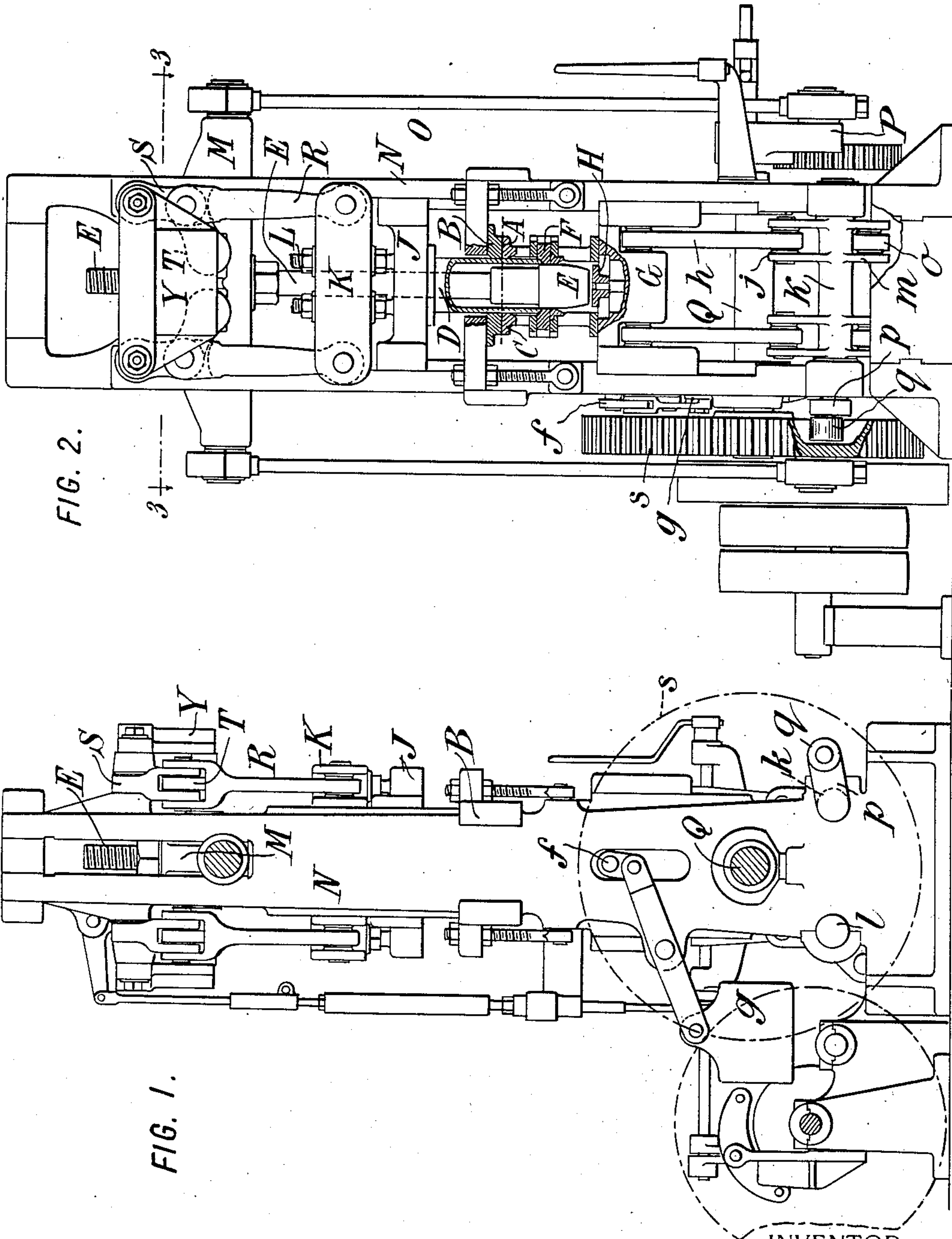


945,550.

Patented Jan. 4, 1910.

6 SHEETS—SHEET 1.



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APPLICATION FILED MAR. 31, 1908.

Patented Jan. 4, 1910.

5 SHEETS—SHEET 2.

FIG. 3.

