No. 749,149. PATENTED JAN. 12, 1904.

J. S. BANCROFT.

CENTERING MECHANISM.

APPLICATION FILED MAY 20, 1903.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 1.

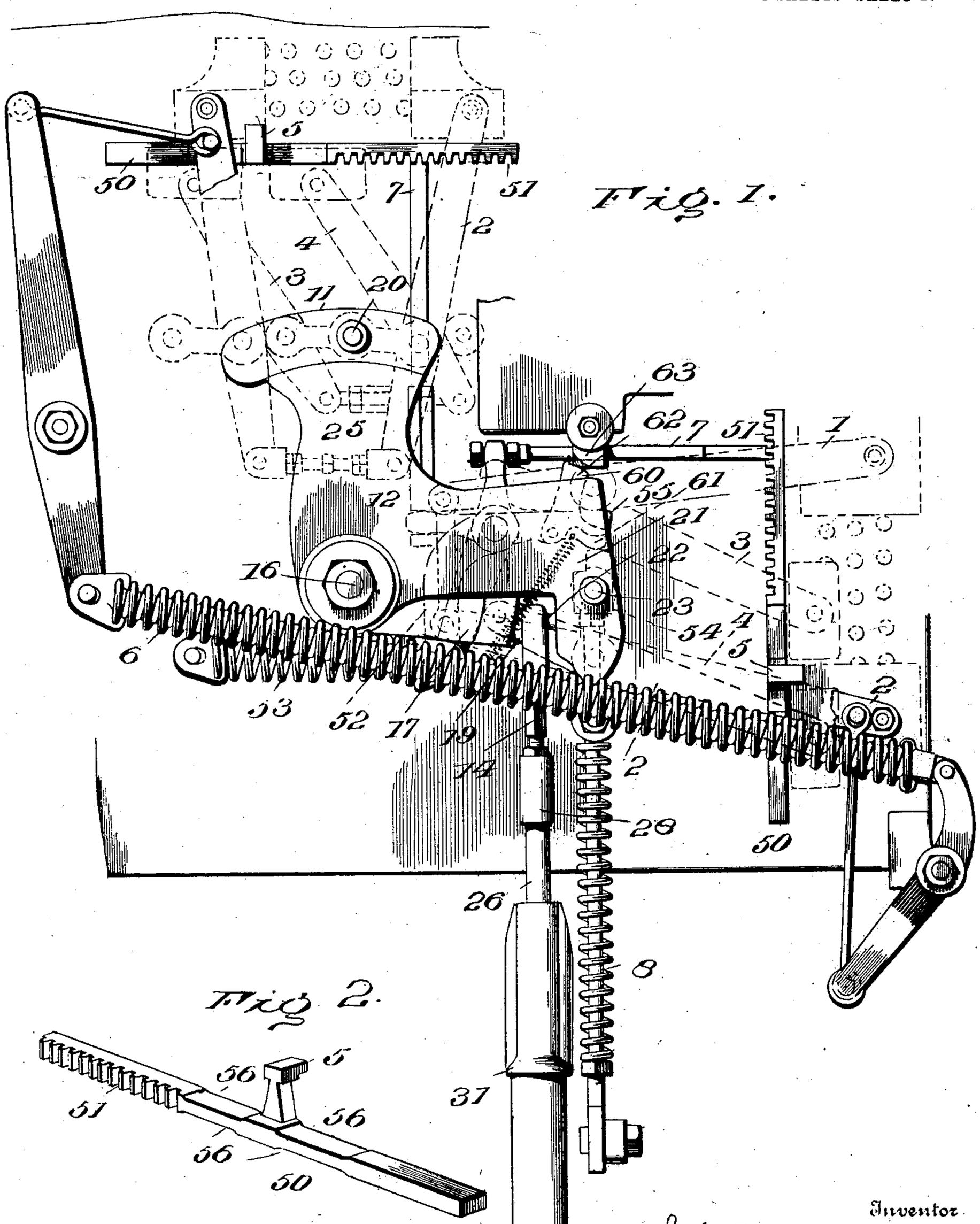

Fig. 2.

Witnesses

Jno. Purcell

Thomas Durant

Inventor

John Sellers Bancroft

by Church & Church

his Attorneys

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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 3.

