSOCIATED WITH THOSE ITEMS. OBTAINING THE APPROPRIATE MATERIALS, TOOLS AND PARTS IS THE SOLE RESPONSIBILITY OF THE BUYER AND IN NO WAY IS BIBLIOFLIP.COM RESPONSIBLE!

BIBLIOFLIP, and the BiblioFlip.Com logo are trademarks of **BIBLIOFLIP**. Other product or brand names are trademarks of their respective holders.

Digital Format & Content
Copyright © 2007 BiblioFlip.Com – All Rights Reserved
Reproduce For Personal Use Only

THE MERGENTHALER LINOTYPE

The Mergenthaler Linotype machine appeared in crude form about 1886. This machine differs widely from all others in that it is adapted to produce the type-faces for each line properly justified on the edge of a solid slug or linotype.

These slugs, automatically produced and assembled by the machine, are used in the same manner as other type-forms, whether for direct printing or for electrotyping, and are remelted after use.

GENERAL ORGANIZATION

The general organization of the machine will first be described. After this the details will be more fully explained and attention plainly directed to the various parts which require special consideration.

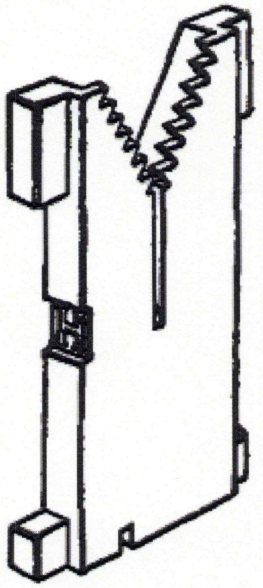


Fig. 1

The machine contains, as the vital element, about sixteen hundred matrices, such as are shown in Fig. 1, each consisting of a small brass plate having in one edge the female character or matrix proper, and in the upper end a series of teeth, used as hereinafter explained for distributing the matrices after use to their proper places in the magazine of the machine. There are in the machine a number of matrices for each letter and also matrices representing special characters, and spaces or quadrats of different thicknesses for use in table-work.

- BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM -

There is a series of finger keys representing the various characters and spaces, and the machine is so organized that on manipulating the keys it selects the matrices in the order in which their characters are to appear in print, and assembles them in a line, with wedge-shaped spaces or justifiers between the words. The series of matrices thus assembled in line forms a line matrix, or, in other words, a line of female dies adapted to mold or form a line of raised type on a slug cast against the matrices. After the matrix line is composed, it is automatically transferred to the face of a slotted mold into which molten type-metal is delivered to form a slug or linotype against the matrices. This done, the matrices are returned to the magazine and distributed, to be again composed in new relations for succeeding lines.

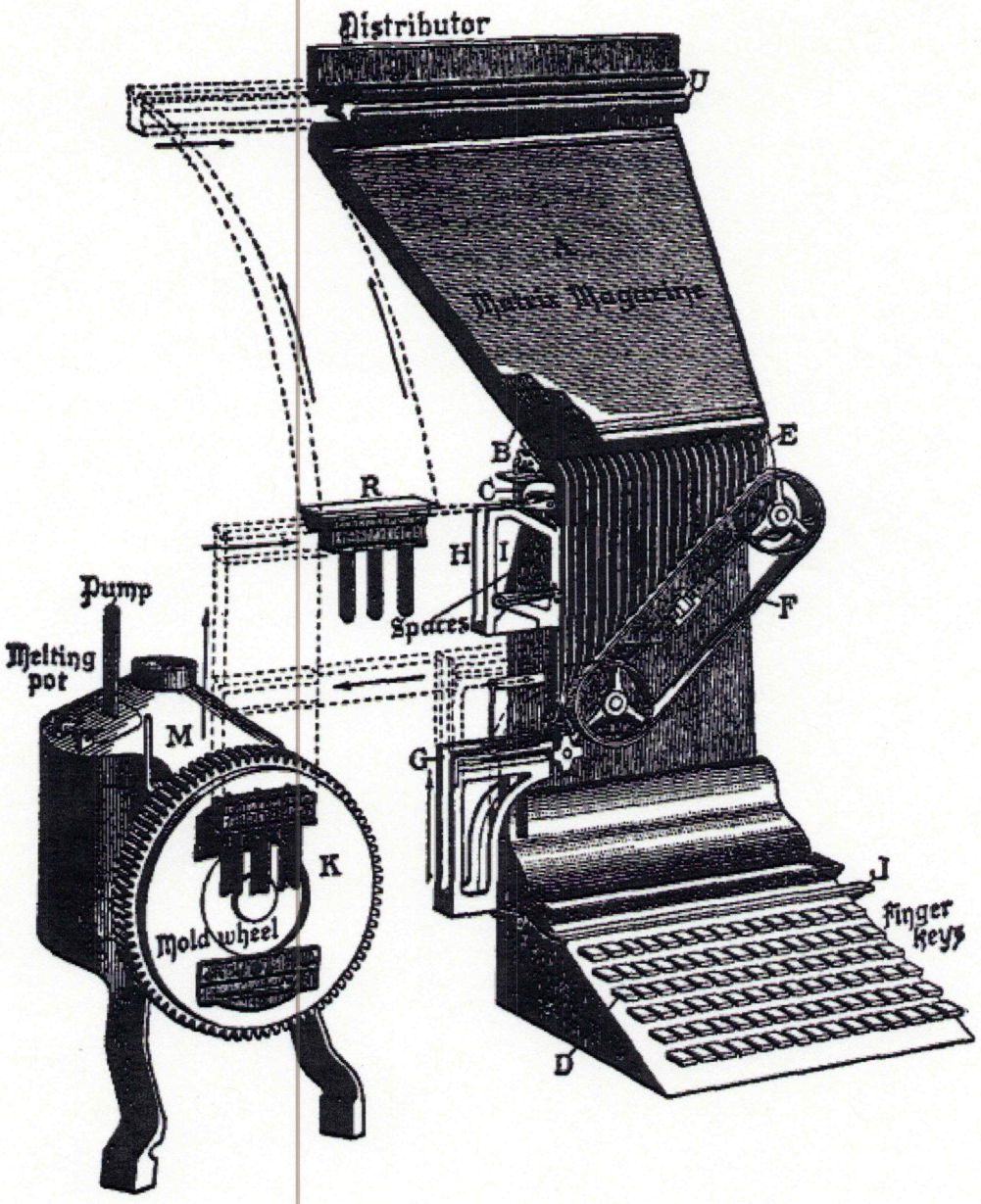


Fig. 2.

- BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM -

Fig. 2 illustrates the general organization of the machine.

A represents an inclined channelled magazine in which the matrices are stored. Each channel has at the lower end an escapement *B* to release the matrices one at a time. Each of these escapements is connected by a rod *C* and intermediate devices to one of the finger-keys in the keyboard *D*. These keys represent the various characters as in a typewriter. The keys are depressed in the order in which the characters and spaces are to appear, and the matricies, released successively from the lower end of the magazine, descend between the guides *E* to the surface of an inclined travelling belt *F*, by which they are carried downward and delivered successively into a channel in the upper part of the assembling elevator *G*, in which they are advanced by a star-shaped wheel, seen at the right.

The wedge-shaped spaces or justifiers *I* are held in a magazine *H*, from which they are delivered at proper intervals by finger-key *J* in the keyboard, so that they may pass downward and assume their proper positions in the line of matrices.

When the composition of the line is completed, the assembling elevator *G* is raised and the line is transferred, as indicated by dotted lines, first to the left and then downward to the casting position in front of the slotted mold seated in and extending through the vertical wheel *K*, as shown in Figs. 2 and 3. The line of matrices is pressed against and closes the front of the mold, the characters on the matrices standing directly opposite the slot in the mold, as shown. The back of the mold communicates with and is closed by the mouth of a melting-pot *M*, containing a supply of molten metal and heated by a Bunsen burner underneath.

Within the pot is a vertical pump-plunger which acts at the proper time to drive the molten metal through the perforated mouth of the pot into the mold and into all the characters in the matrices. The metal, solidifying, forms a slug or linotype bearing on its edge, in relief, type-characters produced from the matrices. The matrices and the pot are immediately separated from the mold, and the mold wheel rotates until the slug contained in the mold is presented in front of an ejector blade, where the slug is ejected from the mold through a pair of knives, which trim the sides to the required size, into the receiving galley, as shown in Fig. 4.

- BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM -

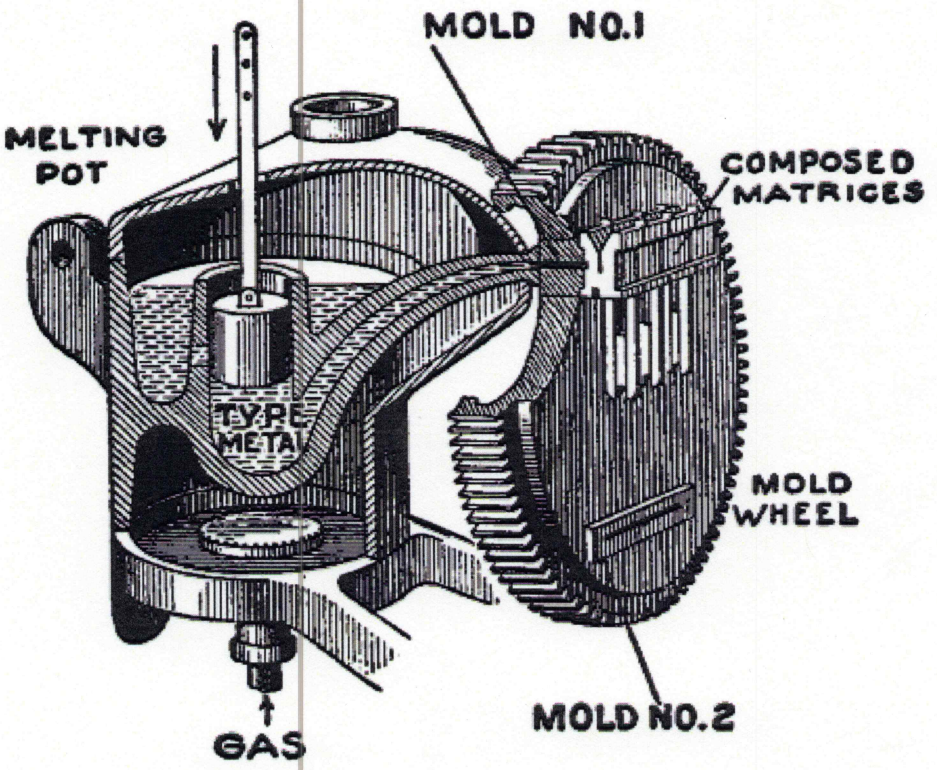


Fig. 3.

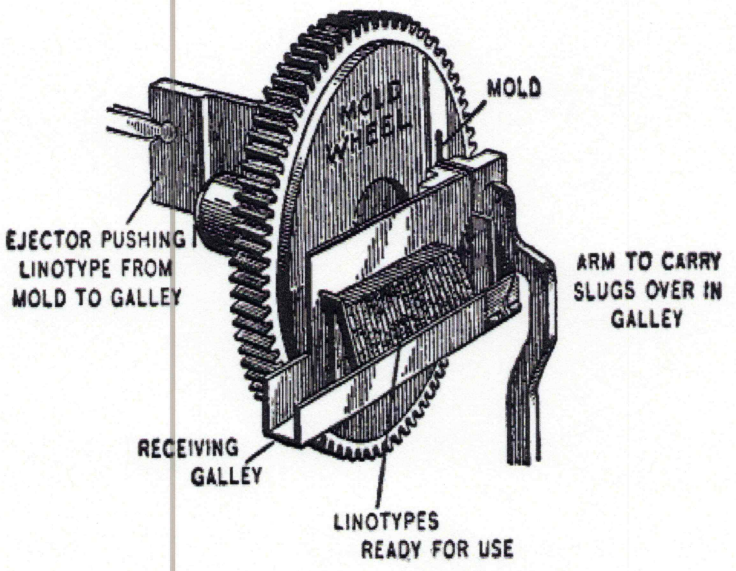


Fig. 4.

- BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM -

After the line of matrices and spaces has served its purpose, it is raised from the casting position and moved to the right, as shown by the dotted lines and arrows in Fig. 2. The teeth in the upper ends of the matrices are engaged with a toothed bar *R*, known as the second elevator. This elevator swings upward, as shown by dotted lines, carrying the matrices to the level of the upper end of the magazine, and leaving the spaces or justifiers behind to be transferred to their magazine *H*.