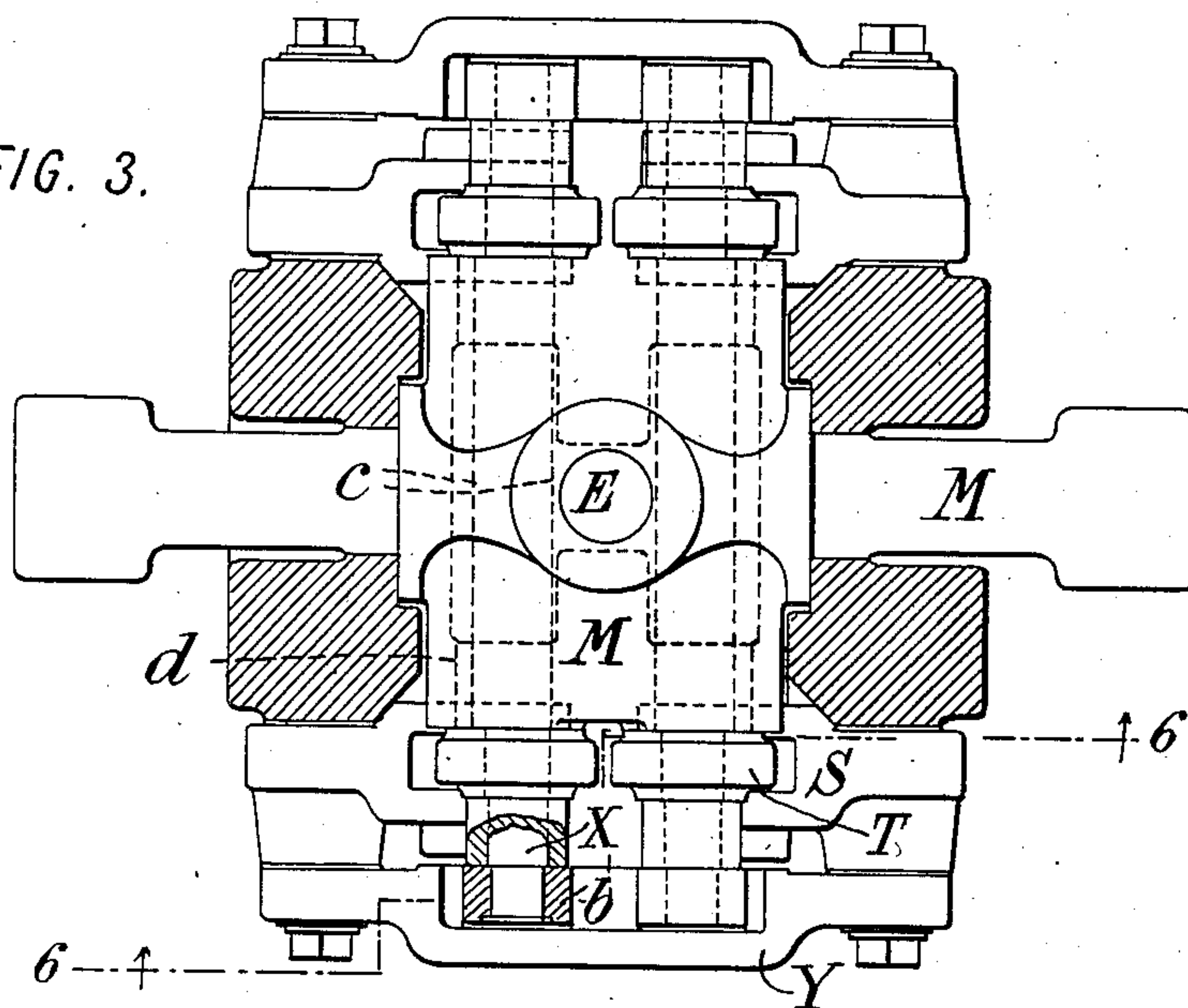
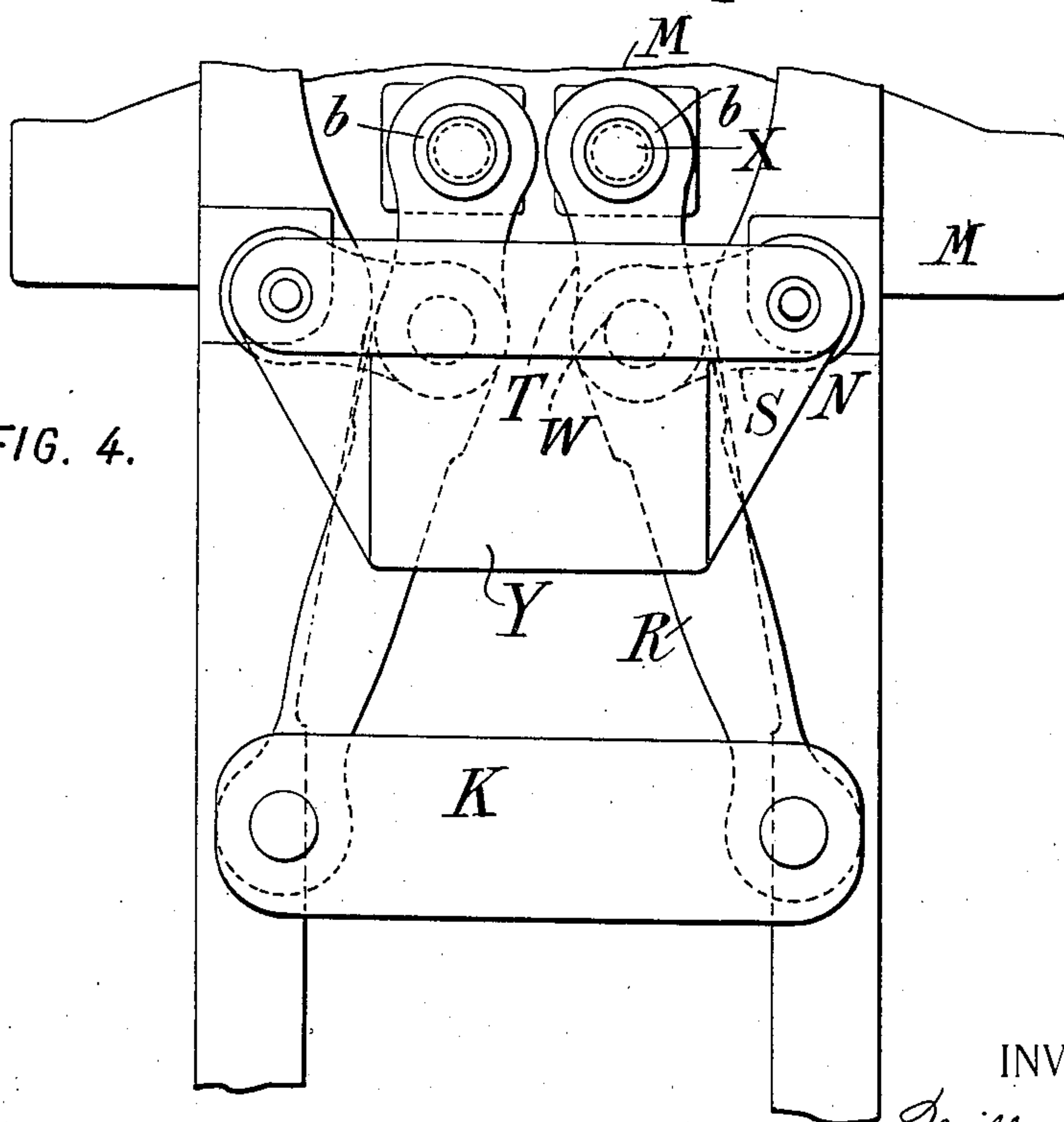