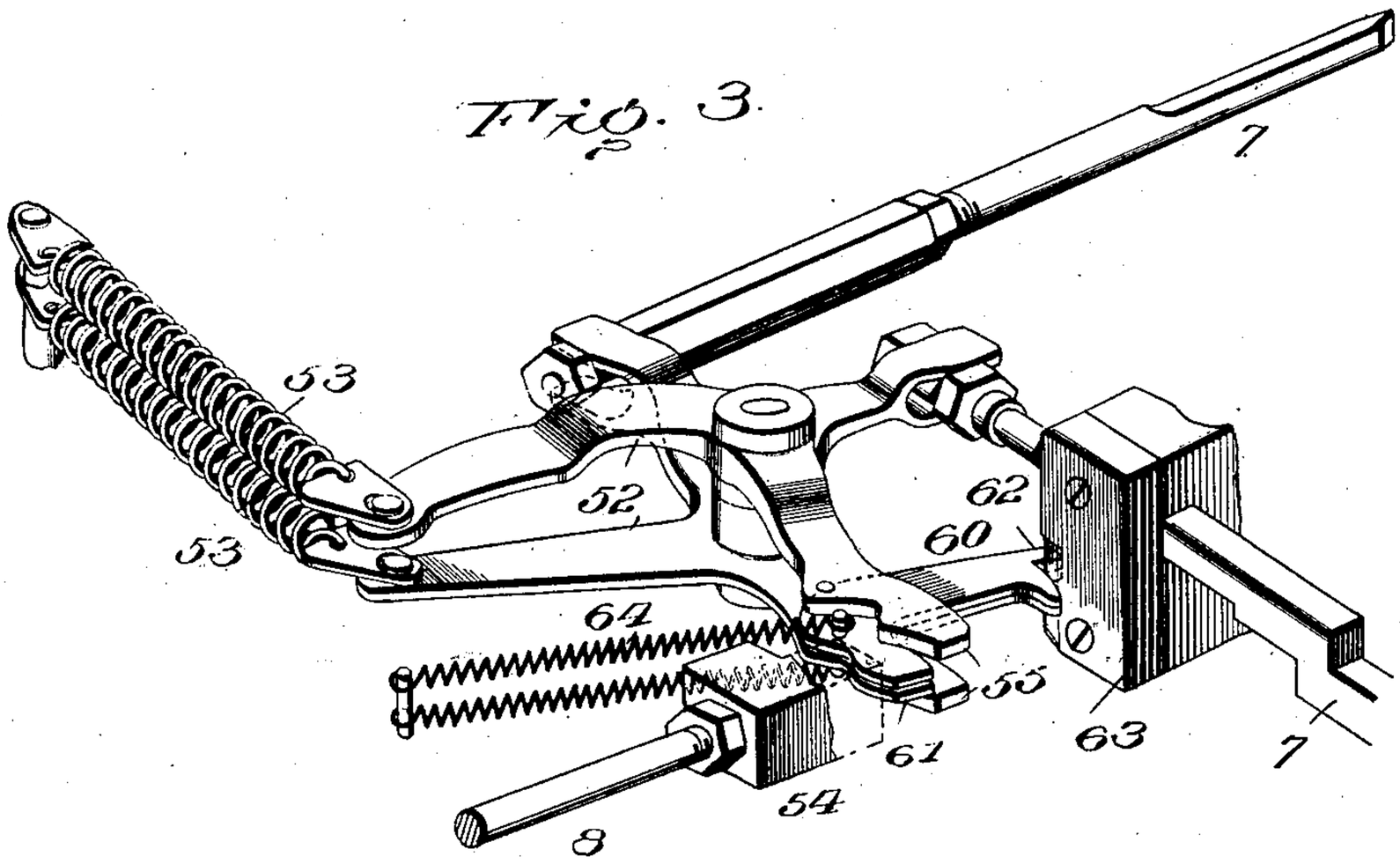

Fig. 4

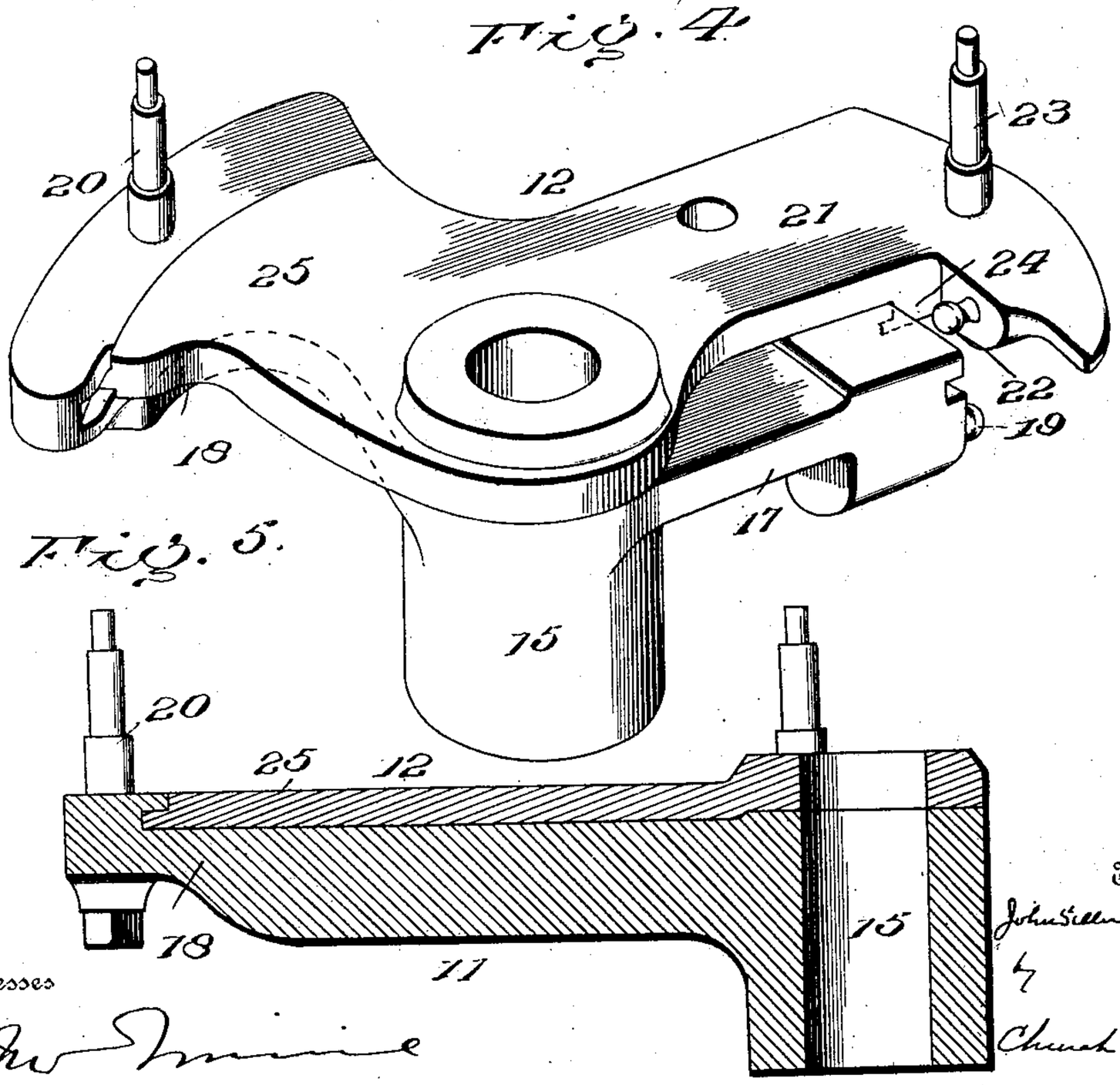

Fig. 5.

Witnesses

Inventor

John Sellers Bancroft

by Church & Church