The distributing mechanism consists essentially of a fixed bar *T*, lying in a horizontal position above the upper end of the magazine, and having along its lower edge, as shown in Fig. 2, horizontal teeth to engage the teeth in the upper end of the matrices and hold them in suspension. The teeth of the matrix for each letter differ in number or arrangement, or both, from the teeth of matrices bearing other letters, and the teeth on the lower edge of the distributor bar are correspondingly varied in arrangement at different points in the length of the bar. (See Fig. 2.)

The matrices are moved forward into engagement with the distributor bar and also into engagement with the threads of horizontal screws *U*, which are extended parallel with the distributor bar and constantly rotated so that they cause the matrices to travel one after another along the distributor and over the mouths of the channels in the magazines. Each matrix is held in suspension until it arrives over its proper channel, where for the first time its teeth bear such relation to those of the bar that it is released and permitted to fall into the magazine.

The speed of the machine, which is commonly from four to five thousand ems per hour, but which has reached ten thousand and upward in competitive trials, is due to the fact that the matrices pursue a circulatory course, leaving the magazine at the lower end, passing thence to the line and to the casting mechanism, and finally returning to the top of the magazine. This permits the composition of one line, the casting of another, and the distribution of a third to proceed simultaneously.

- BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM -

ASSEMBLING AND KEYBOARD MECHANISMS

The matrices pass through the magazine by gravity. Their release is effected by mechanisms shown in Figs. 5 and 6, which are vertical sections through the magazine, the keyboard, and intermediate connections. Under each channel of the magazine, there is an escapement *B*, consisting of a small lever rocking at its centre on a horizontal pivot, and carrying at its opposite ends two dogs or pawls *b, b*, which are projected up alternately into the magazine by the motion of the lever. The key-rod *C*, suspended from the rear end of the escapement *B*, tends to hold the lower pawl *b* in an elevated position, as shown in Fig. 5, so that it engages under the upper ear of the foremost matrix to prevent its escape.

When the escapement *B* is rocked, it withdraws the lower pawl *b*, as shown in Fig. 6, at the same time raising the upper pawl, so that it engages and momentarily arrests the next matrix. As soon as the first matrix has escaped, the escapement resumes its original position, the upper pawl falling, while the lower one rises so as to hold the second matrix, which assumes the position previously occupied by the one released.

- BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM -

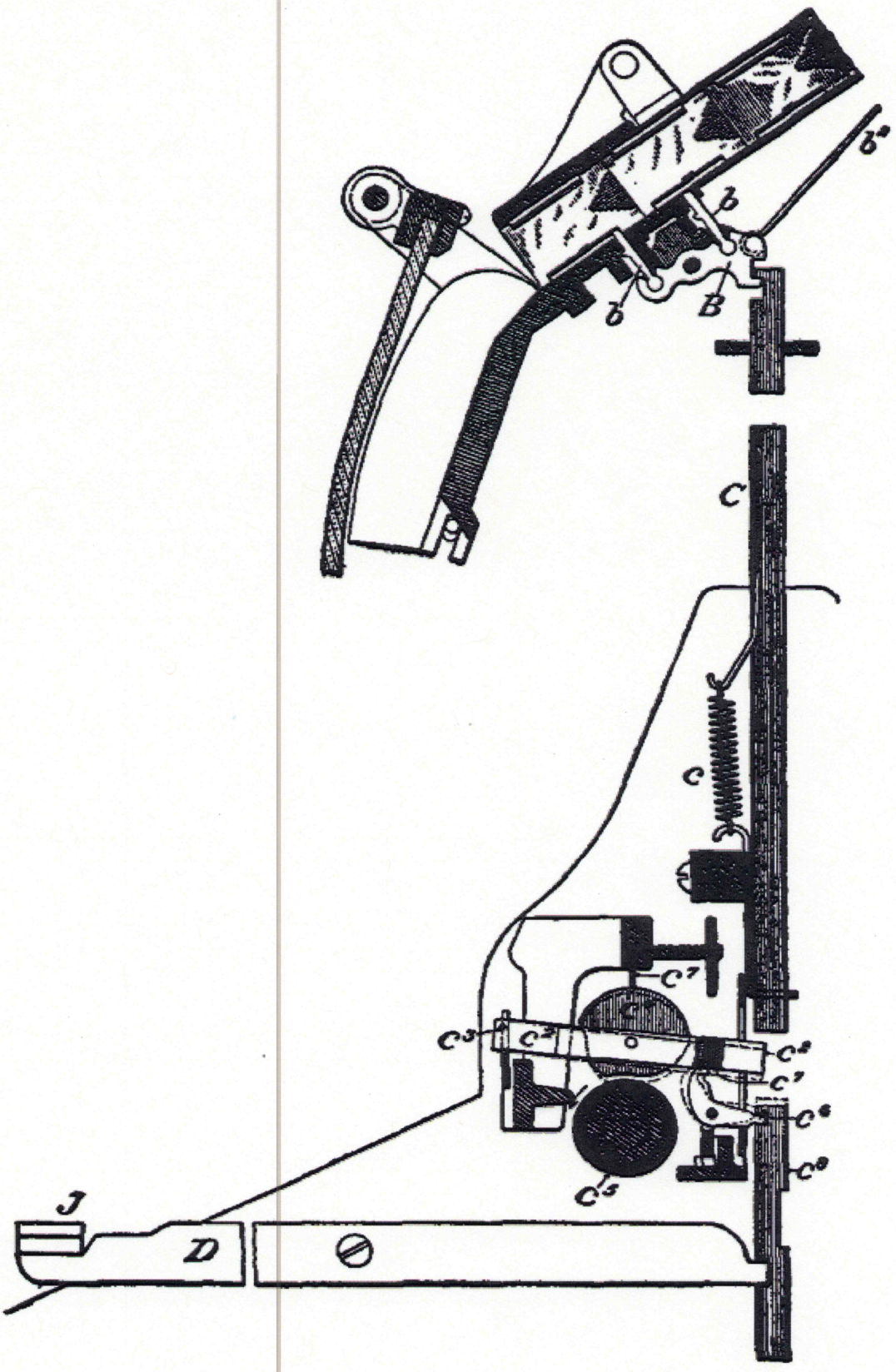


Fig. 5.

- BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM -

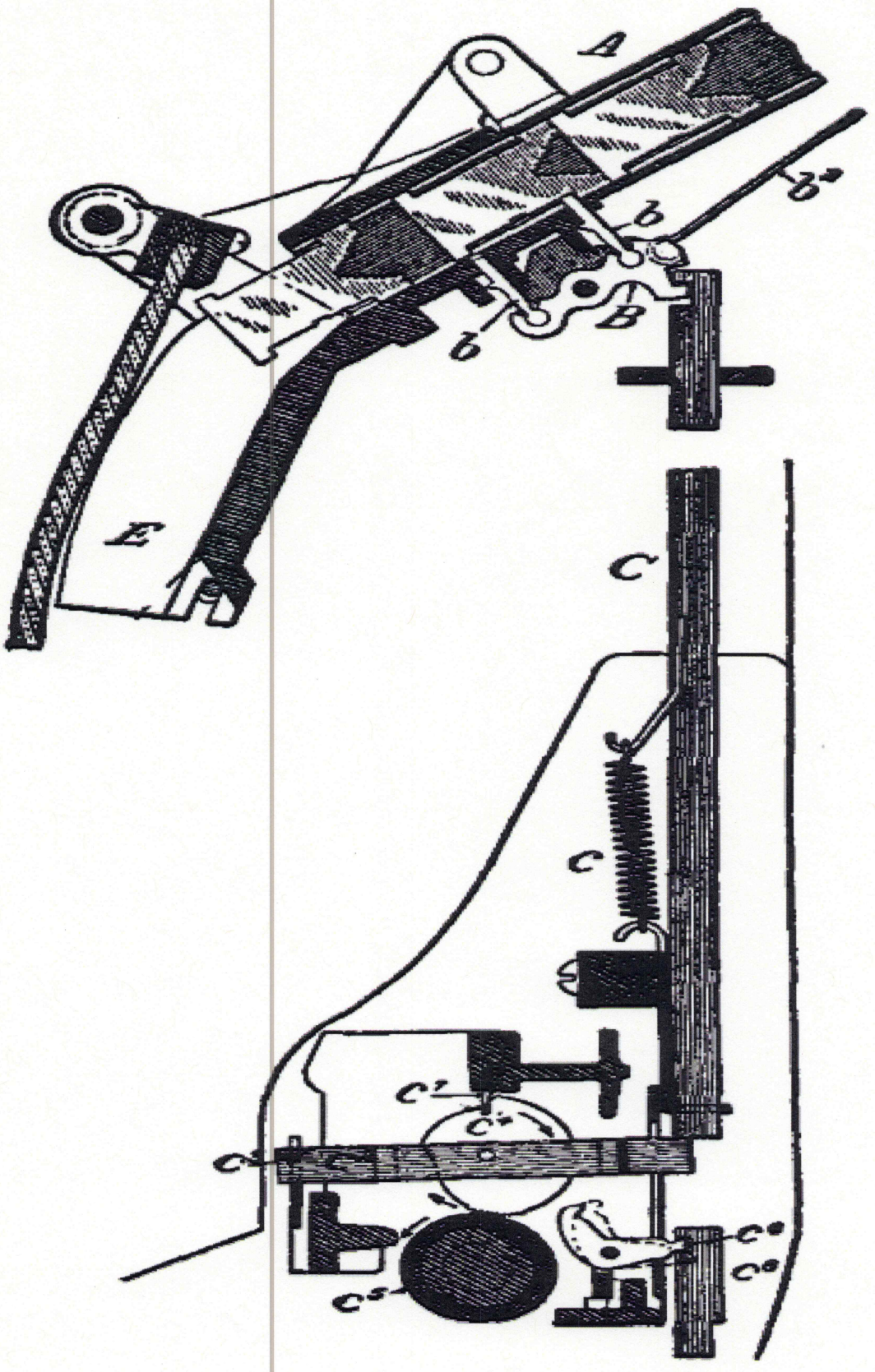


Fig. 6.

- BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM -

Thus it is that the alternate rising and falling of the two escapement pawls permits the matrices to escape one at a time. It is evident that the escapements could be operated directly by rods connected with the finger-keys, but this direct connection is objectionable because of the labor required on the part of the operator, and the danger that the keys may not be fully depressed.

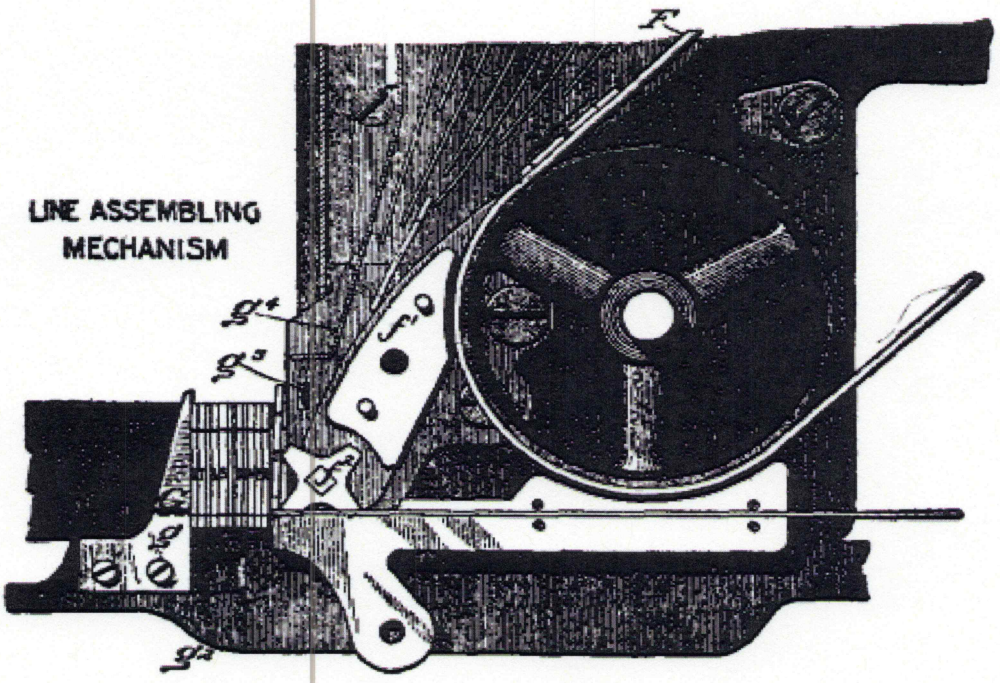


Fig. 7.

