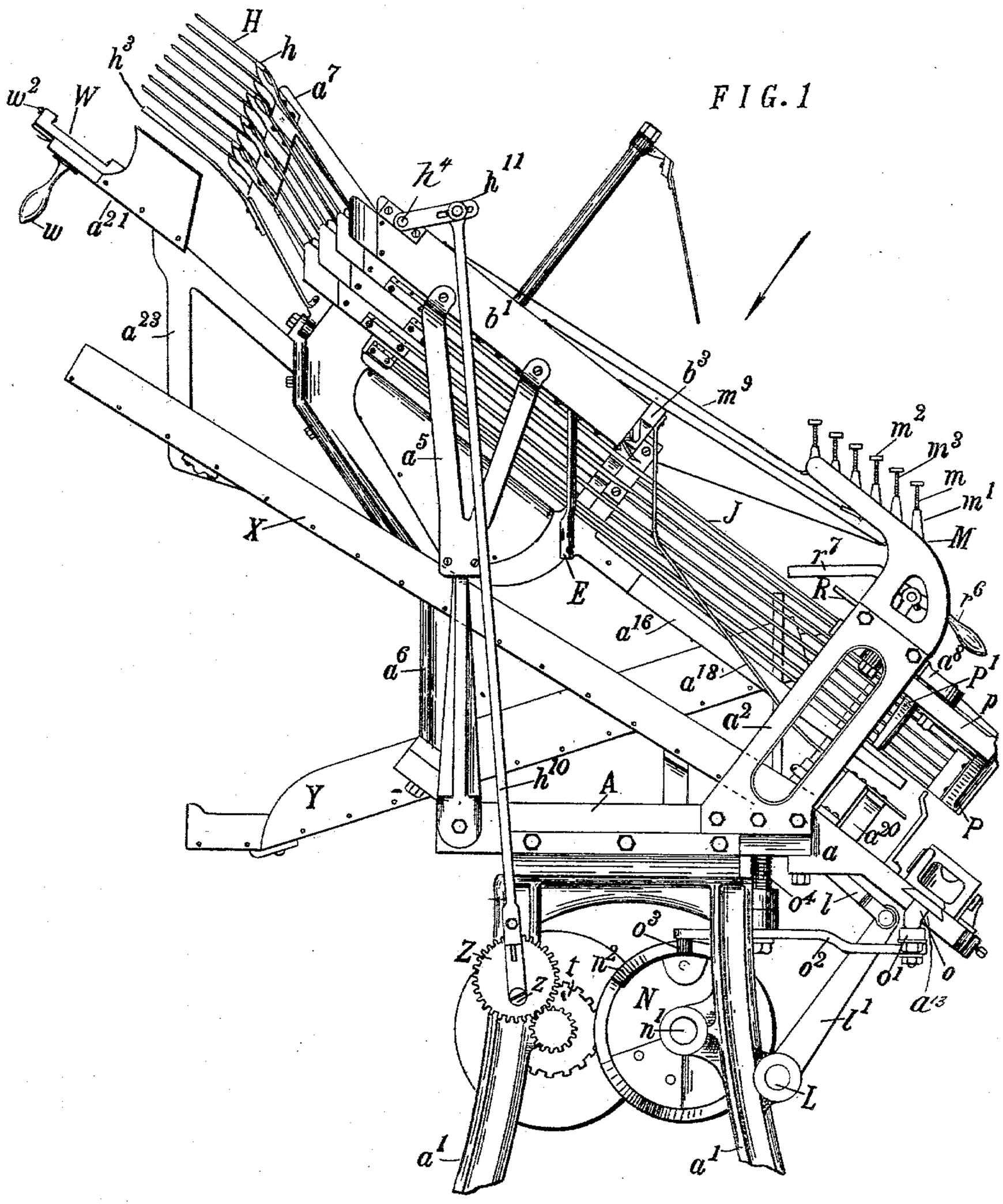
(No Model.) 15 Sheets—Sheet 1.

C. FORTH.

MATRIX ASSEMBLING AND DISTRIBUTING MACHINE.

No. 562,816. Patented June 30, 1896.

FIG. 1



WITNESSES.

E. Griswold.

A. M. Wood.

INVENTOR.

Charles Forth

By Wing & Thurston

his attorneys

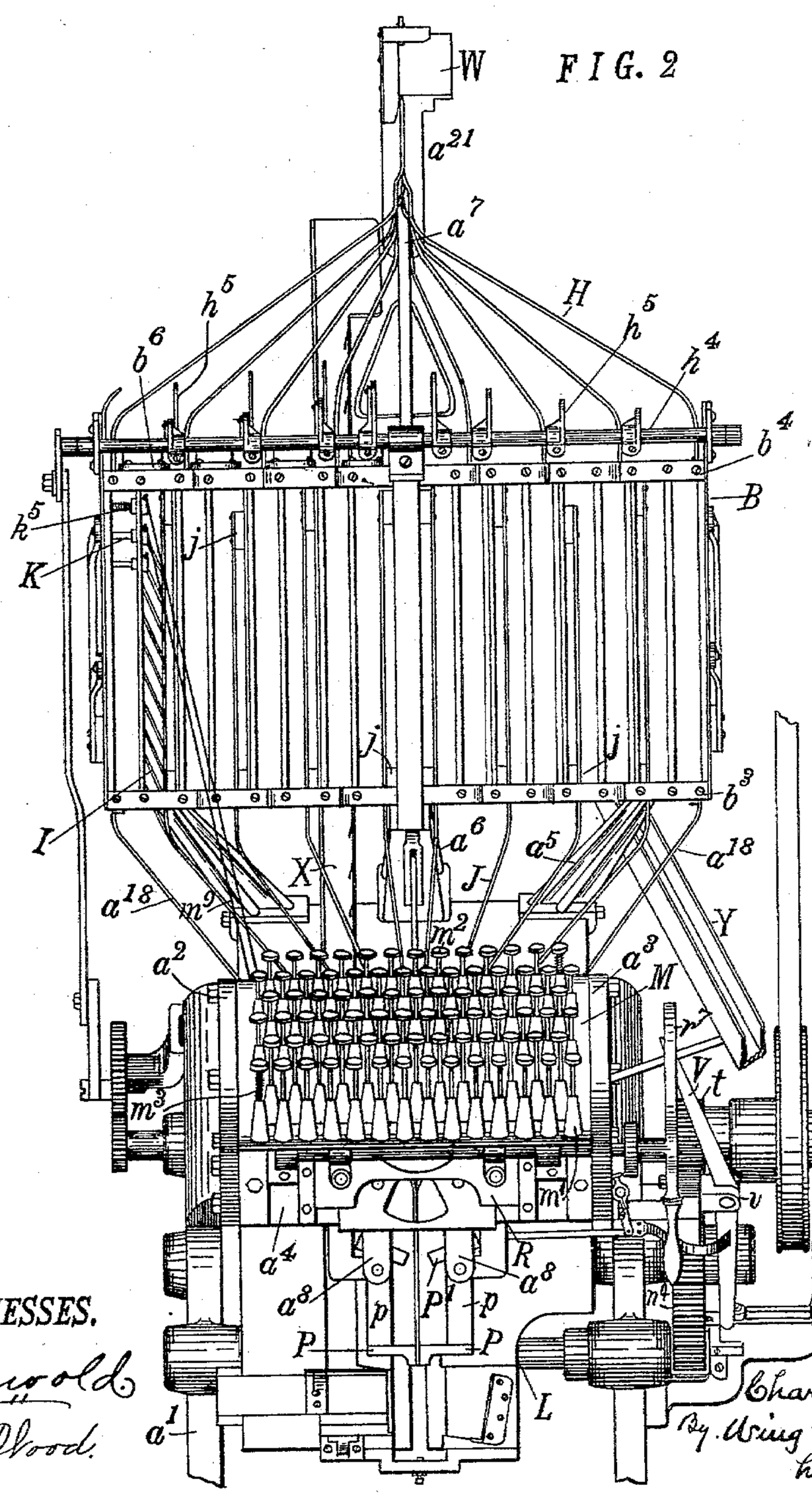
(No Model.) 15 Sheets—Sheet 2.

C. FORTH.

MATRIX ASSEMBLING AND DISTRIBUTING MACHINE.

No. 562,816. Patented June 30, 1896.

FIG. 2



WITNESSES.

H. Griswold

H. M. Wood.

Inventor:

Charles Forth

By Wing & Thurston

his attorneys.

(No Model.) 15 Sheets—Sheet 3.

C. FORTH.

MATRIX ASSEMBLING AND DISTRIBUTING MACHINE.

No. 562,816. Patented June 30, 1896.

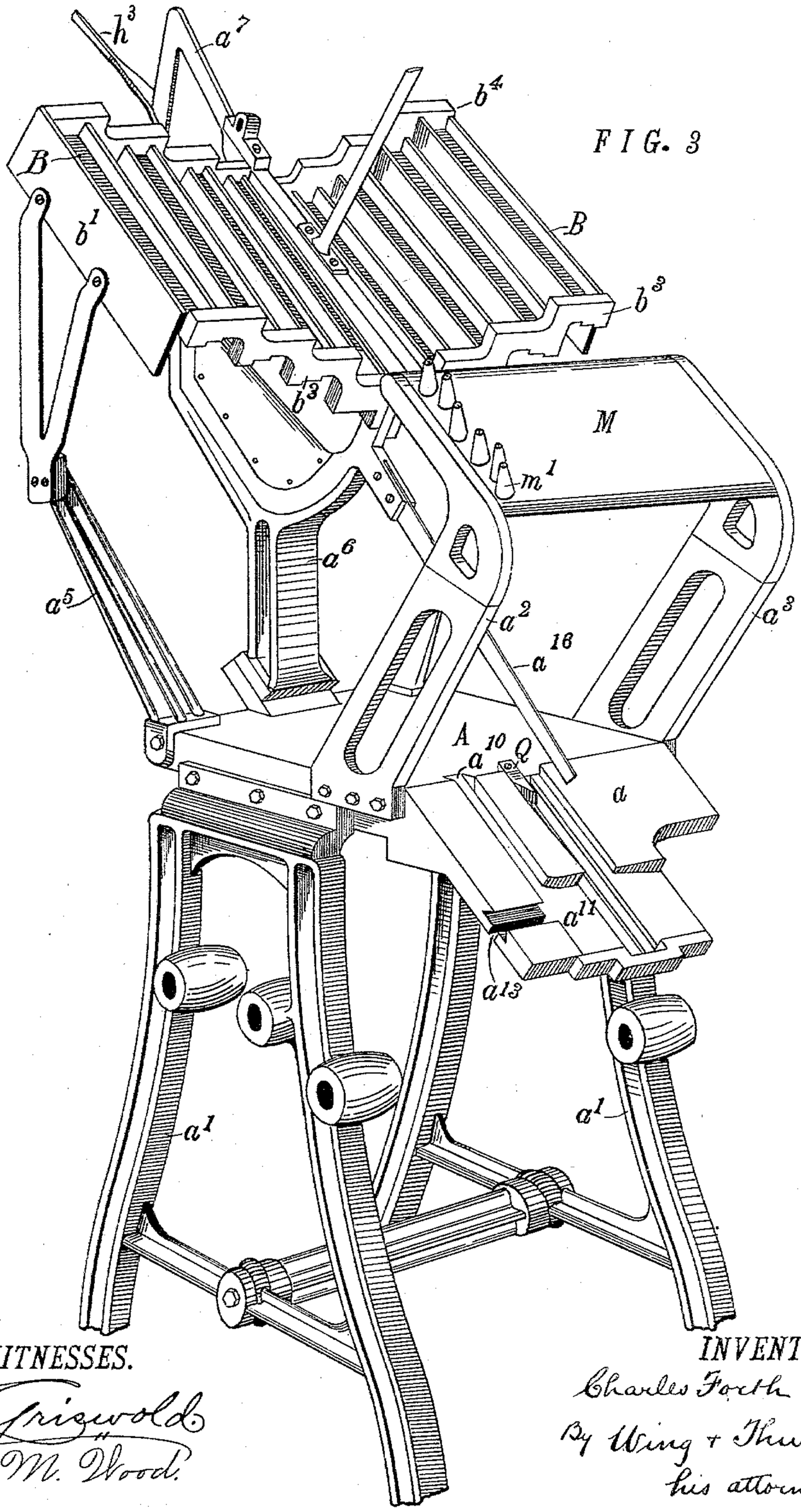


FIG. 3

WITNESSES.

H. Griswold.

H. M. Wood.

INVENTOR.

Charles Forth

By Wing & Thurston

his attorneys

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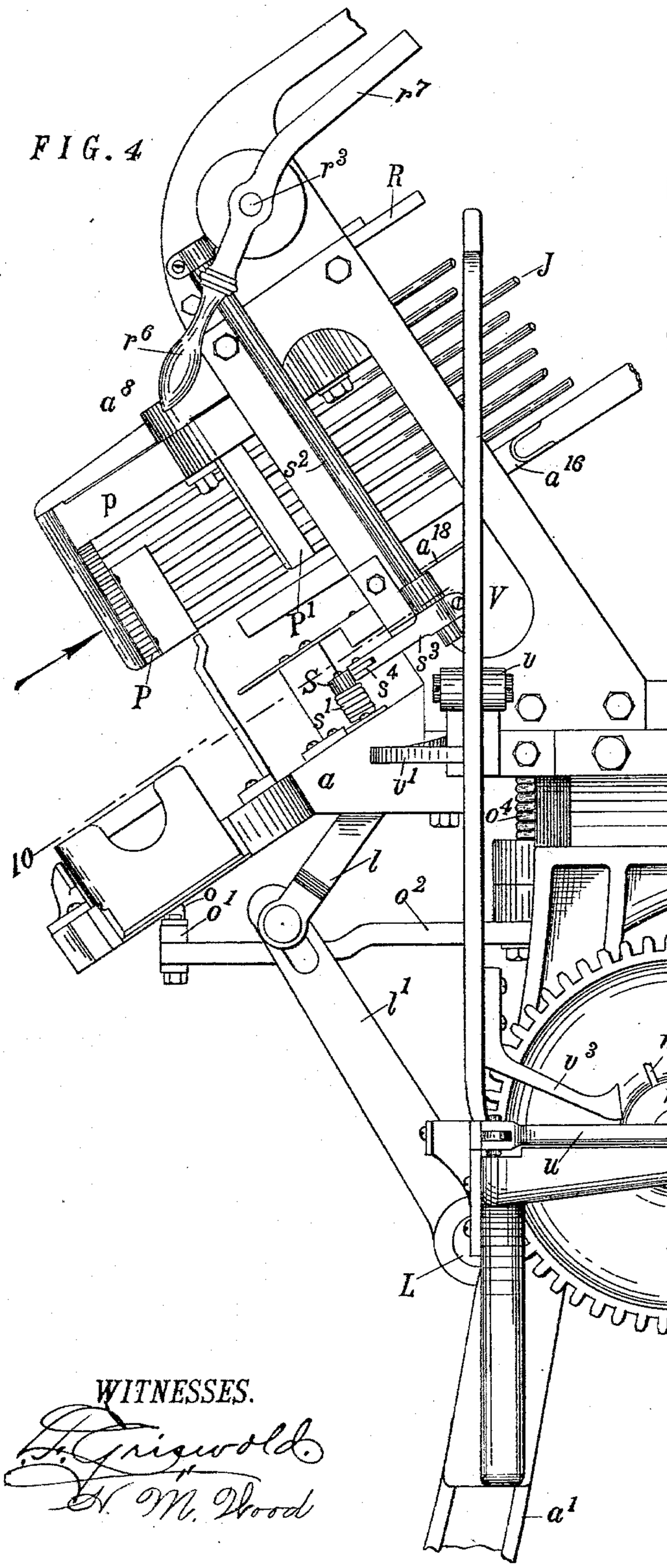
C. FORTH.

MATRIX ASSEMBLING AND DISTRIBUTING MACHINE.

No. 562,816. Patented June 30, 1896.

FIG. 4



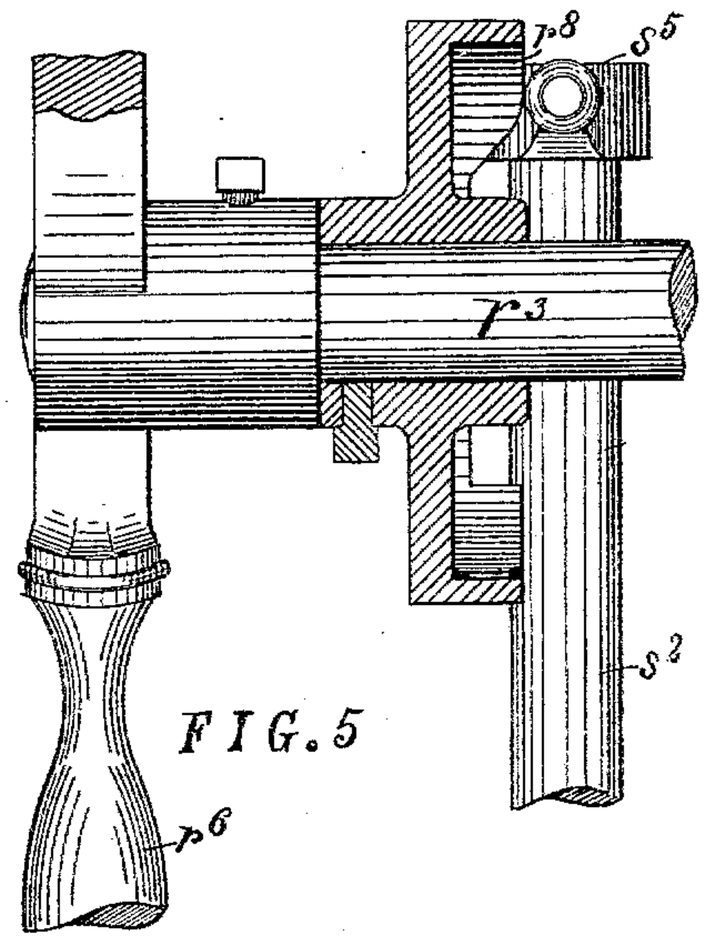


FIG. 5

WITNESSES.

L. Griswold.

H. M. Wood

INVENTOR.

