

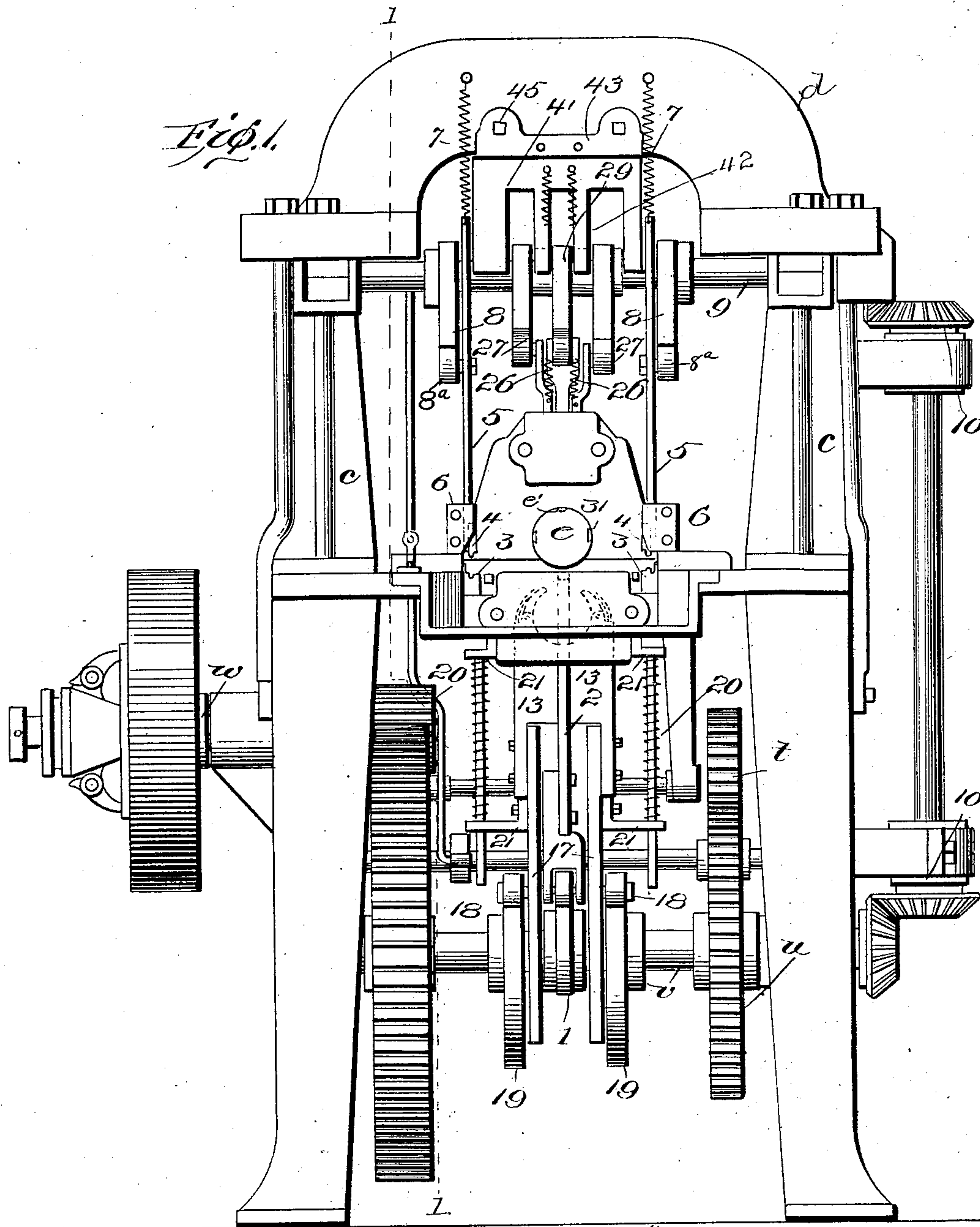
No. 725,886.

PATENTED APR. 21, 1903.

E. SMALL, DEC'D.
M. SMALL, ADMINISTRATRIX.
CAN MAKING MACHINE.
APPLICATION FILED JUNE 21, 1902.

NO MODEL.

. 5 SHEETS—SHEET 1.



