

4 Sheets—Sheet 1.

Patented May 22, 1894.



INVENTORS.

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Henry Glenger
By Wing + Thurston
their attorneys

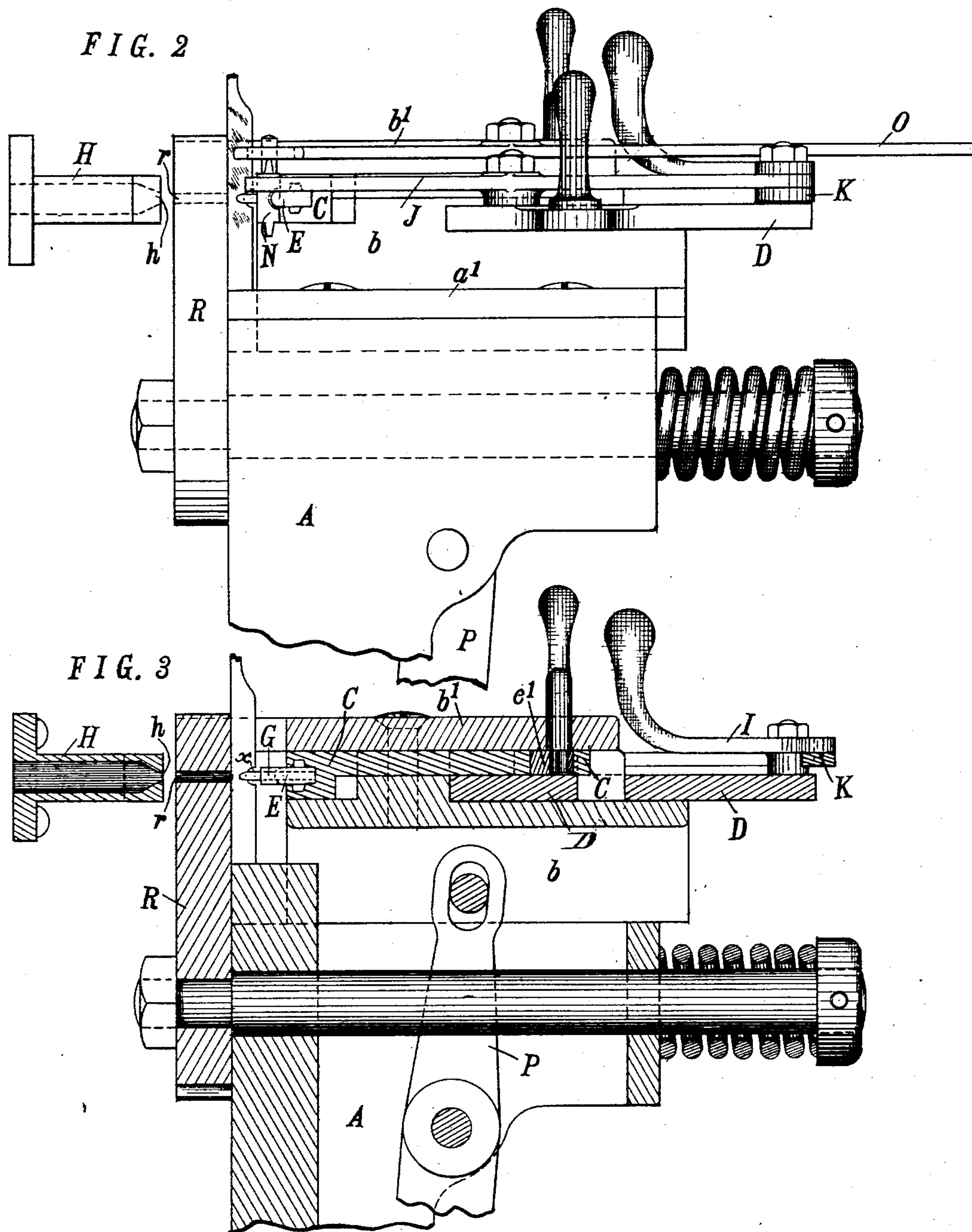
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4 Sheets—Sheet 2.

C. FORTH & H. GLENZER.
MECHANISM FOR JUSTIFYING MATRIX LINES.

No. 520,140.

Patented May 22, 1894.



WITNESSES.

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4 Sheets—Sheet 3.