Charles Forth

By Ubing & Thurston

his attys

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C. FORTH.

MATRIX ASSEMBLING AND DISTRIBUTING MACHINE.

No. 562,816. Patented June 30, 1896.

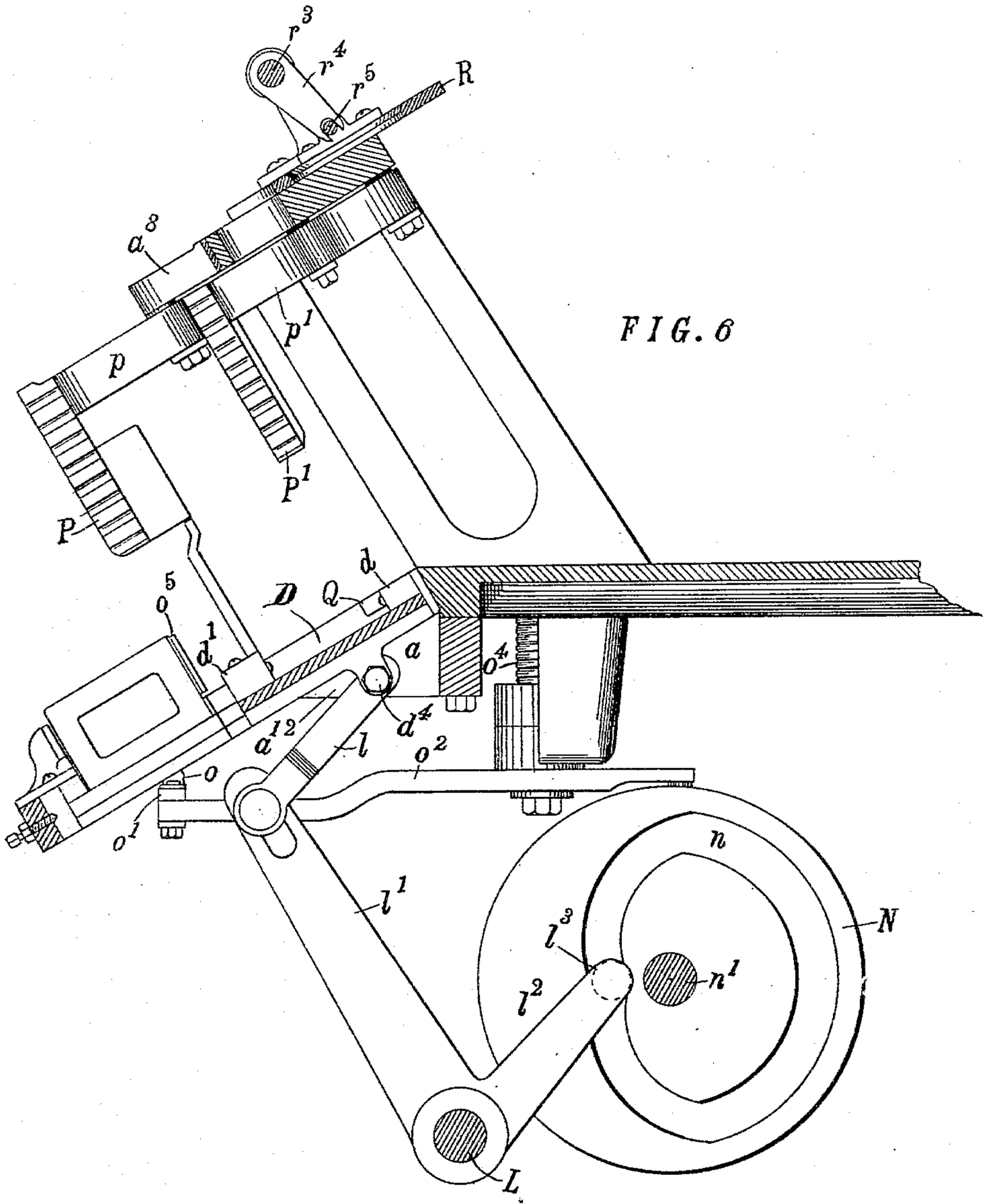


FIG. 6

WITNESSES.

H. Griswold

H. M. Wood.

INVENTOR.

Charles Forth

By Wing & Thurston

his attys

(No Model.) 15 Sheets—Sheet 6.

C. FORTH.

MATRIX ASSEMBLING AND DISTRIBUTING MACHINE.

No. 562,816. Patented June 30, 1896.

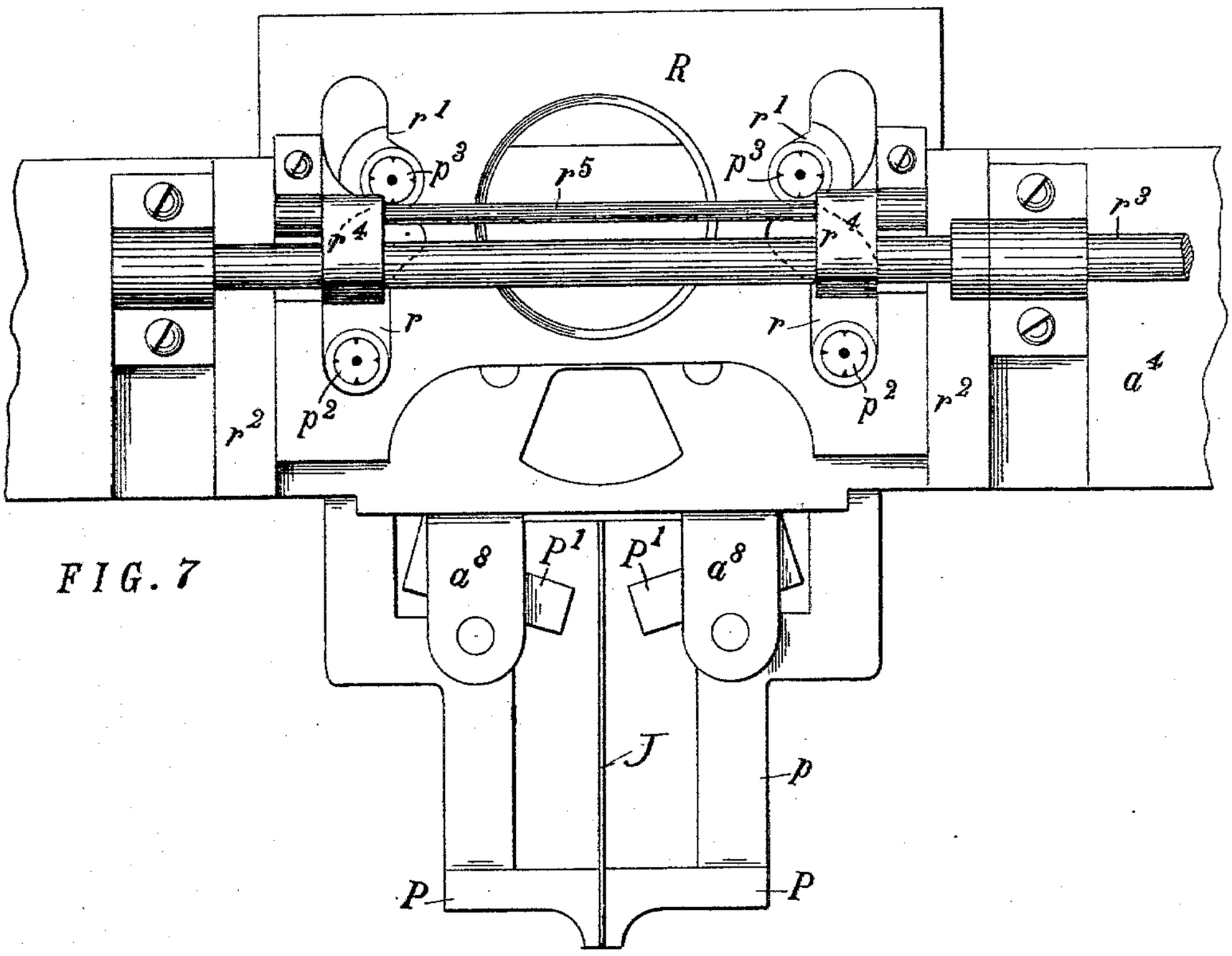
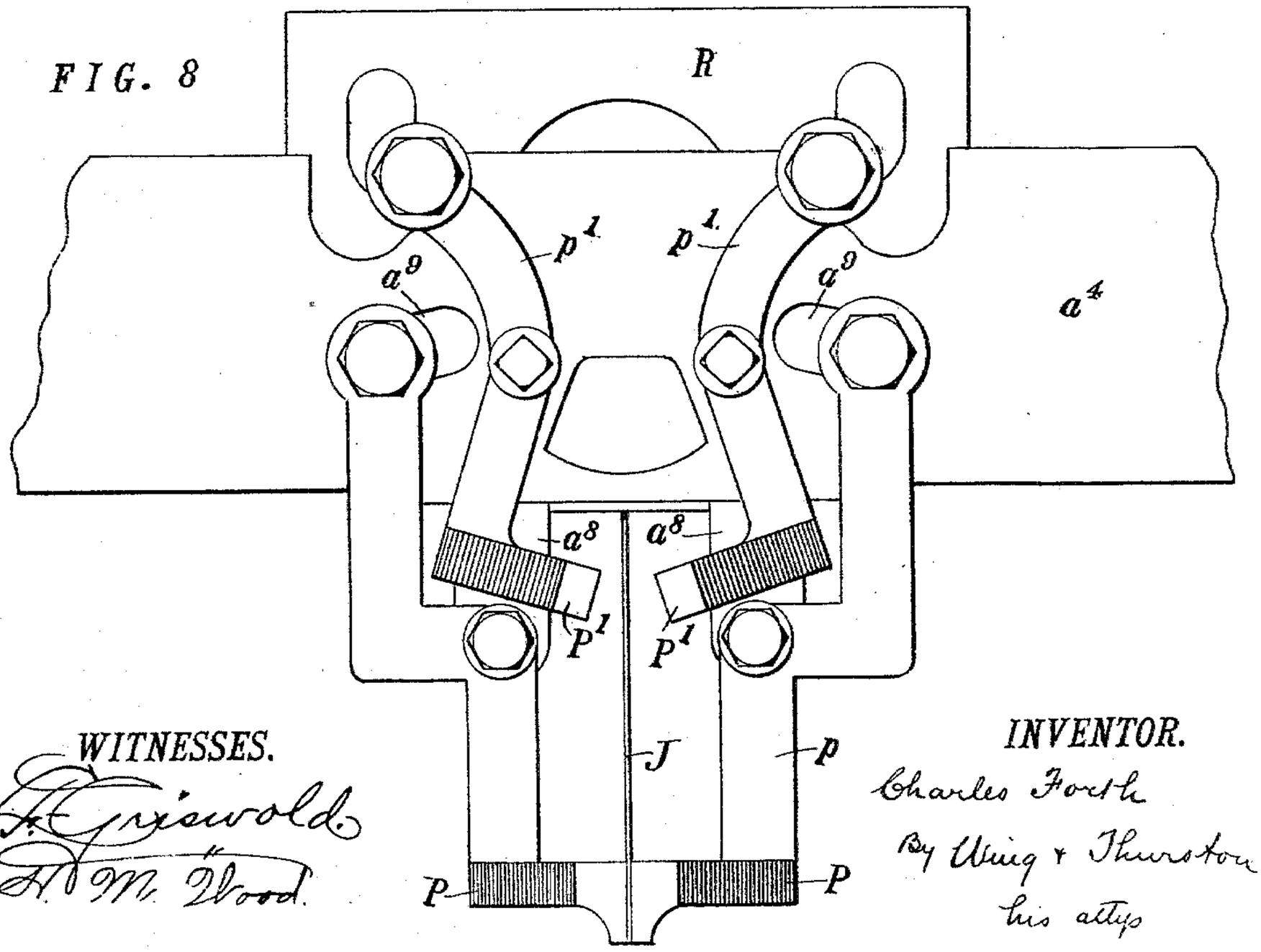


FIG. 7

FIG. 8



WITNESSES.

H. Griswold.

H. M. Wood.

INVENTOR.

Charles Forth

By Uhig & Thurston

his attys

(No Model.) 15 Sheets—Sheet 7.

C. FORTH.

MATRIX ASSEMBLING AND DISTRIBUTING MACHINE.

No. 562,816. Patented June 30, 1896.

FIG. 9

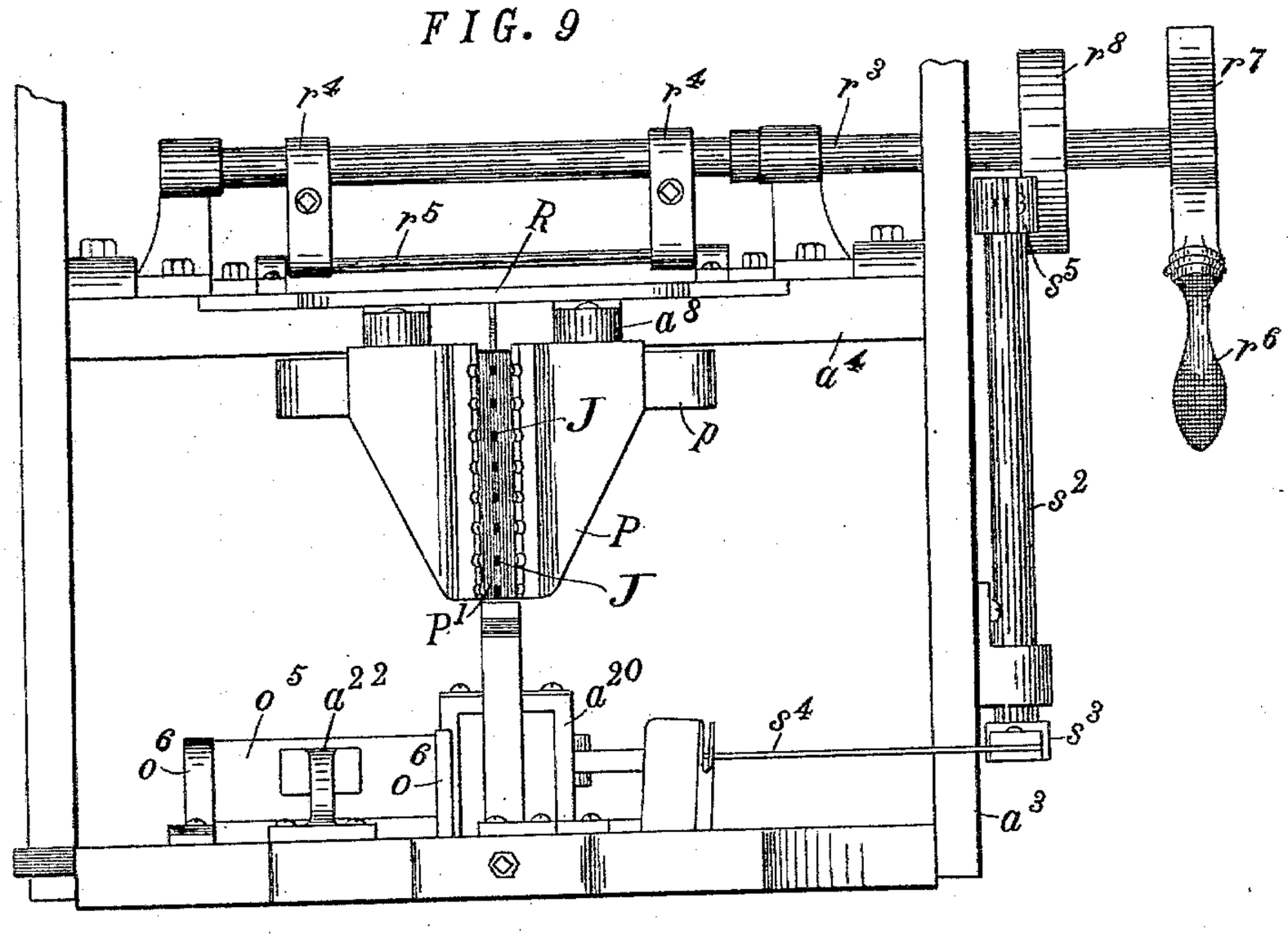
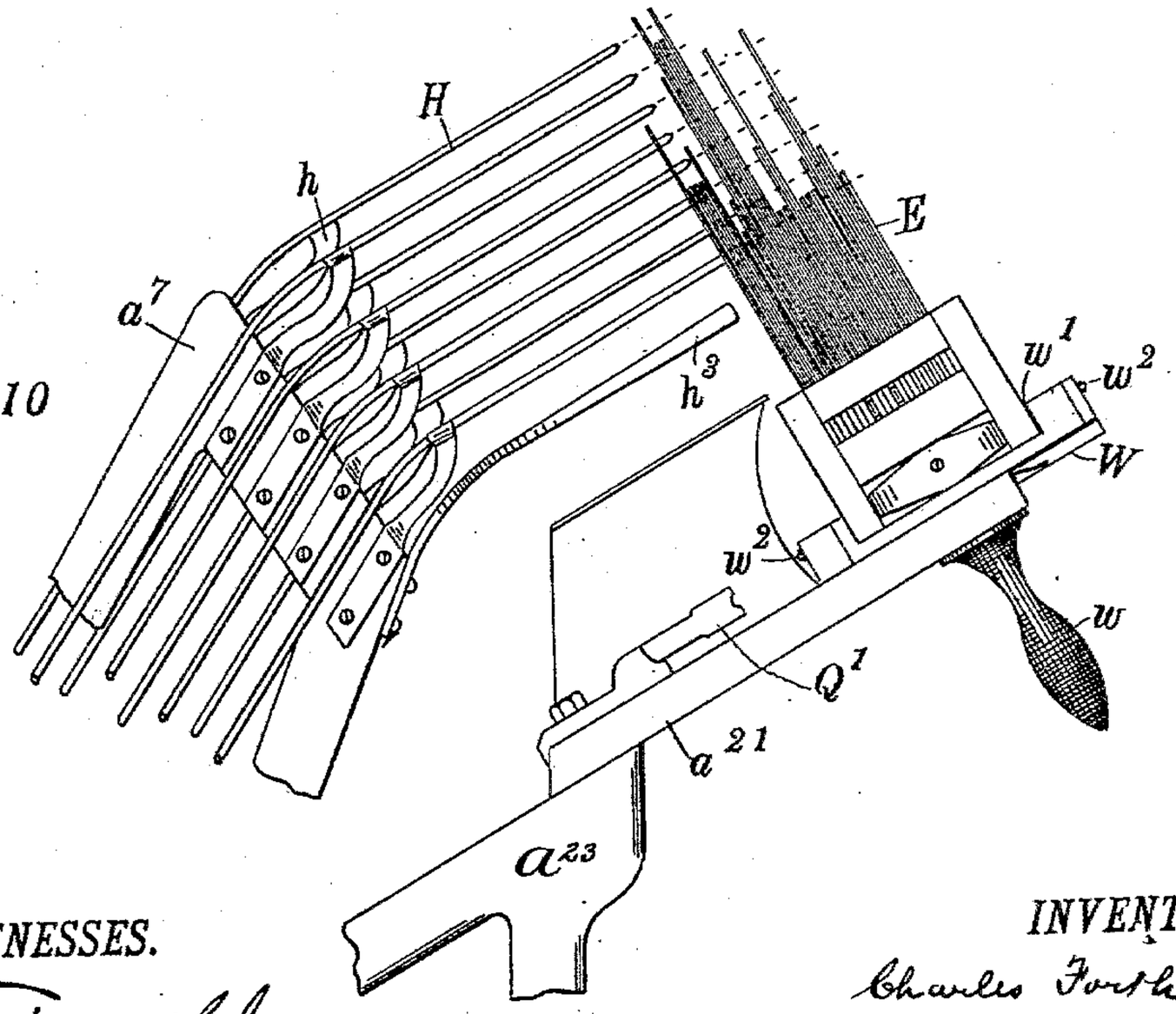


FIG. 10



WITNESSES.

