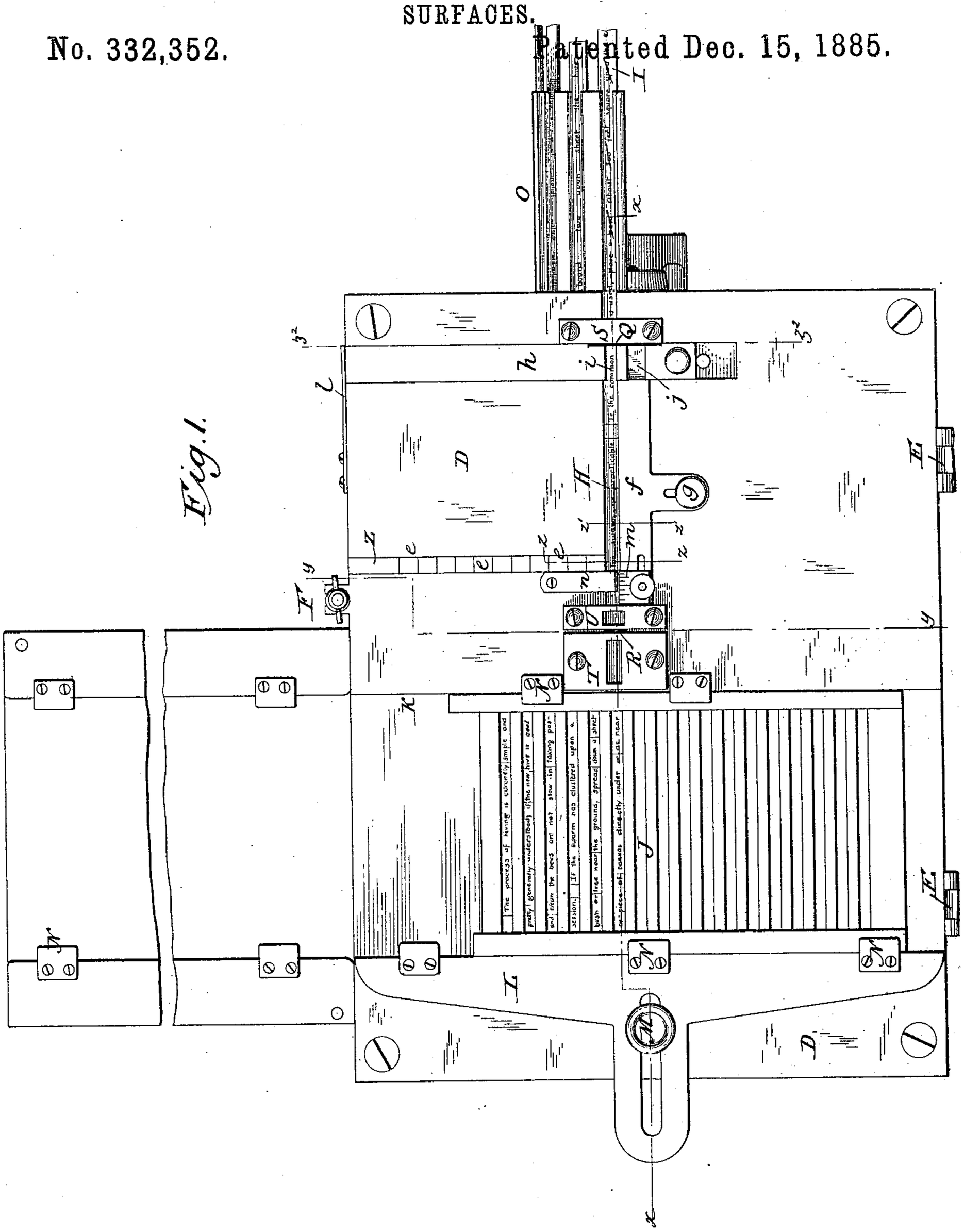
(No Model.) 3 Sheets—Sheet 1.