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FIG. 4

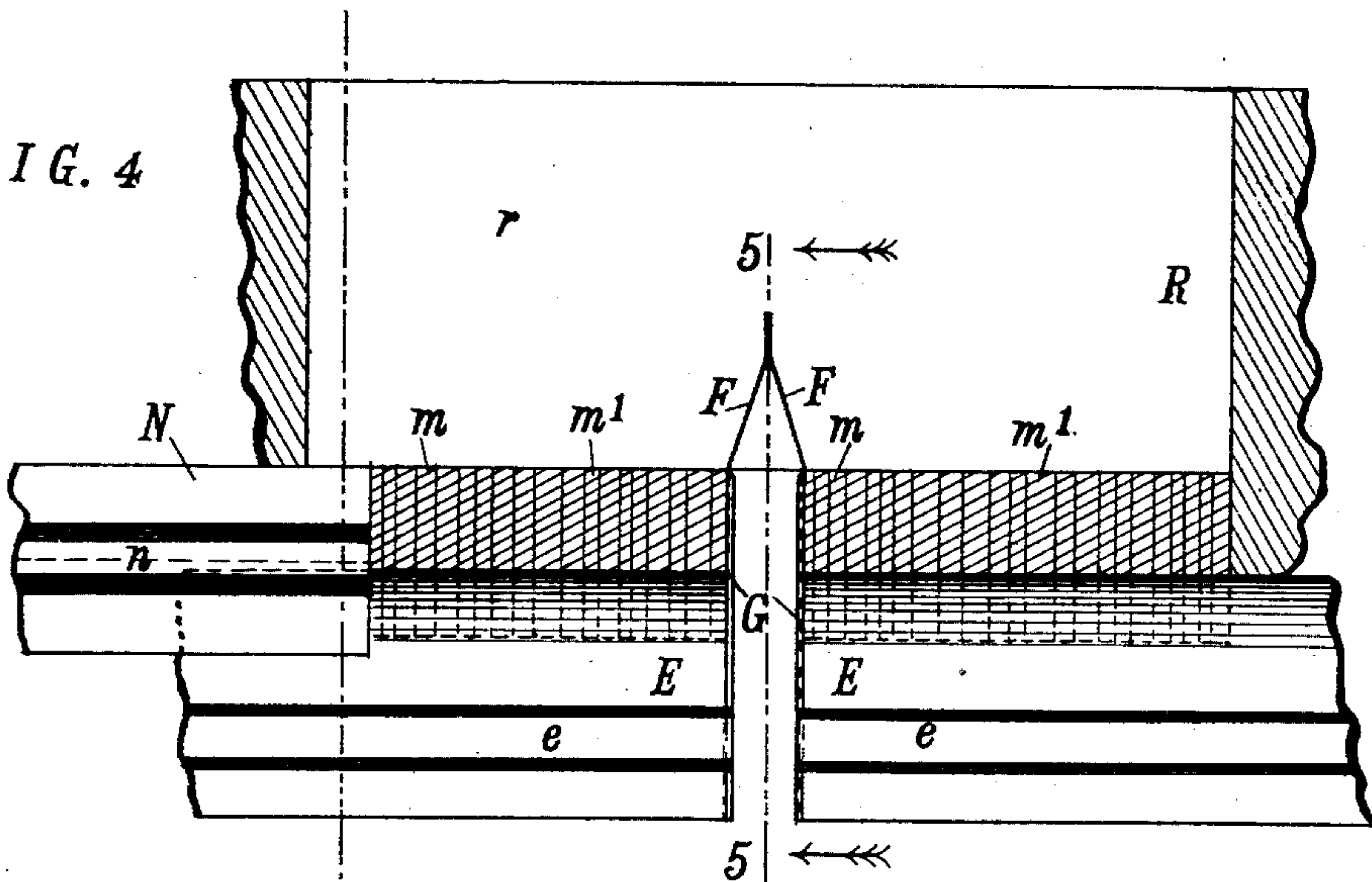