H. Griswold

W. M. Wood.

INVENTOR.

Charles Forth

By Wing & Thurston

his attys.

(No Model.) 15 Sheets—Sheet 8.

C. FORTH.

MATRIX ASSEMBLING AND DISTRIBUTING MACHINE.

No. 562,816. Patented June 30, 1896.

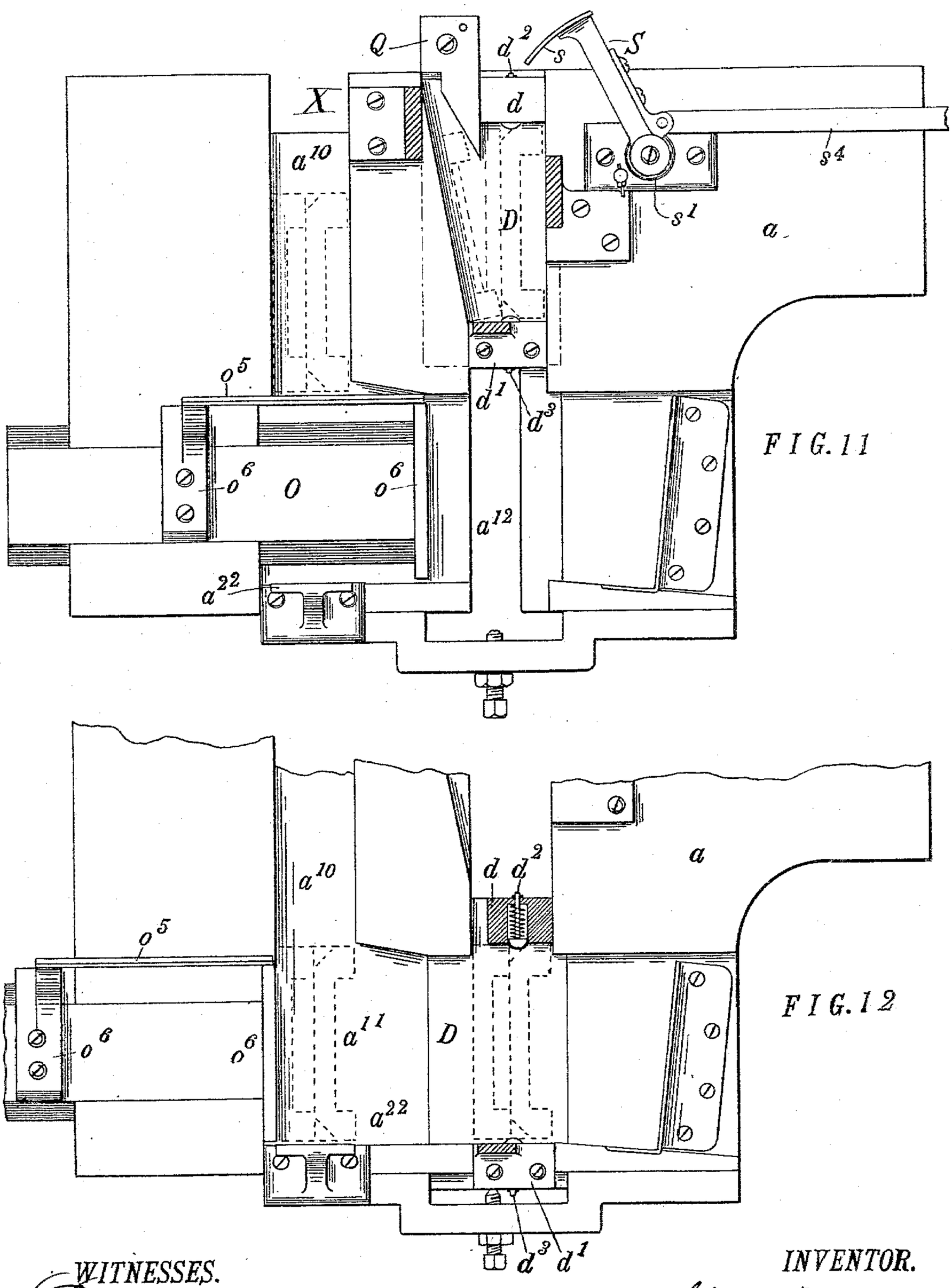


FIG. 11

FIG. 12

WITNESSES.

L. Grinwold.

H. M. Wood.

INVENTOR.

Charles Forth

By Wing & Thurston

his attys

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C. FORTH.

MATRIX ASSEMBLING AND DISTRIBUTING MACHINE.

No. 562,816. Patented June 30, 1896.

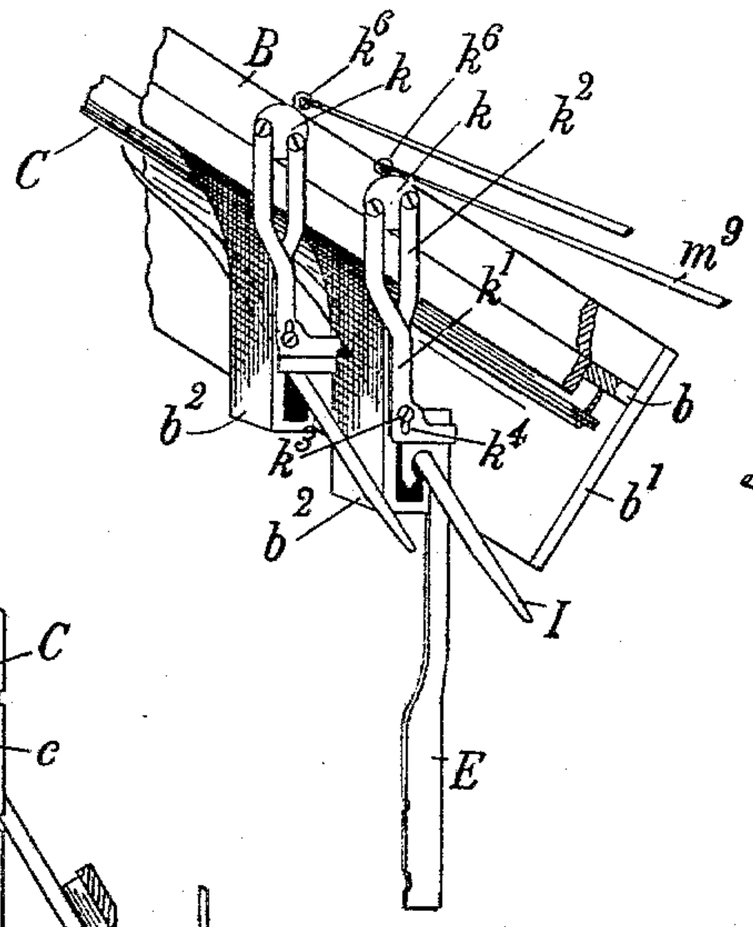
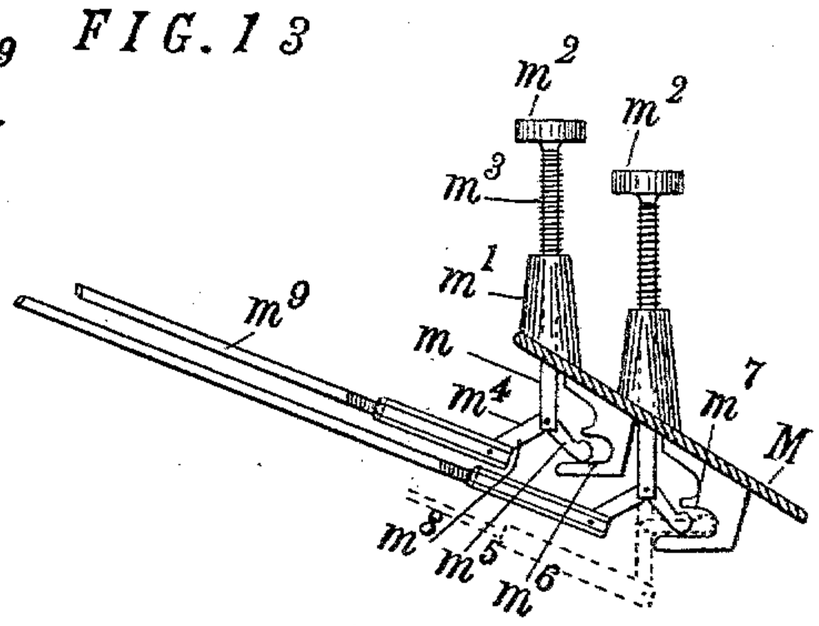


FIG. 13



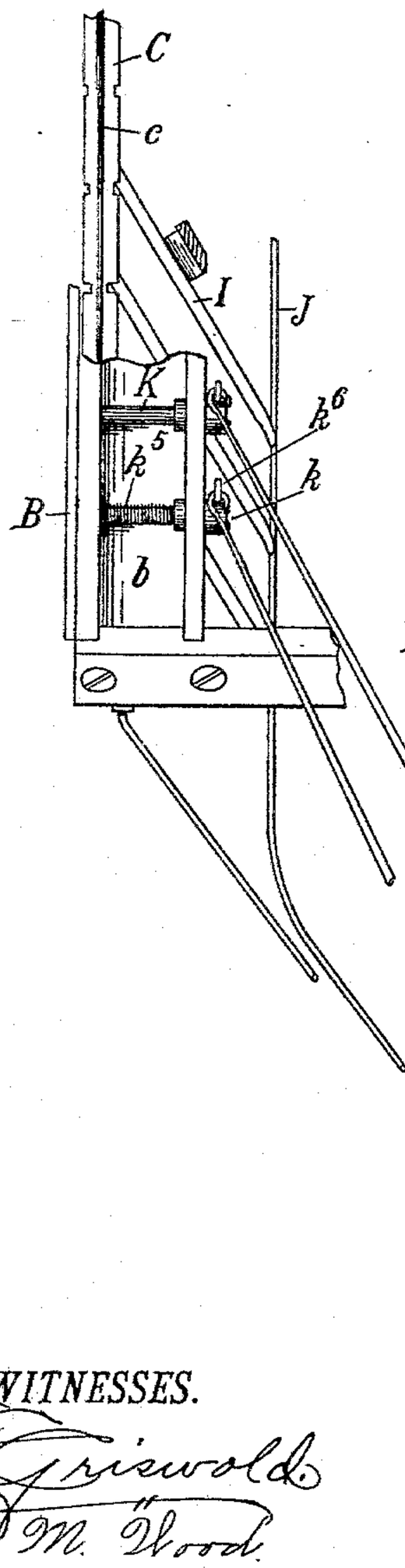


FIG. 14

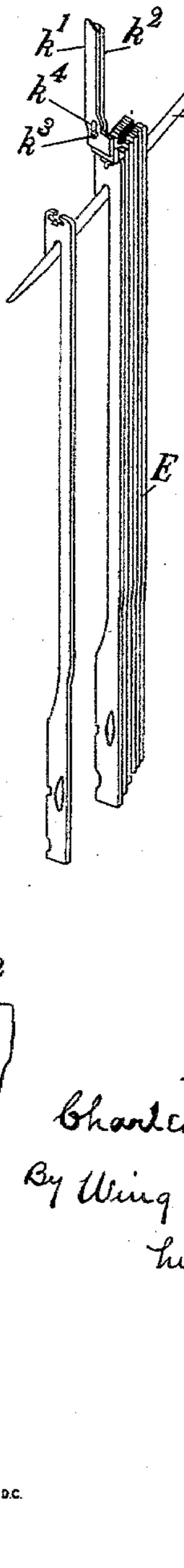
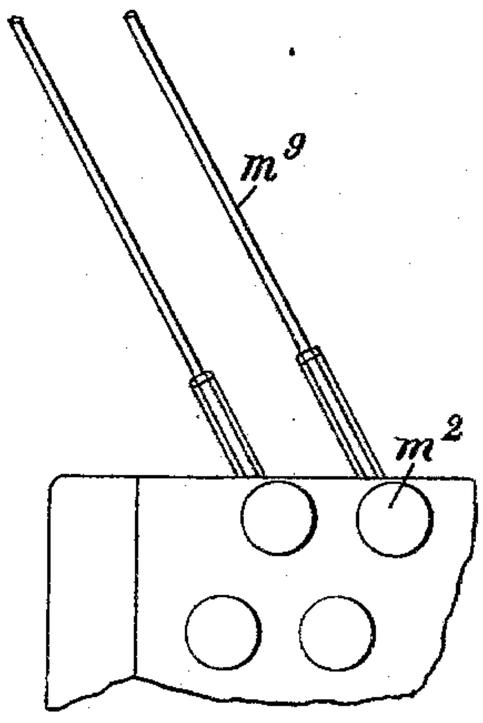


FIG. 15



WITNESSES.

F. Griswold.

N. W. Wood.

INVENTOR.

Charles Forth

By Wing & Thurston

his attys.

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C. FORTH.

MATRIX ASSEMBLING AND DISTRIBUTING MACHINE.

No. 562,816. Patented June 30, 1896.