Witnesses
J. M. Fowler Jr.
Thomas Durant

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Attorneys

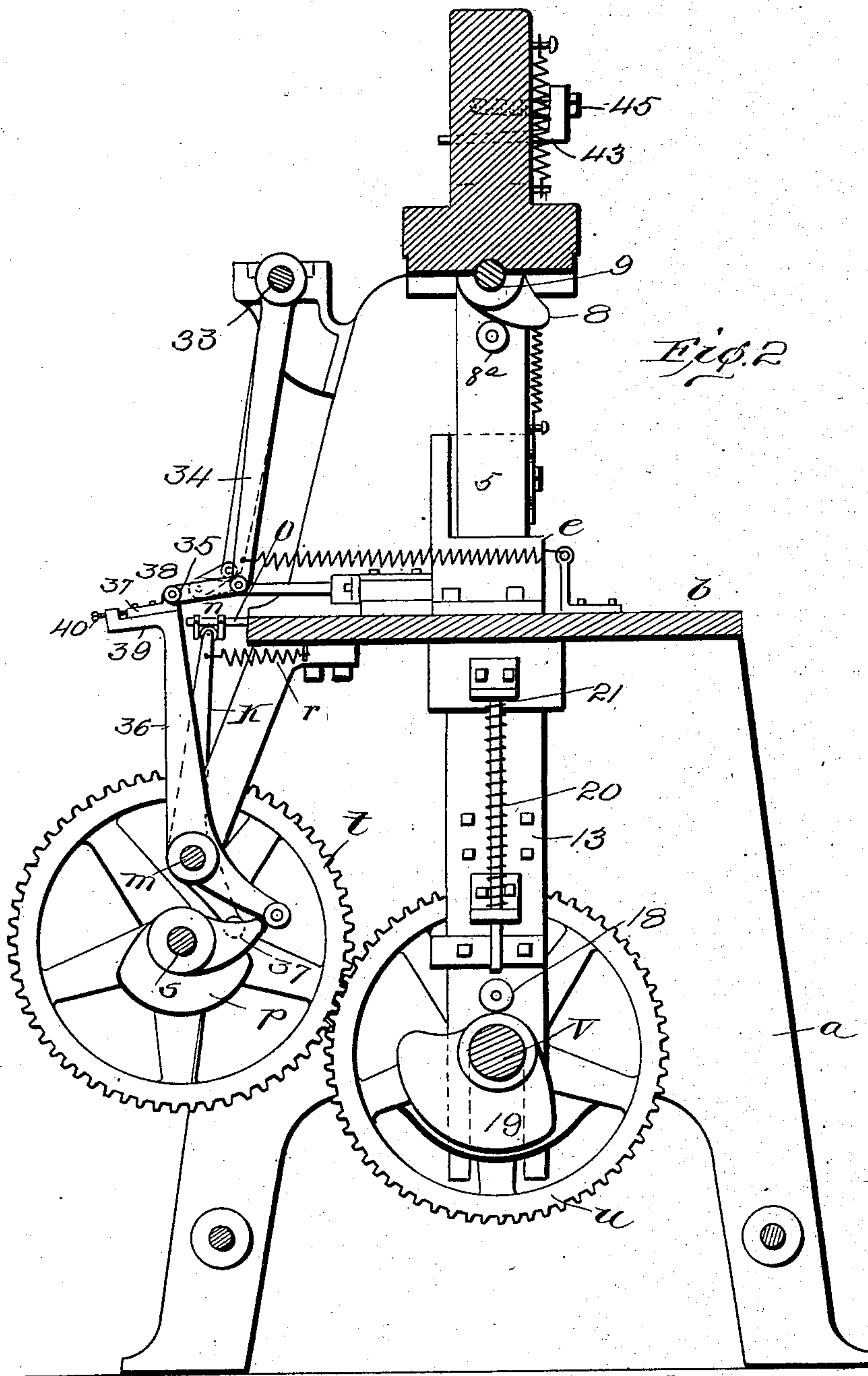