F. D. MALTBY.

MACHINE FOR JUSTIFYING MATRICES FOR PRODUCING PRINTING SURFACES.

No. 332,352. Patented Dec. 15, 1885.



WITNESSES

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(No Model.) 3 Sheets—Sheet 2.

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Fig. 2.

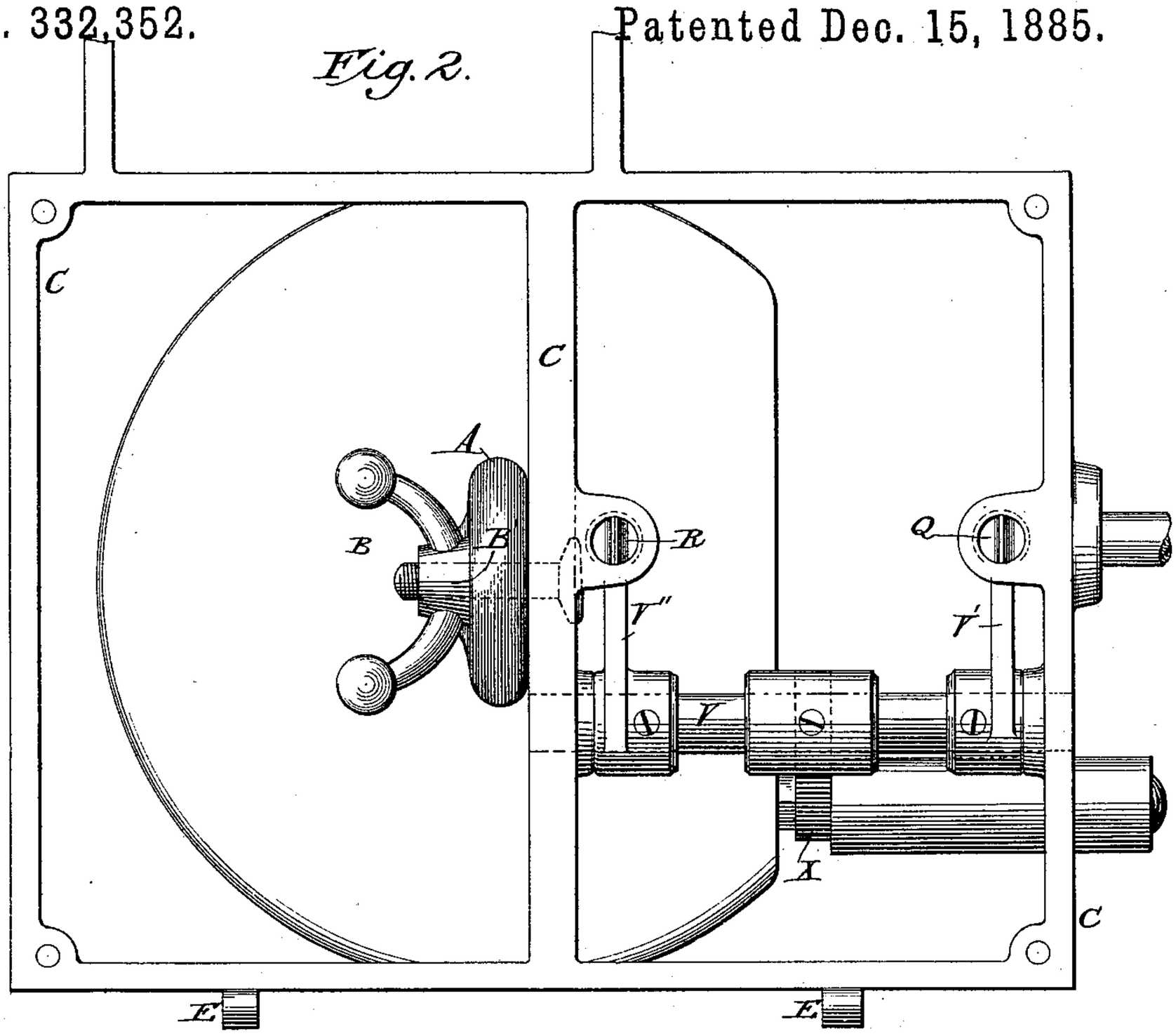
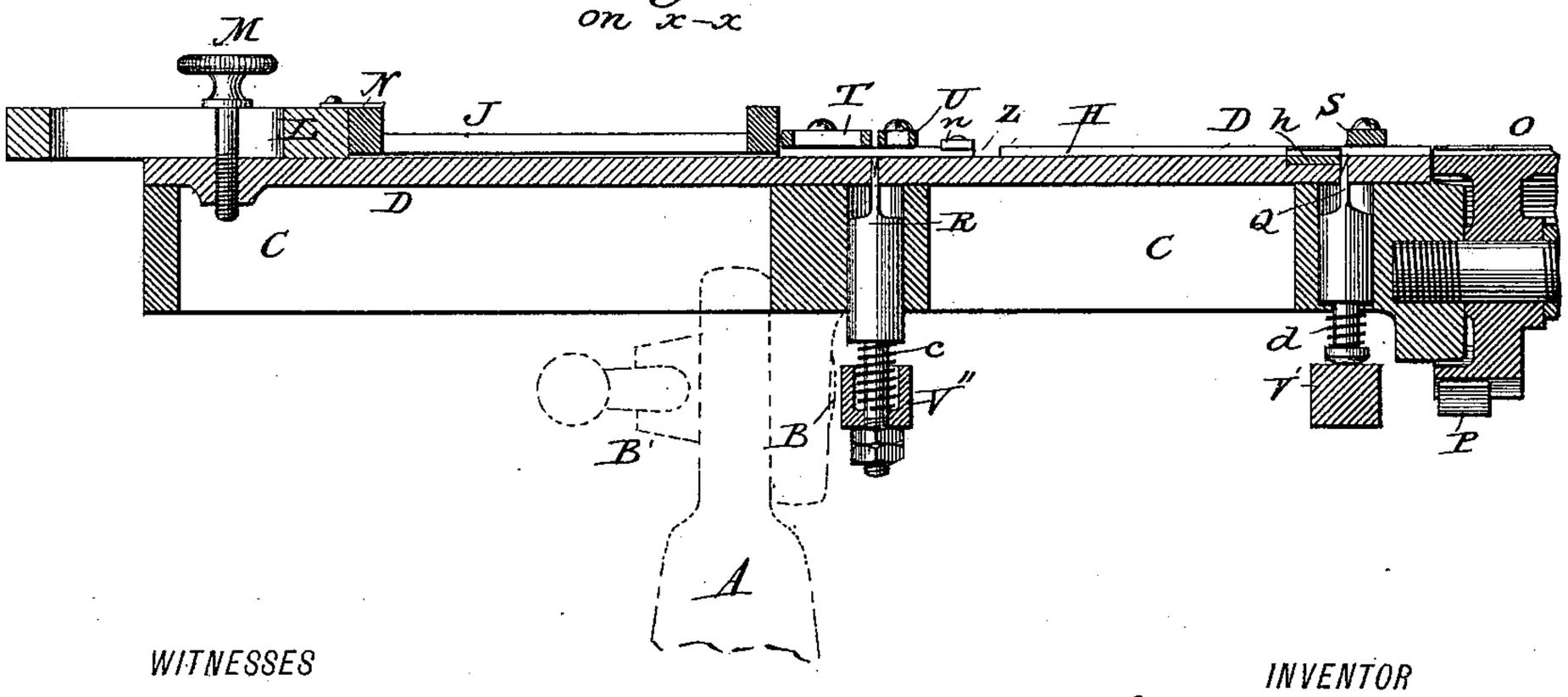