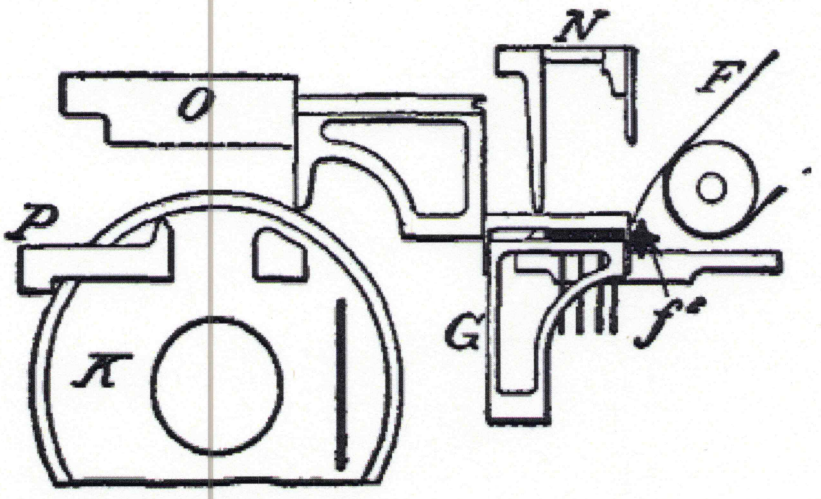


Fig. 8.

- BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM -

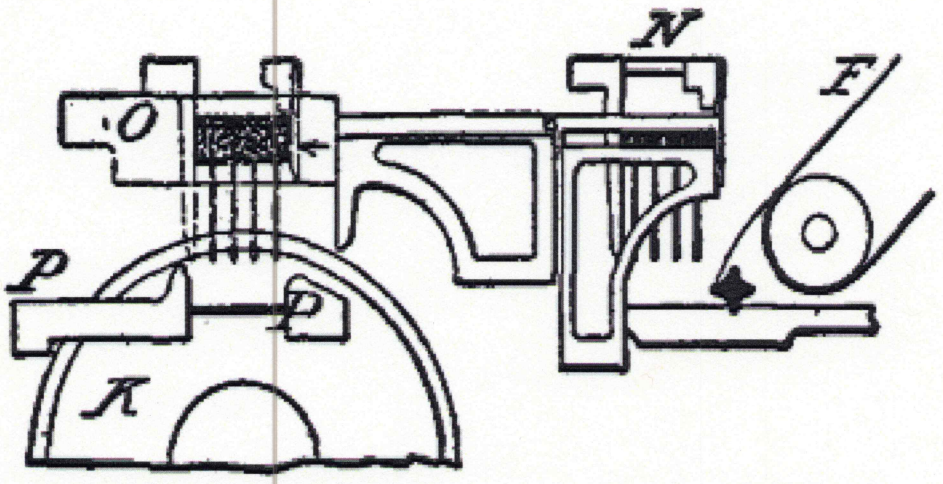


Fig. 9.

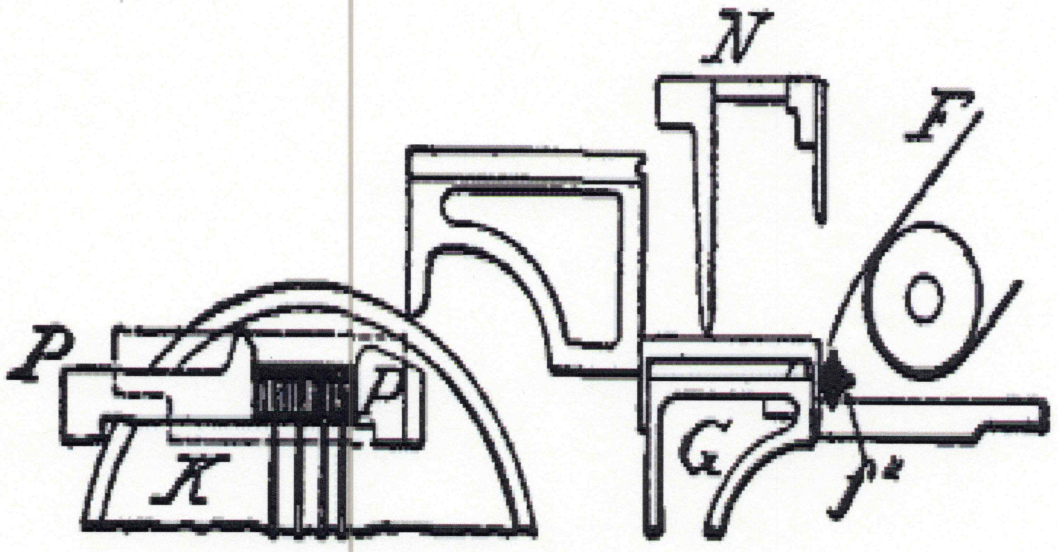


Fig. 10.

Moreover, it is essential that the escapements should act individually with moderate speed to the end that the matrices may be properly engaged and disengaged by the pawls. For these reasons, and to secure easy and uniform action of the parts, the mechanism shown in Figs. 5 and 6 is introduced between the finger-keys and escapements. The vertical rods *C*, which actuate the escapements, are guided in the main frame, and each is urged downward by a spring *c*. Each rod *C* terminates directly over one end of a rising and falling yoke-bar c^2, turning on a pivot c^3 at the opposite end.

- BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM -

Each of the yokes c^2 is slotted vertically to admit an eccentric c^4 turning on a pivot therein. A constantly rotating rubber-covered roll c^5 is extended across the entire keyboard beneath the cams, which stand normally as shown in Fig. 5, out of contact with the roll. When the parts are in this position, the cam-yoke is sustained at its free end by the yoke-trigger c^8, and a cross-bar in the cam engages a vertical pin c^7 on the frame, whereby the cam is prevented from falling on to the roller, as it has a tendency to do.

Each of the yoke-triggers c^6 is connected with a vertical bar c^8, which is in turn connected to the rear end of a finger-key lever *D*. The parts stand normally at rest in the position shown in Fig. 5, the roll c^5 turning freely under the cam without effect upon it.

When the finger-key is depressed, it raises the bar c^8, which in turn trips the yoke-trigger c^6 from under the cam-yoke c^2, permitting the latter to fall, thereby lowering the cam c^4 into peripheral engagement with the rubber roll, at the same time disengaging the cam from the stop-pin c^7. The roll, engaging frictionally with the cam, causes the latter to turn on its centre in the direction indicated by the arrow in Fig. 6.

Owing to the eccentric shape of the cam, its rotation while resting on the roller causes it to lift the yoke c^2 above its original position, so that it acts upon the escapement rod *C*, lifting it and causing it to reverse the position of the escapement *B*, to release the matrix, as plainly seen in Fig. 6.