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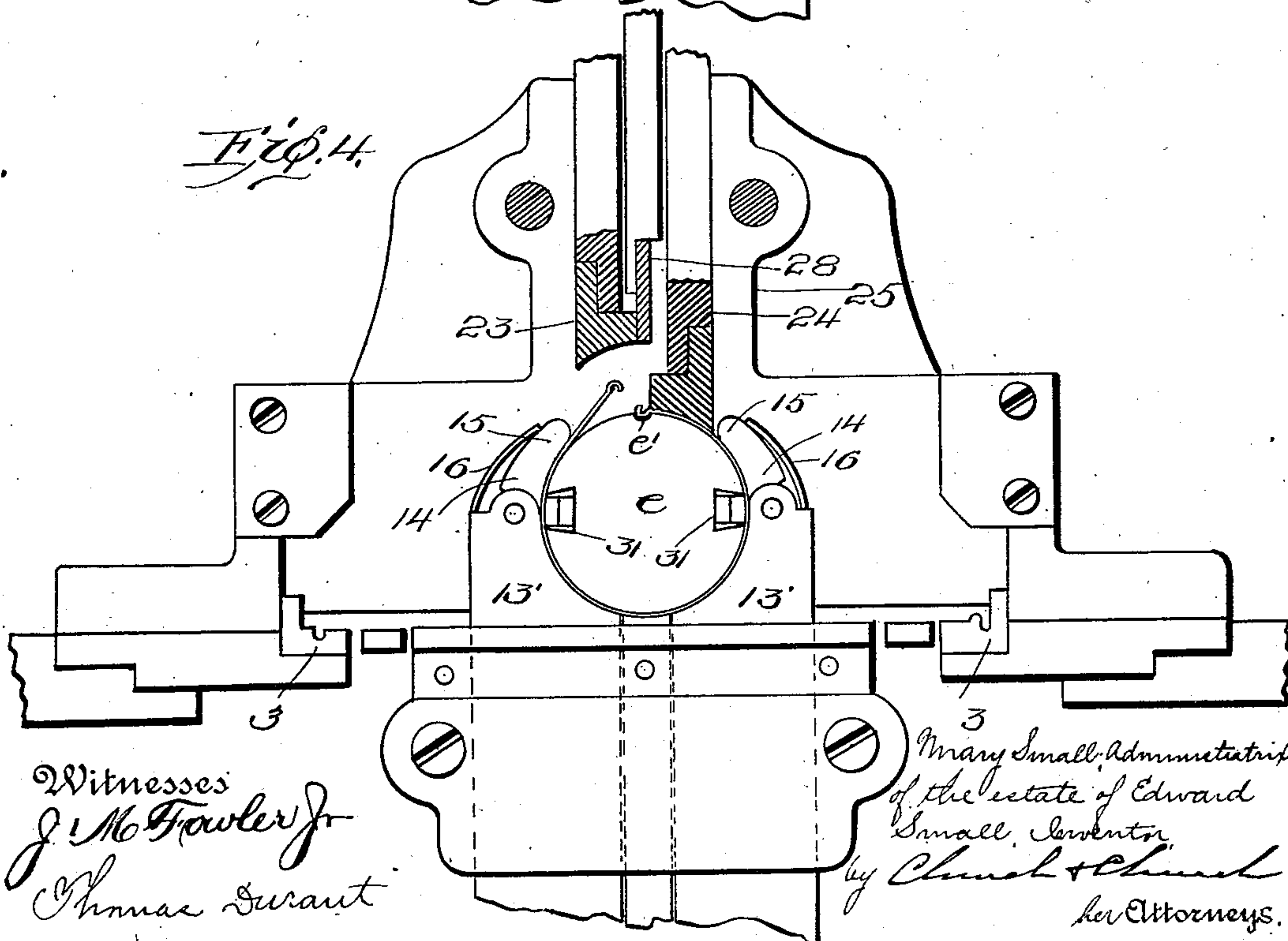
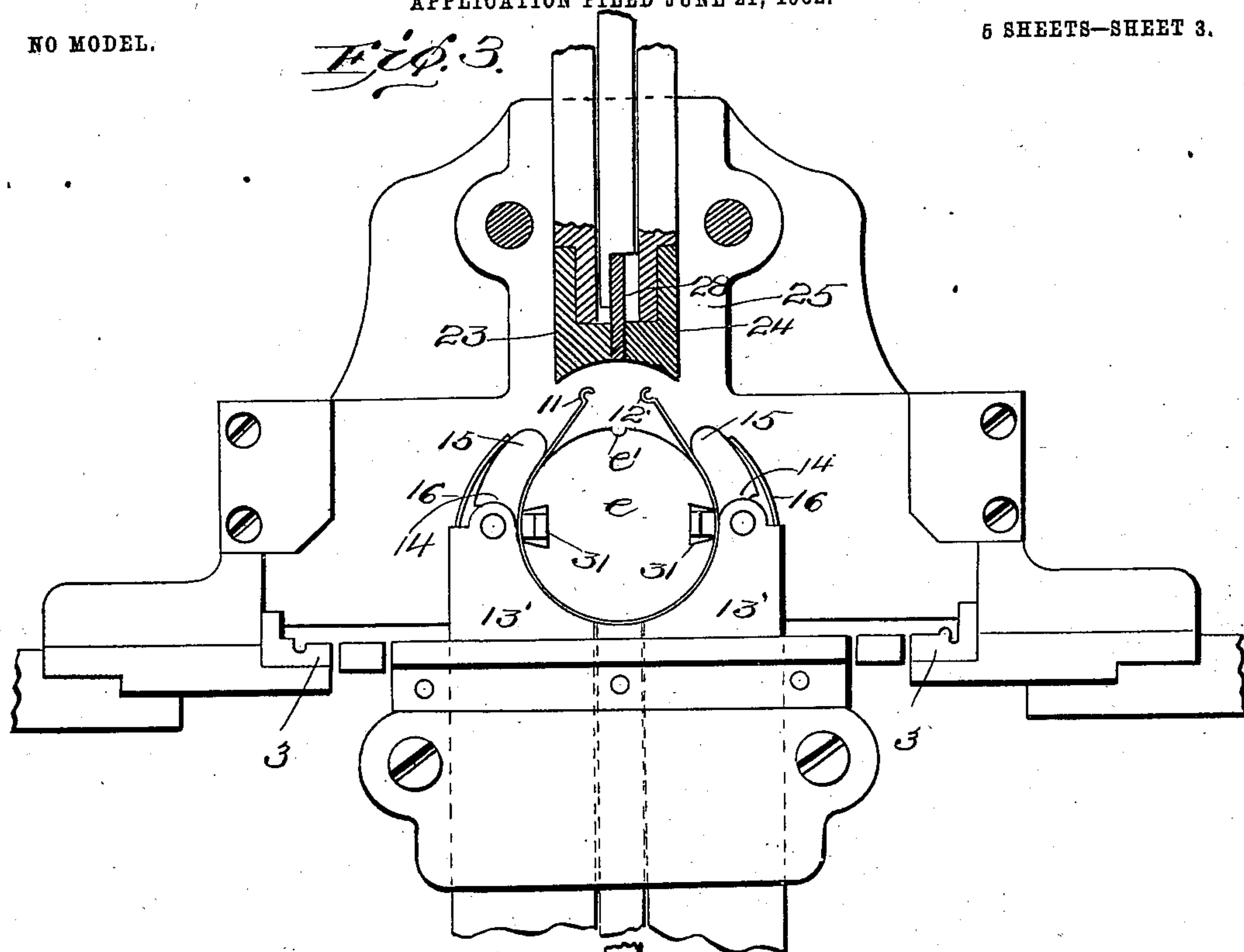
