No. 674,374. Patented May 21, 1901.

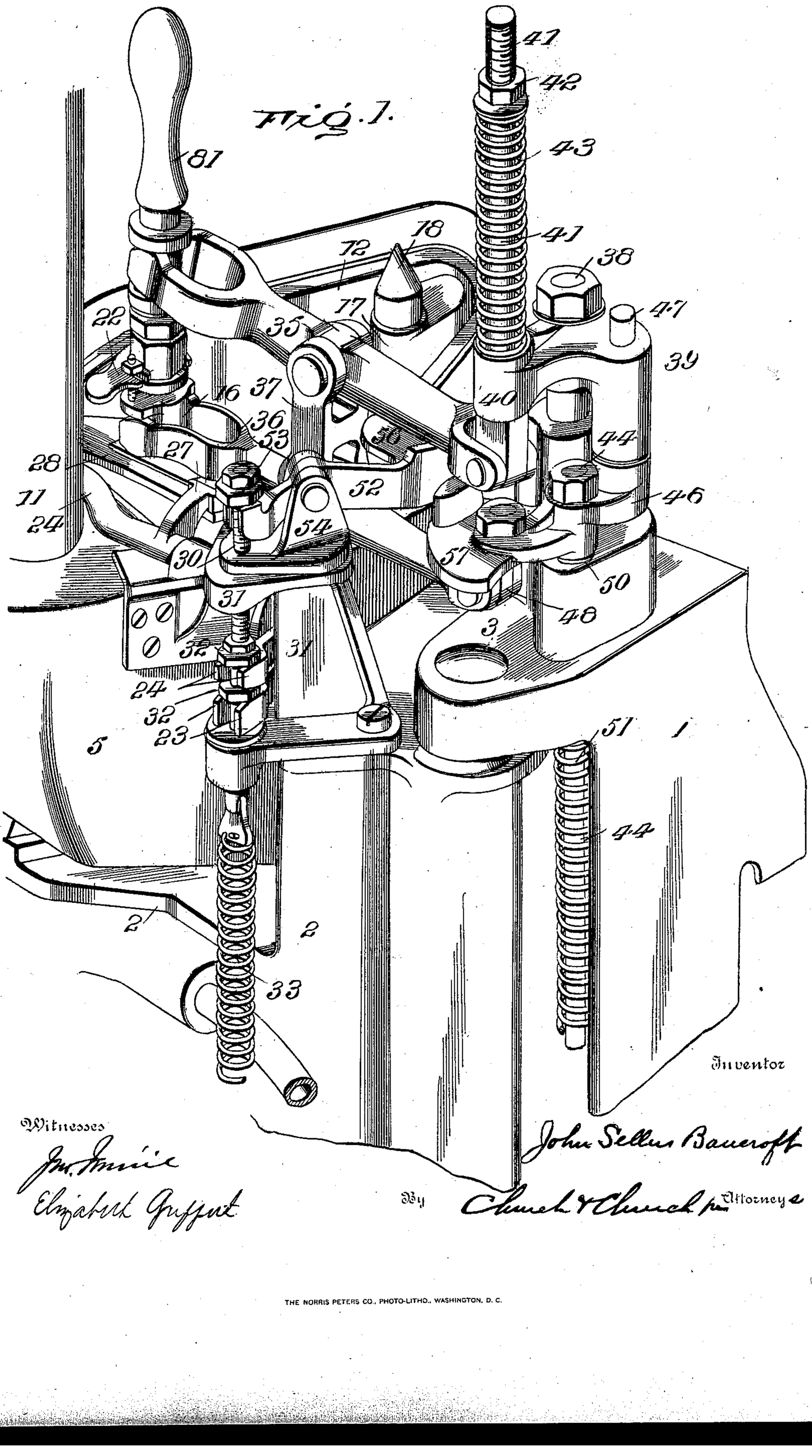
J. S. BANCROFT.

FLUID INJECTING MECHANISM FOR TYPE CASTING OR OTHER MACHINES.

(Application filed Sept. 25, 1900.)

(No Model.) 6 Sheets—Sheet 1.

Fig. 1.



Witnesses

Jno. Imrie

Elizabeth Griffith

Inventor

John Sellers Bancroft

By Church & Church Attorneys

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J. S. BANCROFT.