FIG. 5

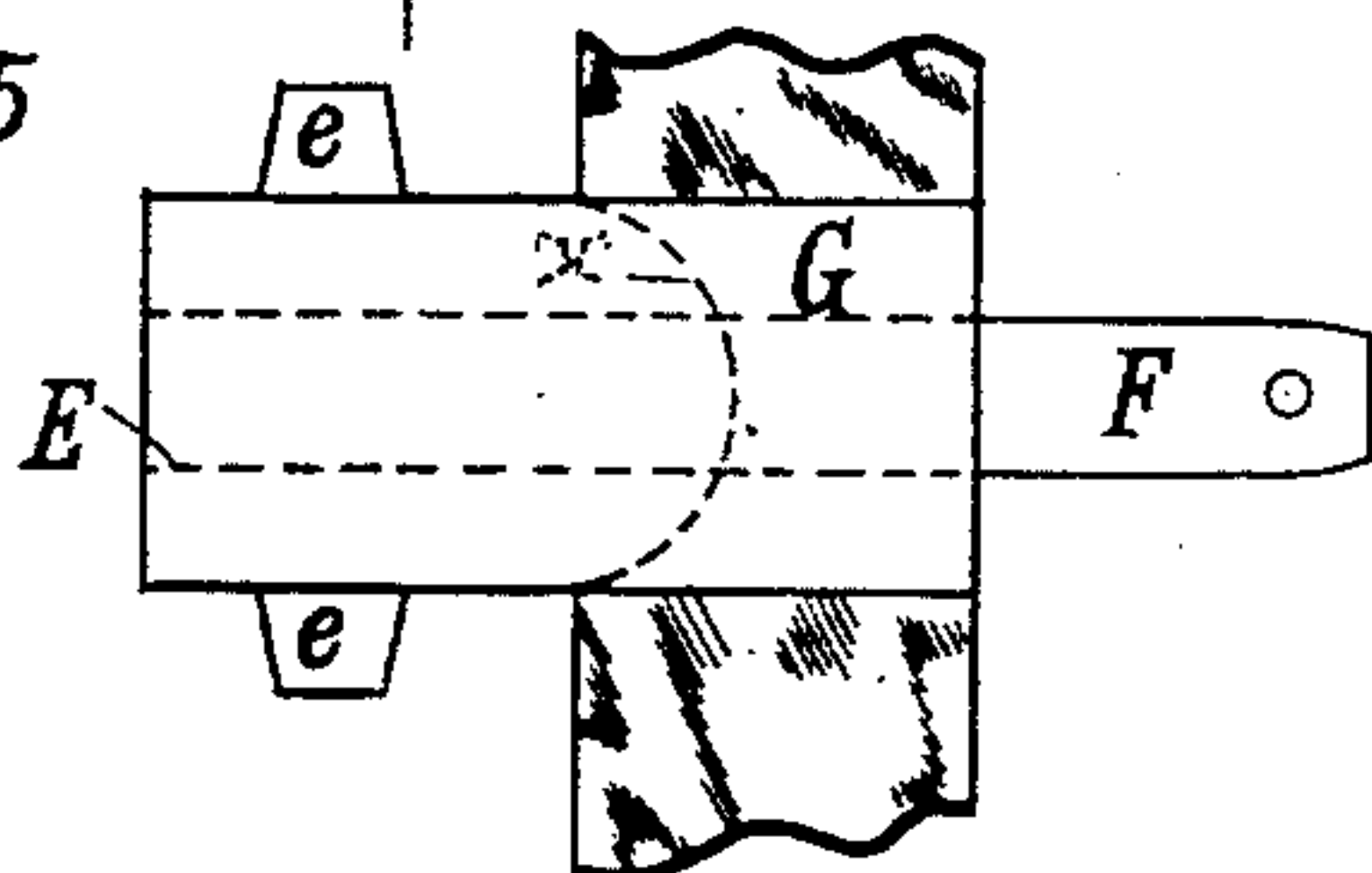


FIG. 6