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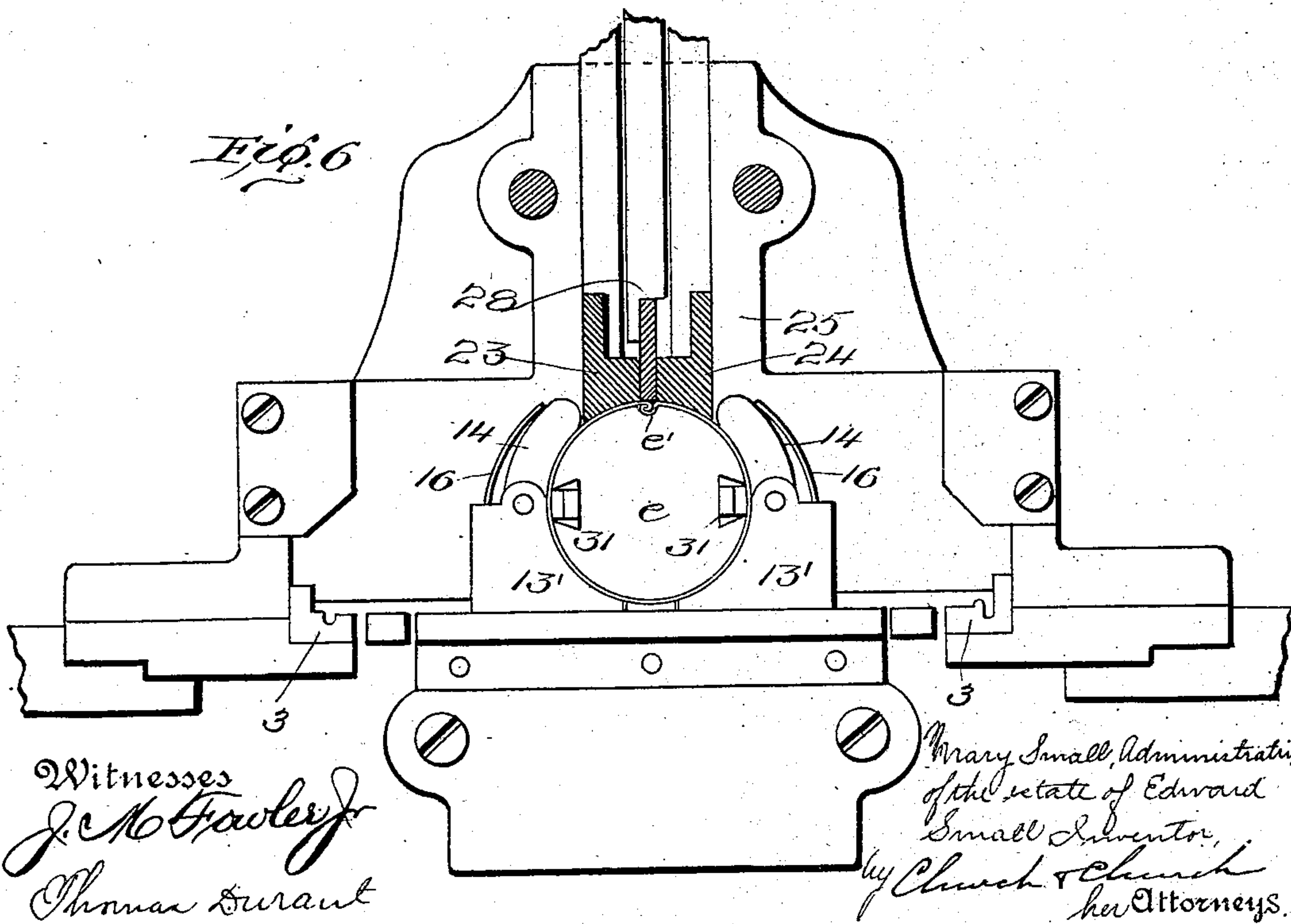
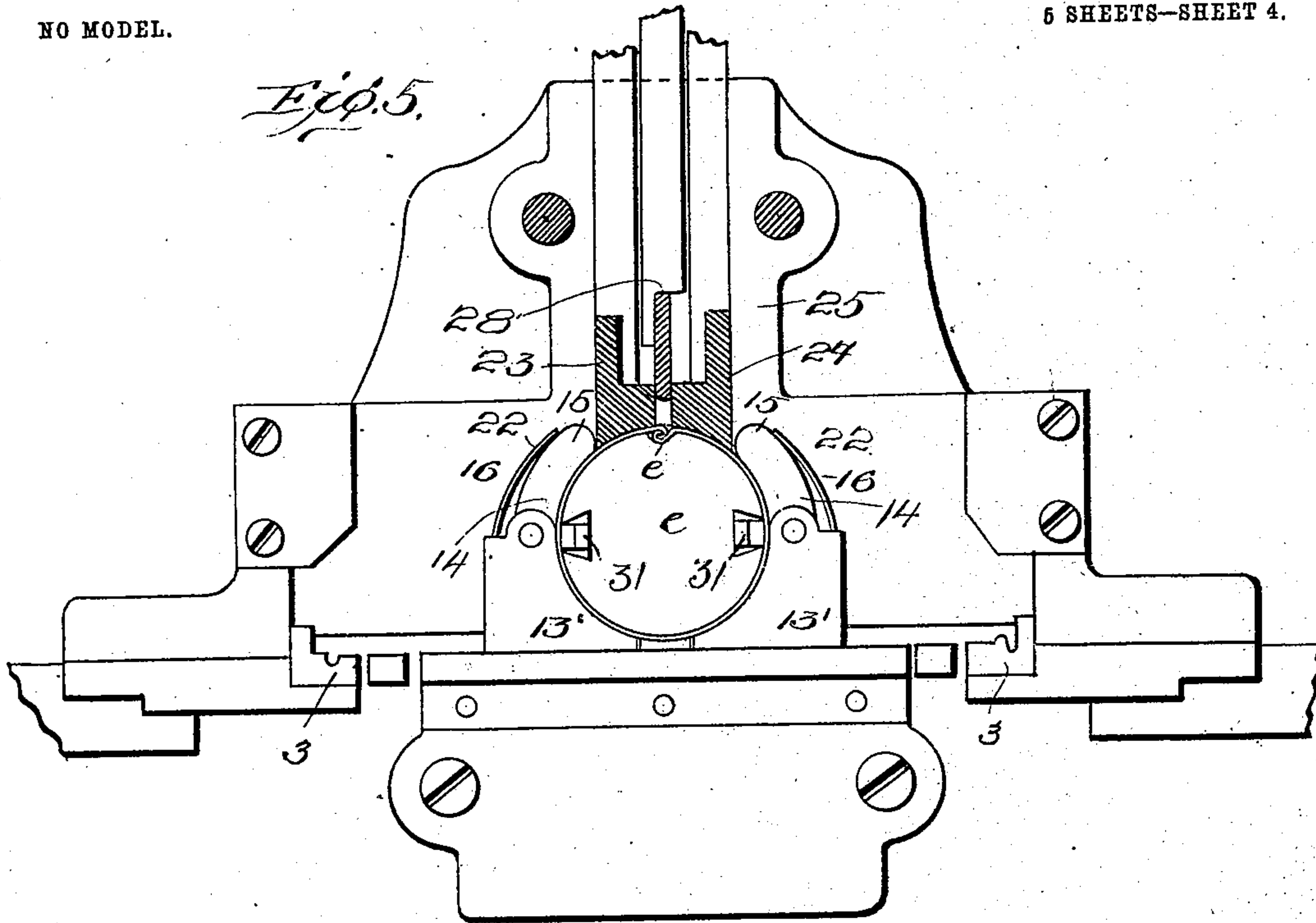
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