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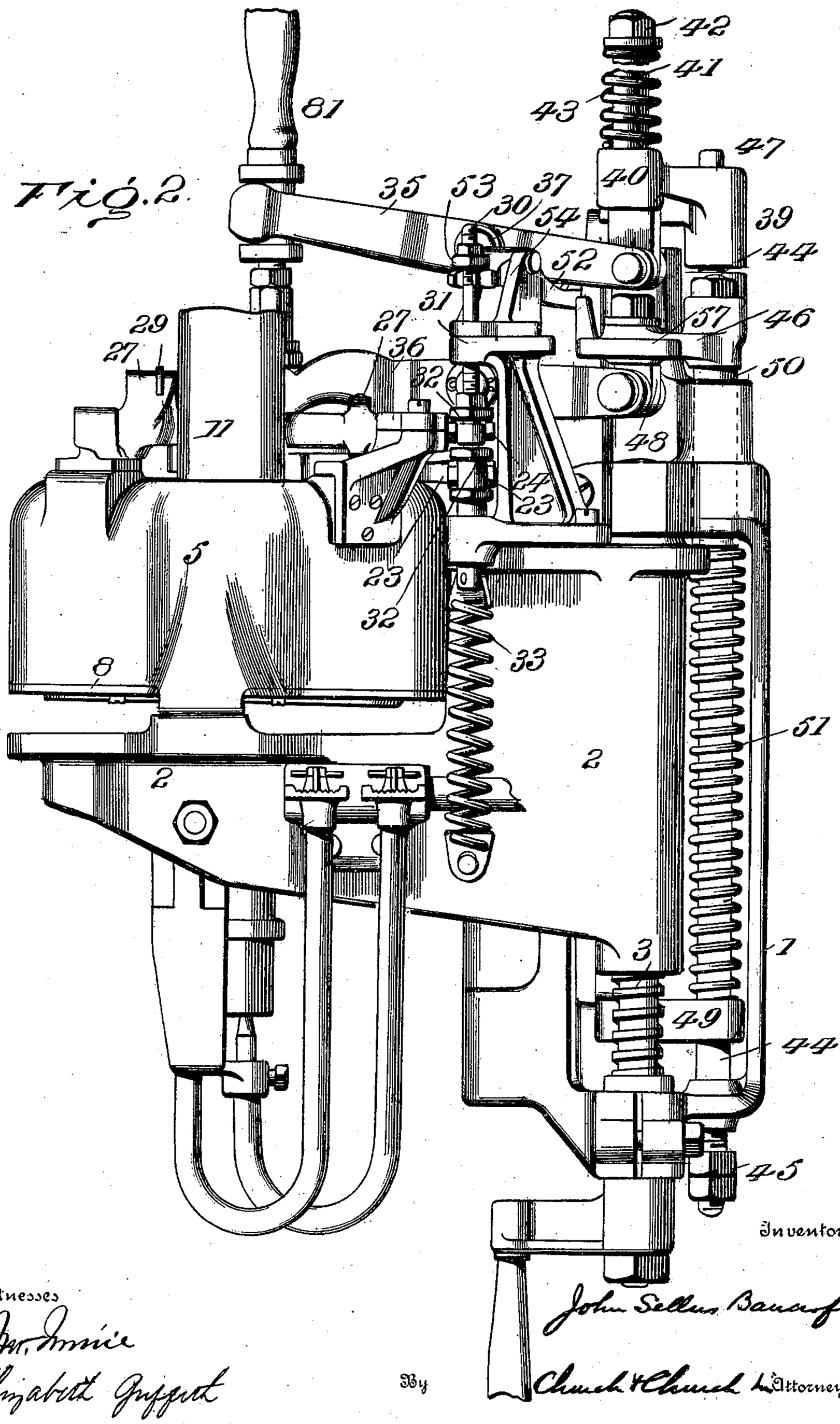
(No Model.) 6 Sheets—Sheet 2.

Fig. 2.



Witnesses
Jno. Imrie
Elizabeth Gifford

Inventor
John Sellers Bancroft
By Church & Church Attorneys

No. 674,374. Patented May 21, 1901.

J. S. BANCROFT.

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(No Model.) 6 Sheets—Sheet 3.