FIG. 16

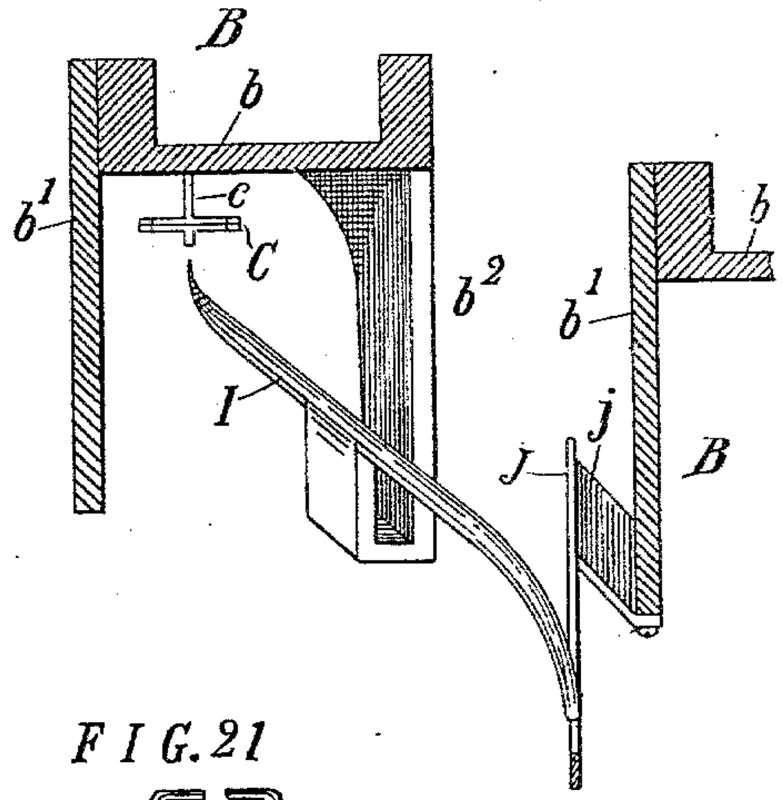


FIG. 17

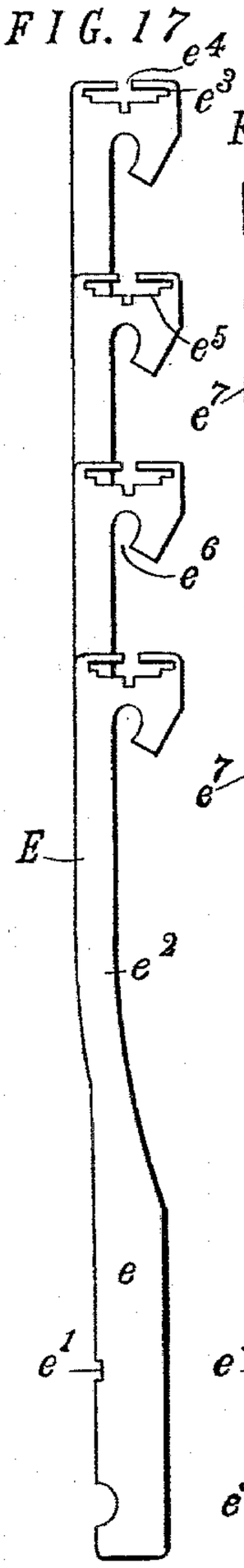


FIG. 18

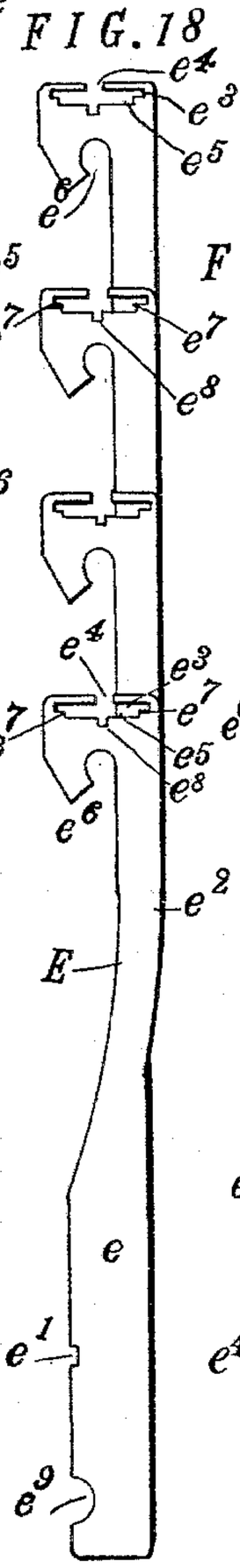


FIG. 19

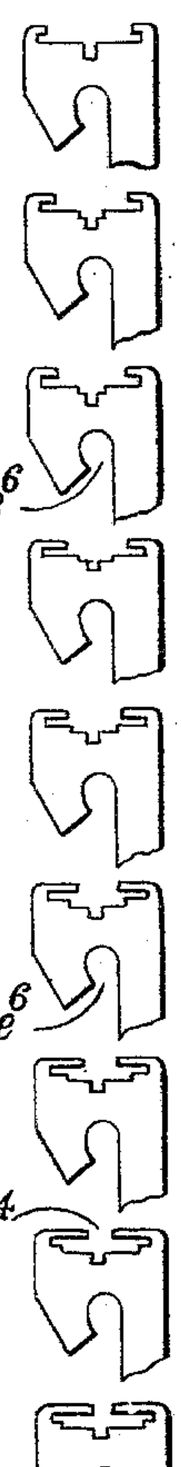


FIG. 21

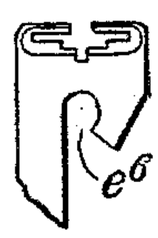


FIG. 20

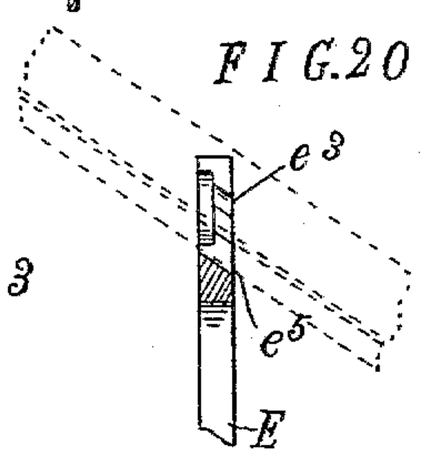


FIG. 22

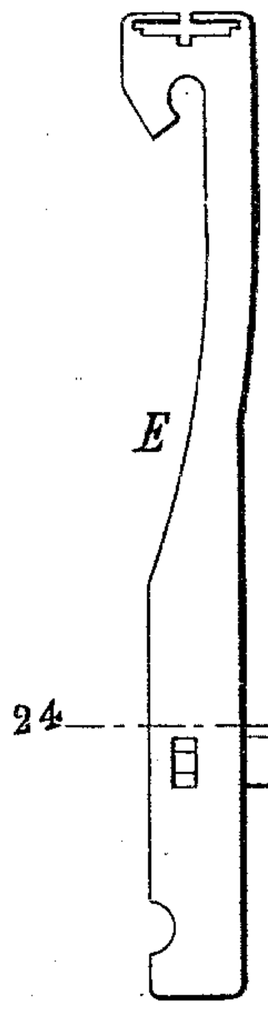


FIG. 23

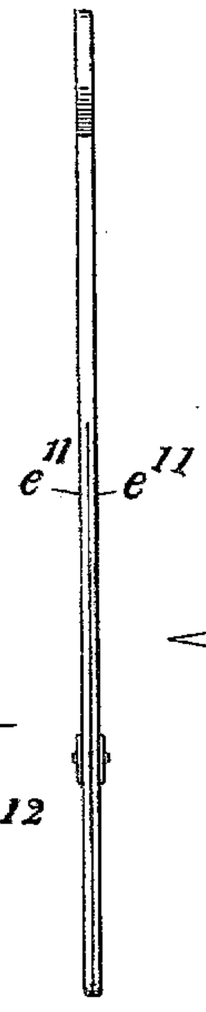


FIG. 24

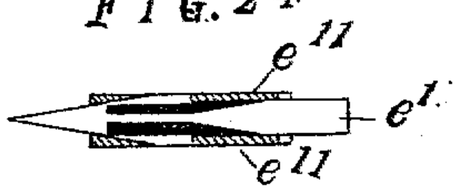
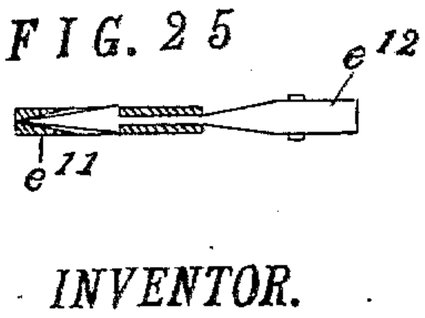


FIG. 25



WITNESSES.

H. Griswold

H. M. Wood.

INVENTOR.

Charles Forth

By Wing & Thurston

his attys

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C. FORTH.

MATRIX ASSEMBLING AND DISTRIBUTING MACHINE.

No. 562,816. Patented June 30, 1896.

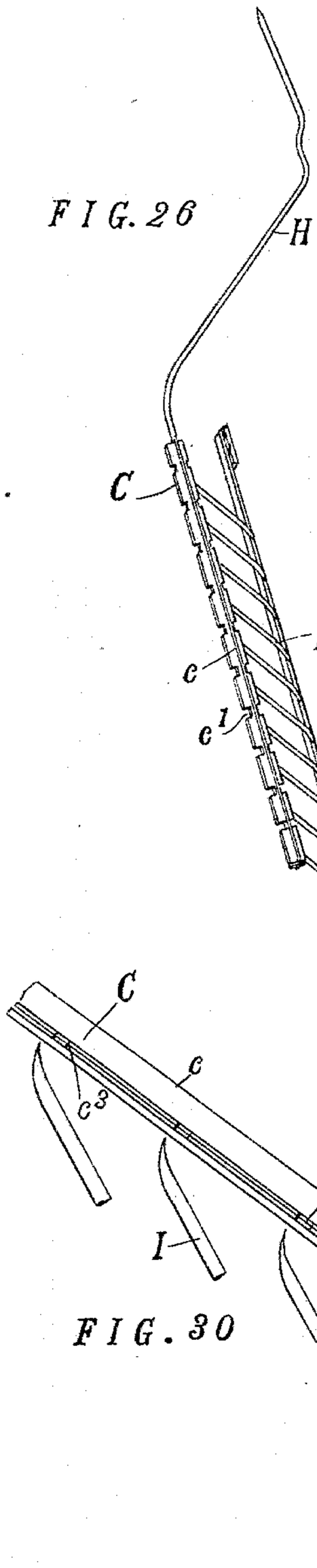


FIG. 26

FIG. 30

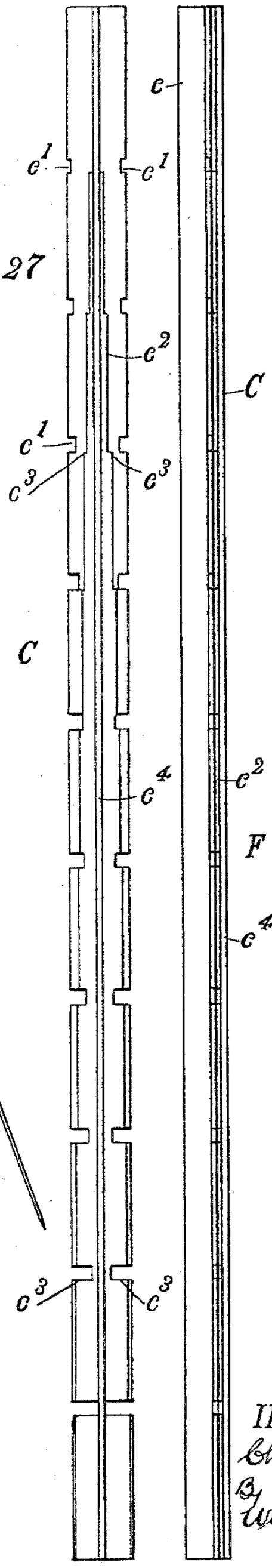


FIG. 27

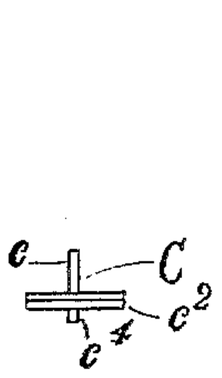


FIG. 29

FIG. 28

WITNESSES.

F. Griswold.

H. M. Wood.

INVENTOR.

Charles Forth

By Wing & Thurston

his attys.

(No Model.) 15 Sheets—Sheet 12.

C. FORTH.

MATRIX ASSEMBLING AND DISTRIBUTING MACHINE.

No. 562,816. Patented June 30, 1896.

FIG. 31

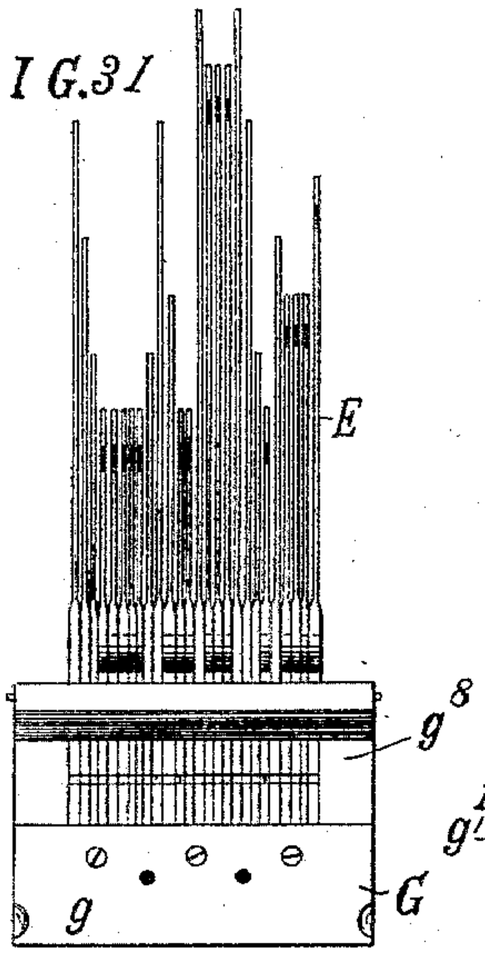


FIG. 32

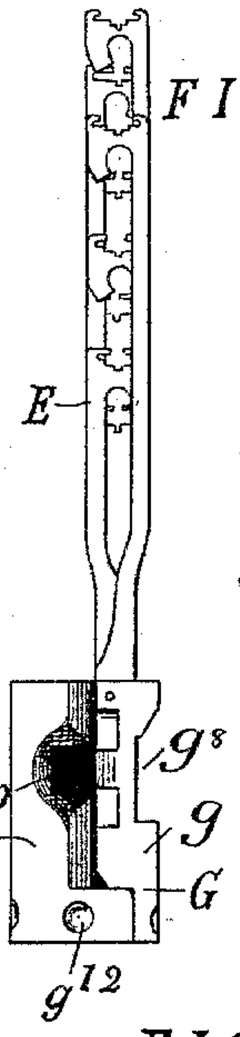


FIG. 33

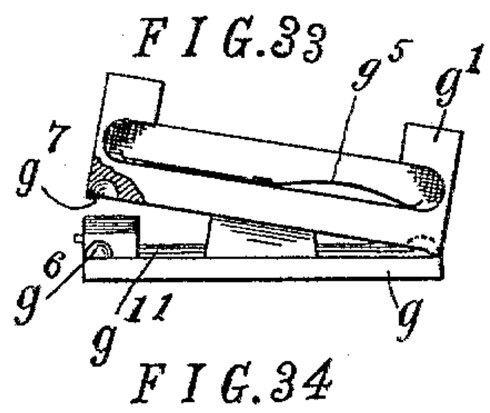


FIG. 34

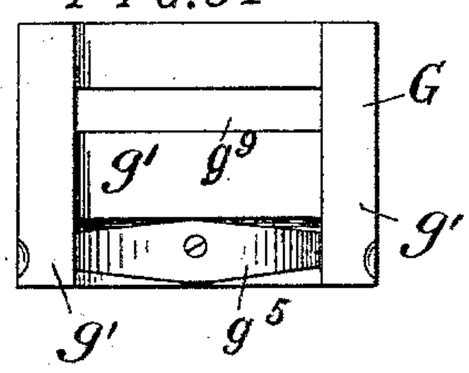


FIG. 35

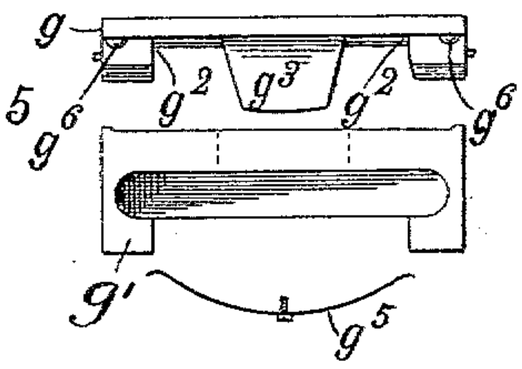


FIG. 36

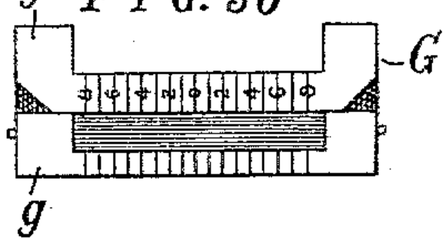


FIG. 37

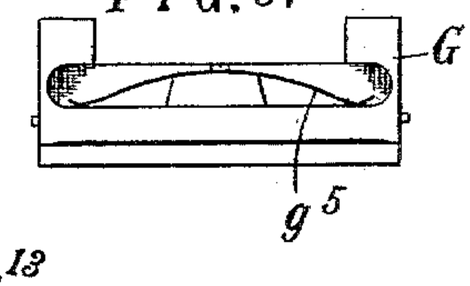


FIG. 38

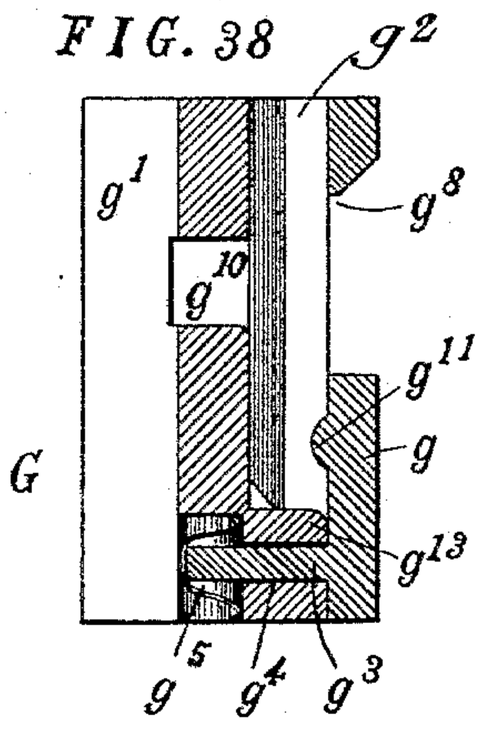
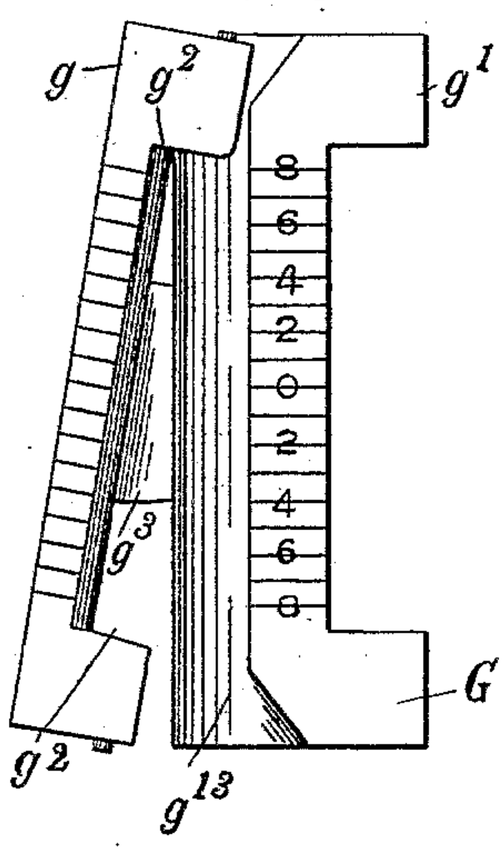


FIG. 39



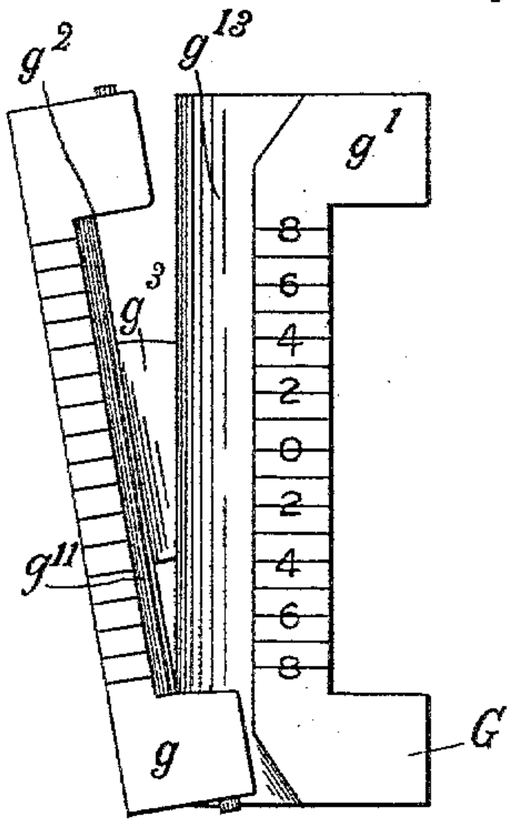


FIG. 40

WITNESSES.