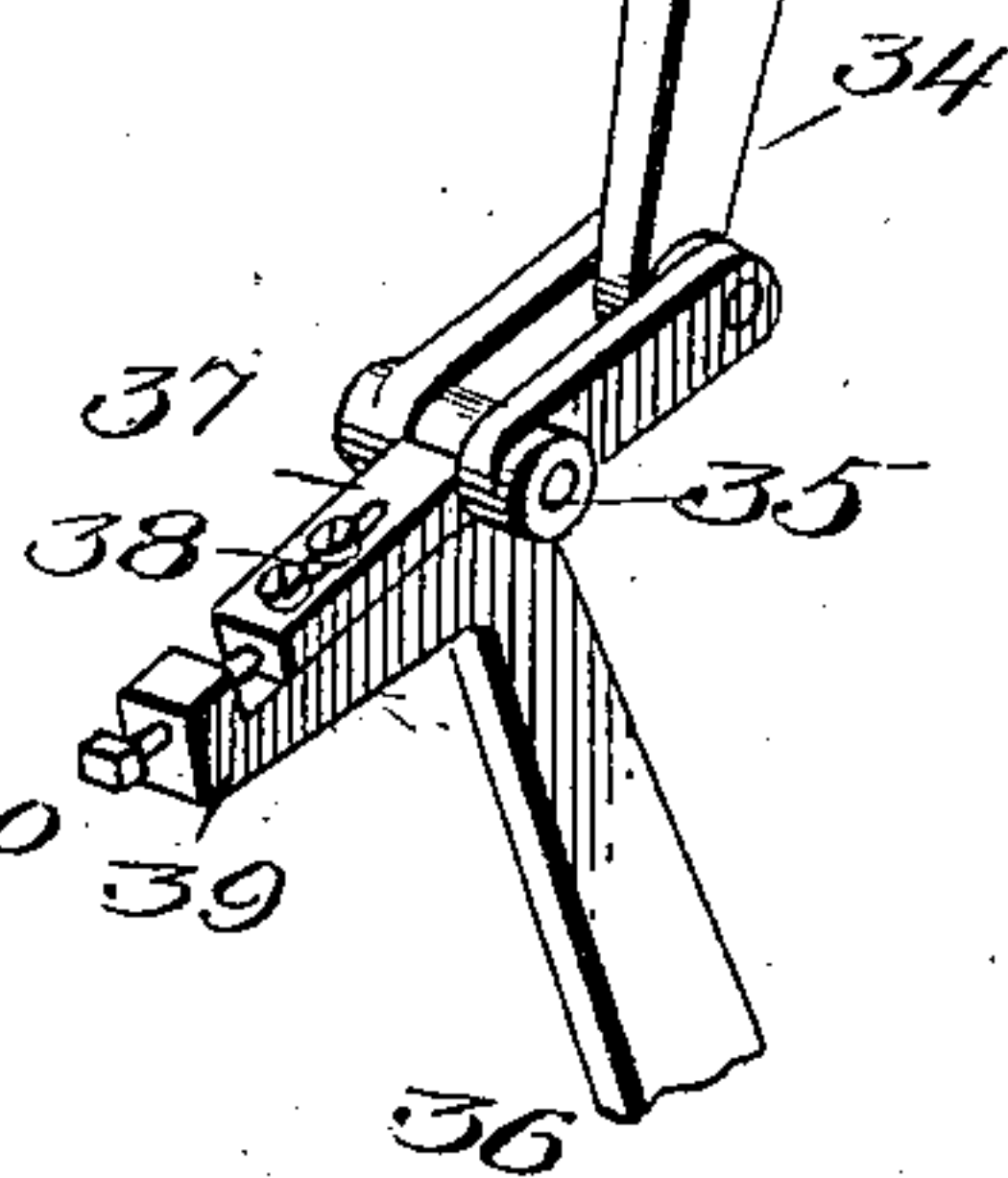
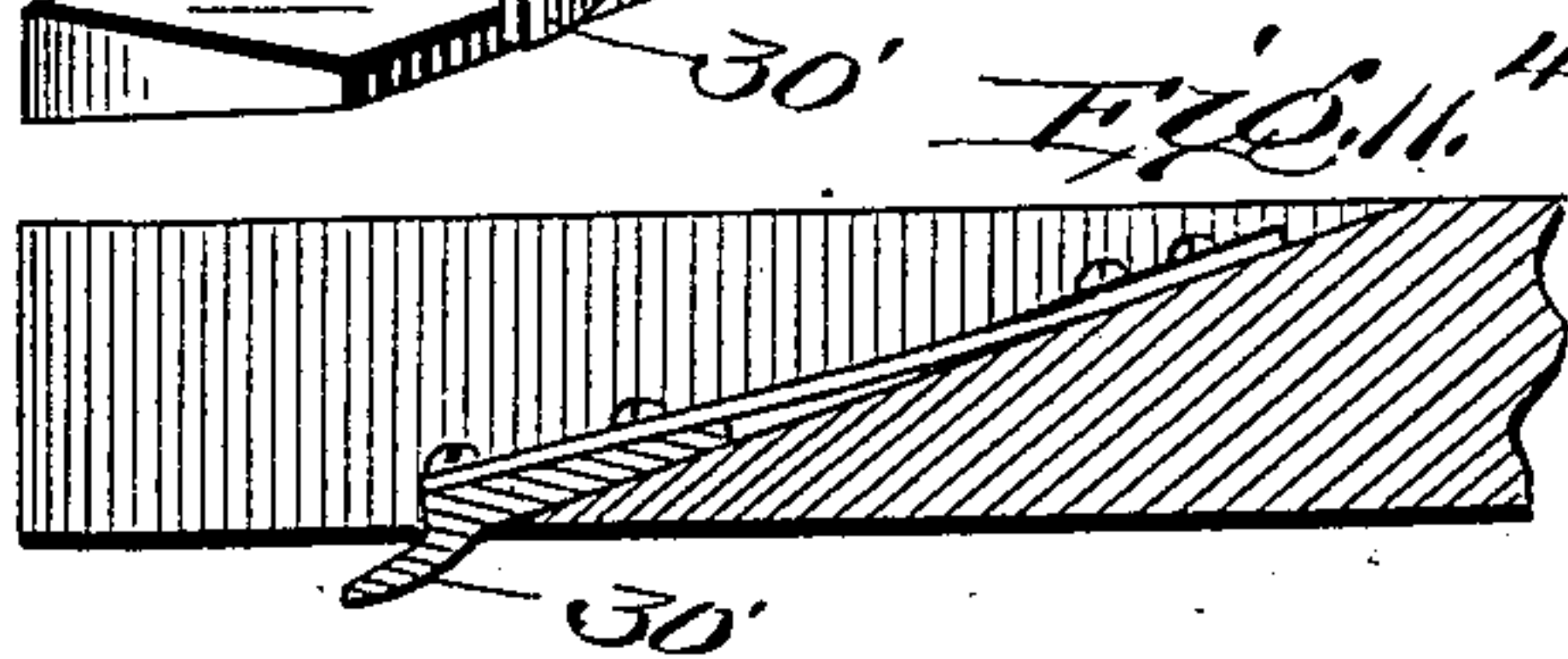
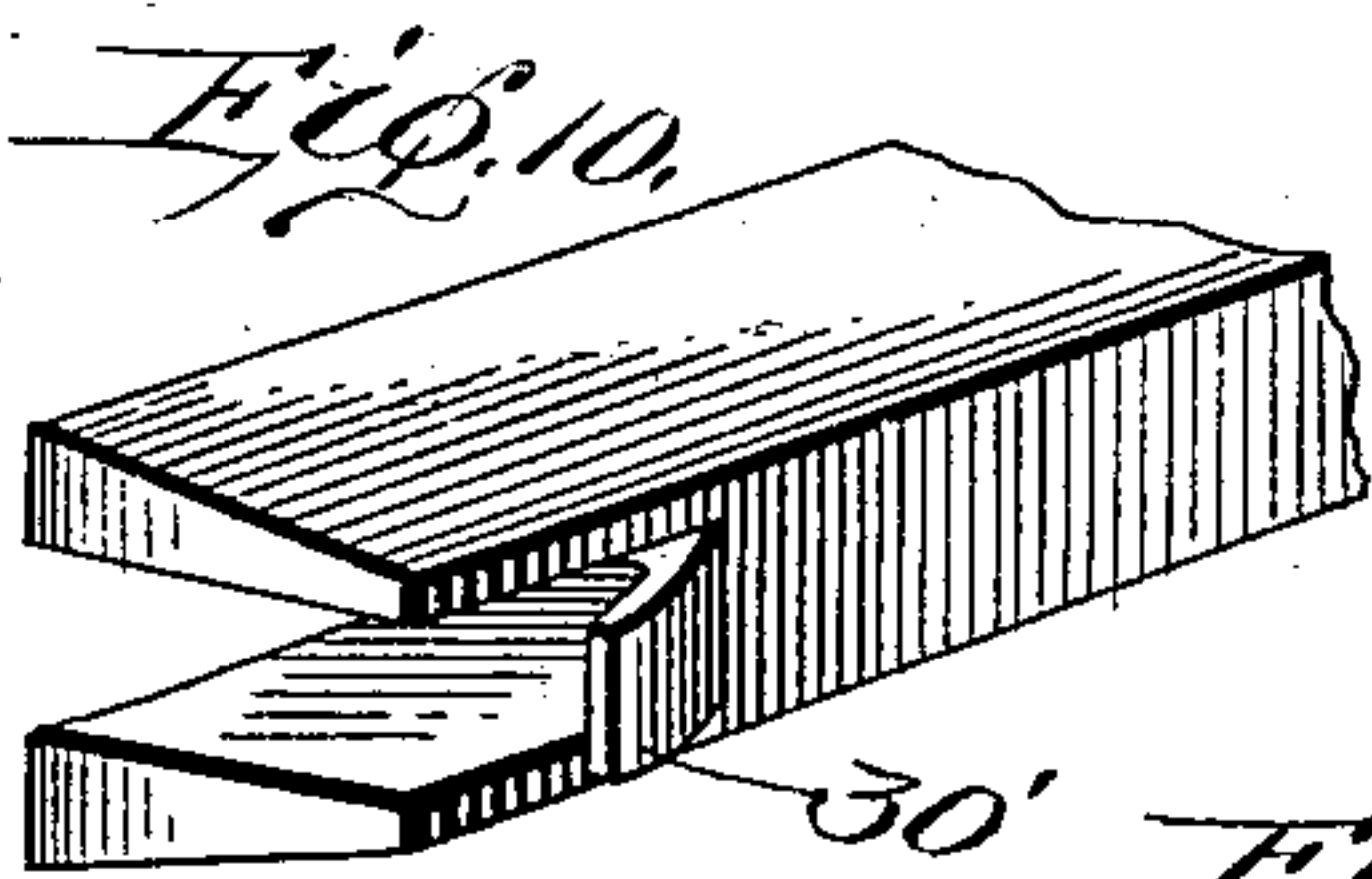