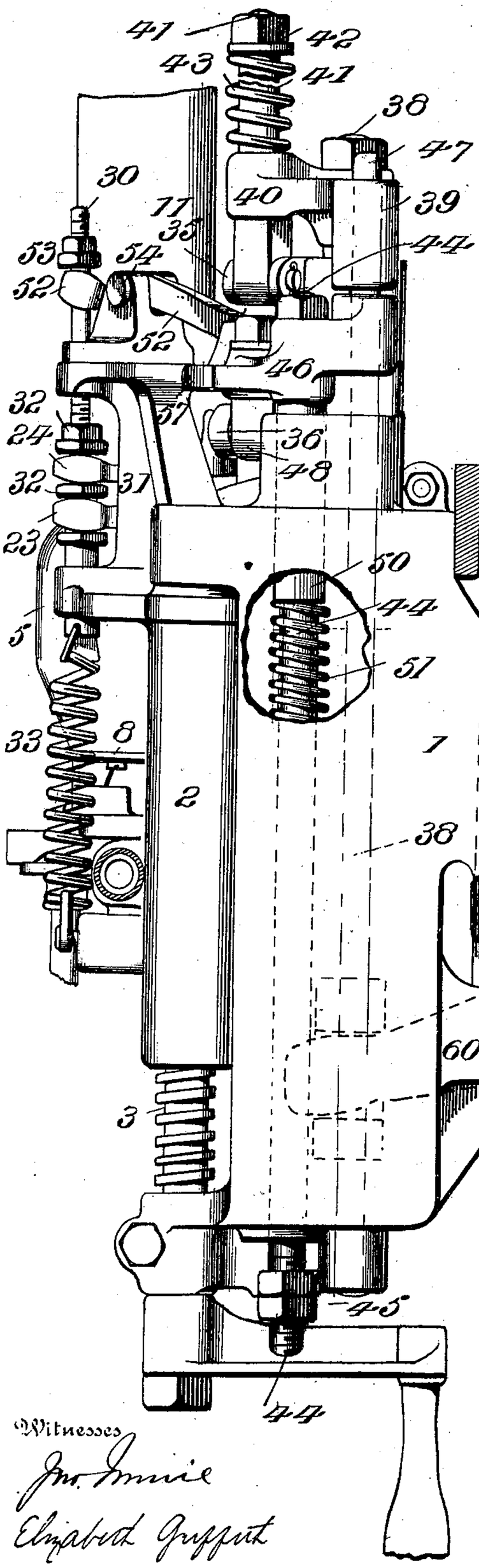
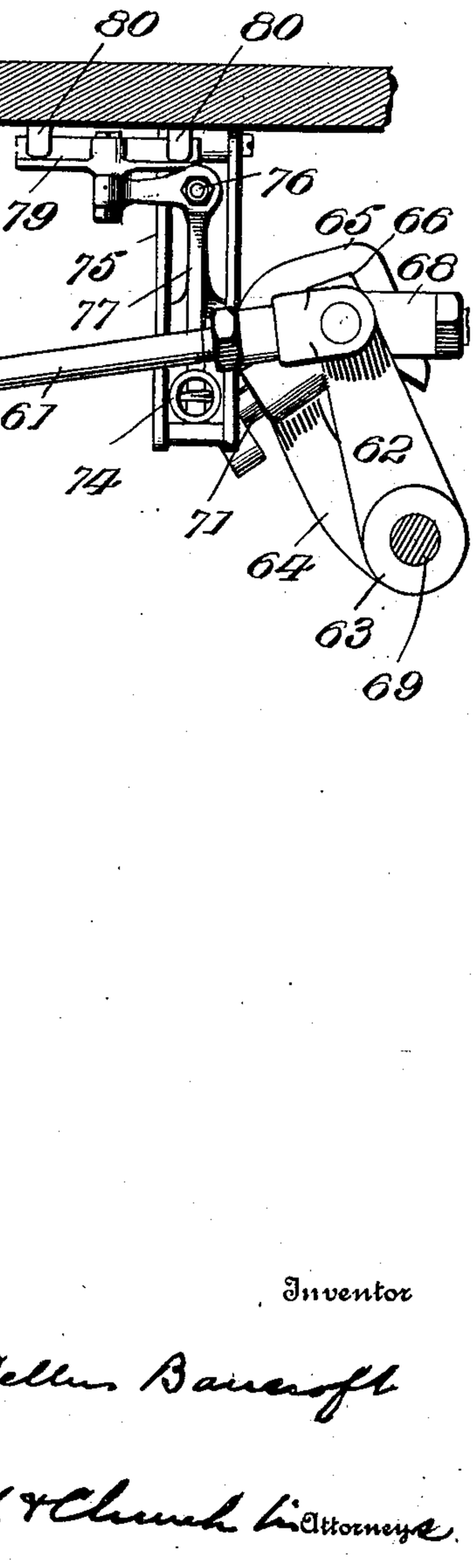


Fig. 3.



Witnesses
Jno. Imrie
Elizabeth Guppert

Inventor
John Sellers Bancroft
By Church & Church his Attorneys.

No. 674,374. Patented May 21, 1901.

J. S. BANCROFT.

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(No Model.) 6 Sheets—Sheet 4.