Fig 3.
on x-x



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(No Model.) 3 Sheets—Sheet 3.

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MACHINE FOR JUSTIFYING MATRICES FOR PRODUCING PRINTING SURFACES.

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Fig. 5

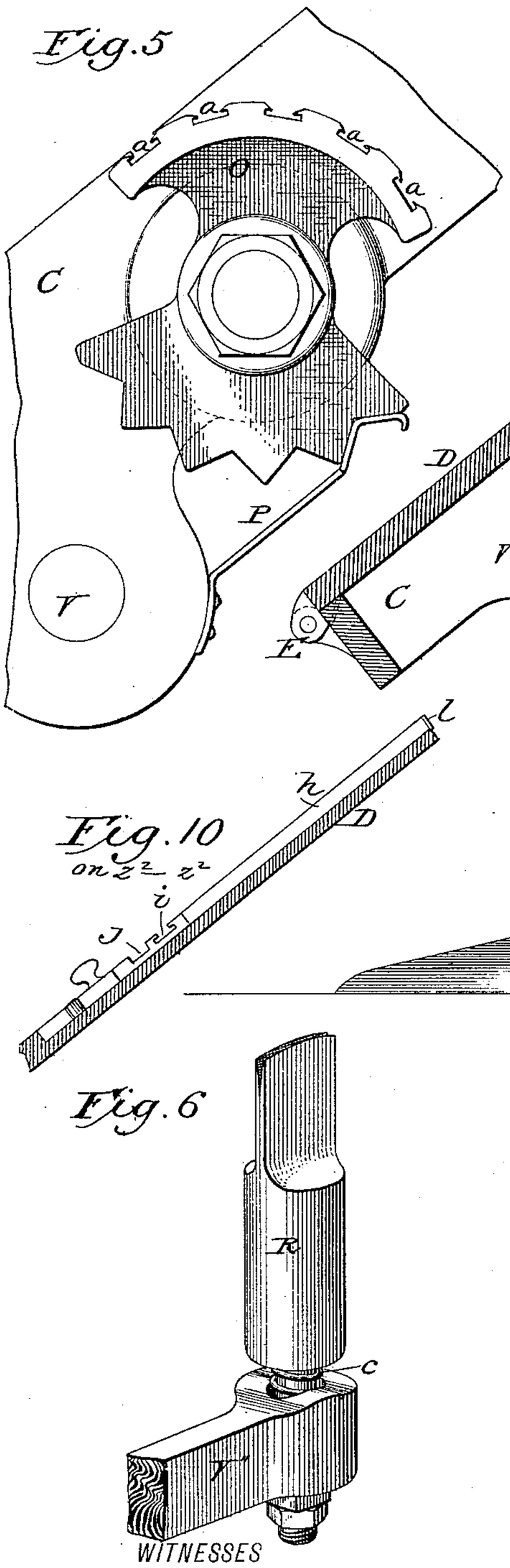

Fig. 4
on y-y

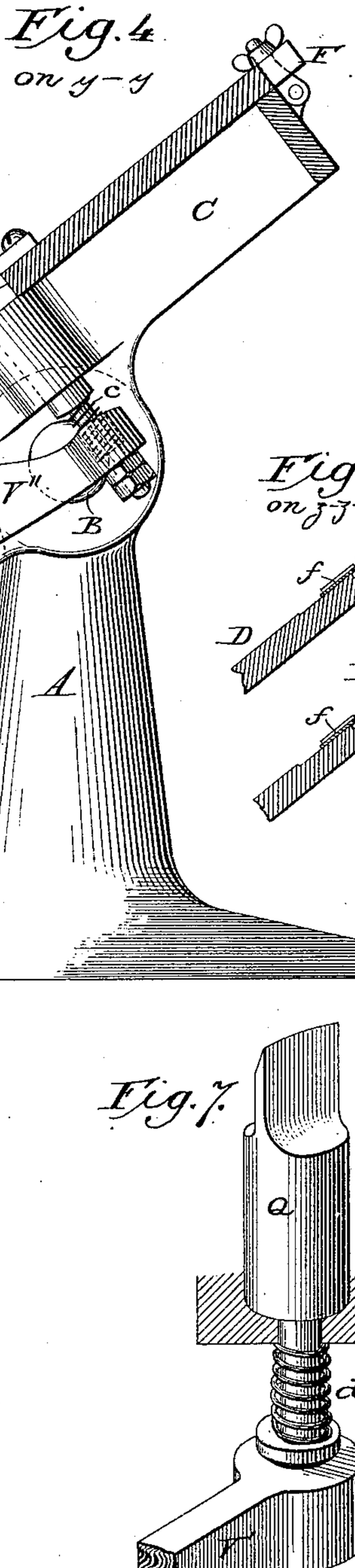

Fig. 8
on j-j

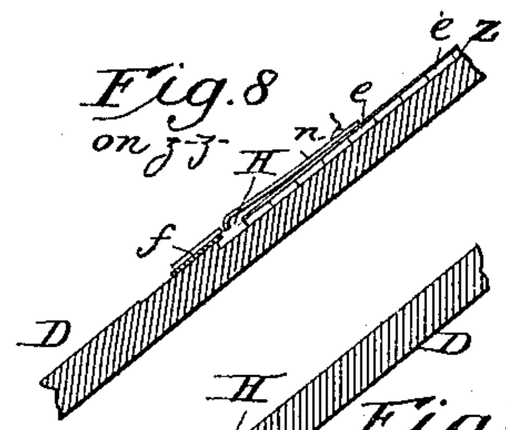

Fig. 9
on z'-z'

Fig. 10
on z²-z²

Fig. 6

Fig. 7.

WITNESSES

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UNITED STATES PATENT OFFICE.

FRANK D. MALTBY, OF WASHINGTON, D. C., ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE NATIONAL TYPOGRAPHIC COMPANY, OF SAME PLACE.

MACHINE FOR JUSTIFYING MATRICES FOR PRODUCING PRINTING-SURFACES.

SPECIFICATION forming part of Letters Patent No. 332,352, dated December 15, 1885.

Application filed October 24, 1884. Serial No. 146,401. (No model.)

To all whom it may concern:

Be it known that I, FRANK D. MALTBY, of Washington, District of Columbia, have invented certain Improvements in Machines for Justifying Matrices, of which the following is a specification.

This invention has relation to that system of producing stereotype-matrices wherein the letters or characters are mechanically indented in the order in which they are intended to be printed in a continuous line-strip of papier-maché or similar material. Said strip is subsequently divided into short lengths, each representing a line, which are properly justified and secured parallel with each other on a backing sheet or support.