H. Grieve old.

N. M. Wood.

INVENTOR.

Charles Forth

By Wing + Thurston

his attys

(No Model.) 15 Sheets—Sheet 13.

C. FORTH.

MATRIX ASSEMBLING AND DISTRIBUTING MACHINE.

No. 562,816. Patented June 30, 1896.

FIG. 41

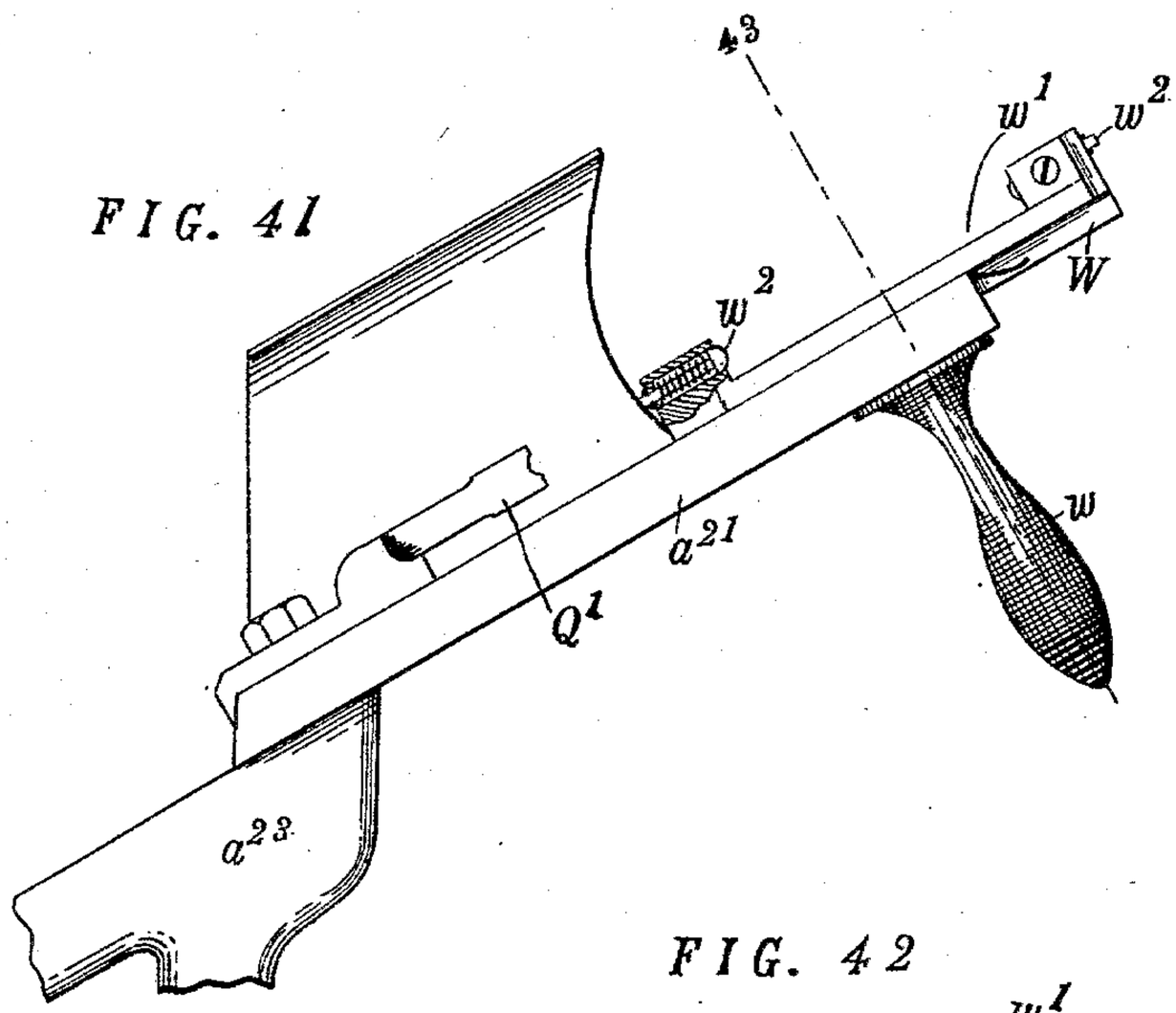


FIG. 43

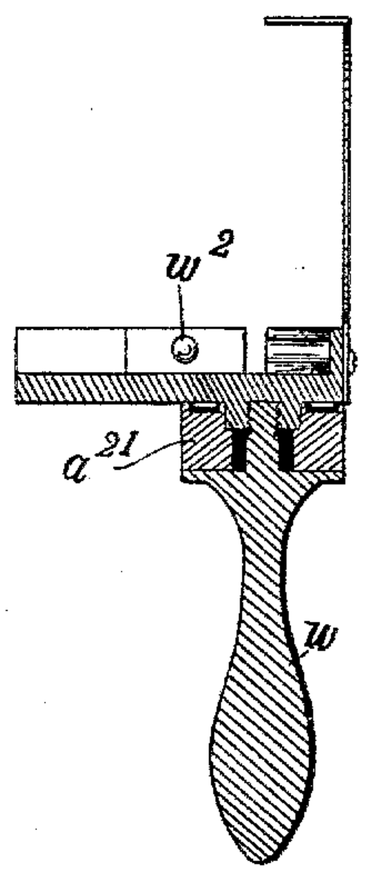


FIG. 42

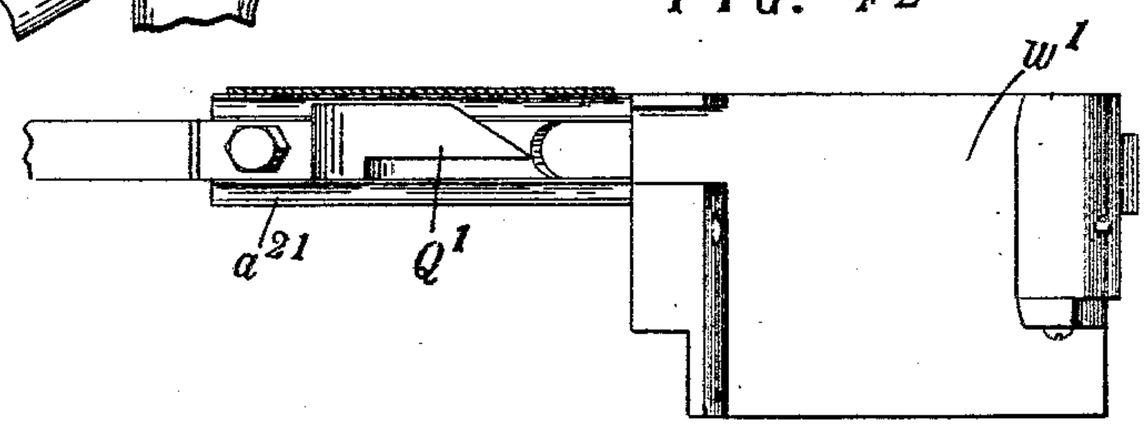


FIG. 44

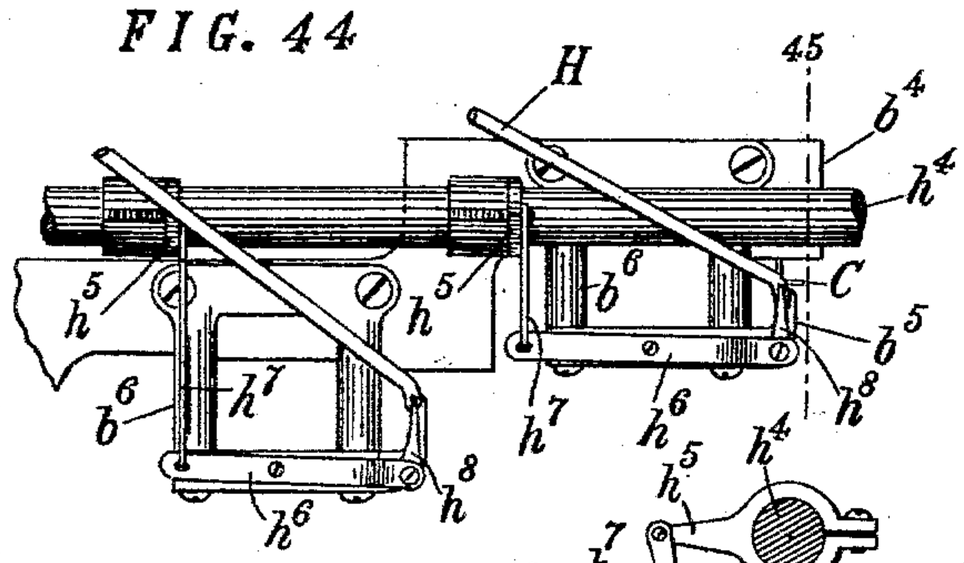
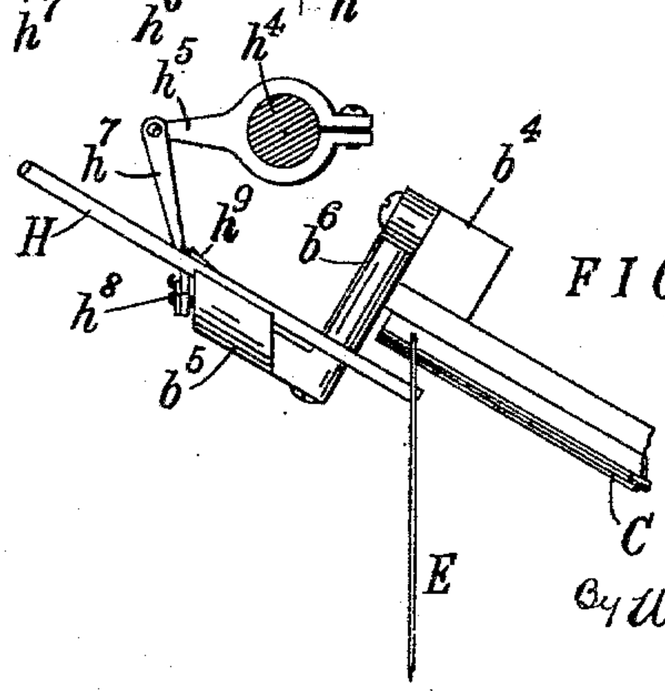


FIG. 45



WITNESSES.

H. Griewold.

H. M. Wood.

INVENTOR.

Charles Forth

By Wing & Thurston

his attys.

(No Model.) 15 Sheets—Sheet 14.

C. FORTH.

MATRIX ASSEMBLING AND DISTRIBUTING MACHINE.

No. 562,816. Patented June 30, 1896.

FIG. 46

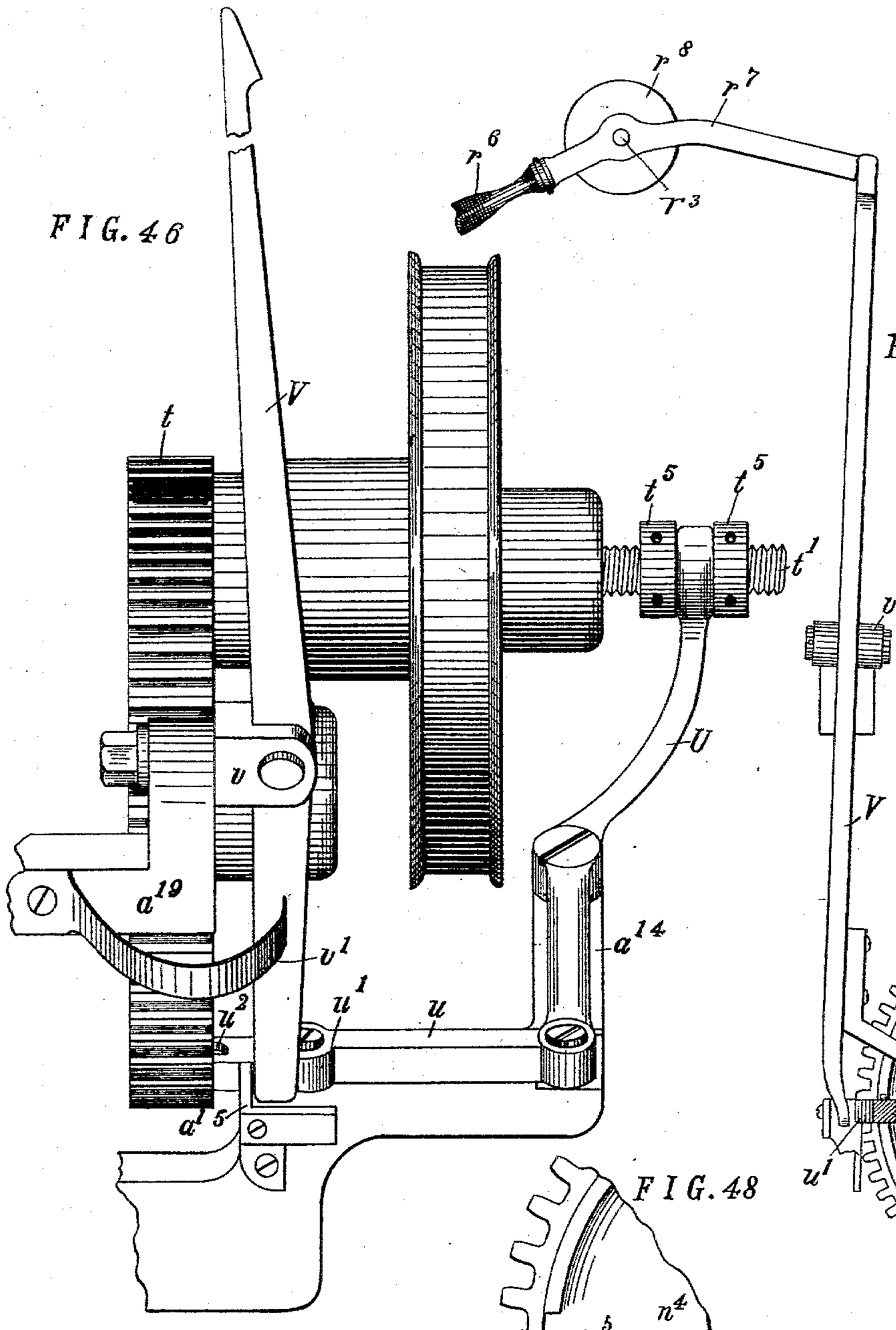
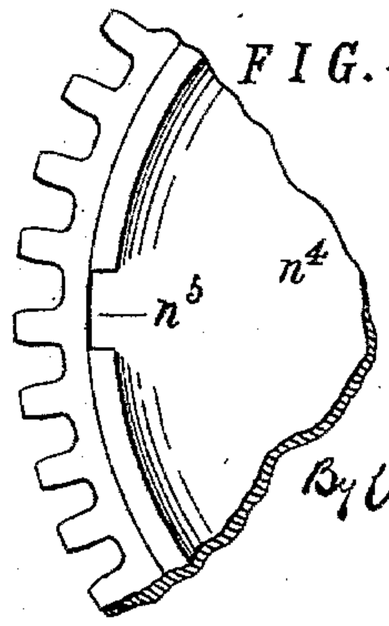


FIG. 47

FIG. 48



WITNESSES.

E. Grieswold.

A. N. Wood.

INVENTOR.

Charles Forth

By Wing & Thurston

his attys

(No Model.) 15 Sheets—Sheet 15.

C. FORTH.

MATRIX ASSEMBLING AND DISTRIBUTING MACHINE.

No. 562,816. Patented June 30, 1896.