Attorneys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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NO MODEL. 3 SHEETS—SHEET 3.

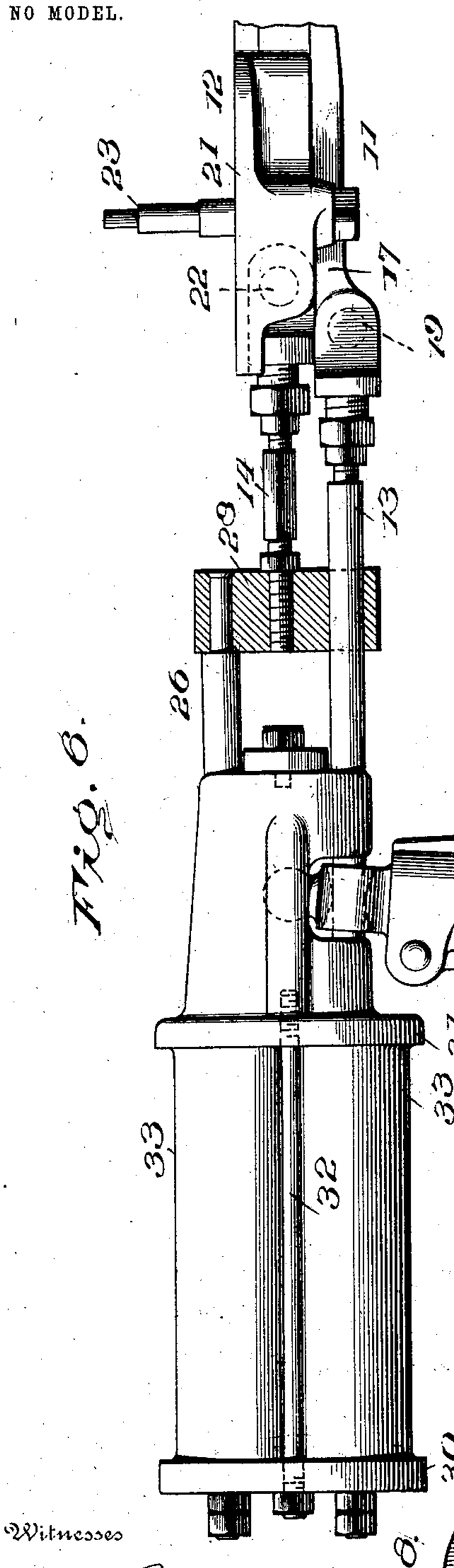

Fig. 6.