While this is taking place, the yoke-trigger c^6 resumes its first position, as shown in dotted lines in Fig. 6, so that as the rotating cam lowers the yoke, it is again supported in its first position, the cam at the same time turning forward by momentum out of engagement with the roll until arrested in its original position by the pin c^7.

It will be observed that the parts between each key lever and escapement operate independently of the others, so that a number of cams may be in engagement with the rollers at one time, and a number of escapements at different stages of their action at one time.

The matrices falling from the magazine descend through the front channels and are received on the inclined belt *F*, on which they are carried over and guided on the upper rounding surface of the assembler entrance-block f^1, by which they are guided downward in front of the star-wheel f^2, which pushes them forward one after another.

The spaces or justifiers *I*, released from their magazine *H*, as heretofore described, descend into the assembler *G* in front of the star-wheel in the same manner as the matrices.

The line in course of composition is sustained at its front end by a yielding finger or resistant *g*, secured to a horizontal assembler slide g^2, the purpose of these parts being to hold the line together in compact form.

- BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM -

As the matrices approach the line, their upper ends are carried over a spring g^3, projecting through the assembler face-plate from the rear, as shown in Fig. 7, its purpose being to hold the matrices forward and prevent them from falling back in such a manner that succeeding matrices and spaces or justifiers will pass improperly ahead of them. The descending matrices also pass beneath a long depending spring g^4, which should be so adjusted as barely to permit the passage of the thickest matrix.

After the composition of the line is completed in the assembling elevator *G*, as shown in Fig. 8, the elevator is raised as shown in Fig. 9, so as to present the line between the depending fingers of the transfer-carriage *N*, which then moves to the left to the position shown by dotted lines in Fig. 9, thereby bringing the line into the first elevator *O*, which then descends, carrying the line of matrices downwards, as shown in Fig. 10, to its position in front of the mold and between the confining jaws *P*, *P*, mounted in the main frame, which determine the length of the line.

Figs. 11 and 12 show the casting mechanism in vertical section from front to rear. When the first elevator *O* lowers the line, as just described, the mold and the pot *M* stand in their rearward positions, as shown in Fig. 11.

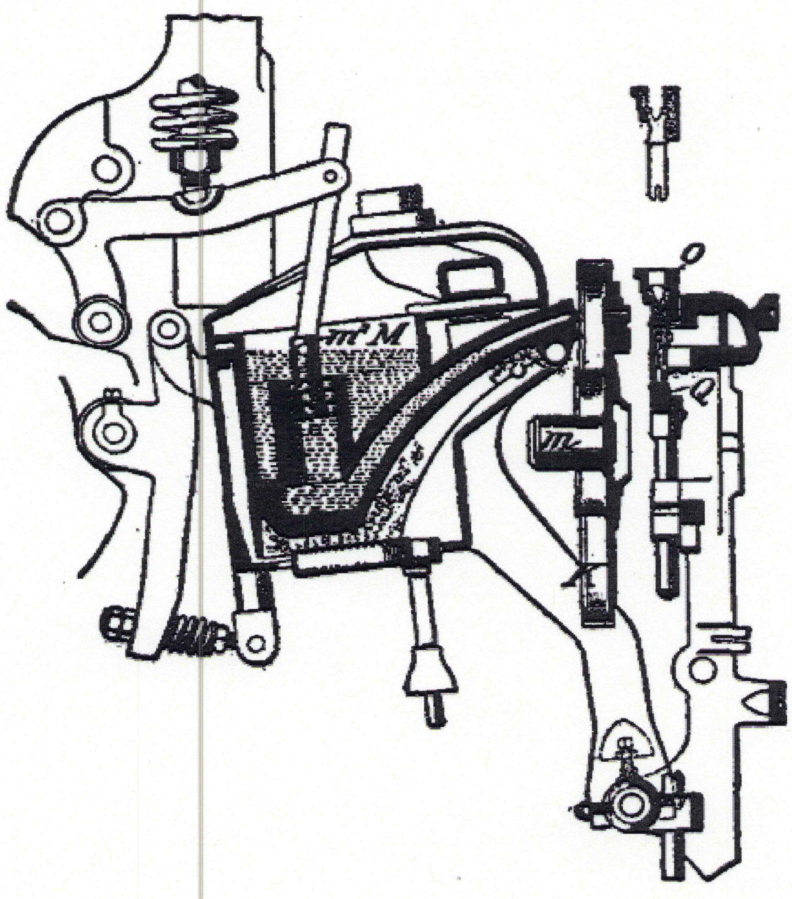


Fig. 11.

- BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM -

The mold-carrying wheel is sustained by a horizontal slide, and as soon as the matrix line is lowered to the casting position, a cam at the rear pushes the slide and mold wheel forward until the front face of the mold is closed tightly against the rear face of the matrix line, as shown in Fig. 12.

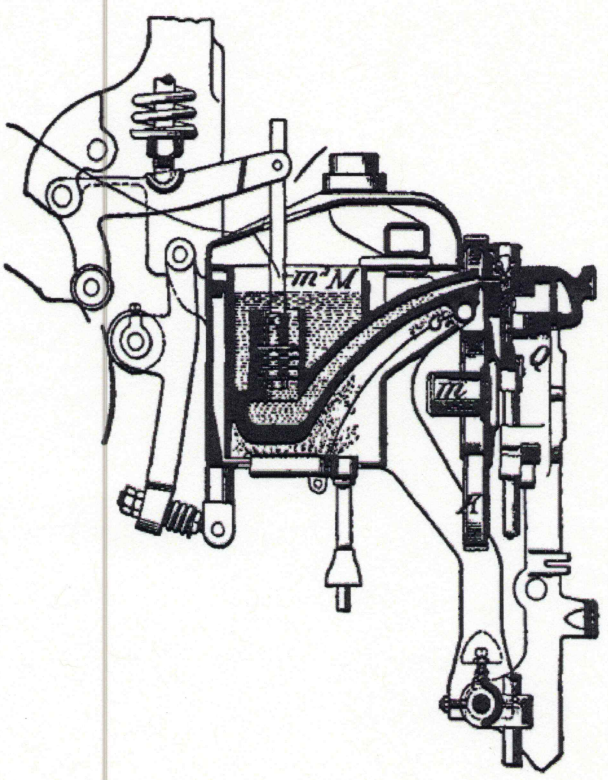


Fig. 12.