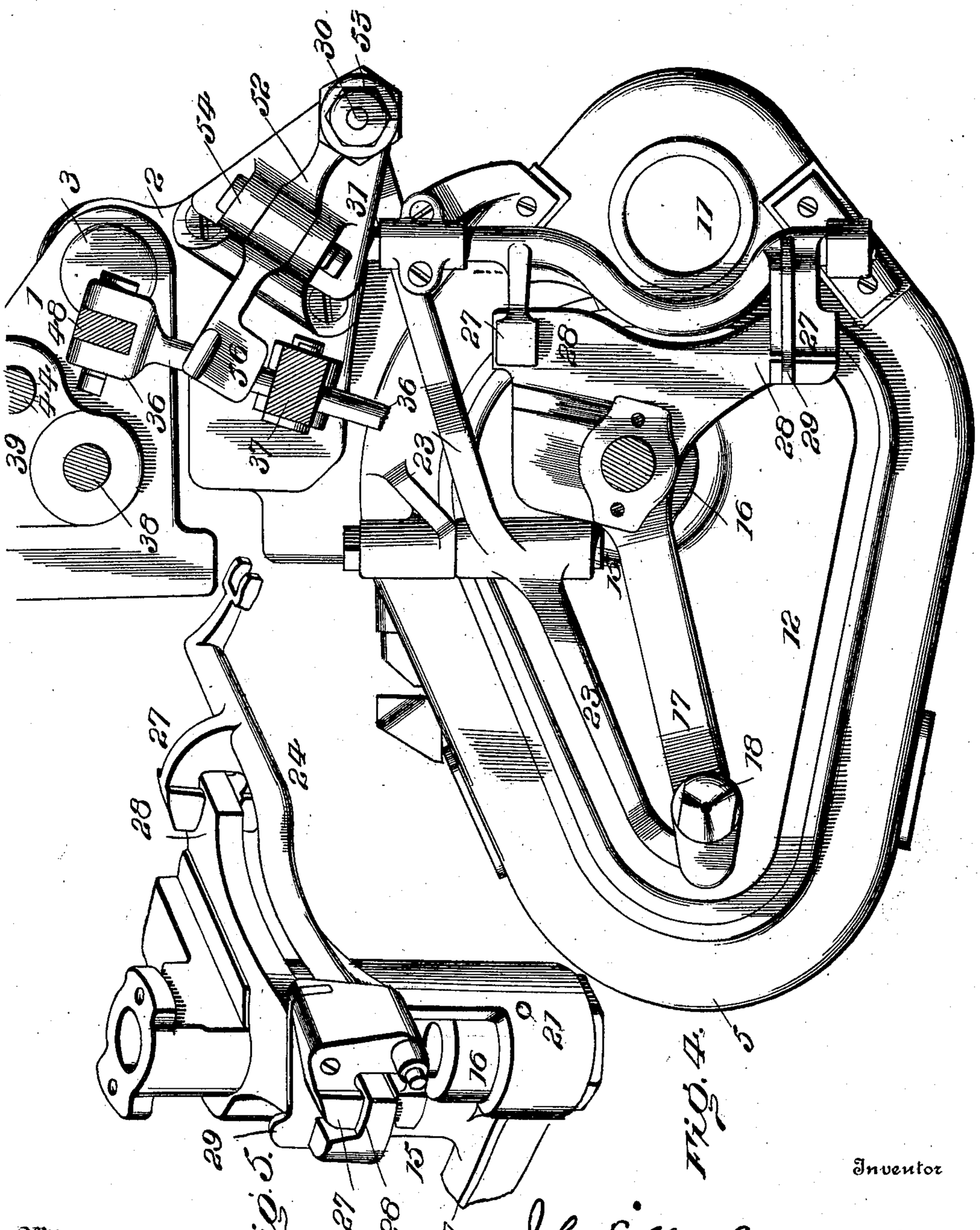

Fig. 4.

Fig. 5.

Witnesses

Jos. Dennie

Elizabeth Griffith

Inventor

John Sillen Bancroft

By Church & Church his Attorneys

No. 674,374. Patented May 21, 1901.

J. S. BANCROFT.

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(No Model.) 6 Sheets—Sheet 5.