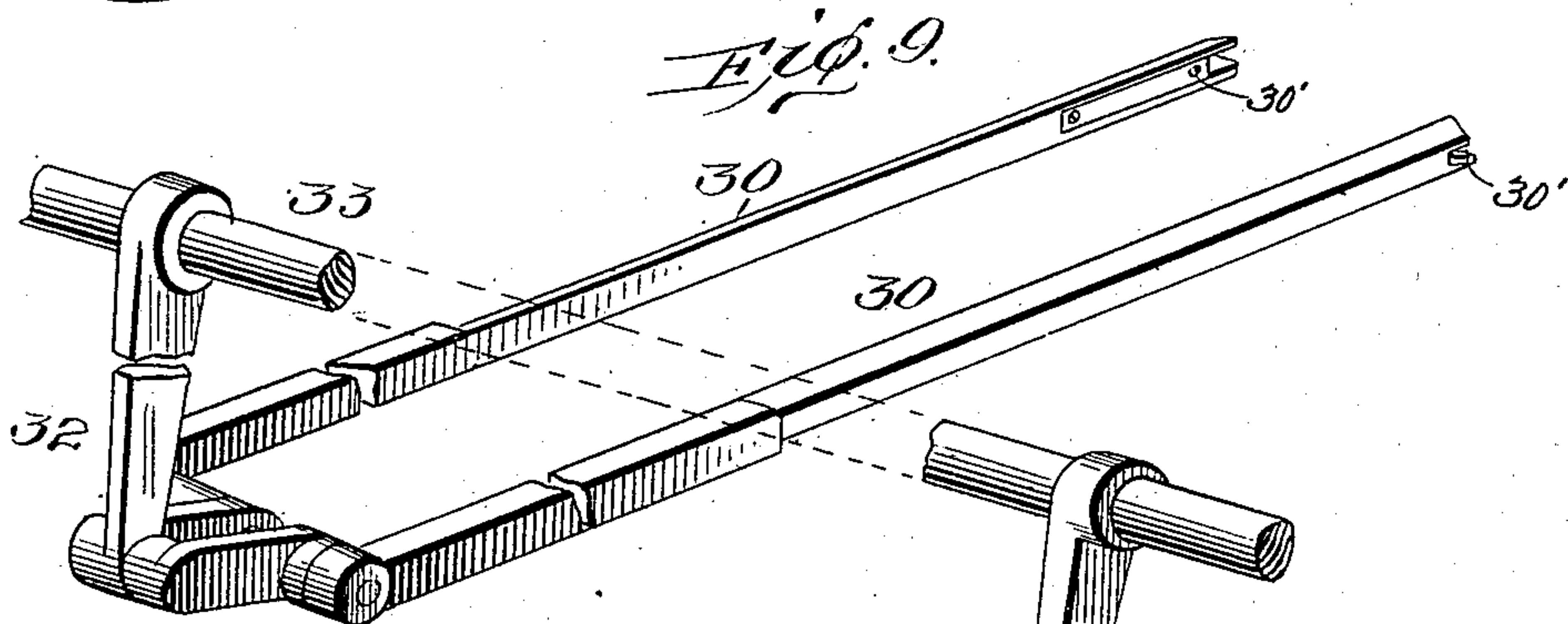
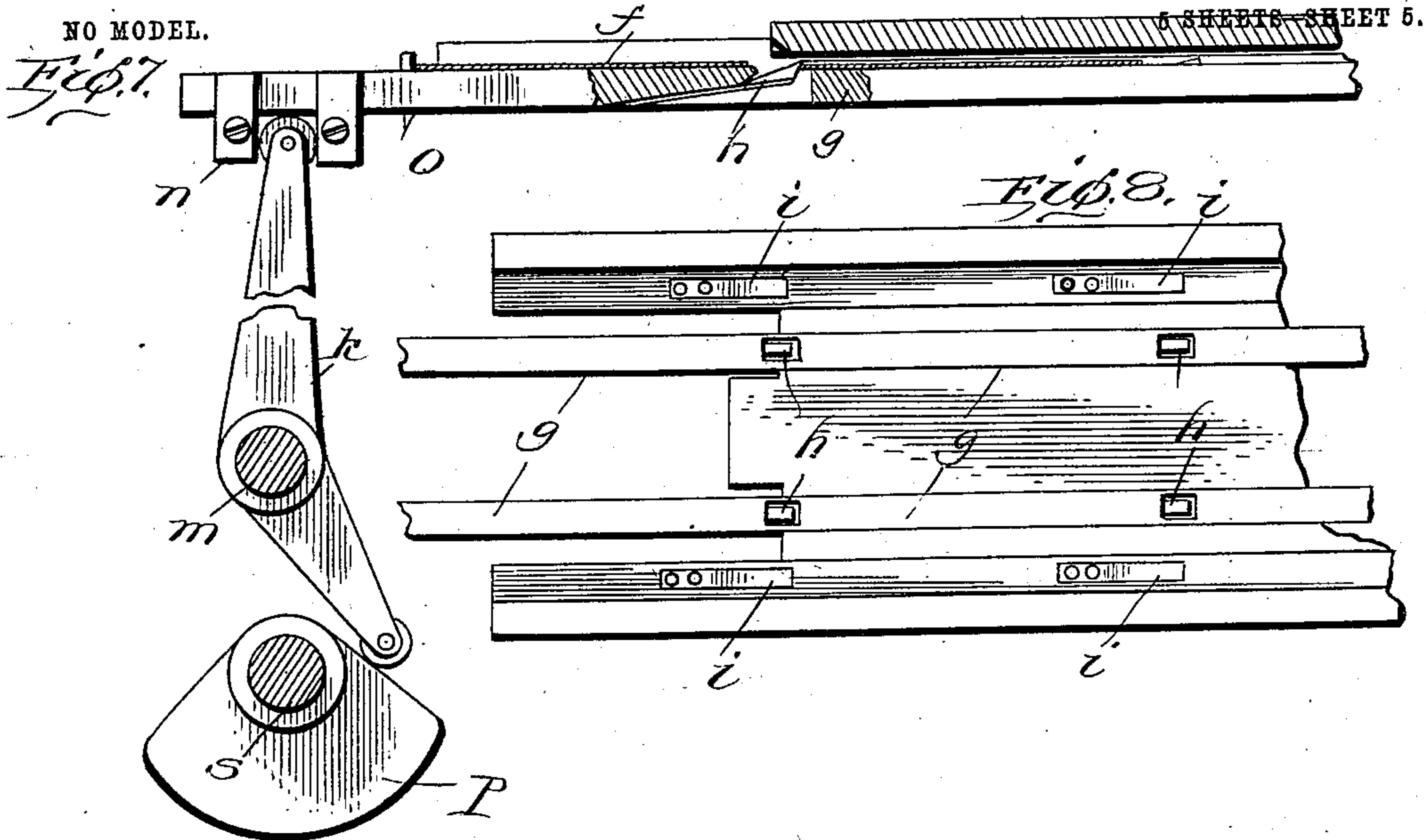
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UNITED STATES PATENT OFFICE.