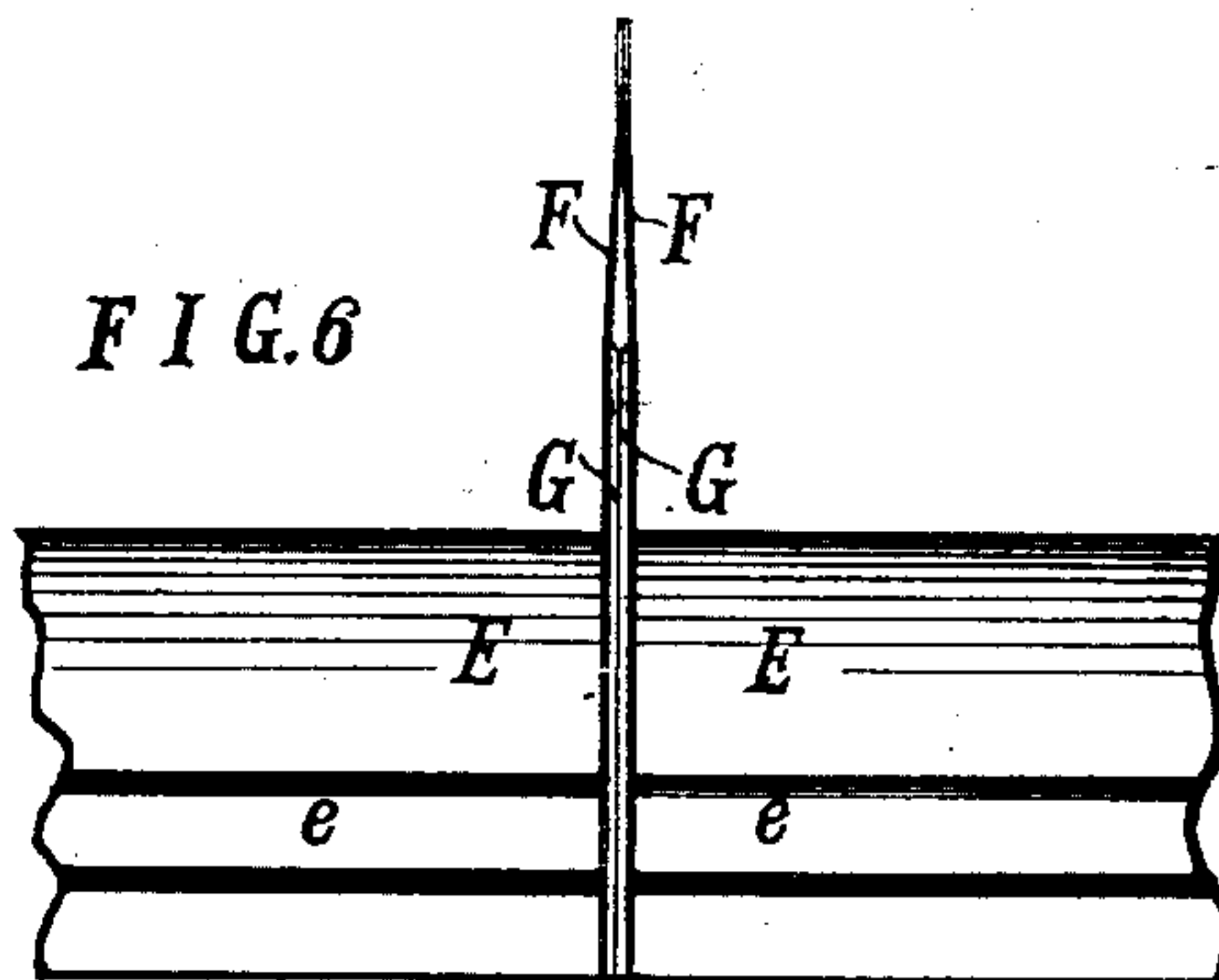
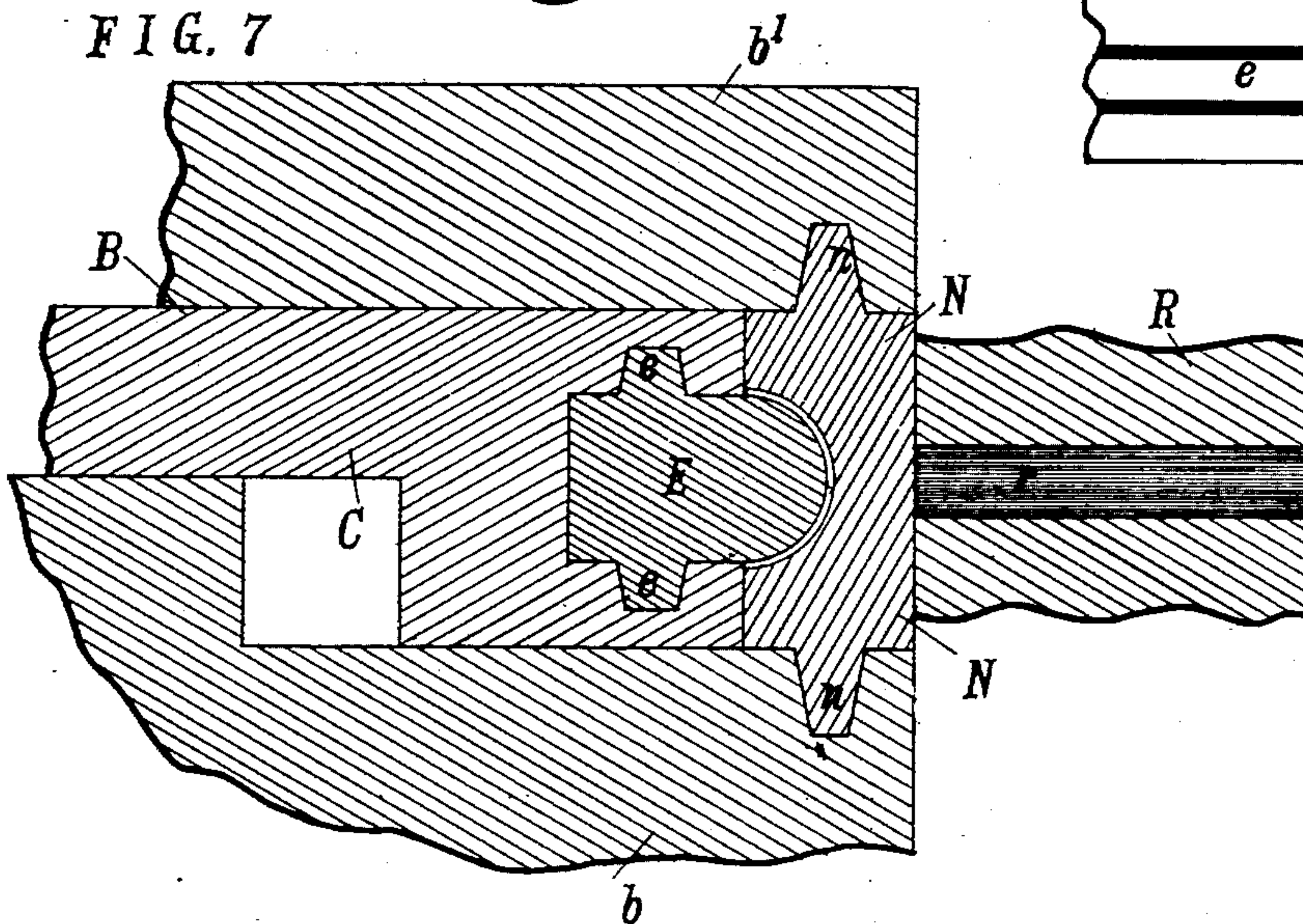