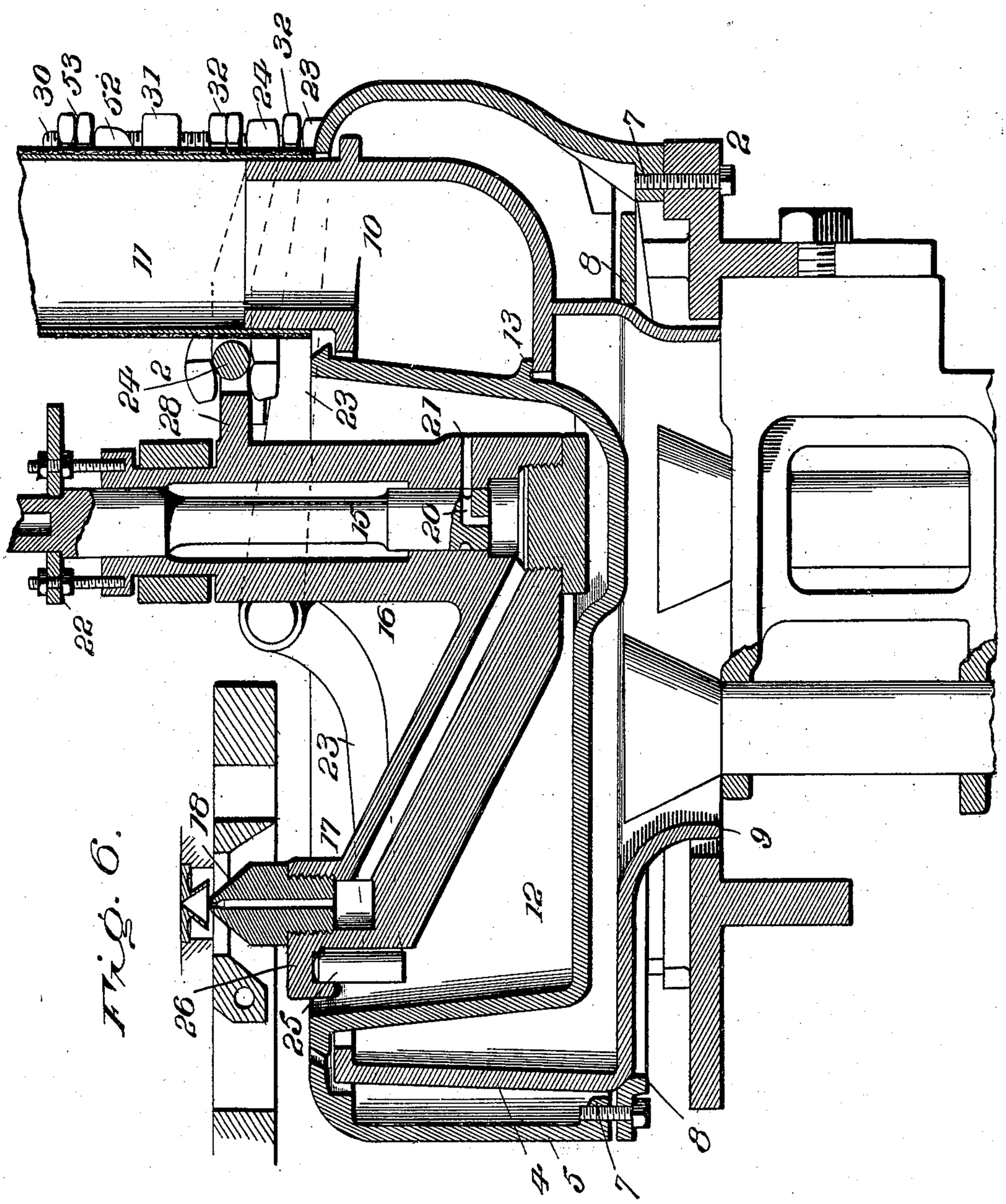

Fig. 6.

Witnesses
Jno. Ormie
Elizabeth Griffith

Inventor.
John Sellers Bancroft
By Church & Church, Attorneys

No. 674,374. Patented May 21, 1901.

J. S. BANCROFT.

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(No Model.) 6 Sheets—Sheet 6.

Fig. 7.