MARY SMALL, OF BALTIMORE, MARYLAND, ADMINISTRATRIX OF EDWARD SMALL, DECEASED.

CAN-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 725,886, dated April 21, 1903.

Application filed June 21, 1902. Serial No. 112,604. (No model.)

To all whom it may concern:

Be it known that EDWARD SMALL, deceased, late a citizen of the United States, and a resident of Baltimore, in the State of Maryland, did invent certain new and useful Improvements in Can-Making Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, and to the letters and numerals of reference marked thereon.

The invention relates to can-making machines, particularly to that type of machines designed to form the complete body of a can from a flat blank, in which means are provided for successively feeding flat can-blanks to mechanism for breaking the edges thereof, forming the blank about a mandrel or horn, interlocking the broken edges, crimping the same to form a side seam, and finally discharging the completed body from the horn or mandrel.

The invention aims to improve the general construction of such machines to the end that their efficiency may be enhanced, to simplify and increase the durability thereof, and to improve the product of the same.

To this end the invention includes the combination of parts and details of construction, which will be hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, which illustrate one embodiment of the invention, Figure 1 is a front elevation of the improved machine. Fig. 2 is a cross-sectional view of the same, taken on the line 1 1. Fig. 3 is a detail end view of the mandrel and formers associated therewith, showing the upper formers in raised position. Fig. 4 is a similar view showing one of the upper formers lowered upon the blank. Fig. 5 is a view showing both of the upper formers in lowered positions. Fig. 6 is a view similar to Fig. 5, showing the crimping-bar in lowered position. Figs. 7 and 8 are detail views of the blank-feeding mechanism, and Figs. 9, 10, and 11 are detail views of the ejecting-fingers and the carrier and operating mechanism for the same.

The main frame of the machine herein presented includes side standards or legs *a*, hav-

ing their upper ends connected by a top or platform *b*, from which rise two side standards *c*, supporting a yoke or arch *d*, which spans the same and is bolted to the upper ends thereof. From the top *b* a cylindrical mandrel or horn *e* is supported, about which the can-blanks are bent to form the same into cylindrical bodies. The blanks *f*, which are perfectly flat, are fed successively to and beneath the mandrel, from the rear thereof, by a reciprocating carriage. (Particularly shown in Figs. 7 and 8 of the drawings.) This carriage includes a pair of reciprocating bars *g*, guided in channels or ways in the top *b*, provided with flexible or resilient pushing-fingers *h*, located in slots in said bars and extending through the ends thereof to form projections above the faces of said bars. Each finger preferably comprises a spring-blade secured at one end within the slot in the bar with which it is associated, while its free end extends through said slot and is surmounted with a head having an inclined or beveled upper surface and a front face arranged substantially at right angles to the face of the bar. The fingers are arranged in pairs spaced a distance apart slightly greater than the width of the body-blank. Associated with each pair of fingers is a pair of fixed stops *i*, having engaging ends and inclined upper surfaces, the said ends being arranged in alinement with or slightly to the rear of the extreme forward position reached by the pair of fingers in the forward reciprocation of the carriage with which they are associated. One of said stops is located to the outside of each finger.

In operation the blanks are fed by hand or automatically onto the carriage in advance of the rear pair of fingers *h* when said carriage is in retracted position or at the end of its rear stroke. Upon the forward reciprocation of the carriage the fingers will push the blank toward the mandrel, said blank riding over the pair of stops *i* in its path, and its rear edge will drop in advance of said stops as the carriage reaches the limit of its forward reciprocation. On the rear stroke or reciprocation of the carriage the blank will be held by said stops *i* and prevented from moving rearwardly with the former, while the suc-

ceeding pair of fingers *h*, or those in advance of the pair which have just fed the blank, will pass beneath said blank until near the end of the rearward reciprocation of the carriage, when they will pass beyond the rear edge of the blank and snap up to assume a position behind and in the plane of said edges. On the forward reciprocation of the carriage the blank will be again advanced, and this action is carried on continuously until the blank reaches a position below the mandrel. The carriage is reciprocated by a bell-crank lever *k*, pivotally supported upon a shaft *m*, having one member thereof provided with a friction-roller working between studs *n*, depending from an arm *o*, extending from the carriage, and its other member provided with a friction-roller with which an operating-cam *p* engages to rock the same against the tension of a spring *r*, connected at one end to a pin depending from the top *b* and at its other end to the vertical member of said lever *k*. The cam *p* is carried by a cam-shaft *s*, provided with a gear-wheel *t*, in mesh with a gear-wheel *u*, fixed to a main cam-shaft *v*, driven from the main drive-shaft *w* of the machine by suitable interposed gearing. When the flat blank reaches a position directly below the mandrel *e*, a cam *l* on the shaft *v* coacts with a friction-roller in the end of a sliding bar *2* and forces the latter upwardly to clamp the blank against the mandrel, and thereby hold the same against movement while the edges thereof are being broken by suitable dies. The dies disclosed in the drawings comprise fixed female members *3* and movable male members *4*, carried by rods or stems *5*, guided in brackets *6*, which are depressed against the tension of lifting-spring *7* by cams *8*, secured to a counter-shaft *9*, journaled in the standard *c* and driven from the shaft *v* by suitable interposed gearing *10*. The cams *8* engage projections, as rollers *8^a* on the stems *5*, once during each rotation of the shaft. On the depression of the die members *4* the edges of the blank are broken or bent to form oppositely-turned hooks *11 12*, as clearly shown in Fig. 3. As soon as the dies *4* are retracted the blank is partially bent about the mandrel *e* by a bottom sectional former *13*, which comprises a head portion *13'* of a length substantially equal to that of the blank, said head having a concave channel or seat therein concentric with the periphery of the mandrel and of a depth substantially equal to one-half the diameter of the same. To each side of the head *13'* a wing *14* is pivotally connected, provided with an inner face conforming to the periphery of the mandrel and providing a continuation of the forming-face of the head *13'*. The wings are provided with noses or rounded free ends *15*, and with each wing a suitable leaf-spring *16* is associated, which tends to press the wings inwardly. The head *13* is guided in suitable vertical ways below the mandrel and is provided with depending bars

17, having forked ends engaging the shaft *v*, which form a guide for the same, and laterally-extending rollers *18*, with which cams *19*, fixed to the shaft *v*, coact to lift said bars, and therethrough the bottom former, against the tension of springs *20*. The latter find bearings between brackets *21*, fixed to a stationary part of the top *b* and to the bars *17*, respectively, and they are guided and maintained in position by stems depending from the upper brackets *21* and passing through openings in the lower companion brackets. The lower former *13* is raised just after the edges of the blank are broken, and as the wings *15*, carried thereby, strike against the slightly convex surface of the blank they are by reason of the rounded ends or noses *15* deflected outwardly or spread apart against the tension of the springs *16*, and thus pass around the mandrel without checking the operation of the machine. After the wings have passed above the center of the mandrel or above a horizontal plane extending through the axis thereof they are forced in by the springs *16* and assist in pressing the blank against the periphery of said mandrel. The edges of the blanks extending beyond the ends of the wings being free extend off or project tangentially from the mandrel, as shown in Fig. 3, and to press the same against the latter a sectional upper former is provided consisting of independently-operating members *23 24*, movable in suitable guides in a bracket *25*. The members *23 24* are depressed against the tension of springs *26* by cams *27*, secured to the shaft *9*, and the operations of said cams are so timed that one member will be depressed in advance of the other. The periphery of the mandrel *e* is provided with a groove *e'*, extending longitudinally thereof, at a point directly above the axis of the same, and on the depression of the member *24* the edge of the blank having an upwardly-projecting hook is forced against the periphery of the horn, and said hook is seated in said groove. Directly thereafter the member *23* is depressed and the other edge of the blank forced against the mandrel and the downwardly-projecting hook *11* interlocked with the hook *12*. To clamp or crimp the interlocked hooked edges, a crimping-bar *28* is provided, which is guided between the members *23 24* and is operated by a cam *29* on the shaft *9*. The action of the latter cam is so timed that it will depress the bar *28* just after the edges *11 12* are interlocked, and thereby the latter are clamped together or crimped, as shown in Fig. 6. The body of the can being thus completely formed, it is then desirable to automatically eject or remove the same from the mandrel in order that another blank may be formed thereon and the operation before described carried on continuously.