While this is taking place, the pot, having its supporting legs mounted on a horizontal shaft, swings forward until its mouth is closed tightly against the back of the mold, as shown in Fig. 12. While the parts are in this position, the justifying bar *Q* is driven up and pushes the spaces or justifiers upward through the line of matrices until the line is expanded or elongated to fill completely the gap between jaws *P*, *P*.

In order to secure exact alignment of the matrices vertically and horizontally, the bar *Q* acts repeatedly on the spaces, and the line is slightly unlocked endwise and relocked. This is done that the matrices may be temporarily released to facilitate the accurate adjustment demanded. While the justified line is locked fast between the jaws, the elevator, and the mold, the plunger m^2 in the pot descends and drives the molten metal before it through the spout or mouth of the pot into the mold, which is filled under pressure, so that a solid slug is produced against the matrices.

- BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM -

The pot then retreats, and its mouth breaks away from the back of the slug in the mold, while, at the same time, the mold retreats to draw the type-characters on the contained slug out of the matrices. The mold wheel now revolves, carrying the rear edge of the slug past a stationary trimming-knife, not shown, and around to the position in front of the ejector, as previously described and shown in Fig. 4, whereupon the ejector advances and drives the slug between two side trimming-knives into the galley at the front.

DISTRIBUTION

After the casting action the first elevator *O* rises and carries the matrix line above the original or composing level, as shown in Fig. 13. The line is then drawn horizontally to the right until the teeth of the matrices engage the toothed elevator bar *R*, which swings upward with the matrices, thus separating the matrices from the spaces or justifiers *I*, which remain suspended in the frame, so that they may be pushed to the right, as indicated by the arrow, into their magazine.

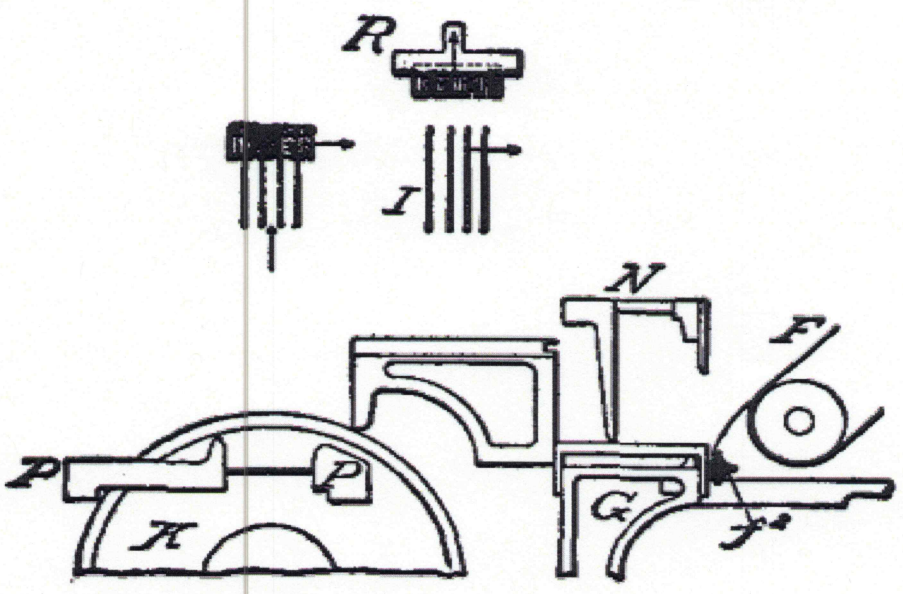


Fig. 13.

- BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM -

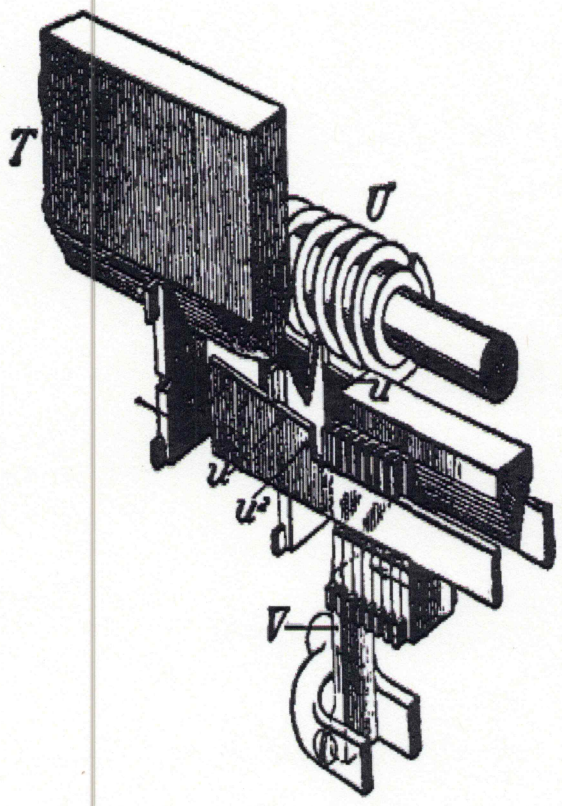


Fig. 14.

When the line of matrices is raised to the distributor, it is necessary that the matrices shall be separated and presented one at a time to the distributor bar, between the threads of the horizontal carrier-screws. This is accomplished as shown in Figs. 14 and 15. A horizontal pusher or line-shifter *S* carries the line of matrices forward from the elevator bar *R* into the so-called distributor box, containing at its opposite sides two rails *u*, having near their forward ends shoulders u^2, against which the forward matrix abuts so as to prevent further advance of the line, which is urged constantly forward by the follower or line-shifter *S*.

A vertically reciprocating lifting finger *V* has its upper end shouldered to engage beneath the foremost matrix, so as to push it upward until its upper ears are lifted above the detaining shoulder u^2, so that they may ride forward on the upwardly inclined inner ends of the rails, as shown in Fig. 14. The matrices thus lifted are engaged by the screws and carried forward, and, as they move forward, they are gradually raised by the rails until the teeth finally engage themselves on the distributor bar *T*, from which they are suspended as they are carried forward, over the mouth of the magazine, until they fall into their respective channels, as shown in Fig. 15.

- BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM -

The distributor box also contains on opposite sides shorter rails, u^4, adapted to engage the lower ends of the matrices, to hold them in position as they are lifted. The lifting finger *V* is mounted on a horizontal pivot in one end of an elbow lever mounted on pivot v^2 and actuated by a cam on the end of one of the carrier-screws, as shown in Figs. 2 and 15.