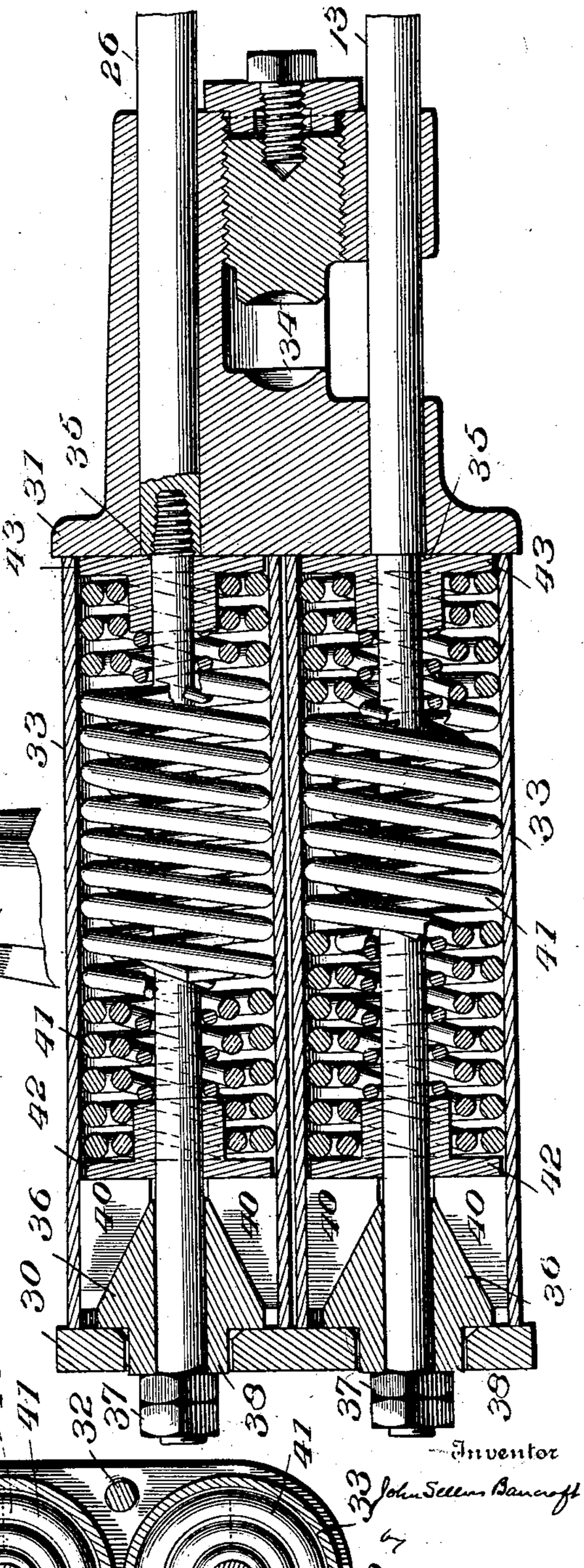

Fig. 7.

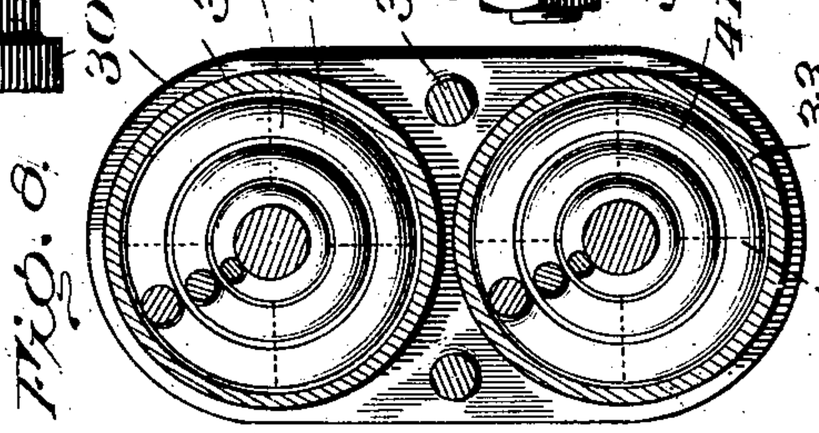

Fig. 8.

Witnesses

Jno. Imrie
Thomas Durant

Inventor
John Sellers Bancroft
by
Church & Church
his Attorneys

No. 749,149. Patented January 12, 1904.

UNITED STATES PATENT OFFICE.

JOHN SELLERS BANCROFT, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO LANSTON MONOTYPE MACHINE COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF VIRGINIA.

CENTERING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 749,149, dated January 12, 1904.

Application filed May 20, 1903. Serial No. 157,978. (No model.)

To all whom it may concern:

Be it known that I, JOHN SELLERS BANCROFT, of Philadelphia, in the county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Centering Mechanism; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the figures of reference marked thereon.