FIG. 4.



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5 SHEETS—SHEET 3.

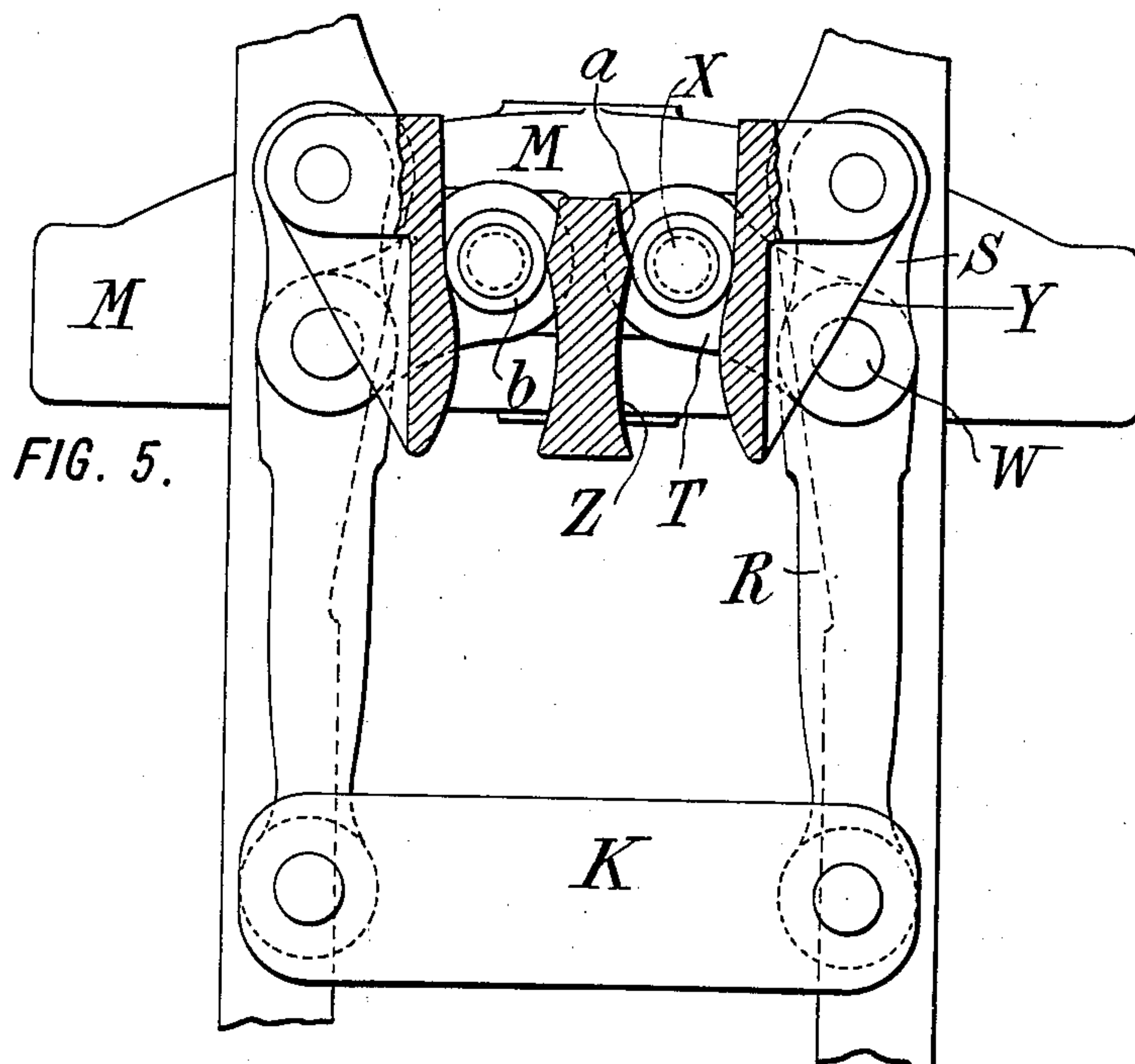


FIG. 5.