The present invention has reference to various improvements in the construction of machines for dividing the matrix-strip into short lengths or line-strips and removing sections therefrom or introducing sections therein, as occasion may demand, in order to secure the proper arrangement or justification of the matter.

I am aware that the method of justification above recited is old, and that machines have hitherto been constructed for effecting such justification.

My invention is designed to avoid the difficulties incident to the use of the prior machine and to increase the speed of the operation.

Referring to the accompanying drawings, Figure 1 represents a top plan view of my improved machine. Fig. 2 is a top plan view of the supporting-frame and its attachments with the bed plate or top removed. Fig. 3 is a transverse vertical section of the complete machine on the line *x x* of Fig. 1. Fig. 4 is a vertical longitudinal section of the machine on the line *y y* of Fig. 1. Fig. 5 is an end view of the adjustable guide by which the matrix-strips, correction-strips, &c., are sustained and delivered to the operative mechanism. Figs. 6 and 7 are perspective views of the two knives and the devices immediately connected therewith. Figs. 8, 9, and 10 are cross-sections on the lines *z z*, *z' z'*, *z'' z''*, respectively.

In constructing my machine I first provide a pedestal or support, A, of any appropriate form, and to its top connect, by one or more horizontal pivots, B, a rectangular frame, C, which may be placed at such inclination as is found most convenient to the operator.

As the most simple means of locking the frame in position, I propose to provide a hand-nut, B', on the end of the pivot B, as plainly represented in Fig. 2 and in dotted lines in Fig. 3; but it is to be understood that any other suitable locking device may be substituted.