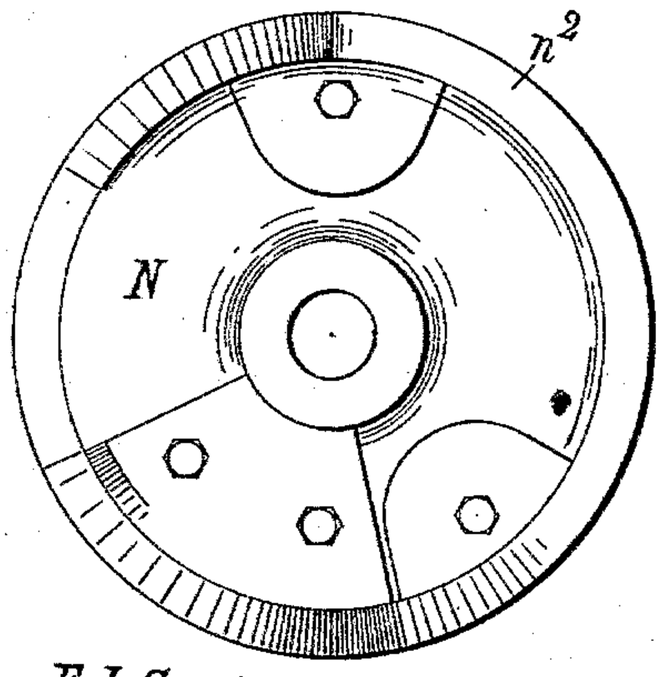


FIG. 49

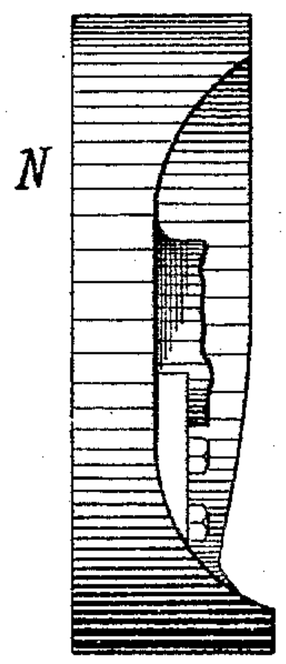


FIG. 50

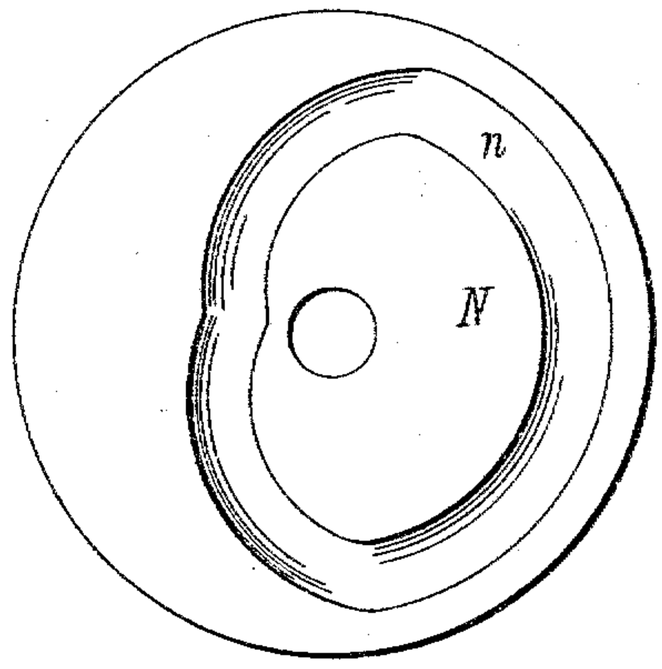


FIG. 51

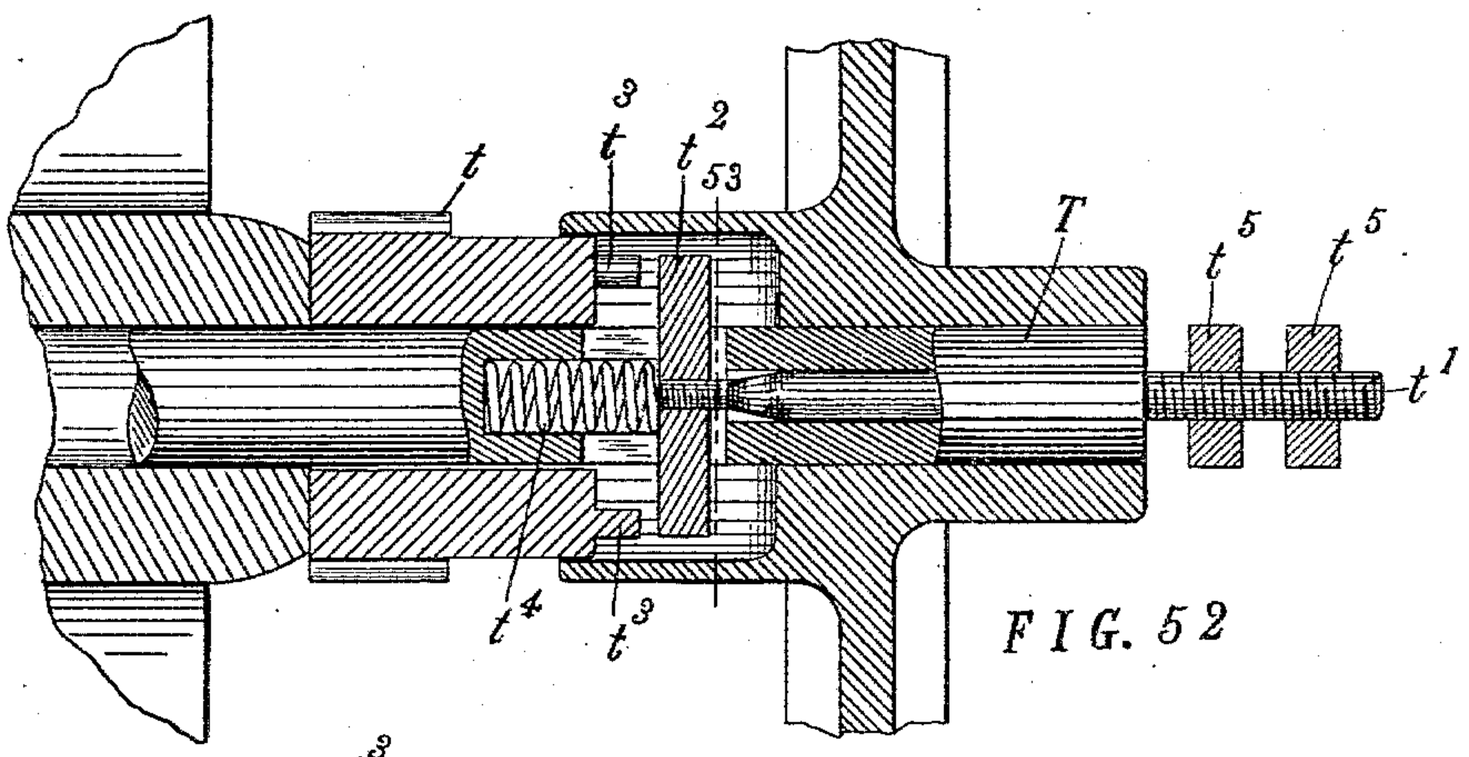


FIG. 52

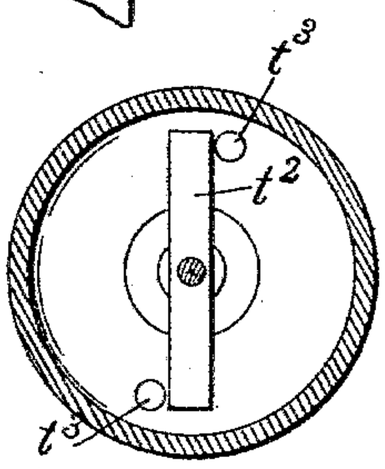
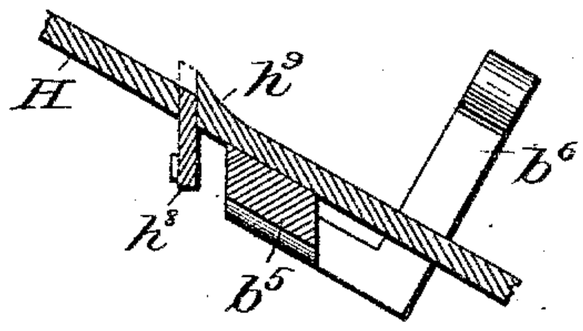


FIG. 53

Fig. 54.



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UNITED STATES PATENT OFFICE.

CHARLES FORTH, OF CLEVELAND, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE FORTH GRAPHOTYPE COMPANY, OF SAME PLACE.

MATRIX ASSEMBLING AND DISTRIBUTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 562,816, dated June 30, 1896.

Application filed January 15, 1894. Serial No. 496,972. (No model.)

To all whom it may concern:

Be it known that I, CHARLES FORTH, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Matrix Assembling and Distributing Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to machines for assembling and distributing matrices; and the machine shown in the drawings and hereinafter described, in which my invention is embodied, is a development of and an improvement upon the machine shown and described in my prior application for a patent, dated September 23, 1892, and serially numbered 446,681.

The improvements constituting the invention relate to the keyboard mechanism; to the detent mechanism whereby the matrices are held on their magazine-rods and released therefrom one by one; to the mechanism for supporting the front ends of the assembling rails during both the assembling and removal of the matrices; to the "stick" in which the matrices are assembled and held when removed from the machine; to the mechanism for automatically removing a full stick and substituting an empty one; to the mechanism for automatically opening the stick and holding it open for the reception of the matrices as they are assembled; to the mechanism for introducing the matrices into the machine at the rear end thereof, and for automatically releasing them from the stick; to the means for supporting the pick-up rods; to the construction of the distributing-rail; to the construction of the matrices whereby they are adapted to engage with and to be automatically distributed from said rail; to the mechanism for compelling the matrices to proceed singly to and down to the distributing-rail; to the construction and relative arrangement of the pick-up rods, distributing-rails, and magazine-rods; and to other parts of the machine, particularly to what I may term the "driving mechanism," all of which have for their ultimate object to make the operation of the machine more certain, rapid, and practical.

In the drawings, Figure 1 is a side elevation of the machine from the left side, in which are shown only four of the wires which connect the key mechanism with the detent mechanism. Fig. 2 is a top view, looking in the direction of the arrow by the side of Fig. 1. In this figure are shown only one series of magazine-rods, only a part of the keys, only three detent mechanisms, and only two of the wires which connect the detent and key mechanisms. Fig. 3 is a perspective view of the frame of the machine. Fig. 4 is a side elevation of the front end of the machine, viewed from the right. Fig. 5 is a rear view, partly in section, of the right end of the rock-shaft r^3 and the vertical shaft s^2 and their connecting mechanism. Fig. 6 is a central vertical longitudinal sectional view of the front of the machine, the assembling-rails being left out. Fig. 7 is a top view in the direction of arrow on Fig. 1 of the front ends of the assembling-rails, the clamps for supporting them, and the mechanism for operating said clamps. Fig. 8 is a bottom view of the same parts. Fig. 9 is a front view of the same parts when viewed in the direction of the arrow in Fig. 4. Fig. 10 is a side view of the rear end of the machine, showing a line of matrices about to be introduced into the machine for distribution. Fig. 11 is a sectional view on line 10 of Fig. 4, looking down on the inclined front of the bed-plate and the parts supported thereby. Fig. 12 is a similiar view of the same parts, showing the movable pieces in different relative positions. Fig. 13 is a side view of the keyboard mechanism, a part of one of the guide-supports, and two of the detent mechanisms for holding and releasing the matrices. Fig. 14 is a plan view of the same parts. Fig. 15 is a side view of one magazine-rod, a bunch of matrices suspended therefrom, and the detent mechanism in position for releasing one matrix. Fig. 16 is a transverse sectional view of one of the guide-supports and of the plate b' of the next one toward the center and parts sustained thereby. Fig. 17 is a front view of the four lengths of matrices which hang on the left side of the machine. Fig. 18 is a front

view of the four lengths of matrices which hang on the right side of the machine. Fig. 19 is a front view of the upper ends of the ten varieties of matrices which belong to any one system. Fig. 20 is a vertical sectional view of the upper end of one matrix as it hangs on the distributing-rail. Fig. 21 is a view of the rear side of the upper end of one matrix. Fig. 22 is a side view of the spacer, for which special provision is made in the stick. Fig. 23 is a front edge view of the same. Fig. 24 is a section on line 24 of Fig. 22 when the two sides of that spacer are spread by the wedge. Fig. 25 is a similar view of the same parts when in their ordinary condition. Fig. 26 is a perspective view of one complete assembling and distributing system disconnected from the machine. Fig. 27 is a bottom view of the distributing-rail. Fig. 28 is a side view thereof. Fig. 29 is an end view. Fig. 30 is a side view of a part of said rail and the upper ends of several magazine-rods, showing their relative positions. Fig. 31 is a view of the left side of the stick with a line of matrices in its embrace. Fig. 32 is a view of the rear end thereof. Fig. 33 is a bottom view of the said stick when open at one end. Fig. 34 is a view of the right side of said stick. Fig. 35 is a bottom view of the two parts of the stick and the operating-spring separated from each other. Fig. 36 is a top view of the stick when closed. Fig. 37 is a bottom view thereof when closed. Fig. 38 is a transverse sectional view through the middle of the stick. Fig. 39 is a top view of the stick open at the front end, as it is when the matrices are being released from its grasp. Fig. 40 is a top view of the stick when open at its rear end, as it is when the matrices are being assembled. Fig. 41 is a side view of the rear slide, which receives the stick, viewed from the right side. Fig. 42 is a plan view thereof. Fig. 43 is a sectional view on line 43 of Fig. 41. Fig. 44 is a rear view of yoke connecting the rear ends of two of the guide-supports and of parts adjacent thereto, especially the mechanism for delivering the matrices singly onto the distributing-rail. Fig. 45 is a sectional view on line 45 of Fig. 44, showing one of the same mechanisms. Fig. 46 is a perspective view of the clutch-operating mechanism. Fig. 47 is a side view of a part of said mechanism. Fig. 48 is a side view of a part of the gear n^4. Fig. 49 is a view of the left side of the cam-disk N. Fig. 50 is a rear view of said cam-disk. Fig. 51 is a view of the right side of said cam-disk. Fig. 52 is a vertical longitudinal sectional view of the right end of the main driving-shaft. Fig. 53 is a sectional view on line 53 of Fig. 52. Fig. 54 is a longitudinal vertical section through that part of the pick-up rod through which the pin h^8 passes.

The principal members of the frame by which the operating parts of the machine are supported are shown in Fig. 3. They consist of a bed-plate A, having a downwardly-inclined front a, said inclination being substantially the same as that of the assembling-rails. The bed is supported by legs a', which carry the bearings for several shafts. Two brackets a^2 a^3 extend upward from opposite sides of the bed A. These brackets support the keyboard M, and also a plate a^4, Fig. 9, which lies in a plane just below that of the keyboard. (This plate is not shown in Fig. 3.) Two standards a^5 a^5, Fig. 3, extend upward and rearward from the sides of the rear edge of the bed, said standards being bifurcated at their upper ends. A central standard a^6 extends upward from the middle of the rear edge of said bed, and it is likewise bifurcated at its upper end, one branch extending forward and one rearward. The chief function of these three standards last named is to support in their proper relative positions the guide-supports B.

Each guide-support consists of a top plate b, Fig. 16, a side plate b', which extends downward from the outer edge of said top plate, and a plurality of brackets b^2, which extend downward from the inner edge of said plate b. Each of these brackets extends from its point of connection with said plate b downward, then outward, and then upward, and a magazine-rod is secured on the top of each upturned end thereof. The construction of the guide-supports is clearly shown in Figs. 13, 14, and 16. These guide-supports are arranged at increasing elevations above the bed from the center outward in both directions. They are substantially parallel with each other and incline downward from their rear toward their forward ends. There are as many of these guide-supports as there are assembling and distributing systems. In the drawings eight are shown, four being placed on each side of the center standard a^6. The four guide-supports on each side are connected at front and rear by yokes b^3 b^4, Fig. 3, respectively, and the guide-supports thus united are supported by being connected with the central standard a^6 and the two side standards a^5 a^5.

In the machine as shown there are eight distributing and assembling systems. Each complete system consists of a pick-up rod H, Figs. 2 and 26, a distributing-rail C, an assembling-rail J, ten magazine-rods I intermediate of the distributing and assembling rail, and mechanism for retaining the matrices on the magazine-rod and for releasing them singly therefrom. The number of systems which each machine must contain depends upon the number of characters which it is desired to use and the number of magazine-rods which form a part of each system. In the machine shown it is obvious that eighty characters, including spaces, are provided for.

Except for the grouping of the front and rear ends of all the systems in one vertical plane, and inclined incidentally in the means for supporting said systems, the systems are entirely independent of each other; and except for the fact that the different systems

are at different elevations and that they are curved to bring their middle portions at different distances from the center of the machine, they are exactly alike, wherefore a description of one will answer for all.

The pick-up rod H at its rear end lies in a vertical longitudinal plane passing centrally through the machine, and it is supported by being attached to the top side of a finger h, projecting rearward from the bracket a^7, Fig. 1. The pick-up rod is bent to one side or the other of the said plane and then curved so that its forward end lies just beneath the rear end of the distributing-rail C, and the front part of the pick-up rod is secured to the top of the upturned end of a finger b^5, Figs. 44 and 45, which projects outward from a bracket b^6, which is secured to the yoke b^4.

The distributing-rail C is a thin strip of metal, which is secured to the under side of the plate b, Fig. 16, of the guide-support B by means of a longitudinal rib c, which extends centrally from the upper side of said distributing-rail.

The assembling-rail J is preferably made of thin steel very smooth on its upper surface. Its rear part is substantially parallel to the distributing-rail of the same system, but it lies in a lower plane. It is secured to the top of little brackets j, Figs. 2 and 16, which are secured to the outer edge of the plate b' of that guide-support which is next nearest to the center. The brackets which support the two inner assembling-rails are connected directly with the central standard a^6. The assembling-rail is then bent toward the center of the machine, and a part of the front end, slightly longer than the length of the line of matrices to be assembled, lies in the vertical plane which passes longitudinally through the center of the machine.

The ten magazine-rods I are supported on the tops of the upturned ends of the brackets b^2, Fig. 16. Their rear or receiving ends lie below the distributing-rail, from which point they extend obliquely downward and inward, (that is, toward the center of the machine,) and their front or delivery ends lie above the corresponding assembling-rail, and at such a distance therefrom that they do not interfere with the downward movement on said rail of matrices which are dropped thereon from any magazine-rod behind them.

Each system, from the rear end of the pick-up rod to the front end of the assembling-rail, has a continuous downward inclination, whereby the matrices will slide by gravity from one point to the other when permitted so to do.

The rear ends of all of the pick-up rods are grouped in one vertical plane, and lie in this plane for a distance slightly greater than the length of an assembled matrix-line, and, in the machine illustrated in the drawings, their upper edges are approximately half an inch apart, one above the other. The rods diverge from this plane alternately in opposite directions, and extend therefrom different distances. For example, the upper rod extends to and coöperates with the outer distributing-rail on the left, the rod next below it extends to the outer distributing-rail on the right, and the third rod extends to the left and coöperates with the distributing-rail next to the first named, and so on.

At the front of the machine the front ends of all of the assembling-rails are grouped in one vertical plane one above another, occupying the same position relative to each other as do the corresponding pick-up rods at the rear.

The construction and relative arrangement of the distributing and assembling systems are generically like those shown and described in my prior application hereinbefore referred to; but there are certain specific differences in the construction of the component parts and in their relative arrangement, which will be pointed out herein.

The front ends of the assembling-rails are upheld in their proper relative positions, while the matrices are being assembled, by two grooved clamping-arms P P, Figs. 4 to 10, which are secured to the under side of the two pivoted levers $p\,p$. These levers are pivoted to the under side of brackets a^8, which project forward from the plate a^4, and operating-pins $p^2\,p^2$, secured to the rear ends of said levers project upward through suitable clearance-slots a^9 in said plate, and engage with cam-slots r in the slide R.

Two other levers $p'\,p'$ are pivoted to the under side of said plate a^4, and, projecting downward from the front ends of said levers, are the grooved clamping-arms P' P', which are adapted to grasp the assembling-rails behind an assembled matrix-line, and support said rails while the matrices are being removed. On the rear ends of said levers are two pins $p^3\,p^3$, which project upward through cam-slots r' in the slide R.