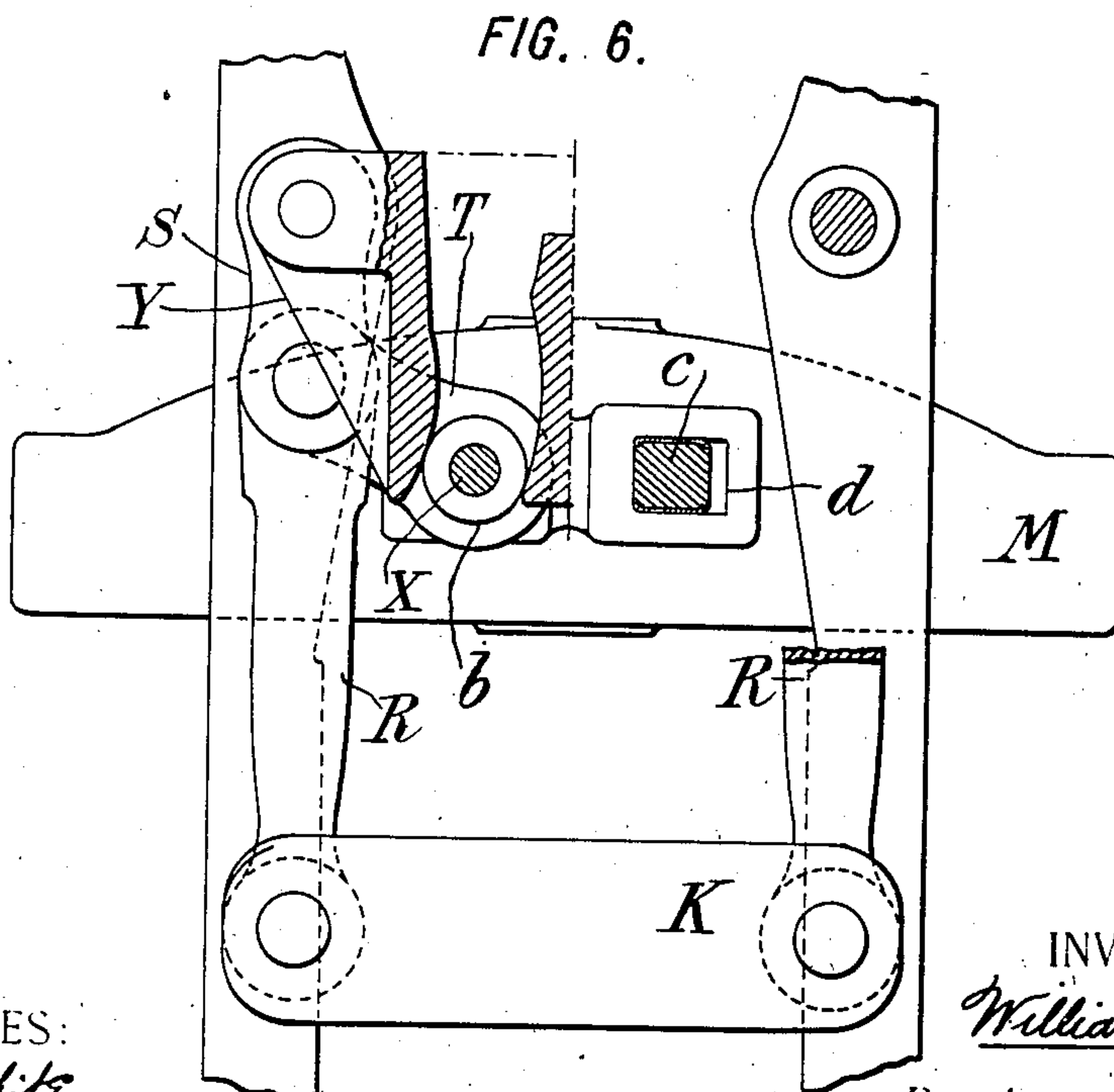


FIG. 6.

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5 SHEETS—SHEET 4.