On the frame C, I mount a flat bed-plate, D, attaching the same thereto by hinges E at one edge, and a latch or locking device, F, at the opposite edge, as represented in Figs. 1 and 4, in order that the bed may be turned forward to permit the convenient inspection of the parts in its under side. Across one side of the bed-plate I form therein a transverse groove, H, of suitable width to receive the matrix-strip I, which has the characters indented lengthwise therein in a single line, as shown. On the opposite side of the bed I mount a frame, J, constructed with parallel grooves in the under side to receive the sections of the matrix-strip, and with corresponding slots of less width, through which the characters of the matrix-strip may be viewed from the top, this frame being similar to those in common use. The frame is arranged to slide upon the bed-plate in a fore-and-aft direction at right angles to the groove H, so that its grooves may be brought one after another in line with the end of the groove H, to receive the justified strips therefrom. The frame, being advanced step by step, receives the matrix-strips in its grooves one after another, and thus serves to retain the series of strips in parallel lines until they are transferred to a permanent backing sheet or support in the ordinary manner. The frame J is guided on one side by a shoulder, K, on the bed-plate, and on the opposite side by a guide-plate, L, which is slotted and secured upon the bed-plate by a set-screw, M, this construction permitting the guide L to be moved forward and backward, in order to admit frames of different widths, according as columns or pages of greater or less width are demanded. Friction-plates N, fastened in position, bear on the

edges of the frame J and retain the same in the position in which it may be placed. At the right side of the bed-plate I connect to the frame by a horizontal pivot a rotary guide or support, O, to receive and carry the matrix-strip and the other strips for spacing, justifying, and correcting the matrix, as will be hereinafter explained.

As represented in Figs. 1 and 5, the guide O is provided with a number of longitudinal grooves, *a*, each of a size adapted to receive the matrix-strip, and each having at opposite edges overhanging lips to engage the strip and retain the same therein. It will be observed that these grooves extend in a line parallel with the groove H on the bed-plate, and that they are equally distant from the pivot on which the guide turns, so that by turning the guide one or another of the grooves may be presented in line with the receiving end of the main groove H, so as to present the main matrix-strip I or either of the other strips at will to the main groove. I propose to place in one of the grooves a specially-prepared strip corresponding in size with the matrix-strip and containing such characters as a reading of the matrix-strip may have shown to be necessary for its correction. In another of the grooves I place a strip having hyphens printed therein, and in another a blank strip for spacing purposes. There may be any suitable number of grooves, and they may contain strips of one kind or another as experience may show to be desirable.

For the purpose of retaining the guide in its different positions I form notches in its under edge, and mount on the frame a spring-arm, P, to engage therein. This arrangement permits the guide to be conveniently turned by hand, and insures the perfect registration of one or another of its grooves with the groove of the bed-plate.

In the bed-plate, near the outer or receiving end, I locate a vertically-acting knife, Q, having a cutting-edge at its outer side designed, mainly, to subdivide the matrix-strip into lengths approximating the width of the column or page to be produced.

Near the inner side of the groove H, slightly in advance of the receiving-frame J, I locate the second knife, R, having cutting-edges at both sides, or, in other words, of a V form in cross-section for the purpose of cutting and removing from the strip narrow sections or portions to reduce its length. The knife Q acts in an upward direction through the groove, its cutting-edge passing closely by the side of a stationary bar, S, which overlies the groove and the matrix-strip, as plainly shown in Figs. 1 and 3.

The arrangement of the knife to act in an upward direction—that is to say, from the back of the matrix-strip—is a feature of great importance, since it has a tendency to force the end of the matrix-strip upward in the act of cutting the same, and to leave a sharp square edge at the upper surface of the strip. In consequence of this fact it is found that the sections of the strip may be brought tightly together in such manner as to form a tight joint and prevent the entrance of the molten metal between them.