The slide R lies on plate a^4 and is held and guided by the guides r^2. The slots r and r' are so formed that as the slide is moved forward, the levers $p'\,p'$ are rocked so as to cause the rails to be grasped between the rear clamping-arms P' P', and then the levers $p\,p$ are rocked so as to cause the front clamping-bars P P to separate and release said rails. When the slide is moved backward, the motion of the said levers is reversed.

To operate the slide, I provide a rock-shaft r^3, which is mounted in suitable bearings on the plate a^4. Two arms r^4, rigidly secured to the rock-shaft, have slots in their lower ends, through which slots the rod r^5 passes, which rod is rigidly secured to the slide R. The rock-shaft is operated by means of the handle r^6.

Detent mechanism operated by finger-keys is provided to act in coöperation with each magazine-rod to retain the matrices thereon and to release them singly. Two vertically-movable slides $k'\,k^2$, Figs. 13 and 14, lying one against the other, are secured to the front edge

of each bracket b^2 by means of a little screw k^3, which passes through vertical slots k^4 in said slides. The upper ends of said slides are pivotally connected, on opposite sides of its axis of oscillation, to the rocker k, which is secured to the end of the rock-shaft K. The rock-shaft K is mounted on the top of the plate b, and a coil-spring k^5, surrounding and connected with said rock-shaft, exerts its force to turn the shaft so as to hold the two slides k' k^2 in the relative position shown at the right of Fig. 13—that is to say, with the lower end of the front slide below the lower end of the rear slide. When the slides are in this position, the lower end of the front slide is directly in front of the upper end of the front matrix which hangs on the adjacent magazine-rod, whereby said front matrix is prevented from sliding forward on the magazine-rod. Thus the front matrix and all the other matrices behind it on the same magazine-rod are retained on said rod. When the rock-shaft K is rocked by means of the corresponding key and the connecting mechanism, the rear slide is moved down in front of the second matrix, and the front slide is raised so as to permit the front matrix to slide under it, as shown in Fig. 15.

By reason of the downward inclination of the magazine-rods, each matrix hangs a little lower than the one behind it, as shown in Fig. 15, so that the rear slide may descend in front of the second matrix, as described, without touching the front matrix.

The rock-shaft K is actuated in opposition to its spring k^5 by the following mechanism, viz: A vertically-movable key-rod m passes through a boss m', Fig. 13, on the keyboard M, and the key-rod is forced upward by a coil-spring m^3, which is compressed between said boss and the key-piece m^2.

The lower end of the key-rod is pivoted to an angle-lever m^4, near the angle thereof. One arm m^5 of said lever rests upon a shelf m^6, which is suitably supported beneath the keyboard. A second shelf m^7 lies above the said end of this lever. The other arm m^8 of the lever is connected by means of a rod or wire m^9 with an eye k^6 on the rocker k. For convenience in construction the rocker k to which the slides are connected is made in the form of a disk, which is secured centrally to the end of said shaft K.

When the key m^2 is pressed down, the front arm m^5 of the angle-lever is moved toward a horizontal position, because as its pivot is moved down the end of said arm does not move down but slides forward, bearing against the shelf m^6. This causes the other arm m^8 of said lever to approach a vertical position, its end necessarily moving forward in so doing. This draws on the rod m^9 and causes the rock-shaft k to be rocked, with the result, before described, of raising the front slide k' and lowering the rear slide k^2, thereby releasing one matrix. When the key is released, the springs k^5 and m^3 restore the detent and key mechanism to the position shown at the right of Fig. 13. As the key-rod m moves upward it draws up the pivot of the lever m^4; but the end of the front arm m^5 thereof bears against the under side of shelf m^7, which prevents the upward movement of said end, the result being that the end of the other arm m^8 moves backward to the position shown by full lines in Fig. 13. The position of the same parts when the key is depressed is shown by the dotted lines in said figure.

The distributing-rail C, Figs. 16 and 26 to 29, consists of a thin flat strip of metal. A thin longitudinal fin c projects centrally from the upper side of said rail, and, being secured to the under side of plate b, serves to support said rail. At intervals notches c' are cut in the said rail in pairs from both sides, and these notches increase successively in depth from the rear end forward, whereby the notched parts of said rail are widest at the rear end and grow gradually narrower toward the front. The notches are placed at regular intervals, and the receiving ends of the several magazine-rods I lie below and just a little behind the corresponding notched part of the rail, whereby a matrix falling from the rail at one of the notched parts is caught by its assembling-hook on its own magazine-rod.

Below the distributing-rail is a stop-rail c^2, which may be made as an integral part of the distributing-rail; but it is preferable to make it separately, and the two rails are soldered together. This rail is narrowest at its rear end and abruptly increases in width at points just in front of the notched parts of the distributing-rail, thereby forming, on both sides of the longitudinal central line, shoulders c^3, which are narrowest at the rear and increase in width successively from back to front. These shoulders and their relative size are the essential features of what I have called the "stop-rail," the other features of the construction shown being preferable for convenience in construction.

A longitudinal fin c^4 is secured centrally to the under side of the distributing-rail, and its function is to prevent the sidewise swaying of the matrices as they slide down the distributing-rail.

The matrices E, Sheet 10, which are employed in this machine consist of, first, a body e, in the edge of which the character depression e' is formed, and, second, a stem e^2, which is offset a little to one side of the body for two reasons: first, so that the center of the assembling-hook and the opening into the distributing-eye may be in line with the center of gravity of the matrix, whereby the latter will hang vertically, whether it is hanging by its distributing-eye or its assembling-hook; second, so that when the matrices are assembled in line there will be a space between the stems of those belonging on the right and those on the left side of the machine, as shown in Fig. 32.

Each matrix has near its upper end an inverted assembling-hook e^6, which may be entered from that side of the matrix which is opposite to that toward which the stem is offset. A part of the matrices belong on one side and a part on the other side of the machine, and the assembling-hooks are entered from the right side of the matrices which belong on the left side of the machine, and from the left side of the matrices which belong on the right side of the machine. These assembling-hooks are below the distributing-eyes in such relation thereto that as the matrices suspended by said hooks slide down one of the pick-up rods the corresponding distributing-rail will enter the distributing-eye.

The matrices employed in the machine are of as many different lengths as there are assembling and distributing systems—in the present case eight. Four lengths have their assembling-hooks on the right side (see Fig. 17) and four have them on the left side. (See Fig. 18.) All of the matrices of each system are of the same length, but they differ in the shape of the distributing-eyes. There are as many different kinds of distributing-eyes as there are magazine-rods in each system—in the present case ten. (See Fig. 19.) The distributing-eyes are of different shapes, so that each matrix will strike the proper shoulders e^3 and will fall from the distributing-rail at the prescribed notched part thereof, so as to be caught on its own magazine-rod.

The upper part e^3 of the eye is equal in width to the width of the distributing-rail. The openings e^4 through the tops of the matrices are of different widths, corresponding to the widths of the notched part of said distributing-rail adjacent to the several magazine-rods. Below the part e^3 of the eye which receives the distributing-rail is a part e^5, which embraces the stop-rail on the under side of the distributing-rail, and the sides of this part of the eye form shoulders e^7 e^7, which are different distances apart, corresponding to the different widths of the shoulders c^3 of the stop-rail. The lower part of the eye is narrow—a mere notch e^8, which receives the fin c^4 on the under side of the distributing-rail.

The upper edge of the part e^3 and the lower edge of the part e^5 of the eye are beveled, as shown in Fig. 20, so that the matrix may hang vertically from the inclined distributing-rail.

The spacers, which are shown in Figs. 21, 22, 23, and 24, are substantially like those shown in the former application—that is to say, they each consist of two thin plates e^{11} e^{11}, secured together at points above and below the wedges. A transversely-movable wedge e^{12} is held between said plates, said wedge being so placed that it lies in the plane of composition when a spacer is assembled as a part of a matrix-line. In shape and in the form and arrangement thereon of the distributing-eye and assembling-hooks the spacers are like the matrices, and are assembled and distributed in the same way. The spacer is shown in order to better explain certain features in the construction of the stick in which a line of matrices and spacers is assembled and removed from the machine.

The machine shown does not form the slug or linotype, but means are provided whereby an assembled line of matrices may be taken from the machine to a suitable casting-machine, and then returned to the machine, the line being held together in a suitable clamp or stick.

The stick G is shown in Figs. 31 to 40, inclusive. It consists of two parts g g', adapted to grasp the matrices between them, and so connected that they may be spread apart at either end as if hinged at the other end.

The part g has two vertical shoulders g^2 g^2, the distance between which is equal to the standard length of line. An ear g^3 on the part g passes loosely through a slot g^4 in the part g', and a leaf-spring g^5, which is fastened near its middle to said ear, bears against the part g'. This spring prevents the complete separation of the two parts, although it permits of their being separated enough to allow the matrices to pass between them, and it draws them and holds them together when they are not separated by some superior force. On the part g' is a ledge or shelf g^{13}, on which the lower ends of the matrices rest.

On the part g near the bottom and at both ends are the hemispherical bosses g^6; and on the part g' are corresponding sockets g^7, into which said bosses set. These balls and sockets act as hinges whereby the two parts of the stick may be opened or spread apart at either end.

In the part g is a horizontal slot g^8, which uncovers the impression-line on the assembled matrices, so that said matrices may be used to close the face of a mold. In the other part g' is a similar slot g^9, through which the wedges in the spacers may be operated, and the end pieces of the stick are notched, as at g^{10}, in line with said slot g^9, so that the spacers may enter the stick.

On the part g is an alinement-rib g^{11}, which enters the alinement-depression e^9 in the matrices; and in each end of the part g' is the spherical socket g^{12}.

When in position to receive the matrices as they are assembled, the stick rests upon a slide D, which is moved longitudinally in suitable ways formed on the inclined front part a of the bed. On the top of this slide and at both ends thereof are the two blocks d d', the distance between said blocks being equal to the length of the stick. Projecting from the blocks d and d' are the spherical heads of the two spring-actuated pins d^2 d^3, Figs. 11 and 12, respectively, which spherical heads are adapted to enter the sockets g^{12} g^{12}, Fig. 32, in the stick, thereby holding the stick in the proper position on the slide. An ear d^4, Fig. 6, on

the under side of the slide D passes through a suitable clearance-slot a^{12} in the inclined front of the bed, and this ear is pivotally connected to one end of the link l, the other end of said link being connected with the arm l', which is secured to the rock-shaft L. This rock-shaft is actuated by means of the arm l^2, which is secured thereto, and has at its end a pin l^3, which operates in a cam-groove n in the side of a disk N on the shaft n'.

In the top of the inclined front of the bed-plate is a groove a^{10}, Figs. 3, 11, and 12, which forms the lower end of the stick-returning viaduct X, Figs. 1 and 2. Communicating with the lower end of this groove is a transverse groove a^{11}, Fig. 12, the top of the slide D being flush with the floor of said groove. A transversely-movable slide O, Fig. 11, mounted in suitable ways, slides in said groove, passing the lower end of the groove a^{10}. A stud o, Fig. 6, on the under side of said slide passes through a clearance-slot a^{13}, Fig. 3, in the bed, and a link o', Fig. 1, which is pivoted to said stud at one end, is pivoted to the forward end of lever o^2 at the other. The lever is pivoted to the frame, and its rear end has a friction-roller o^3, which bears against a cam n^2 on the left side of said disk N, whereby said lever is operated in opposition to a spring o^4, which surrounds the pivot of said lever and acts constantly to hold the end of the lever against the cam n^2.

On the top of the slide O are two brackets o^6 o^6, Fig. 11, to which are attached the ends of a buffer-spring o^5. The normal position of the slide O is as shown in Fig. 11, in which this buffer-spring lies across the lower end of the stick-returning viaduct X.

Mounted in suitable bearings beneath the bed are two shafts n' and T, Figs. 1 and 4, which are connected by means of two gears n^4 and t. The shaft T is constantly driven, and the pinion t is loosely mounted thereon. A clutching device is provided for connecting said pinion to the shaft at will. In the form shown this clutching device is constructed as follows, viz: The end of the shaft T is hollow and a rod t', Sheets 14 and 15, passes into said shaft and screws into a bar t^2, which extends transversely through a slot in said shaft. On the edge of the gear t, facing said bar are two pins t^3 t^3. Behind the bar t^2 a coil-spring t^4 is placed in the shaft and it thrusts endwise against said bar. On the projecting end of the rod are two nuts t^5 t^5, between which the end of a lever U is placed. This lever is pivoted to a bracket a^{14} and its forward end is connected with a link u, having a shoulder u' thereon, which is adapted to be engaged by the lower end of the lever V. This lever V is pivoted to the block v, which is swiveled to the frame. A spring V', which is secured to the frame and to the lever V, acts to draw the lower end of the lever V in two directions, viz., toward the left against a stop a^{15} and backward against a bracket a^{14}. The lever is therefore normally held in a position to engage with the shoulder u' on link u. The end of the link u is adapted to enter a notch n^5 in the side of the gear n^4. A friction-wheel u^2 is mounted in the end of said link u, which rides on the side of said gear when the end of the link has been withdrawn from said notch n^5 and the gear n^4 is revolved.

The upper end of the lever V is beveled and the arm r^7 on the rock-shaft r^3 is adapted to engage with said upper beveled end of said lever V and draw it to the left. The lower end thereof moves to the right, striking the shoulder u', thereby moving link u and the lever U, so that the rod t' is moved with the shaft T, causing the bar t^2 to enter between the two pins t^3 t^3, thereby connecting the gear t with the shaft T. On the hub of the gear n^4 is a pin n^6, which is adapted to strike the beveled end of the arm v^3, which is rigidly secured to the lever V when said gear is revolved. This causes the block v to turn on the pivot which connects it to the frame, with the result of moving the upper end of lever backward out of engagement with the side of the arm r^7, and the spring v' moves the upper part of lever to the left behind the end of the arm, where it is held until the arm r^7 is moved out of the way. When so held, the lower end of said lever is in a position where it will not be struck by the shoulder u' as the link u is moved to the left by the action of the spring t^4. Consequently the end of the link u enters the notch n^5 in the side of the gear n^4, the gear t being released from connection with shaft T and the gear n^4 being stopped by this movement.

A wedge Q, Fig. 11, is secured to the bed above the rear end of the groove-path traveled by slide D. It is in such position that its point enters between the two parts g g' of the stick as it is moved backward by said slide and moves the rear end of the part g away from the part g', which is held in fixed position by the pins d^2 d^3.

At the front end of the machine an arm S, Fig. 11, is pivoted to the top side of the inclined front of the bed. On the end of the arm is a curved finger s, adapted to enter the stick from the rear side and press the matrices therein close together. A coil-spring s', surrounding the pivot of said arm S, exerts its force to swing said arm forward, as described. The arm is moved backward and held back by the following mechanism, viz.: A rock-shaft s^2, Fig. 4, is mounted on the side of the bracket a^3, Fig. 3. To its lower end an arm s^3 is rigidly secured, which arm is connected by means of the link s^4 with the arm S. On the upper end of this rock-shaft is an arm s^5, Fig. 5, which engages with a cam r^8 on the rock-shaft r^3, Fig. 9, whereby, as the rock-shaft r^3 is rocked as the first step toward the removal of an assembled matrix-line, the cam r^8 moves so as to permit the described movement of the rock-shaft s^2 and arm S by the influence of the spring s'. When the rock-shaft r^3 is returned to its normal position, the

cam causes the reverse movement of the rock-shaft s^2 and the consequent backward movement of the pivoted arm S.

a^{16}, Fig. 3, represents a thin bar connected at its rear end to the standard. It extends forward directly below the lowest assembling-rail, and when a line of matrices is assembled, this rail lies in the space between the shanks of the right and left matrices.

a^{18} a^{18}, Figs. 1 and 3, represent two curved guides, which are secured at their forward ends to posts a^{20}, and at their rear ends to the front of the outer edges of the yokes b^3 b^3. These guides are so curved that they lie always outside of the path in which the matrices travel in going to the composition-point. These guides and the bar a^{16} guide the matrices, which would otherwise tend to sway sidewise, into the stick.

Secured to the bracket a^{23}, Fig. 1, at the rear end of the machine is a plate a^{21}, which lies below and parallel to and extends backward beyond the rear ends of the pick-up rods. A longitudinally-movable slide W, Figs. 10, 41, 42, and 43, is mounted on said plate, and said slide is moved by a handle w, extending from its under side through a slot in the said plate. In the upper face of said slide is a transverse groove w', into which the stick may be placed from the side, and moved transversely until the spring-pins w^2 w^2 engage in the sockets g^{12} in the ends of said stick. When the slide is moved forward, carrying with it the stick and the assembled matrix-line in its grasp, the assembling-hooks on the several matrices engage, respectively, with the pick-up rod forming a part of the system in which it belongs.

Secured to the top of the plate a^{21} is a wedge Q', which lies above the forward end of the path traveled by slide W, and as the slide is moved forward this wedge enters between the two parts g g' of the stick and separates their forward ends, so that the matrices may slide on their pick-up rods out of said stick.

h^3, Fig. 10, represents a spreader which is secured to the bracket a^7 below the rear ends of the pick-up rods H. As the slide W is moved forward, this spreader enters the space between the shanks of the matrices belonging on the right and left sides, respectively, of the machine. The spreader increases in width toward its forward end, whereby as the matrices slide down the pick-up rods the spreader turns toward the right the matrices which belong on the right, and toward the left the matrices which belong on the left side of the machine. This spreader acts upon the lower parts of the matrices, which may tend to stick together, and separates them, the upper ends of the matrices being separated by the pick-up rods themselves.

A rock-shaft h^4, Fig. 2, extends transversly across the machine at the rear end thereof, being mounted in suitable bearings. Attached to said shaft and extending rearwardly therefrom are as many arms h^5 as there are pick-up rods. Pivoted to a bracket b^6, Figs. 44 and 45, adjacent to each pick-up rod, is a lever h^6. One end of this lever is connected by means of a link h^7 with one of said arms h^5. The other end of said lever is connected with a pin h^8, which passes vertically through a hole in the pick-up rod H. Just in front of this hole is a shoulder h^9 on the upper side of the pick-up rod. The matrices as they slide down the pick-up rod are stopped by said shoulder from going any farther. The rock-shaft is actuated by means of a pitman h^{10}, Fig. 1, connecting the arm h^{11} on shaft h^4 with a crank-pin z on the driven gear Z.