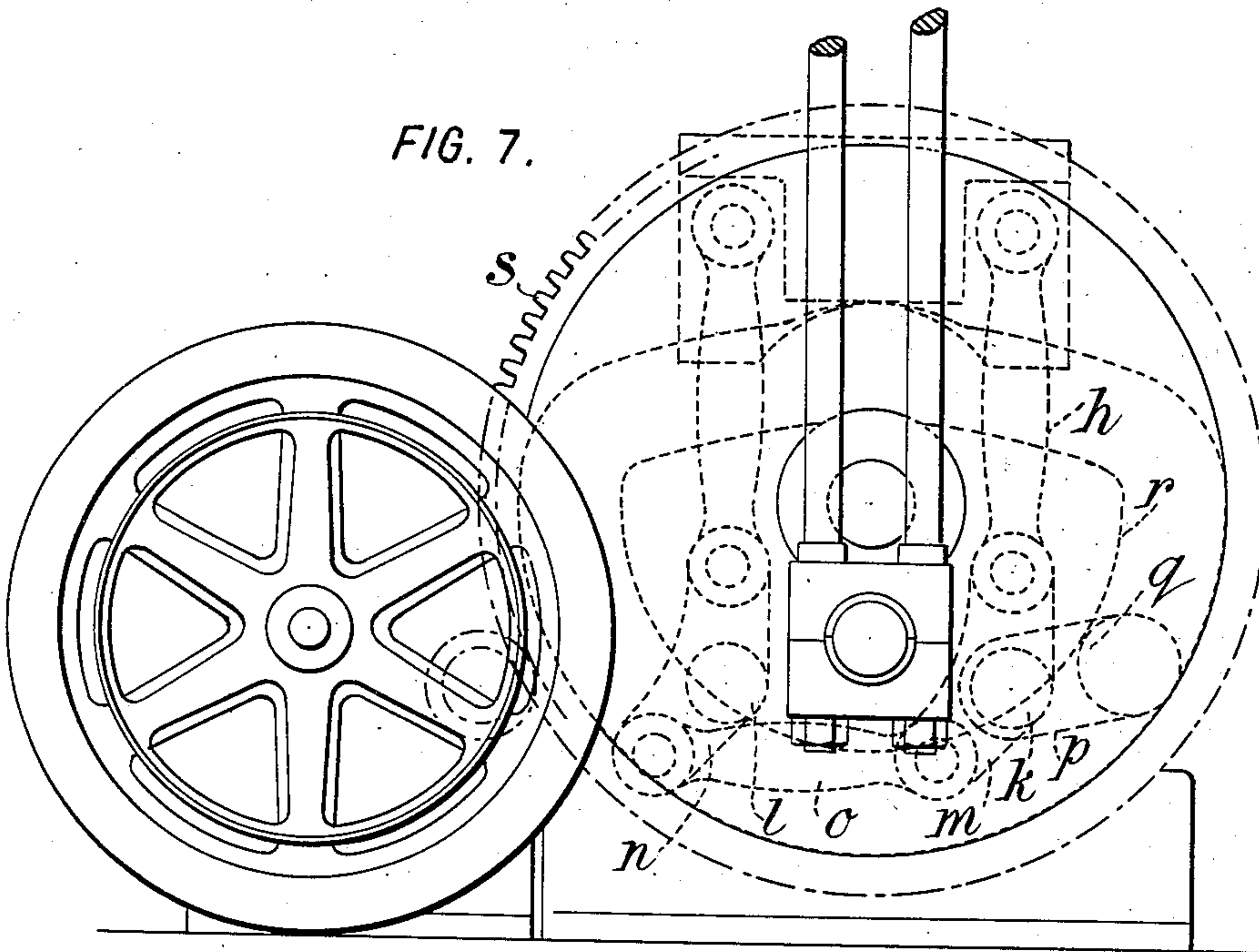
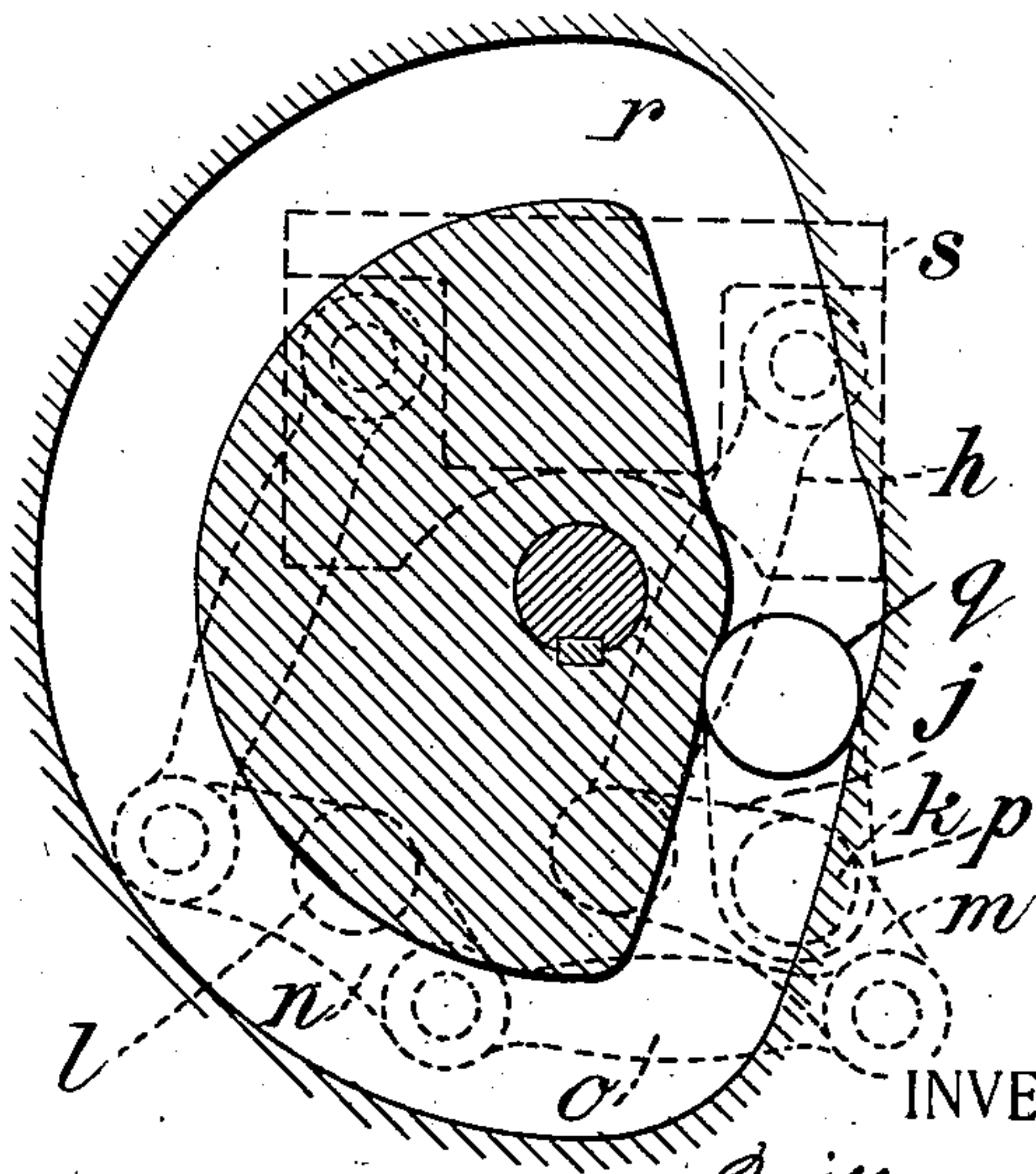