FIG. 7



WITNESSES.

Frank. Miller.
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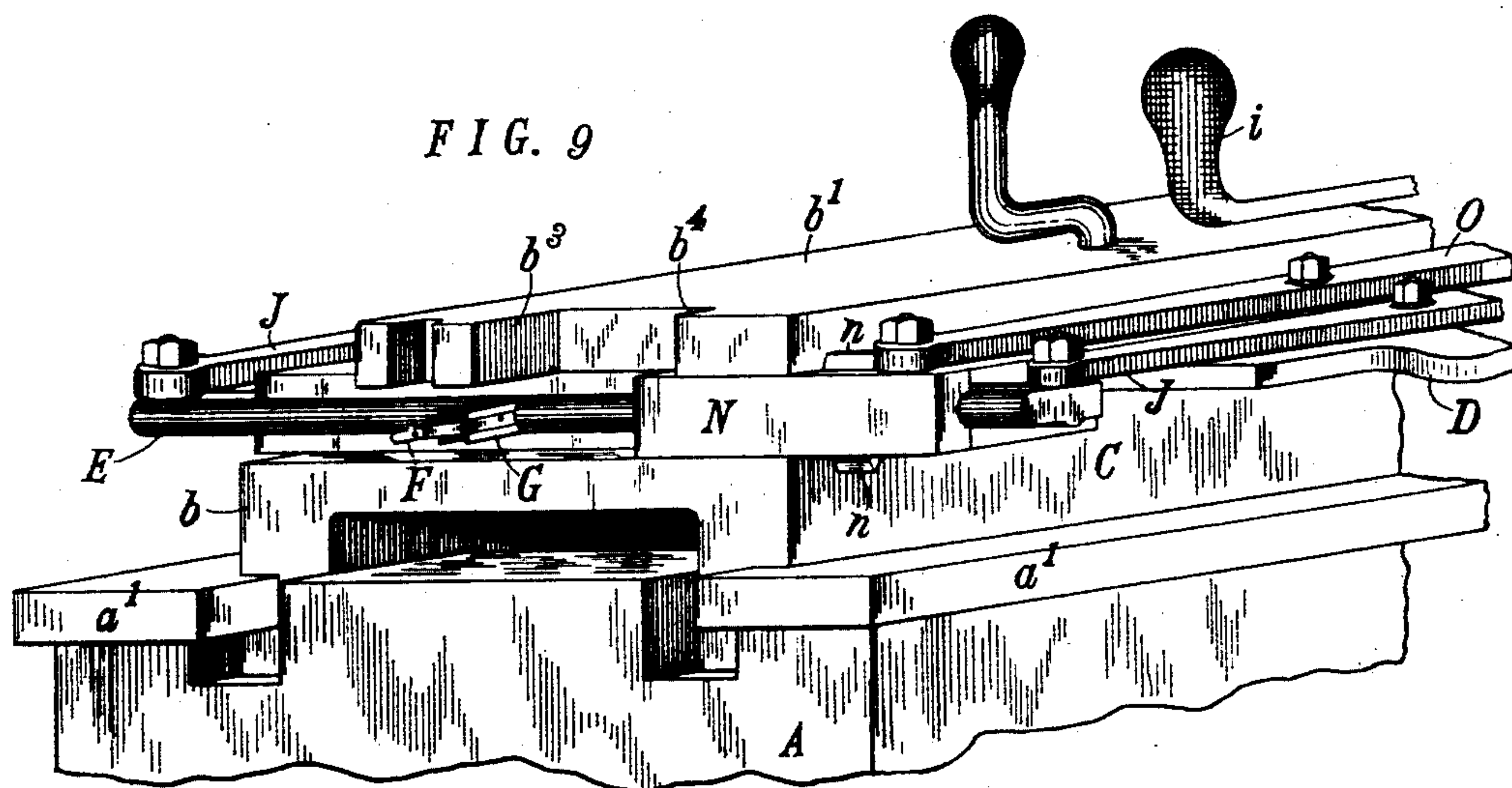
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4 Sheets—Sheet 4.