In justifying-machines of the present class heretofore in use the dividing-knife acted in a downward direction from the face of the matrix-strip, the ends of which were thereby beveled or inclined in such manner that when brought together a small opening was left between them, into which the molten metal entered in such manner as to leave upon the cast raised surfaces, which required to be removed or routed out by hand, an operation which was tedious and expensive. The edges of the knife R pass between and in close proximity to the two plates T and U, fixed in position and overlying the groove, and the strip as represented in Figs. 1 and 3, so that the knife acts to sever the strip in two parallel lines and to remove the intervening portion. Owing to its upward action this knife, like the other, has the effect of leaving sharp edges at the upper face of the strip. The knives may be actuated in any suitable manner; but I prefer to mount in the main frame a horizontal rock-shaft, V, provided at the top with two arms, V′ and V″, acting beneath the ends of the respective knives. The shaft is operated by a depending arm, X, the lower end of which is provided with a pedal or foot-piece, so that when urged downward by the foot of the attendant it will have the effect of elevating both knives. The knife R is provided with a neck or spindle extending downward loosely through the operating-arm V″ in the manner represented in Fig. 3. A spiral spring, *c*, is seated around this neck between the arm V″ and the body portion of the knife, as shown in Figs. 3, 4, and 6.

In the operation of the device the upward movements of the knife are arrested by the strip overlying its edge. The movement of the arm V″ has the primary effect of compressing the spring *c*, the knife remaining at rest until the spring exerts sufficient force to drive it upward through the strip, or until the arm acts positively against the knife, whereupon the knife is thrown suddenly and quickly upward, so as to sever the strip and at the same time drive the section which is cut therefrom out of the way. The knife Q has at its lower end a headed neck or spindle bearing on the arm V′, and surrounded by a spiral spring, *d*, which has the effect of urging the knife downward when released. This spring acts also, through the intermediate parts, to restore both the operating-arms and their lever to the normal position. The knife R has at its lower end a nut or head engaging beneath the arm V″, so that the arm in descending has the effect of positively depressing the knife.

In effecting the justification of the strip it is frequently necessary to indent the lines at the left of the page—as, for example, the beginning of a paragraph. To provide for in-

troducing these blank spaces I form in the bed-plate a groove, Z, lying at right angles to the main groove H, and intersecting the latter near its left-hand end. The quads or spacing pieces of a section corresponding with that of the matrix and of any suitable width are inserted into this groove one behind the other, as shown at *e*, so that they may be slipped one after another into the main groove H in line with the matrix-strip, so as to pass with the latter into the frame J. During the passage of the matrix-strip through the groove H it is confined therein by a plate, *f*, secured by a thumb-screw, *g*, to the bed-plate, and projecting inward over one edge of the groove, as shown in Figs. 1, 8, and 9, so as to bear upon and confine the matrix-strip.

In practical operations with the machine it is frequently necessary to remove one or more characters from the matrix-strip—as, for example, when they have been printed incorrectly or accidentally therein. To this end I provide in the top of the bed-plate a slide, *h*, working in a groove at right angles to and across the main groove H. This slide contains two transverse grooves, *i* and *j*. The groove *i*, which stands normally in line with and forms a continuation of the groove H, as shown in Fig. 1, has overhanging edges, as shown in Fig. 10, to confine the matrix-strip therein. The groove *j*, however, is without these overhanging edges, and is of the full width of the matrix-strip, which may be lifted freely therefrom. During the ordinary operation of the parts the slide stands in the position shown in Fig. 1, the strip passing through the groove *i* and being held down in position thereby. When, however, it is necessary to remove a portion of the matrix-strip, the slide *h* is moved upward until the groove *j* is brought in line with the main groove H, whereupon the matrix-strip is introduced from the guide on the right and severed at the proper point by the knife Q, the severed portion being passed into the groove *j*, from which it may be readily removed without disturbing the remaining portion. After this removal the slide is restored to its normal position. The slide may be retained in position by friction; but I prefer to make use of a spring, *l*, secured to the main frame and acting against one end of the slide, as shown in Fig. 1. The knob or thumb-piece on the lower end of the slide serves as a convenient means for moving it upward when required. The distance between the two knives is somewhat greater than the length of the longest lines demanded in practice, so that, although both knives are moved at once, there is no danger of their cutting the strip at the same time.