FIG. 8.



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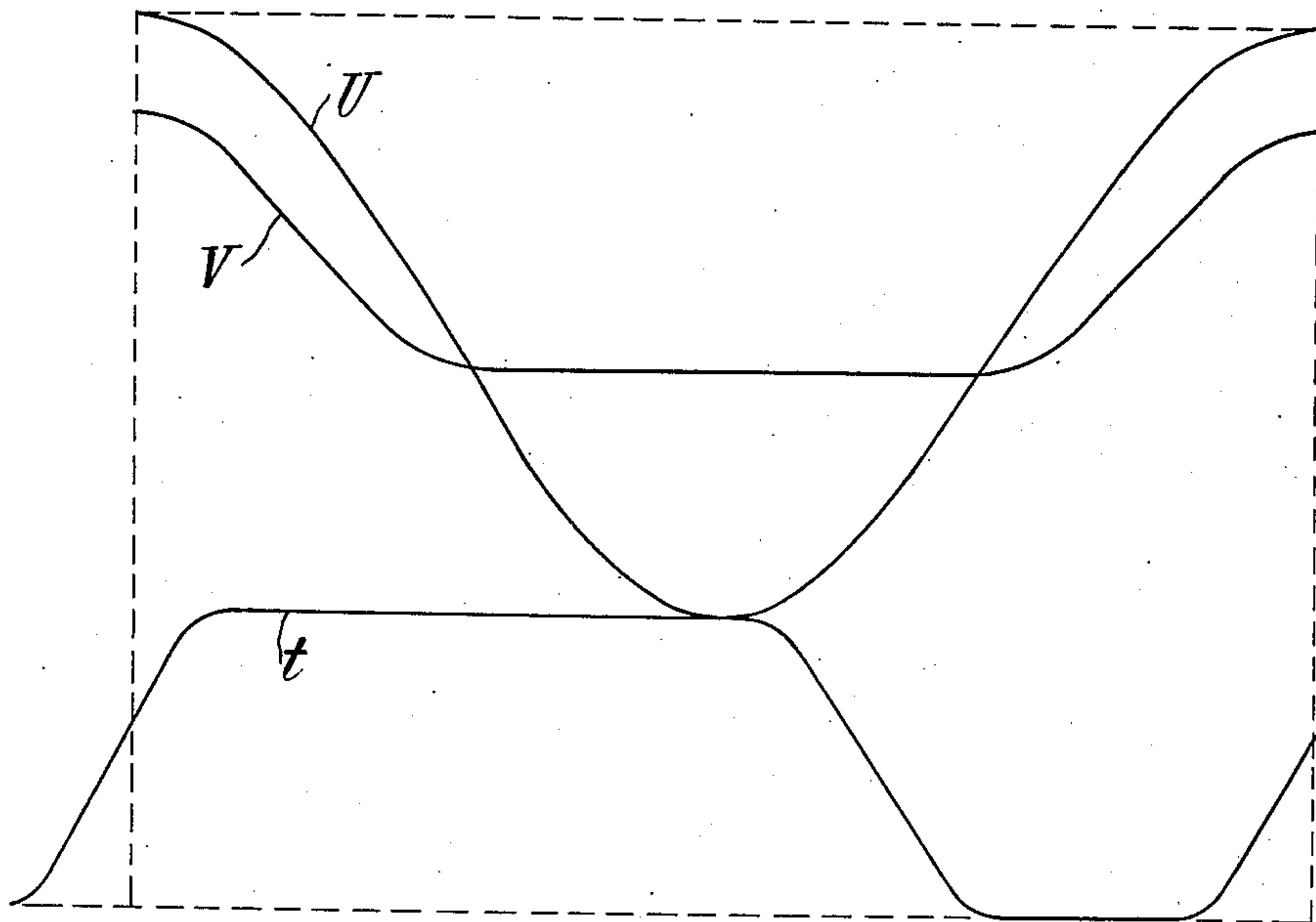
APPLICATION FILED MAR. 31, 1908.