Each time the pin h^8 is moved up through the pick-up rod it engages with the under side of the hook a^6 of the foremost matrix and thus lifts said matrix, so that it slides off of the end of said pin and over the said shoulder h^9, and thence down the pick-up rod to the distributing-rail. This causes each matrix to slide down the distributing-rail alone out of contact with any other matrix, and thus the proper distribution of said matrices is insured. If a number of matrices were allowed to slide down in contact, the pressure against the front matrix of those in the rear might prevent the front matrix from dropping at the proper time, and thus the distribution might be impeded.

X and Y, Fig. 1, represent two "stick-viaducts," of which the former inclines downward from rear to front and the latter inclines in the opposite direction. The rear end of the viaduct Y lies as near as practical to the machine in which the slugs are cast, and the rear end of the viaduct X lies near to the rear slide W. Its forward ends connect with the groove a^{10}, Fig. 12, in the bed before referred to. The forward end of viaduct Y, Fig. 1, is near the composition-point of the machine.

I will now proceed to describe the operation of the different parts of the machine hereinbefore described as a matrix-line is assembled and distributed.

Before beginning the assembling of a line, the slide D, Fig. 11, is at its rear position. A stick G is held on said slide, and is held open at its rear end by the wedge Q. The stick in the described position is shown in dotted lines in said Fig. 11. The front ends of the assembling-rails are held between the front clamping-arms P P, Fig. 1, the rear clamping-arms P' P' being swung out of the way, as shown in Figs. 2, 7, and 8. The position of the rock-shaft r^3 and of all the different parts of the driving mechanism is shown in Figs. 1, 2, 4, and 7.

The operator presses down the keys corresponding to the matrices he wishes to assemble. This actuates the several detent mechanisms, thereby releasing the matrices one by one from the several magazine-rods. They fall by gravity from said rods onto the assembling-rails beneath their delivery ends and

then slide down said rails to the front or composition point of the machine, entering between the two parts of the stick.

When the stick is full, the operator, grasping the handle r^6, Fig. 9, rocks the rock-shaft r^3 by moving said handle forward and upward. The arm S, Fig. 11, is moved forward because the cam r^8 has been moved so as to permit the spring s' to so move it. The finger on said arm S presses against the rear matrix, thereby forcing them all compactly together. The slide R is also moved, thereby closing the rear clamping-arms against the assembling-rails and then opening the front clamping-arms to permit the removal of the matrices from the ends of the assembling-rails. The arm r^7 strikes the beveled upper end of the lever V, thereby moving it to the left. The lower end consequently moves to the right, striking the shoulder u', Fig. 46, on link u, thereby, first, withdrawing the end of said link from the notch n^5 in the gear n^4, and, second, moving the lever U so as to clutch the gear t to the revolving shaft T. The revolution of the gear t revolves gear n^4 and one of the first effects of the movement of said gear n^4 is to cause the pin n^6 to strike the arm v^3 on lever V, thereby moving the lower end of said lever forward. The upper end thereby becomes disengaged from the side of the arm r^7, and the spring v' moves it behind the end of said arm, where it is held until the arm is moved away by the reverse movement of the rock-shaft.

The revolution of the shaft n' revolves the disk N, which is secured thereto. The engagement of the arm l^2 with the cam-groove n in the side of said disk causes the rock-shaft L to be rocked, thereby moving the slide D toward the front of the machine. By this movement of the slide the full stick G is moved forward, thereby withdrawing the matrices from the ends of the assembling-rails. In moving forward, the stick leaves the wedge Q and thereupon the stick is closed by its spring g^5. While the slide D is moving forward, the slide O is moved to the left by the spring o^4 and the movement of the cam n^2. This uncovers the lower end of the stick-returning viaduct X, and the stick, which has been resting against the buffer-spring o^5, as shown by dotted lines in Fig. 11, slides down to the lower end of said viaduct against the stop-post a^{22}. The relative positions of the two slides D and O and the full and empty stick at this juncture are shown in Fig. 12. The continued movement of the cam n^2, by acting on the lever o^2, causes the slide O to move to the right, whereby the empty stick is forced against the full stick. The full stick is pushed by the empty stick into the space to the right of the slide D, and the empty stick takes its place on said slide D, the spring-pins d^2 d^3 entering the sockets g^{12} in said empty stick. During this movement of the slide O the slide D has remained stationary; but immediately after the empty stick has been engaged by the spring-pins on slide D said slide begins its backward movement. In this movement the wedge Q enters between the two parts of the stick, thereby opening the rear end thereof, as shown in Fig. 11. When the slide reaches this position, the gear n^4 has completed one revolution and the end of the link u, which has been riding against the side of the gear, enters the notch n^5 therein, thus stopping the gear and permitting the disengagement of the clutching-bar t^2 with the pins t^3 on gear t. The rock-shaft r^3 is then moved to return the slide to its original position, when all of the parts are in condition to coöperate in the assembling of a new line, as before.

The full stick is placed by hand in the inclined viaduct Y, down which it slides to the rear end of the machine. The operator at the casting-machine takes it, uses it to make a linotype, and then returns the matrices to the machine for distribution in the following manner: The stick is put into the groove w' in the top of the slide W and pushed over until the spring-pins w^2 enter into the sockets g^{12}. Then the slide is moved forward by its handle w. The wedge Q' enters between the two parts of the stick and the front end of the stick is opened. As the stick moves to this position the assembling-hooks e^6 of the different matrices slip over the ends of the proper pick-up rods, and the separator h^3 passes between the stems of the right and left matrices. When the stick has been opened as described, the matrices slide down the pick-up rods, passing to the right or left, and bring up against the several shoulders or stops h^9 on said pick-up rods. The rock-shaft h^4 is in constant operation and at each upward movement of each of the pins h^8, due to such movement of the rock-shaft, one matrix on each pick-up rod is lifted to the level of said shoulders h^9 and permitted to slide down to the distributing-rail. The distributing-rail enters the eye of the matrix before the end of the pick-up rod is reached. The matrix slides down the distributing-rail until the shoulders e^7 strike the corresponding shoulders c^3 on the stop-rail. At this point the notches c' in the distributing-rail are of such depth that the matrix may drop from the notched part onto that magazine-rod which has its receiving end beneath the rail at this point. The matrix slides down the magazine-rod against the bunch of matrices hanging thereon, and it is then ready to be again assembled in its order. When the matrices have been released from the stick, the stick is taken from the slide and placed in the inclined viaduct X, down which it slides to and against the buffer-spring o^5, where it is again ready to be used as described.

Having described my invention, I claim—

1. In a matrix assembling and distributing machine, a matrix having in its upper end first an inverted assembling-hook which may be entered from one side of the matrix, and second a distributing-eye which is above the

assembling-hook and has an opening through its upper side, which opening is directly over the middle of the assembling-hook, substantially as and for the purpose specified.

2. In a matrix assembling and distributing machine, a series of matrices each having near its upper end first an inverted assembling-hook which may be entered from one side of the matrix, and second a distributing-eye above the assembling-hook, which eye has an opening through its top side directly over the middle of the assembling-hook, the said eyes being of the same width on all of the matrices, and said openings being of different widths on the different matrices, substantially as and for the purpose specified.

3. In a matrix assembling and distributing machine, a series of matrices each having an inverted assembling-hook which may be entered from one side of the matrix, and a distributing-eye above the assembling-hook, which eye has first an opening through its top side, which openings are of different widths on the different matrices; second one division just below said openings adapted to receive the distributing-rail, which divisions on the different matrices are of the same width, and third a division below the first division adapted to receive a stop-rail, which division is of different width on each different matrix, substantially as and for the purpose specified.

4. In a matrix assembling and distributing machine, a matrix having first near its upper end an inverted assembling-hook which may be entered from one side of the matrix, and second a distributing-eye above said assembling-hook, having an opening through its top side, which distributing-eye is beveled on its upper and lower edges, whereby the matrix may hang vertically on an inclined distributing-rail, passing through said eye, substantially as and for the purpose specified.

5. In a matrix assembling and distributing machine a matrix consisting of a body part in which the character depression is formed, and a stem which is offset to one side of the body, said stem having through its upper end an inverted assembling-hook which is entered from the opposite side to that toward which the stem is offset, and a distributing-eye above the assembling-hook, which eye has an opening through its upper side directly over the middle of the assembling-hook, substantially as and for the purpose specified.

6. The combination of a series of assembling-rails having their forward parts grouped in one plane one above another, a pair of separable clamping-fingers adapted to grasp the front ends of all of said rails, a second pair of separable clamping-fingers adapted to grasp all of said rails a short distance back from their ends, and mechanism for separating either pair of fingers and for closing the other pair at the same time, substantially as and for the purpose specified.

7. In a matrix-assembling machine, in combination, a series of assembling-rails having their forward parts grouped in one vertical plane, a pair of pivoted levers having clamping-fingers which are adapted to grasp the front ends of all of the assembling-rails between them, a second pair of pivoted levers having clamping-fingers adapted to grasp all of said assembling-rails back from their ends, and mechanism for operating said levers, substantially as and for the purpose specified.

8. In a matrix-assembling machine, in combination, a series of assembling-rails having their forward parts grouped in one vertical plane, a pair of levers having clamping-fingers adapted to grasp all of said rails, a second pair of levers having clamping-fingers adapted to grasp all of said rails, a slide having cam-slots, pins on said levers entering said cam-slots, and mechanism for moving said slide, substantially as and for the purpose specified.

9. In a matrix-assembling machine, in combination, a series of assembling-rails having their forward parts grouped in one vertical plane, a pair of pivoted levers having depending clamping-fingers adapted to grasp the front ends of all of said rails, another pair of levers having depending clamping-fingers adapted to grasp all of said rails back from their ends, a slide having cam-slots, pins secured to said levers projecting into said cam-slots, a rock-shaft and mechanism connecting said rock-shaft and slide, substantially as and for the purpose specified.

10. In a matrix-assembling machine, in combination, a series of assembling-rails grouped in one vertical plane at their forward ends, a longitudinally-movable slide below said ends, and a wedge placed above the rear end of the path of said slide, substantially as and for the purpose specified.

11. In a matrix-assembling machine, in combination, the forward ends of a series of assembling-rails, a longitudinally-movable slide beneath said forward ends, a transversely-movable slide adjacent to the first-named slide and mechanism for operating said slides, substantially as and for the purpose specified.

12. In a matrix-assembling machine, in combination, the forward ends of a series of assembling-rails, a forwardly-inclined viaduct, a transversely-movable slide movable across the lower end of said viaduct, a longitudinally-movable slide beneath the forward ends of said assembling-rails, and a fixed wedge placed above the rear end of the path traveled by the slide last named, and mechanism for operating said slides, substantially as and for the purpose specified.

13. In a matrix-assembling machine, in combination, a longitudinally-movable slide located below the forward ends of the assembling-rails, the two blocks secured to the top of said slide, spring-pins mounted in said blocks, and a fixed wedge placed above the rear end of the path of said slide, substantially as and for the purpose specified.

14. In a matrix assembling and distributing machine, in combination, a forwardly-inclined viaduct extending from the back to the front of the machine, a slide movable transversely across the lower end of said viaduct, and a buffer-spring secured to said slide, substantially as and for the purpose specified.

15. In a matrix assembling and distributing machine, the combination with the frame of the machine of two oppositely-inclined viaducts X and Y which are fixed to said frame and extend from points near the front ends of the assembling systems to points near the rear ends of the distributing systems, said viaducts being adapted to convey a stickful of matrices by gravity the one from the front to the rear and the other from the rear to the front of said machine, substantially as and for the purpose specified.

16. In a matrix-assembling machine, in combination, a series of assembling-rails having their front parts grouped in one vertical plane and diverging therefrom rearward into different vertical planes, and a bar a^{16} rigidly secured at its rear end to the frame and extending therefrom toward the front of the machine and lying beneath and in the same vertical plane with the front parts of said assembling-rails, substantially as and for the purpose specified.

17. In a matrix-assembling machine, in combination, two shelves, a bent lever having one end lying between said two shelves, detent mechanism, a wire connecting said detent mechanism and the other end of said lever, and a key adapted to move the middle part of said lever, substantially as and for the purpose specified.

18. In a matrix-assembling machine, in combination, a downwardly-inclined magazine-rod, a bracket having an upturned end on which said magazine-rod is secured, a rocker, two vertically-movable slides mounted on said bracket having their lower ends extending over said magazine-rod, and having their upper ends connected with said rocker on opposite sides of its axis, and mechanism for actuating the rocker, substantially as and for the purpose specified.

19. In a matrix-assembling machine, in combination, a magazine-rod for supporting the matrices, two slides which lie against each other and have each a slot through which a single guide-screw passes, the lower ends of said slides being extended over the magazine-rod, a rocker to which the upper ends of said slides are connected on opposite sides of its axis, and mechanism for actuating said rocker, substantially as and for the purpose specified.

20. In a machine for assembling and distributing matrices, in combination, a downwardly-inclined distributing-rail having notches in its sides, a downwardly-inclined assembling-rail placed below the distributing-rail and nearer to the center of the machine, and a series of downwardly-inclined magazine-rods having their receiving ends beneath the distributing-rail and behind the several notched parts thereof and having their delivery ends over the assembling-rail, substantially as and for the purpose specified.

21. In a machine for distributing matrices, in combination, a distributing-rail of equal width from end to end having a series of notches arranged in pairs in both sides thereof, which notches are deepest at the rear end and decrease in depth successively from rear toward the front, and means for supporting said rail, substantially as and for the purpose specified.

22. In a machine for distributing matrices, a distributing-guide consisting of a distributing-rail of equal width from end to end having a series of notches arranged in pairs in its sides, which notches decrease in depth from rear to front, a longitudinal fin secured centrally to its top side whereby it may be suspended, a stop-rail below the distributing-rail having shoulders arranged in pairs which are narrowest at the rear end and increase in width forward, substantially as and for the purpose specified.

23. In a matrix-distributing machine, a downwardly-inclined distributing-guide consisting of a distributing-rail of equal width from end to end having notches in its sides arranged in pairs and made deepest at the rear end and decreasing in depth successively toward the front end, a stop-rail on the under side of the distributing-rail having shoulders arranged in pairs at increasing distances apart from the rear to the front end, the several shoulders being placed just in front of the notches in the distributing-rail, a central fin secured to the top of the distributing-rail, whereby the guide is supported and a central longitudinal fin below the stop-rail, substantially as and for the purpose specified.

24. In a matrix-distributing machine, in combination, a distributing-rail, and a pick-up rod having its forward end beneath the rear end of said distributing-rail, and means for supporting said distributing-rail and pick-up rod, substantially as and for the purpose specified.

25. In a matrix-distributing machine, in combination, a distributing-rail, a pick-up rod having its forward end below the rear end of the distributing-rail, and a finger secured to the machine at a point, inside the said pick-up rod, and having its outer end upturned and secured to the under side of the pick-up rod near the forward end thereof, substantially as and for the purpose specified.

26. The combination of a series of pick-up rods which are grouped in one vertical plane at their rear ends and diverging therefrom into different planes, a series of fingers secured at their forward ends to the fixed framework and extending rearwardly therefrom, having their rear ends upturned and secured to the under side of said pick-up rods where-

by the rear ends of said pick-up rods are supported, substantially as and for the purpose specified.

27. The combination of a pick-up rod having a shoulder on its upper side, a pin movable vertically through said pick-up rod just behind said shoulder, a rock-shaft and mechanism connecting said rock-shaft and pin whereby the latter is reciprocated up and down, substantially as and for the purpose specified.

28. The combination of a series of pick-up rods grouped in one plane at their rear ends, a bracket below said rear ends, a longitudinally-movable slide mounted on said bracket, and adapted to hold the stick, substantially as and for the purpose specified.

29. The combination of a series of pick-up rods grouped in one plane at their rear ends, a bracket below said rear ends of the pick-up rods, a longitudinally-movable slide mounted on said bracket, means for holding the stick on said slide, and a wedge fixed above the forward end of the path of said slide, substantially as and for the purpose specified.

30. In a matrix assembling and distributing machine, a stick composed of two parts adapted to grasp a line of matrices between them, combined with means, substantially as described, for connecting said parts whereby they may be spread apart at either end, for the purpose specified.

31. In a matrix assembling and distributing machine, a stick composed of two parts adapted to grasp a line of matrices between them, one part having a tongue, the other part having a slot through which said tongue passes, in combination with a spring secured to said tongue and bearing against the other part, substantially as and for the purpose specified.

32. In a matrix assembling and distributing machine, a stick composed of two parts, one part having two end shoulders which define the length of the line of matrices which may be held in the stick, the other part having a ledge on which the matrices rest, a tongue on one part which passes through a slot in the other part, a leaf-spring secured near its middle to said tongue, both parts of said stick having longitudinal slots in their sides, and bosses in the face of one part near both ends and corresponding sockets in the meeting face of the other part which receive said bosses, substantially as and for the purpose specified.

33. In a matrix-assembling machine, a stick composed of two parts adapted to grasp a line of matrices, one of said parts having sockets in its outer ends, one of said parts having a tongue and the other a slot through which said tongue passes, and a spring secured to the end of said tongue, substantially as and for the purpose specified.

34. In a matrix-assembling machine, in combination, a lever pivoted to the bed adjacent to the composition-point having a finger which is adapted to be swung against the rear matrix, a spring for swinging said lever in one direction, a substantially vertical rock-shaft, a link connecting said rock-shaft and lever, a horizontal rock-shaft, a cam secured thereto and mechanism making an operative connection between the upper end of the vertical rock-shaft and said cam, substantially as and for the purpose specified.

35. The combination of the assembling-rails grouped in one plane at their forward ends, two pairs of clamping-fingers adapted to alternately grasp and release said rails, a rock-shaft r^3 and connecting mechanism between said rock-shaft and clamps, with a slide movable beneath said assembling-rails, a revoluble shaft and mechanism connecting said slide and shaft, a clutching device connecting said shaft with a motor, and mechanism intermediate of the clutching mechanism and rock-shaft r^3, substantially as and for the purpose specified.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES FORTH.

Witnesses:
E. L. THURSTON,
C. L. NEWELL.