TRIMMING-KNIVES

In practice there is occasionally found a slight irregularity in the thickness of slugs, and thin fins are sometimes cast around the forward edges. For the purpose of reducing them to a uniform thickness, they are driven on their way to the galley between two vertical knives, as shown in Figs. 4 and 16. The inner knife is stationary, but the outer knife is adjustable in order that it may accommodate slugs of different thicknesses. This adjustment is made by the knife being seated at its outer edge against a supporting bar or wedge, having at opposite ends two inclined surfaces seated against supporting screws in the knife-block.

A lever engages a pin on the wedge for the purpose of moving it endwise; when moving in one direction, it forces the knife inward toward the stationary knife, and when moved in the other direction, it forces it to retreat under the influence of a spring seated in the block. The wedge is provided with a series of teeth engaged by a spring-actuated pin or dog, whereby the wedge and the knife are stopped in proper positions to insure the exact space required between the two knives.

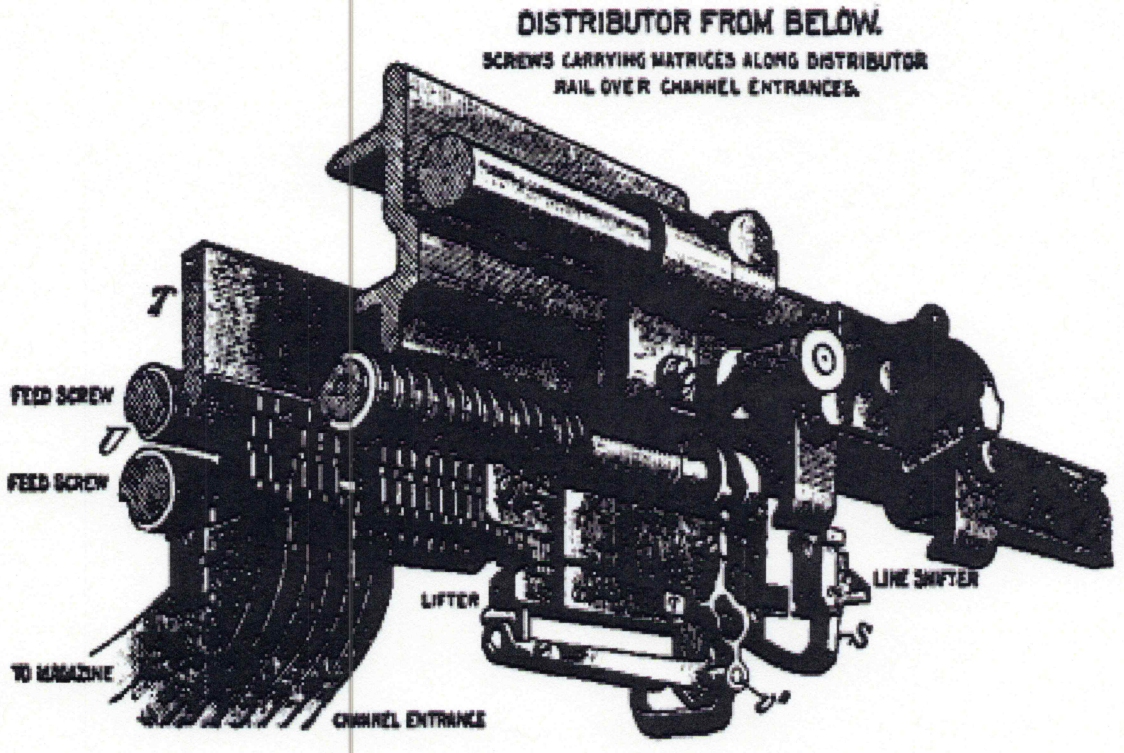


Fig. 15.

- BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM -

The back knife, secured to the frame for trimming the base of the slug as it is carried past by the revolving wheel, should be kept moderately sharp and adjusted so as to fit closely against the back of the passing mold. Particular attention should be paid to this feature. The edge of the knife must bear uniformly across the face of the mold.

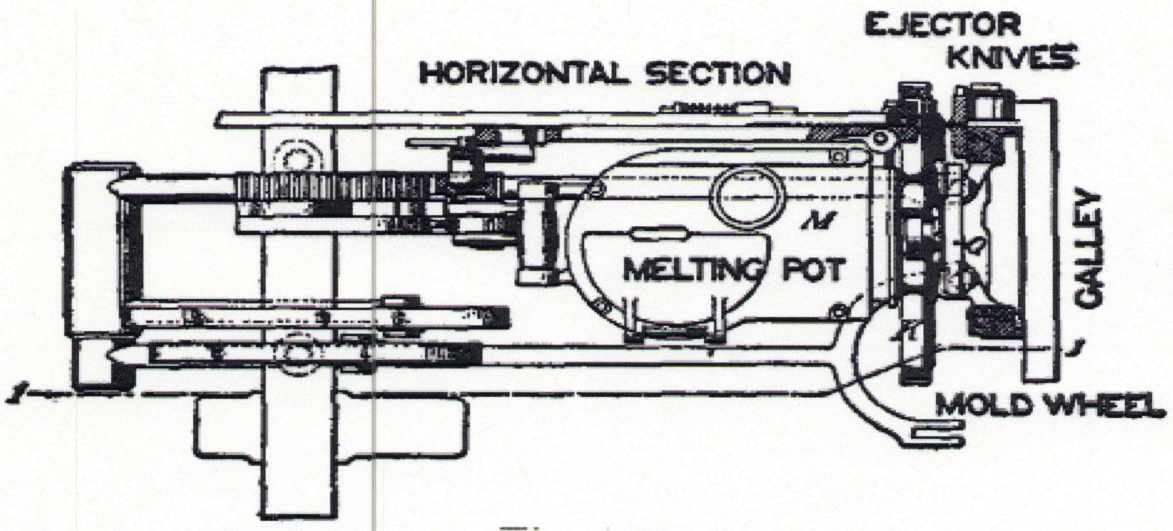


Fig. 16.

The front knives, between which the slug is ejected, should not be made too sharp. After being sharpened, the thin edge can be advantageously removed by the use of a thin oilstone applied against the side face; that is, against the face past which the slug is carried.

The stationary or left-hand knife should be so adjusted as to align exactly with the inner side of the mold. Under proper conditions this knife does not trim the side face of the slug, but acts only to remove any slight fins or projections at the front edge.

The right-hand knife, adjustable by means of a wedge and lever, should stand exactly parallel with the stationary knife. It trims the side of the slug on which the ribs are formed, and it serves to bring the slug to the exact thickness required.

- BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM - BIBLIOFLIP.COM -