945,550.

Patented Jan. 4, 1910.

5 SHEETS—SHEET 5.

FIG. 9.



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UNITED STATES PATENT OFFICE.

WILLIAM KLOCKE, OF NEW YORK, N. Y., ASSIGNOR TO E. W. BLISS COMPANY, OF
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DRAWING-PRESS.

945,550.

Specification of Letters Patent.

Patented Jan. 4, 1910.

Application filed March 31, 1908. Serial No. 424,315.

To all whom it may concern:

Be it known that I, WILLIAM KLOCKE, a citizen of the United States, residing in the borough of Brooklyn, county of Kings, city and State of New York, have invented certain new and useful Improvements in Drawing-Presses, of which the following is a specification.

This invention aims to provide certain improvements in drawing presses, the principal features of improvement being especially adapted to what are known as two-step presses which draw the material from a flat shape to the tubular shape desired in two stages. The invention is also particularly applicable to a toggle-operated press.

Other features of improvement are referred to in detail hereinafter.

The accompanying drawings illustrate an embodiment of the invention.

Figures 1 and 2 are respectively a side and a front elevation of a complete press; Fig. 3 is a cross-section approximately on the line 3—3 of Fig. 2; Fig. 4 is a diagrammatic view of the toggles in the position in which both punches are lifted; Fig. 5 is a similar view showing the position in which only the outer punch is down, the cams being in section; Fig. 6 is a similar view showing the position in which both punches are down, the planes of section being indicated at 6—6, Fig. 3; Fig. 7 is a side elevation of the lower portion of the press indicating the mechanism for operating the blank holder; Fig. 8 is a diagram of the same with the cam in a different position from that shown in Fig. 7; Fig. 9 is a diagram of the movements of the punches and the blank holder.

Referring to the embodiment of the invention illustrated, the sheet A is first clamped between the stationary upper blank holder B and the movable lower blank holder and first drawing die C. The inside blank holder or first punch D and the main or second punch E move downward together, drawing the sheet to the tubular form of large diameter, after which the hollow member D serves only as a blank holder holding the metal against the re-drawing die F. The second movement is of the punch E alone, and draws the work down to the form of smaller final diameter. The two punches are then withdrawn, and the movable bed G carrying the drawing dies or movable member of the blank holder is then lowered, the

knock-out H remaining stationary and holding up the work so as to permit its removal when the bed and movable member of the blank holder shall have been entirely lowered. The outer punch D is fastened at its upper end to a slide J which is supported from a cross-head K (guided by the side frames N) by means of bolts L so as to be adjustable in height. The slide J and cross-head K are hollow, and the inner punch E passes through them and is supported from a cross-head M which passes through the side frames N of the machine and is raised and lowered by means of links O connected at their lower ends to cranks P on a main shaft Q.

The first drawing movement is obtained from the same cross-head M. In previous apparatus the means for effecting this first drawing movement have been open to serious objections, especially in that the mechanism interposed between the main cross head and the cross head of the first punch has been subjected to substantial bending strains, and has been difficult to adjust and keep in adjustment. According to one feature of this invention a toggle mechanism is used, and in a way to obtain substantial advantages.

Referring to Figs. 4, 5 and 6, the cross-head K of the outer punch is connected by a long toggle link R and a short toggle link S to the side frame N of the machine, and the point of connection of these two toggle links is connected by a third link T with the main cross head M. At the beginning of the downward movement, the operating link T and the lower toggle link R are nearly in a straight line with each other, so that the pressure is transmitted from the upper to the lower cross head with little or no substantial bending strain upon the intermediate members, and with a nearly synchronous movement. The curves U and V of the second and first punches respectively (Fig. 9) show this operation. Toward the end of the movement the lower cross head is moved very slowly, but with the maximum multiplication of power to press the outer punch as a blank holder upon the re-drawing die. At the end of this first movement (see Fig. 5) the pin W which connects the two toggle links to each other, is moved so as to bring these two toggle links approximately or substantially in line with each

other, and the main cross head stands slightly above the level of the pin W. The movement of the second punch beyond the first punch takes place while the pin X moves from the position of Fig. 5 to that of Fig. 6. This pin during this second movement may move in a vertical line without causing a wide variation of the pin W out of line, and a very substantial variation of the position of the pin W may be effected without involving any serious vertical movement of the lower cross-head K. Preferably however the pin X during this second movement moves through such an arc as to entirely suppress the lateral movement of the pin W, or to suppress it to any desired extent. Besides the advantage of a very direct initial movement and a firm clamping operation, it will be observed that in the clamping position of the first punch the two toggle links are substantially in line, so that there is no transverse strain upon them, and the strain is transmitted very directly and straight to the frame of the machine.