The ejecting mechanism herein disclosed is best illustrated in Figs. 9, 10, and 11, and as therein shown it comprises a carriage in-

cluding a pair of reciprocating bars guided in channels 31, Figs. 3 to 6, extending longitudinally in the mandrel *e*, each bar being provided at the end thereof with a flexibly-supported pushing-finger 30'. Each finger comprises a spring-blade secured in a slot in the end of the bar with which it is associated, provided with a head the end of which projects beyond the outer face of the bar and presents a beveled or inclined side and a shouldered end. The bars are connected at their rear ends to the end of an arm 32, fixed to a rock-shaft 33, that is operated through an arm 34, connected by an adjustable link-coupling 35 to the end of one member of a bell-crank lever 36, which is operated by a cam 37 on the shaft *s*. The adjustability of the coupling 35 permits the throw imparted to the arm 34 by the lever 36 to be regulated and therethrough the paths of travel of the fingers 30' to be regulated or adjusted. The particular construction of adjustable coupling employed in the present embodiment of the invention includes a pair of pivoted links connected at one end to the arm 34 and at their opposite ends to an arm 37, provided with a longitudinal slot, through which binding-screws 38 pass for securing the same to a head on the end of the arm 36. This head is provided with a lateral extension 39, in which an adjusting-screw 40 is threaded and which finds a bearing on the end of arm 38. As the bars 30 are reciprocated rearwardly the inclined faces of the head 30', contacting with the side of the blank bent about the mandrel, force the fingers within the slots in the end of said bars, and thus they offer no obstruction to the free reciprocation of the carriage. At or near the end of the rearward reciprocation of said carriage the heads pass beyond the rear edges of the formed blank, when, under the tension of the springs carrying the same, they snap up in position to engage with said rear edge. On the forward stroke of the bars the fingers then act as pushers and eject the formed blank from the mandrel.

To brace shaft 9 and prevent the central portion thereof from buckling or bending under the pressure of the cams mounted thereon, a brace-bracket 41 is provided, which finds a bearing upon the under side of the yoke *d*, upon which it is adjustably mounted. This bracket is provided with depending fingers 42, engaging said shaft 9 between the cams mounted thereon. To adjust the bracket to take up wear, a wedge 43 is provided, which is forced in between the same and the yoke by screws 45, Figs. 1 and 2, and acts to hold the bracket against upward movement, and thereby prevents any springing of the shaft upwardly at the center. The bracket and wedge, in effect, constitute a brace between the frame and the intermediate part of the shaft to support the latter in proximity to each of the arms. The top of the bracket and wedge have extended flat contacting

faces, and thus no other holding means is necessary to retain the parts in position than the screws 45 and the recesses in which the shaft takes its bearing.

What is claimed is—

1. In a can-body-forming machine, the combination with a mandrel, means for feeding a flat blank thereto, and means for breaking the edges thereof, of a bottom former comprising yielding and rigid sections, a top former comprising successively-operating sections, and a crimping-bar, substantially as described.

2. In a can-body-forming machine, the combination with a mandrel, means for feeding a flat blank thereto, and means for breaking the edges thereof, of an upper former comprising successively-operating sections, and a crimping-bar located between said successively-operating sections, substantially as described.

3. In a can-body-forming machine, the combination with a mandrel, means for feeding a flat blank thereto, and means for breaking the edges thereof, of a bottom former comprising a rigid head and yielding sections associated therewith, a top former comprising successively-operating sections, and a crimping-bar, substantially as described.

4. In combination in a can-body-forming machine, a mandrel, means for feeding a flat blank thereto, a clamping-bar for clamping the blank to the mandrel, dies operating upon the opposite edges of the flat blank to break the edges of the same, a bottom former for bending said blank about the mandrel, said mandrel having a longitudinal groove therein, sectional dies for forcing the broken edges of the blank into said groove in interlocking positions, and a crimping-plate operating upon said interlocked edges, substantially as described.

5. In a machine for forming can-body blanks, and in combination, a main frame; a mandrel; a main cam-shaft; a supplemental cam-shaft operated therefrom; means for feeding a flat blank beneath said mandrel; edge dies for breaking the edges of the blank; a bottom former operated from said main cam-shaft; top formers, and a crimping-bar cooperating with the mandrel to interlock the edges and crimp the seam; cams for operating the dies, top formers and crimping-bar; an upper cam-shaft carrying said cams, driven from the main cam-shaft; and ejecting means for the body, said feeding and ejecting means for the completed body being operated from the supplemental cam-shaft, substantially as described.

6. In a machine for forming can-body blanks, and in combination, a main frame; a mandrel; a main cam-shaft; a supplemental cam-shaft operated therefrom; means for feeding a flat blank beneath said mandrel; a bottom former operated from said main cam-shaft; dies for breaking the edges of the blank and top formers, and a crimping-bar cooperating with the mandrel to interlock the edges and crimp the seam; cams for operat-

- ing the dies, top formers and crimping-bar; an upper cam-shaft carrying said cams, driven from the main cam-shaft; means for ejecting the completed body, said feeding and ejecting means comprising reciprocating carriages, means for operating said carriages including bell-crank levers, and cams on said supplemental cam-shaft for actuating said levers, substantially as described.
- 10 7. In a can-body-forming machine, the combination with a mandrel, means for feeding a blank thereto, and means for forming the same about the mandrel, of ejecting means for the formed body, including a pair of reciprocating bars guided in said mandrel, a flexibly-supported finger associated with the end of each bar, a rock-shaft, an arm secured thereto connected to said bars, a second arm depending from the said rock-shaft, a bell-crank lever with means for rocking the same, and an adjustable coupling between said bell-crank lever and said second arm, including a link and an arm carried thereby having a sliding connection with the head of said bell-crank lever, substantially as described.
- 20 8. In a can-body-forming machine, the combination with a mandrel, of a former, including a rigid head having a channel or seat therein concentric with the periphery of the mandrel, wings pivoted to opposite sides thereof having inner faces concentric with said mandrel, and rounded ends, and a spring associated with each wing for pressing the same inwardly, substantially as described.
- 30 9. In a can-body-forming machine, the combination with a frame, a mandrel, and means for feeding flat blanks successively thereto, a main cam-shaft, a bottom former, bars depending therefrom having forked ends straddling said shaft, cams on said shaft, and co-acting rollers on said bars, brackets carried by said bars and companion fixed brackets, springs interposed between the same, a clamping-bar operated from said main cam-shaft, movable dies operating upon the edges of said blank, a second cam-shaft driven from the main cam-shaft, means carried thereby for operating said dies, an upper former, means operated from the upper cam-shaft for depressing the same, a crimping-bar and means operated by said second cam-shaft for depressing the latter, substantially as described.
- 40 10. In a can-body-forming machine, the combination with a frame, comprising a bottom portion, side standards and a yoke connecting the same, of a mandrel, blank-feeding mechanism, means located above the blank for operating upon the same, a cam-shaft journaled in said standards, cams secured thereto for actuating the latter means, and a bracing device for said shaft, including a bracket adjustably connected to said yoke, and depending fingers engaging said shaft, substantially as described.
- 50 60

MARY SMALL,

Administratrix of the estate of Edward Small,
deceased.

Witnesses:

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CARROLL T. BOND.