This invention relates to improvements in or pertaining to the die-case-centering mechanism of Patents Nos. 625,998 and 674,376, and it has for its principal objects to facilitate the initial adjustment of the positioning mechanisms and prevent interference one with the other by providing each with a separate actuating mechanism connected to the prime mover or lever; to prevent distortion of or injury to the primary positioning mechanism and its actuating devices and render the latter self-accommodating by so constructing and arranging the elements of the spring-box that the compression-spring will be operative during the closing of the primary positioning jaws; to render the action of the final positioning-bolt more certain and prevent its accidental displacement when in engagement with the secondary controller by the application of automatic locking devices for retaining said bolt in adjusted position during the action of the positioning mechanism; to preserve or prolong the life of the stop-bar forming the secondary controller or gage by increasing its elasticity in the vicinity of the stop, so that it may yield slightly under the impact of the jaws of the positioning mechanism, and generally to improve the mechanism as a whole and render it more efficient, all as hereinafter fully described, the novel features being pointed out in the claims.

In the accompanying drawings, illustrating a preferred form of embodiment of the invention, Figure 1 is a top plan view of the die-case-centering mechanism with the improvements applied thereto. Fig. 2 is a perspective view of the improved stop-bar. Fig. 3 is a perspective view of the locking mechanism for the final positioning-bolts. Fig. 4 is a perspective view, and Fig. 5 is a sectional view, of the duplex actuator for transmitting motion to the two sets of positioning mechanism. Fig. 6 is a side elevation, partly in section, Fig. 7 is a longitudinal section, and Fig. 8 is a transverse section, of the duplex spring-box.

Similar numerals in the several figures indicate like parts.

The die-case or matrix centering mechanism with which the present improvements are shown associated is that of Patents Nos. 625,998 and 674,376, to which latter reference may be had for a description of its general construction and functions, only such parts as are immediately connected with the present improvements being indicated in the drawings. These are the levers 1 2 of the two primary positioning mechanisms, the levers 3 4 of the two secondary positioning mechanisms, the stops 5 of the secondary controller-gage, the retracting-spring 6 of the primary positioning mechanisms, the final positioning-bolts 7 of the secondary controllers or gages, the actuating-rod 8 for bolts 7, the prime mover or lever 9 for driving the positioning mechanisms, and a portion of the main frame. The following brief outline of the action of some of these parts may serve as an aid in understanding the objects sought and accomplished by the present invention.

The die-case to be adjusted is controlled in its movements or position by two sets of control mechanism operating on intersecting lines and each determining position in one direction. Each set comprises a primary controller consisting of a series of stop-pins serially arranged; a primary positioning mechanism, comprising a pair of oppositely-moving jaws attached to the outer ends of levers 1 2, which close upon the indicating stop-pin; a secondary controller in the form of a bar provided with a stop 5, which stands between said jaws and is brought to position thereby; a final po-

sitioning-bolt 7, which is advanced to lock the secondary controller in adjusted position, and a secondary positioning mechanism in the form of jaws connected to the outer ends of levers 3 4, said jaws closing upon the stop 5 of the secondary controller and upon a connection with the die-case to bring the latter to the position designated by stop 5.

In the prior machines the levers 1 2, 3 4 of both positioning mechanisms were connected to and derived motion from a single bell-crank lever, which in turn was connected to the prime mover 9 through a compound elastic and frictional coupling, as described in Patent No. 674,376. It resulted from this arrangement that great care and skill were required in locating centers and proportioning parts in order that the two systems might work in harmony, for what affected one affected all. Thus the adjustments for regulating the closing of the primary positioning-jaws (connected to levers 1 2) or the secondary positioning-jaws (connected to levers 3 4) had to be performed in proper relation not only to the movements of the actuating-lever, but also to that of the complementary set of positioning-jaws. Moreover, the reactions due to inertia and elasticity directly affecting one positioning mechanism were transmitted to the other through the lever of the actuating mechanism. To remedy these and other minor defects, each set of control mechanism is furnished with a separate actuator, intermediate levers 1 2, 3 4, and the prime mover 9 common to all and from whence their respective movements are derived, so that the levers of one positioning mechanism may be set or adjusted independently of the complementary mechanism and without interference with the latter as to movement or position. To this end each set of levers 1 2, 3 4 is connected to one of a pair of levers or actuators 11 12, and the latter in turn are connected to the prime mover 9 through rods 13 14 and separate spring-boxes, as hereinafter described.

The two actuators 11 12 are designed to occupy the place of the single bell-crank actuator of existing machines. Hence they are so arranged that when united they simulate the form of the single bell-crank. In the preferred form shown the actuator 11 comprises a hub 15, bored to receive the pivot 16, and two arms 17 18, one furnished with a spherical bearing 19 for the reception of a socket member on driving-rod 13 and the other with a pin 20 for the driving-links of levers 1 2, 3 4.