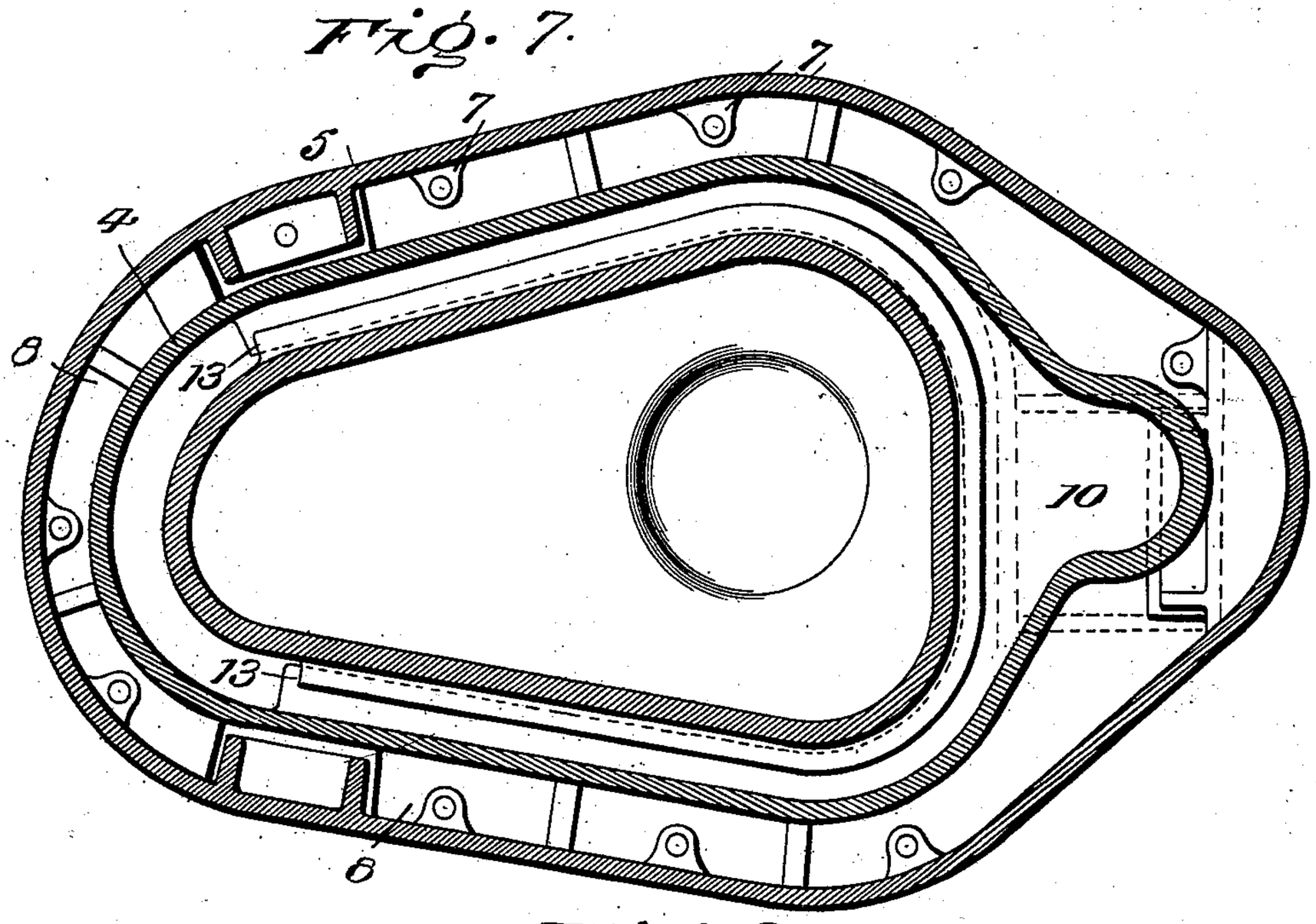
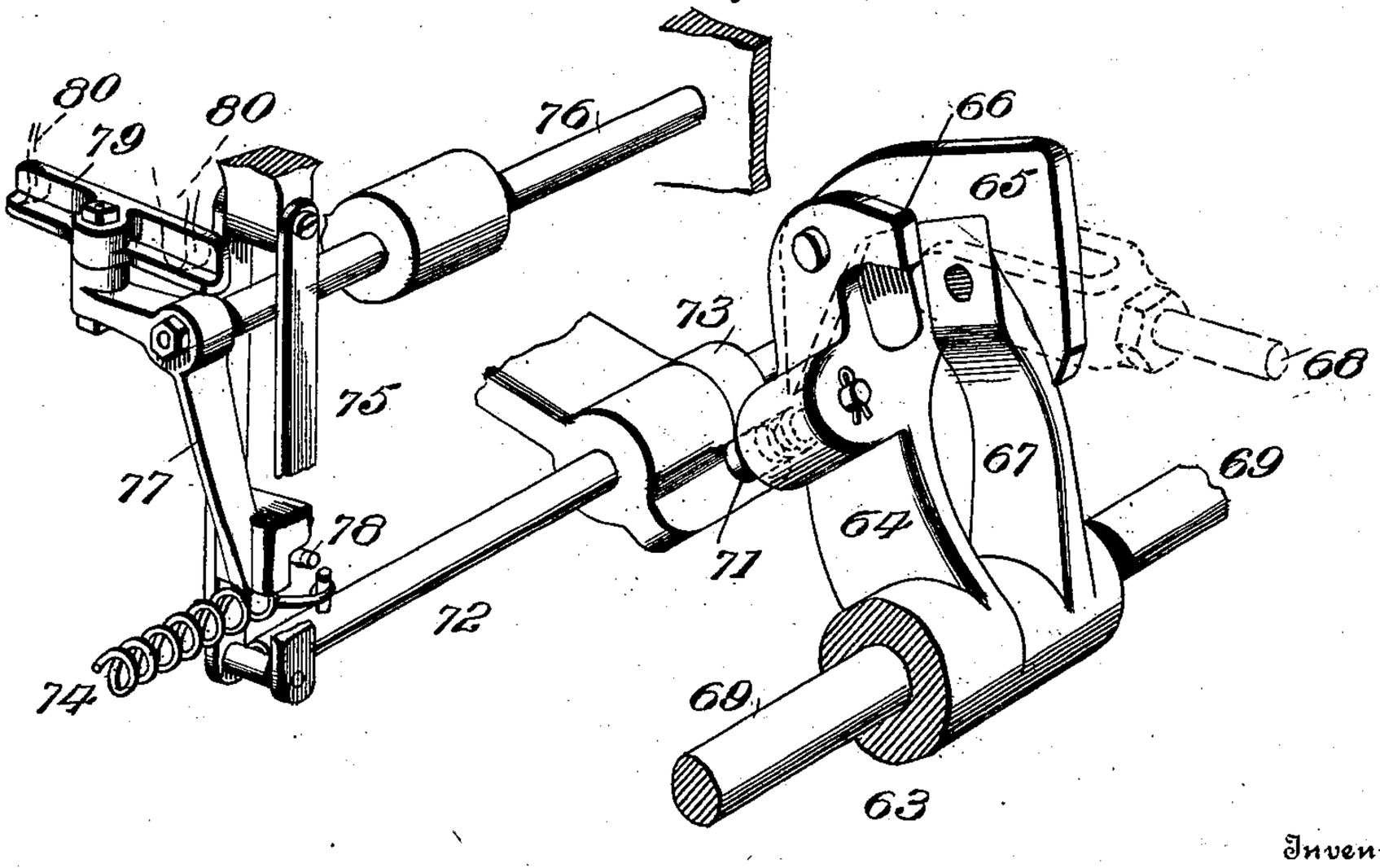


Fig. 8.