For the purpose of enabling the attendant to determine the length at which the strip is to be cut in the first instance, and also to determine as to the justification, I secure on the bed-plate adjacent to the groove H a graduated plate or scale, *m*.

As a means of arresting the inward movement of the strip, I attach to the bed-plate a spring-arm, *n*, one end of which overhangs the groove H, so that it may be forced downward therein by the pressure of the finger upon its end.

While I have described the main frame as being pivoted to the supporting-standard, and while this construction is preferred, it is to be understood that this is not a necessary feature of my machine. It is also to be understood that the devices for imparting motion to the knives may be modified, if required.

Having thus described my invention, what I claim is—

1. In combination with the bed or support grooved to receive the matrix-strip, the rotary guide provided with a series of grooves or channels to register with that in the bed.

2. The support containing the groove H, in combination with the guide O, pivoted to turn in a plane at right angles to said groove, and provided in its periphery with a series of grooves extended in lines parallel thereto and all adapted to register therewith.

3. In combination with the grooved bed-plate and the pivoted guide O, grooved as described, the automatic spring-locking device to hold the guide in position.

4. In a matrix-justifying machine, the combination of the matrix-guide and a dividing-knife acting in an inward direction or from the back of the matrix, whereby sharp clean edges are produced at the face of the matrix, so that its sections may be jointed closely together.

5. In a justifying-machine, the bed provided with the matrix-guide and a dividing-knife, in combination with a standard or support to which the bed is jointed, substantially as described, to admit of its inclination being changed at will.

6. In a machine for justifying strip-matrices, the combination of a grooved bed or guide, through which to pass the matrix in an endwise direction, and a two-edged knife acting transversely of the groove at an intermediate point in the length of the same, substantially as described, whereby sections may be removed from the strip and the remaining portions permitted to continue their advance end to end beyond the knife within the groove.

7. In a machine for justifying strip-matrices, the combination, substantially as shown, of a grooved bed or guide, through which to pass the matrix in an endwise direction, the two-edged knife acting transversely of the groove at an intermediate point in the length of the same, the operating-arm V″, and the interposed spring *c*, whereby sections may be removed at intermediate points in the strip and automatically ejected, and the remaining portions are permitted to continue their advance beyond the knife within the groove.

8. The combination of the two knives, their actuating-arms, and the lever connected to said arms, whereby the lever is caused to actuate the knives simultaneously.

9. In combination with the bed or guide and the knives Q and R, the rock-shaft, the arm V″, having a limited movement in relation to knife R, the lifting-spring *c*, the arm V′, and the depressing-spring *d*, whereby the shaft is caused to actuate both knives and the spring *d* caused to restore the parts to their normal positions.

10. In a justifying-machine, a bed or support provided with the main matrix groove or guide H, and the secondary groove or guide Z, at right angles thereto, whereby the introduction of spacing-pieces, quads, or characters is permitted.

11. In combination with a bed provided with a main matrix groove or guide, a severing-knife, and a grooved slide, Z, moving across the main groove, whereby the removal of severed portions from the main strip is permitted.

12. In combination with the bed provided with the matrix guide or groove H, the severing-knife Q, and the transverse slide containing the grooves *i* and *j*, of the form shown and described.

13. In a matrix-justifying machine provided with a groove or guide, H, and a severing-knife, a stop-arm, *n*, to arrest the advance of the matrix-strip.

14. In a matrix-justifying machine, and in combination with the bed grooved to receive the matrix, two knives located near opposite ends of said groove, one adapted, as described, to sever the strip at a single point and the other to sever it at two points and remove the intervening portion.

In testimony whereof I hereunto set my hand in the presence of two attesting witnesses.

FRANK D. MALTBY.

Witnesses:
JOHN T. ARMS,
WILLIAM H. SHIPLEY.