Actuator 12, located above 11, is provided with a pivot-bearing and two arms, the one, 21, carrying a spherical bearing 22 and the pin 23 for the attachment of driving-rod 14 and the driving-links, respectively, and provided with an offset 24, whose inner face is arc-shaped and furnished with a rib fitted to a corresponding grooved bearing-face on the end of arm 17 of actuator 11, while the other arm, 25, is furnished with an arc-shaped outer face provided with a longitudinal rib or spline and fitted to the corresponding inner face of an offset portion of arm 18. The arc-shaped bearings are struck from the axis of pivot 16, and the arrangement is designed especially to prevent lateral displacement of the actuators, at the same time permitting independent circular motion about the axis of pivot 16.

To the prime mover or lever 9 are connected the two spring-boxes, one for each actuator 11 12 and acting upon the latter through rods 13 14, the one directly and the other indirectly, through a rod 26, carrying a cross-head 28, guided upon rod 13, said rods being provided with suitable adjusting devices for varying the positions of the actuators.

The two spring-boxes are substantially identical in construction so far as their active elements are concerned, and for convenience they are united in a single structure constituting what may be termed a "duplex spring-box."

Interposed between end blocks or heads 30 31 and held in position by tie rods or bolts 32, uniting said heads, are two casings 33, preferably cylindrical, each containing one of the spring-box mechanisms. The head 31 is recessed laterally for the passage of lever 9 and is provided with a central spherical bearing 34 to receive the spherical head of said lever.

Extending longitudinally through head 31 and preferably at equal distances on opposite sides of the bearing 34 are two parallel bearings for the reception and passage of rods 13 and 26. Each of said rods is reduced in diameter beyond the inner face of head 31 to form a shoulder 35, and each rod carries on its outer end a wedge in the form of a cone 36, with its base adjacent to head 30. For the purpose of supporting and guiding the outer ends of the rods and permitting ready access to the nuts 37 the cones 36 are provided with cylindrical or other shaped extensions 38, extending through openings in head 30, and the rods are extended through said extensions beyond the head.

Located within and at or near one end of the casing is a friction member composed of cone 36 and a series of wedge-blocks 40 interposed between said cone and the inner surface of the casing, the blocks 40 having inner inclined faces corresponding to those of the cone or wedge 36 and outer surfaces parallel and in contact with the interior of the casing. A tensioning-spring 41 (preferably comprising two or more springs nested together, as shown) bears at one end against the bases of the wedge-blocks 40, either directly or through an interposed loose plate or collar 42, the opposite end engaging a loose collar 43 on shaft 13 or 26, said collar taking its bearing upon shoulder 35.

Spring 41 is under initial tension and serves normally to retain cone 36 in contact with head 30 and collar 43 in contact with head 31, so that when the spring-box is reciprocated by lever 9 its motion will be transmitted undiminished as to time and extent to the rods 13 and 26, providing the resistance encountered is less than the pressure exerted by the spring. The tension of spring 41 is precalculated to maintain this relation under normal conditions; but should any unusual obstruction be encountered or the resistance to the movemedt of levers 1 2 be unduly increased, as by a slight displacement of centers or inaccurate proportioning of parts, the spring will yield, permitting a retardation or stoppage of rods 13 or 26 and the parts driven thereby, while the lever 9 continues its movement. This action takes place during the forward movement of lever 9, when the outer ends of levers 3 4 are separated and those of levers 1 2 drawn together to close the jaws of the primary positioning mechanism upon the primary controller or stop-pin and move the secondary controller 5 to position.

During the opposite or return motion of lever 9, when the outer ends of levers 3 4 are caused to approach and in so doing close the jaws of the secondary positioning mechanism upon the secondary controller, at the same time shifting the die-case to position, not only is the resistance to be overcome greater, but it varies with the inertia of the parts to be moved. Hence the introduction of a combined elastic and frictional member, as described in Patent No. 674,376, to absorb the reaction of the elastic members and lessen shock. In the present instance this frictional absorbing member is represented by the wedge or cone 36 and blocks 40, the former carried by the rod and the latter acted upon by spring 41, so that when the resistance encountered exceeds the pressure of the spring plus the friction of blocks 40 upon the casing the spring will yield, but not otherwise, and in expanding the power exerted by the spring upon the rod and connected parts will be diminished by the amount absorbed in returning the wedge-blocks and wedge to their initial position within the casing. Thus the same spring 41 is utilized in developing different degees of resistance as applied to levers 1 2 and 3 4 during their closing movements, acting directly upon the connecting-rod when closing levers 1 2 and through the friction members when closing jaws 3 4, and there being a separate spring-box for each actuator 11 12 whatever reaction takes place in connection with one set of levers 1 2, 3 4 is taken up or absorbed by its spring-box, and thus prevented from interfering with the other set.