No. 520,140.

Patented May 22, 1894.



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UNITED STATES PATENT OFFICE.

CHARLES FORTH AND HENRY GLENZER, OF CLEVELAND, OHIO, ASSIGNORS,
BY DIRECT AND MESNE ASSIGNMENTS, TO E. L. THURSTON, TRUSTEE.

MECHANISM FOR JUSTIFYING MATRIX-LINES.

SPECIFICATION forming part of Letters Patent No. 520,140, dated May 22, 1894.

Application filed December 2, 1892. Serial No. 453,896. (No model.)

To all whom it may concern:

Be it known that we, CHARLES FORTH and HENRY GLENZER, citizens of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Mechanism for Justifying Matrix-Lines; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as it will enable others skilled in the art to which it appertains to make and use the same.

It is now generally conceded that printing lines, whether made up of separate type or in the form of a linotype, must be justified,—that is to say, each line must be made of exactly the same length as every other full line which is to appear in the same column. In order that linotypes, which are cast from matrix lines made up of independent matrix blocks, shall be of uniform length, the matrix lines have usually been justified before the linotypes are made therefrom. The only method of justifying a matrix line which, so far as I am aware, has been practically successful heretofore, is that in which the spaces between the words are formed by a series of expansible space-bars which are introduced at the proper points as the line is assembled. When the entire line is assembled, all of the space-bars are expanded simultaneously, whereby all of the spaces in the line are proportionately increased in width, until the line is spread to the proper length. This uniformity of spacing is admittedly pleasing to the few who are able to appreciate it. But it is a degree of perfection which is entirely unnecessary in practice and is never sought for by type setters. A compositor in justifying a line of type will, if he can, do it by adding the necessary extra spacing at one or perhaps two places in the line. Of course the spaces at such points are wider than at other points, but it is rarely if ever noticed, and it meets all of the requirements of ordinary newspaper work.

The object of our invention is to provide for use in connection with the casting mechanism, novel means for justifying a matrix line made up of independent matrix blocks, by spreading the line at one point and closing the mold at said point, thus producing

the desired result with sufficient accuracy and in a manner more nearly resembling the actual work of the compositors.

In the drawings, Figure 1 is a plan view of a linotype casting mechanism adapted to be used in connection with any matrix assembling machine, or to form a linotype from a line of matrices which have been assembled in an entirely independent machine. Our improved justifying mechanism is shown as applied to and forming a part of this casting mechanism. Fig. 2 is a side view of the same mechanism. Fig. 3 is a vertical section on line 3—3 as shown in Fig. 1. Fig. 4 is an enlarged plan view partly in section of the front part of the mold and justifying mechanism when the latter has been spread, *i. e.* has been operated with the result of justifying a line of assembled matrices. Fig. 5 is an end view of one of the sliding justifying bars and the finger and a part of the expansible mold plug on its end showing their relative position to the adjacent matrix when the line is or is about to be justified. Fig. 6 is an enlarged plan view of the adjacent ends of the two justifying bars and their connections. Fig. 7 is a vertical section on line 7—7 of Fig. 1. Fig. 8 is a view of a linotype made with the described mechanism; and Fig. 9 is a perspective view of a part of said mechanism, intended especially to show the face thereof,—the mold and casting mechanism being removed.

We will now describe our invention, and incidentally so much of the special casting mechanism shown in the drawings as may be necessary to a proper understanding of said invention and its mode of operation. It will be understood however that the invention hereinafter claimed is not dependent on the special casting apparatus shown. It will also be noticed that we do not claim in this application the casting mechanism shown except to the extent that it co-operates with the justifying mechanism, although it contains novel features of construction because the specific construction of the casting mechanism is not material to the invention which this patent is intended to cover. It will also be observed that we have shown no mechanism for assembling the matrices; and this for the reason that the invention may be em-

ployed in connection with any of the numerous forms of combined matrix assembling and linotype making machines or with linotype machines which are adapted to cast a slug
5 from a line of matrices which have been assembled either by hand or in an entirely independent machine.

Referring to the parts by letters, G G represent two inversely movable fingers which
10 are adapted to lie between any two of the matrices in a line.

E E represent two longitudinally movable justifying bars,—to the adjacent ends of which the fingers G G are respectively attached.
15

F F represent two thin flexible metallic plates secured to the fingers G G and extending forward therefrom; and the front ends of said plates are united by a rivet or other
20 suitable means. These plates are so placed that they are adapted to enter the slot in the mold block in which the slug is to be formed; and are of such width as to fit snugly therein. These plates form what I call an expansible mold plug,—which prevents the escape of
25 the molten metal from that part of the mold which is in front of the space in the matrix line formed by the two fingers as hereinafter described.