The movement of the pin X through an arc is effected by means of cam slots or grooves in fixed cams Y which are bolted to the upper parts of the frame of the machine, and which are provided on their inner faces with arc-shaped grooves Z having a wide entrance *a*. Each of the pins X is provided on its end with a roller *b* traveling in one of the grooves Z *a*. Each of the pins X is extended from a square body portion *c* which is held in a slot *d* in the main cross-head M, this slot being wider but not higher than the squared portion *c* of the connecting pin. Each connecting pin is capable of slight lateral movement in the cross head, but not of any other movement relatively to the cross head; and as the cross head moves down each of the pins X enters the wide portion *a* of its cam-groove and is guided into the upper end of the curved groove Z exactly at the end of the first movement. During the second movement therefore each of the pins X travels through an arc controlled by the cam-groove Z, so that it effects a comparatively slight lateral movement of the pin W which connects the two toggle links, which movement is under perfect regulation by the use of cam grooves of a different degree of curvature. This mechanism serves also to transmit through the cam directly to the fixed frame of the machine, any lateral pressure upon the operating link T, and to avoid the transmission of any such lateral strain to the cross head in which the pins X are mounted.

The knock-out H is connected at its lower end to a shaft *f* (Fig. 1) which through a suitable link and lever connection is held up by one or more counterweights *g*, regardless of the movements of the movable bed or lower member of the blank holder.

The upward movement of the movable bed G is produced by four links *h* pivoted at their lower ends on cranks *j* which are carried in pairs on two shafts *k* *l*. These shafts are provided also with crank arms *m* *n* respectively, which are connected to each other by links *o* so as to synchronize the movement of the two shafts, and to transmit the motion of the driven one *k* to the opposite one *l*. The turning of the shaft *k* is effected by means of a third arm *p* on this shaft having a pin and roller *q* traveling in a slot *r* of a cam *s* mounted on the shaft Q, as shown in Fig. 2. By this means a very quick lifting and lowering of the movable bed is obtained, with a long dwell during the two successive punching operations, the movement of the bed being indicated by the curve *t* of Fig. 9.

The operating of the two shafts *k* and *l* from a single cam-actuated arm *p* has an advantage over previous constructions in which each of two shafts similar to *k* and *l* have been driven separately. Where the driving arm or similar mechanism of one shaft is broken the other shaft has continued to operate, resulting in a one-sided pressure upon the work, and sometimes in the breakage of other parts of the machine. It is advantageous therefore to operate the two shafts from a single arm as in the described construction.

What I claim is:—

1. A two step drawing press having an outer punch, an inner punch, a reciprocating cross-head operating said inner punch directly, and toggle mechanism for operating the outer punch from said cross-head, the links of said toggle mechanism moving toward the straight position in effecting the drawing movement of said outer punch.

2. A drawing press having an outer punch, an inner punch, toggle mechanism for operating said outer punch, said mechanism including a pair of toggle links, an operating link connected to said toggle links, and a cross-head operating the inner punch, reciprocating in a direction approximately parallel to the straight position of the toggle and connected to said operating link to actuate the toggle.

3. A drawing press having an outer and an inner punch, toggle mechanism for operating said outer punch, said mechanism including a cross-head operating said inner punch, a pair of toggle links, and an operating link connected to said toggle links and to said cross-head, said outer punch and said cross-head being reciprocable in a direction approximately parallel to the straight position of the toggle.

4. A two step drawing press having an outer punch, an inner punch and toggle mechanism for operating said outer punch, said toggle mechanism including toggle

links R and S and an operating link T, said links R and T being approximately in line in the raised position of said outer punch.

5 5. A drawing press having a punch-car-
rying slide and toggle mechanism for oper-
ating the same, said toggle mechanism in-
cluding a toggle link R pivoted to said slide,
a toggle link S pivoted to a support and
to said link R, an operating link T, and a
10 vertically movable cross-head M connected
to said link T, said links R and T being
approximately at right angles to each other
in the advanced position of said cross-head.

15 6. A drawing press having a punch and
toggle mechanism for operating said punch,
said toggle mechanism including toggle
links R and S and an operating link T,
said links R and T being approximately
in line in the raised position of the punch,
20 and approximately at right angles to each
other in the lowered position.

25 7. A press having a movable member
and toggle mechanism the movement of
whose links toward and from the straight
position effects movement of said movable
member, actuating means for said links, and
additional means for restraining the move-
ment of said links away from their position
in line with each other.

8. A press having a punch and toggle 30
mechanism the movement of whose links
toward the straight position effects a draw-
ing movement of said punch, actuating
means for said links, and additional means
for restraining said links from movement 35
away from their straight position.

9. A press including a pair of toggle links,
an operating link having one end connected
thereto, means for moving the opposite end
of said operating link to straighten said 40
toggles, and a fixed member limiting the
direction of movement of said opposite end
and restraining the movement of the toggle
links away from the straight position.

10. A press including a pair of toggle 45
links R and S, an operating link T, a mov-
able cross-head engaging the outer end of
said operating link, and a fixed cam Z en-
gaging the outer end of said operating link
T during a portion of the movement of the 50
latter.

In witness whereof, I have hereunto
signed my name in the presence of two sub-
scribing witnesses.

WILLIAM KLOCKE.

Witnesses:

DOMINGO A. USINA,
THEODORE T. SNELL.