The bars 50, carrying the stops 5 of the secondary controllers or gages, are each provided with a series of teeth 51 for the reception of the beveled end of its final positioning-bolt 7, the latter connected to a lever 52, which is acted upon by a spring 53 to advance the bolt and by a head 54, engaging arm 55, to retract or withdraw the same. These secondary controllers in their dual capacity of shiftable members and fixed points of resistance present centers of alternate activity and resistance, and being acted upon successively by both sets of jaws—those of the primary and secondary positioning mechanisms—the strains imposed upon them are very considerable, more especially such as result from the reaction of the flexible elements or where from imperfect adjustment or proportioning of the parts an undue proportion of the work is imposed upon one controller. Hence it sometimes occurs that one or both controllers will be destroyed or incapacitated, the fracture commonly occurring either at the junction of the stop 5 with its supporting-bar 50 or among the holding-teeth 51. This tendency to fracture is materially reduced by the action of the separate actuators and spring-boxes, hereinbefore explained, in diminishing the reactionary effect of one set of mechanism upon the other and providing for individual adjustment and accommodation. To still further guard against this breaking of the secondary controller and at the same time increase its effectiveness in action, two remedies have been devised and applied, the one especially designed to prevent fracture of the stops 5 and the other fracture of the teeth 51. In the first place the bar 50, which is supported in guides and carries the stop 5, is changed from a practically rigid into a somewhat flexible member at or near the point of attachment of said stop, so that the latter may yield slightly under the impact of the jaws. To this end the bar 50 is reduced in cross-section on each side of the point of attachment of stop 5, as by the removal of metal at 56, Fig. 2, so that these portions being unsupported by the guides may bend slightly when the stop is hit by the jaws, and thus prevent fracture. The strength and stability of the stop itself may also be increased by widening the base thereof in the direction of the length of bar 50, thus greatly strengthening it at the point where rupture most frequently occurs.

To preserve the teeth 51, they are made shorter and with a more obtuse angle than heretofore, with the result that the final positioning-bolts are the more easily displaced. Hence additional means have to be provided to prevent this most undesirable occurrence. For various reasons affecting the general operations of the machine, such as the balancing of forces, &c., it is not deemed desirable to proportionally increase the power of the springs 53 for holding the positioning-bolts 7 firmly in engagement wtih the teeth of the stop-bar. Hence other means have been devised to accomplish this purpose. This comprises a locking device or mechanism, preferably applied

to lever 52 and operating when the bolt is in engagement to hold it firmly and positively against motion in a direction to disturb such engagement or permit accidental displacement of the secondary controller or gage, the importance of which will be readily understood where it is considered that said controllers are the final gages for determining the position of the die-case opposite the mold. To this end the arm 55 of each lever 52 is furnished with an automatic lock, preferably in the form of a lever 60, pivotally carried by said lever 52 and provided with an arm 61, lying in the path of the retracting-head 54, a second arm 62, adapted to engage a fixed bearing 63 on the machine, and a spring 64, operating to advance and hold arm 61 beyond the engaging face of lever 55 and the arm 62 in engagement with bearing 63.

The pivot of lever 60 is so related to that of its supporting-lever 55 and the fixed bearing 63 that when arm 62 contacts with said bearing motion of lever 55 in a direction to withdraw its bolt 7 will be resisted, and in order to prevent even slight displacement the engaging face of the locking-arm 62 is formed at a slight inclination to the direction of motion in effecting engagement, so that it will have a slight wedging action with relation to its bearing 63, and thus hold the bolt 7 securely in its most advanced position. The advance of the positioning-bolts 7 to locate and lock the secondary controller in final position is effected by springs 53, and the withdrawal of said bolts to release the controller by the advance of head 54 against arms 55, as heretofore, and by interposing the actuating member or arm 61 of lever 60 in the path of said head the latter is utilized in effecting a positive withdrawal of the locking member or arm 62 before engaging lever 55 during the advance movement to withdraw bolt 7 and hold the lock open until during the reverse motion of the head the lever 52 is arrested by the seating of its bolt 7, whereupon the head as it passes from arm 55 will release arm 61 and permit spring 64 to bring the lock into action. The lock is thus rendered automatic both in its application and withdrawal, and, as applied, does not interfere to any extent with the normal action of the other mechanism.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a centering mechanism such as described wherein a plurality of positioning mechanisms each provided with oppositely-moving levers are driven from a single prime mover, the combination with said levers and prime mover of separate actuators connected to and driven by said prime mover and each connected to a different set of levers, substantially as described.

2. In a centering mechanism such as described the combination with the two sets of positioning-levers and the prime mover therefor, of two actuators each connected to and driving one set of levers, and a spring-box located in the line of communication between each actuator and the prime mover, substantially as described.

3. In a centering mechanism such as described and in combination with the two sets of oppositely-movable levers pertaining to the primary and secondary positioning mechanism an actuator for said levers, a prime mover, and an elastic coupling or spring-box in the line of communication between said prime mover and actuator, said elastic coupling arranged and operating to afford yielding resistance in both directions, substantially as described.

4. In a centering mechanism such as described the combination with the levers of the primary and secondary positioning mechanisms, the actuator therefor and the prime mover, an elastic connection or spring-box interposed in the line of communication between the prime mover and actuator and provided with a tensioning-spring operating directly upon the connecting devices in producing motion in one direction and indirectly through friction members in producing motion in the opposite direction.