30 A represents a stationary bed.

R represents the mold, which is secured thereto. It is a solid block having a slot *r* in which the slug is formed. The slot is open at front and rear. The rear of this slot is closed
35 by the block H, in which is formed the conduit *h* through which the molten metal is forced from the melting pot into the slot. The front of the mold is to be closed by the assembled matrix line. In the particulars
40 described in this paragraph, the casting mechanism is, or may be substantially like many of the casting mechanisms heretofore used.

The movable head of the casting apparatus shown, is made up of the block *b* (which is held
45 in sliding engagement with the bed A by the two plates *a' a'* which are secured to the bed A and enter horizontal grooves in said block *b*) and the plate *b'* (which is secured to the top of block *b*). Between the block *b* and plate
50 *b'* two movable plates or slides C and D are held. The slide C is movable forward and backward between suitable guiding shoulders *b² b²* shown in dotted lines in Fig. 1; and is moved in the described manner by the eccentric *c'* which is pivoted to the plate *b'* and
55 lies in a transverse slot in the slide C. The slide D is also independently movable from side to side for the purposes to be presently explained.

60 In the front edge of the slide C is a horizontal groove in which the sliding bars E E are fitted,—being held therein by the tongues *e e*. This groove is so placed that the bars lie directly in front of the slot *r* in the mold.

65 The fingers G G as hereinbefore explained are attached to the proximate ends of the two bars E E, wherefore the fingers are separated,

with the result hereinafter explained, by the movement of said bars.

For the purpose of moving said bars, I provide the two levers J J which are pivoted to
70 opposite sides of the slide D. The forward ends of said levers are slotted and receive pins *e' e'* which are secured to the bars E E. The rear ends of said levers are connected by
75 the links K K to opposite ends of the lever I which is pivoted to the slide D.

b³ represents a shoulder which projects forward from the plate *b'*, and the first matrix in the line abuts against said shoulder during the casting operation.
80

b⁴ represents another shoulder which projects forward from said plate *b'* and, when the head is moved forward to cause the matrix line to engage with and close the slot in
85 the mold, the shoulder *b⁴* lies to the left of and engages with the last matrix in the line. The distance between the two shoulders *b³* and *b⁴* represents the length of a justified matrix line.
90

In the operation of the above described mechanism, independent matrices may be assembled one by one, in the space between the mold and sliding head, the first matrix lying
95 against the shoulder *b³*. When some convenient point is reached where a space is required, the slide C is moved forward, to bring the front ends of the plates F F in the path of the assembling matrices, and the slide D is
100 moved sidewise as required to bring said plate against the matrix last brought into line. Then as many other matrices are brought into the line as possible without making the line longer than the standard. The normal spaces
105 between words are formed of blocks substantially like the matrix blocks but with no character depression on their edges. Spacing blocks of various thickness may be provided (as for example the blocks marked *m m'* in Fig. 4) and the skill and judgment of
110 the operator may be exercised in their use so as to make the length of the line as near as possible to that of the standard.

Instead of assembling the matrices one by one in front of the mold as above explained,
115 an entire line already assembled in some other machine may be brought to the casting mechanism, and the justifying mechanism may be then thrust into the line at the desired point, and the subsequent mode of operation will
120 be substantially the same. And said subsequent mode of operation with the particular mechanism shown is as follows:—The movable head is then moved by the lever P or other suitable mechanism toward the mold
125 until the shoulder *b⁴* is at the left of the line of matrices. Then the lever I is rocked by means of its handle *i* and thereby the levers K K are rocked. This causes the bars E E to slide in opposite directions carrying with
130 them the fingers G G; this spreads the line of matrices, from the point therein where the fingers are inserted, in opposite directions, until the two parts of said line are firmly held

between the shoulder b^3 and one finger on one side, and between the shoulder b^4 and the other finger on the other side. The movable head then moves the matrix line up against the mold, the characters on said matrices being at the level of the slot r . The matrices and plain spaces thereby close that part of the slot before which they lie. The expansible plug *i. e.*—the connected plates $F F$ enter the slot and close that part thereof which lies in front of the space in the line formed by the separation of the fingers $G G$, substantially as shown in Fig. 4. The matrices may be, and preferably are, provided with an alignment notch X which as shown is semi-circular in form and the front edge of the bars $E E$ are shaped to fit into said notches. When the rear of the slot r is closed and molten metal is forced into it, a slug is formed in which there is a V-shaped notch formed by the expanded plates at the point where the extra or justifying space has been added, substantially as shown in Fig. 8.