Witnesses

Jno. Imrie

Elizabeth Griffith

Inventor

John Sellers Bancroft

By Church & Church, Attorneys.

UNITED STATES PATENT OFFICE.

JOHN SELLERS BANCROFT, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE LANSTON MONOTYPE MACHINE COMPANY, OF WASHINGTON, DISTRICT OF COLUMBIA.

FLUID-INJECTING MECHANISM FOR TYPE-CASTING OR OTHER MACHINES.

SPECIFICATION forming part of Letters Patent No. 674,374, dated May 21, 1901.

Application filed September 25, 1900. Serial No. 31,012. (No model.)

To all whom it may concern:

Be it known that I, JOHN SELLERS BANCROFT, a citizen of the United States, and a resident of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Fluid-Metal-Injecting Mechanism for Type-Casting or other Machines; 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 a new and improved fluid-metal-injecting mechanism designed especially for use in connection with the type-casting and composing machine of Patent No. 625,998, but applicable to other machines and uses.

The objects had in view are speed and certainty of action, freedom from clogging or interruptions, simplicity, ease of access, and adaptability to operate in harmony with the other elements of the machine of the patent referred to.

With these ends in view the invention consists, primarily, in the employment of a relatively stationary melting pot or receptacle for containing the supply of metal and a pump separated from the pot, but movable therein toward and from the mold, the pump being submerged within the molten metal and carrying or moving in unison with the injecting-nozzle, whereby the metal in the cylinder, passages, and nozzle of the pump is heated and maintained at the temperature of that in the pot, and the conjunction of the nozzle and mold is effected by a bodily movement of the pump within the molten metal. The mechanism for intermittingly connecting the pump and mold is applied to the pump, and inasmuch as the latter is immersed in the molten metal and partially supported thereby it follows that comparatively little power is required or consumed in moving it toward and from the mold.

The invention also consists in a novel pump-actuating mechanism, including means for supporting and reciprocating the pump independent of the melting-pot and for actuating the piston of the pump, the arrangement of said supporting and actuating devices in a manner to permit the ready removal and insertion of the pump; automatically disconnecting the pump from the actuating devices when the pot is swung back and connecting them when moved to position with the nozzle opposite the mold, controlling the application of power to the pump supporting and actuating mechanism through connections with the galley trip-shaft and the justifying wedge-designating levers, and in minor features of construction and combinations and arrangements of parts all, as hereinafter more fully described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view in perspective of the pump-actuating devices in their relation to the pump and melting-pot. Fig. 2 is a rear elevation. Fig. 3 is a side elevation. Fig. 4 is a top plan view of the melting-pot and pump. Fig. 5 is a detail view showing the pump and its rear supporting-lever. Fig. 6 is a vertical section through the pump, melting-pot, and the casing for the latter. Fig. 7 is a horizontal sectional view of the melting-pot and its casing. Fig. 8 is a perspective view of the power-transmitting devices and trip for controlling the action of the pump.

Like numerals of reference in the several figures indicate the same parts.

The invention in its preferred form of embodiment is designed for application to the main frame of the machine of Patent No. 625,998, of which sections are illustrated in the drawings. The melting-pot, pump, and its immediate actuating devices are mounted and supported upon a frame independent of the main frame and detachably secured thereto, said frame including the base or fixed section 1, attached to the main frame, and the swinging section or frame 2, the two pivotally connected by the vertical threaded shaft 3, by which the section 2 is raised and lowered and about which it is swung to withdraw the metal-injecting devices from beneath the mold. Upon the swinging section 2, which, as in the former machine, carries the Bunsen burners or other means for heating the melting-pot, is erected a casing comprising inner

and outer sections 4 and 5. The outer section 5 entirely surrounds the inner one and is provided with an inturned edge or lip furnished with a seat for the upper edge of the inner section. At the base it is furnished with lugs 7 for attachment to frame 2 and with detachable clamping-sections 8 for confining and holding the inner section in place, a space being left between the two sections for the reception of a non-conducting packing, such as asbestos or the like. The inner section 4 is formed with an open top, vertical walls, and a bottom provided with downwardly-projecting flanges 9, surrounding an opening therein for the admission of the burners or other heating appliances. At one end of this inner section is formed a flue or passage 10, upon which is mounted the pipe 11, through which the products of combustion are conducted from the casing.

The melting-pot 12 is an open vessel fitting within the inner section 4 of the casing and supported thereupon by flanges 13, so that it can be readily inserted or removed at pleasure.