5. A spring-box or yielding connection for driving a centering mechanism such as described comprising a casing, heads secured to opposite ends of said casing, a rod or reciprocating member provided with a collar and a wedge-block, wedge members interposed between said wedge-block and the casing and a spring interposed between said wedging members and the collar on the rod, said spring operating through the collar to resist motion of the rod in one direction and through the wedge members and wedge to resist motion in the opposite direction, substantially as described.

6. In a centering mechanism such as described the combination with the levers of the positioning mechanisms of actuating mechanism therefor comprising two actuators pivotally supported upon a pivot and provided with interlocking members or bearings for preventing lateral displacement while permitting independent circular motion about their common axis.

7. An actuating device for a centering mechanism such as described comprising two actuators in the form of bell-crank levers provided with interlocking bearings adapted to prevent lateral displacement while permitting independent circular motion about an axis common to both, one of said levers being provided with means for attaching a driving member to one arm and a driven member to the other, while the other lever is provided with attachments for both driving and driven members upon the same arm; substantially as described.

8. In a centering mechanism such as de-

scribed the combination to form an actuating mechanism for the levers of the positioning mechanisms, of a driver consisting of two actuators mounted upon a common pivot, one of said actuators consisting of a bell-crank provided with a driving connection on one arm and a driven connection on the other and the other actuator with the driving and driven connections on the same arm and in proximity to the driving connection of the first-named actuator, the corresponding arms of the two actuators being connected by arc-shaped bearings and interlocking projections; substantially as described.

9. In a centering mechanism such as described the combination with the two sets of levers for operating the positioning mechanisms of two actuators, each connected to one set of levers and pivotally supported to oscillate independently about a common axis, a driver or prime mover common to both actuators, a connecting-rod for each actuator, and a compound frictional and elastic connection or spring-box interposed between the driver and each connecting-rod, substantially as described.

10. In a centering mechanism such as described the combination with the levers of the positioning mechanism and the secondary controllers, of one actuating mechanism for said levers provided with independently-movable actuators driven from a common prime mover or lever, as and for the purpose specified.

11. In a centering mechanism provided with a shiftable controller and a final positioning device therefor, the combination with said positioning device and its actuating mechanism of a lock operating to retain said positioning device positively in engagement with the controller; substantially as described.

12. In a centering mechanism such as described the combination with a shiftable controller, a final positioning device or bolt, and actuating devices for reciprocating said positioning device, to alternately engage and release said controller, of automatic locking devices for alternately engaging and releasing the positioning device; substantially as described.

13. In a centering mechanism such as described wherein primary and secondary positioning mechanisms are employed in connection with a shifting controller the latter provided with a final positioning device and actuating mechanism therefor, the combination with said final positioning device of a lock and actuating devices therefor controlled by or from the actuating mechanism of the final positioning device to lock the latter after engagement with the controller and release it in advance of its withdrawal from the controller; substantially as described.

14. In a centering mechanism such as described the combination with the shiftable controller final positioning-bolt, and actuating devices therefor including a lever, spring and reciprocating head, of a locking member pivotally supported upon the lever in position to engage a fixed abutment and projecting into the line of movement of the reciprocating head; substantially as described.

15. In a centering mechanism such as described the combination with the actuating-lever of the final positioning-bolt and the reciprocating head operating upon said lever, of a locking device adapted to be interposed between an abutment and said lever in the line of the latter's movement, said locking device being furnished with an inclined or tapering engaging surface; substantially as described.

16. In a centering mechanism such as described the combination with the final positioning-bolt and its actuating-lever, spring and reciprocating head, of a lock for said lever comprising a member pivoted upon the lever and provided with an engaging surface for contacting with a fixed abutment, and a spring, said member projecting into the path of the reciprocating head in advance of the portion of the lever with which said head engages; substantially as described.

17. In a centering mechanism such as described comprising a plurality of positioning and controller mechanisms, each of the former provided with a separate actuator, and each of the latter provided with a final positioning-bolt, and an actuating-lever, and a reciprocating head common to the two actuating-levers, the combination with said actuating-levers and reciprocating head of two locks, one for each actuating-lever, both operated upon by said head to alternately hold and release the positioning-bolt as said head engages and is withdrawn from said actuating-levers; substantially as described.

18. A controller for centering mechanisms such as described, consisting of a guide-bar provided with a flexible elastic section and an arm, constituting a stop, attached to and projecting laterally of said guide-bar in the vicinity of said flexible elastic section.

19. A controller for centering mechanisms such as described comprising a guide-bar reduced in cross-section at two points in its length, to form flexible elastic sections, and a stop projecting laterally of said guide-bar at a point intermediate said flexible elastic sections.

JOHN SELLERS BANCROFT.

Witnesses:
MORTIMER A. JONES,
JOSEPH B. CHURCH.