It will often happen that there is not enough matter to fill out a full line, as at the beginning or end of a paragraph. To avoid the necessity of filling out the line with blanks, I provide a slide N , which can be moved in against the end matrix in the line and there held during the casting operation. This slide lies between the block b and plate b' being held in place by the tongues $n n$ on the slide which engage in corresponding grooves in said block and plate. This slide is of substantially the same width as the matrices, so that it holds them firmly, and its front face lies in the plane of the front edges of the matrices. When the matrices are in engagement with the mold, the face of the slide engages with the face of the mold, and closes that part of the slot before which it lies so that no metal can escape. The rear side of the slide has a notch which corresponds with the alignment notch in the matrices, and for this reason the slide, whatever its position, does not in any way affect the operation of the bars $E E$. The left end of the slide has a projecting pin which enters a slot in the lever O . This lever is pivoted to the plate b' and by the action of this lever the abutment is moved. The lever carries a latch o which engages a notched sector Q secured to the plate b' whereby the lever is held in any desired position. We have not shown a similar slide for engaging with the front end matrix of the line, for the purpose of effecting the indentation of the printing line at the beginning of a paragraph; but obviously such a slide and its operating mechanism might be a mere duplication of that shown, both in construction and mode of operation.

Having thus described our invention, we claim—

1. As a means for justifying a line of independent matrices for presentation to the mold, a holder for said matrices having two shoulders against which the end matrices of a jus-

tified line impinge, two movable fingers adapted to lie between two matrices in the line, mechanism for forcibly separating said fingers thereby forcing the matrices from the point of insertion of said fingers in opposite directions toward and against said shoulders, and an expansible mold plug which is secured to said fingers and is adapted to enter the mold and close it in front of the space created by said fingers, substantially as and for the purpose specified.

2. As the means for justifying a line of independent matrices for presentation to the mold, a holder for said matrices having two shoulders against which the end matrices of a justified line impinge, two movable fingers adapted to lie between any two matrices in the line, mechanism for forcibly separating said fingers and thereby moving the matrices in opposite directions from said fingers toward and against said shoulders, and two narrow flexible plates secured to and projecting forward from said fingers, secured together at their forward ends and adapted to enter and close the mold in front of the space in the matrix line created by said fingers, substantially as and for the purpose specified.

3. In a machine for casting linotypes, in combination, a mold, a head adapted to hold a line of independent matrices for presentation to the mold, and having two shoulders against which the end matrices of the justified line impinge, two transversely movable justifying bars adapted to enter and engage with alignment notches in the rear edge of the matrices, two fingers secured to and projecting forward from said bars, an expansible mold plug adapted to close the mold in front of the space created by said fingers, and mechanism for moving the justifying bars apart, substantially as and for the purpose specified.

4. In a machine for casting linotypes, in combination, a mold, a head adapted to hold a line of independent matrices for presentation to said mold and having two shoulders against which the end matrices of a justified line impinge, a longitudinally movable slide C having a groove in its front face, two justifying bars mounted in said groove, two spacing fingers secured to and projecting forward from the ends of said bars, two flexible plates secured to and projecting forward from said fingers, and secured together at their forward ends, a transversely movable slide D mounted in said head and a system of levers mounted on said slide for operating the justifying bars, substantially as and for the purpose specified.

5. In a machine for casting linotypes, in combination, a mold, a head adapted to hold a line of independent matrices for presentation to the mold, and having two shoulders against which the end matrices of the justified line impinge, a slide mounted in said head having a groove in its front face, two justifying bars mounted in said groove, two fingers

secured respectively to and projecting forward from the proximate ends of said bars, two flexible plates secured to and projecting forward from said fingers and secured to each other at their forward ends, which plates are adapted to enter and close the mold in front of the space in the matrix line created by said fingers, and mechanism for moving said bars apart, substantially as and for the purpose specified.

6. In a machine for casting linotypes, in combination, a mold, a head adapted to hold a line of independent matrices for presentation to the mold, and having two shoulders against which the end matrices of a justified line impinge, and having also a groove in its face, two movable justifying bars which are guided in said groove, two fingers attached respectively to the proximate ends of said bars and extending forward therefrom, two flexible plates, secured to and extending for-

ward from said fingers and secured together at their front ends, adapted to enter and close the mold in front of the space created by said fingers, and means for actuating said bars, substantially as and for the purpose specified.

7. In a machine for making linotypes, in combination, a mold, a head adapted to hold independent matrices for presentation to the mold, a slide mounted on said head having its front face in the plane of the front face of the matrices, a lever mounted on said head and engaging with said slide, and a latch for said lever, substantially as set forth.

In testimony whereof we affix our signatures in presence of two witnesses.

CHARLES FORTH.
HENRY GLENZER.

Witnesses:

E. L. THURSTON,
FRANK MILLER.