The pump 15 constitutes a separate structure wholly independent of the melting-pot and comprising a pump-frame containing a cylinder 16, with an arm 17 extending laterally therefrom and provided with a passage communicating with the cylinder, a nozzle 18, detachably secured in the outer end of said arm, and a piston working within the cylinder and provided with a passage 20, which registers with an induction-passage 21 in the side of the cylinder when the piston is at the limit of its movement in an upward direction, this limit being determined by the position of a stop 22, applied to the upper end of the pump-frame in position to engage a shoulder on the piston. This function of stop 22 is secondary in importance and of value merely as an adjunct to the special form of inlet employed. Its principal function will be explained later.

Mounted in bearings upon the outer section 5 of the casing are two levers 23 and 24, the former extending to a point beneath the nozzle and provided with a rounded or pivotal bearing-point 25, engaging a recess 26, formed on the under side of the outer end of arm 17. The other lever 24 is provided with two furcated arms 27, adapted to receive a horizontal flange 28, formed upon and projecting to one side of the pump-frame. A latch 29, pivoted upon one of the arms 27 and engaging a notch in the flange 28, sustains the pump against lateral displacement; but when said latch is lifted out of engagement with the flange the pump can be turned slightly upon the point 25 of lever 23 until its flange 28 is withdrawn from between the jaws of one arm 27, when by slightly tilting it can be withdrawn from the opposite jaws and lifted out from the melting-pot. The levers 23 and 24, supporting opposite ends of the pump, are each prolonged in rear of their pivots and forked for the accommodation of a vertical rod 30, guided in a bracket 31, secured to swinging frame 2, and provided with an adjustable nut 32 above each of said levers. To the lower end of this rod 30 is attached a spring 33, whose opposite end is secured to the frame. Through the agency of this spring 33 both levers 23 and 24 are actuated in a direction to cause the elevation of the pump and the engagement and seating of its nozzle 18 upon the nozzle-plate or base of the mold. It will be seen from this description that the pump is entirely independent of the melting-pot and that the means described constitute an efficient actuating mechanism, whereby the pump is supported and guided by its levers, so as to be permitted vertical motion within the pot toward and from the mold. To compensate for the slight displacement due to expansion, the joints or connections between the levers and pump are of such forms and dimensions as to permit a sufficient lateral movement of the nozzle to enable it to automatically adjust and accommodate itself to the nozzle-plate when brought up in engagement therewith.

The means illustrated for communicating motion to the piston of the pump and sustaining the pressure thus applied by an opposing pressure upon the pump-cylinder is generically the same as that of the prior patent referred to—that is to say, it includes two levers 35 and 36, pivotally connected by a link 37 intermediate their ends, the lower lever 36 engaging the pump-frame and the upper lever 35 engaging the plunger or piston. It differs, however, from that of the prior patent in that the outer furcated ends of levers 35 and 36 instead of being permanently attached to the pump-frame and piston loosely engage seats formed between collars upon the upper end of the pump-frame and plunger, respectively, while the inner ends of said levers instead of being connected to their actuating devices on the base-section 1 in line with the axis 3 of the swinging section 2 are attached eccentrically thereto, so that when the section 2, carrying the pump and melting-pot, is lowered and swung rearwardly from beneath the mold the outer engaging ends of the levers will be withdrawn from their seats upon the pump and piston, respectively, and when the pump is swung back again into position beneath the mold they will be reëngaged. Thus the swinging of the melting-pot and pump will automatically free the pump from its actuating-levers, so that it can be readily withdrawn from the melting-pot and replaced therein without manually connecting or disconnecting the parts.

The mechanism for raising and lowering the pump and for operating the latter through levers 35 and 36 is constructed and operated as follows: Mounted in bearings on the main frame is a vertical shaft 38, to the upper end of which is secured a head 39, the latter provided with a horizontal arm or projection 40,

containing a vertical opening for the passage of a rod 41, whose lower end is pivotally attached to the inner end of lever 35, while its upper end is furnished with an adjusting-nut 42, between which and the horizontal arm 40 is interposed a spring 43. This spring 43 is normally under compression and serves to hold the rod 41 elevated, with its shouldered head in contact with the under side of arm 40. Extending parallel with shaft 38 is a second vertical shaft 44, mounted in bearings on the main frame and prolonged below its lower bearing, where it is furnished with an adjustable collar or nuts 45. To the upper end of this shaft 44 is secured a head 46, the latter extending beneath a portion of head 39, a steady-pin 47, extending through both said heads 39 and 46, serving to prevent rotary motion about the axes of their respective shafts. To the under side of head 46, in line with head 41, is a swivel-joint connection 48 for the lower lever 36. Shaft 38, constituting the main driving member, is furnished with a lateral projection or foot 49, and between the latter and a sleeve 50 on shaft 44 is interposed a spring 51. The function of this spring 51 is to retain the heads 39 and 46 in contact while the shaft 38 is being elevated and the pump raised to seat the nozzle. When this is accomplished, the further vertical movement of shaft 44 is arrested by the contact of its nuts 45 with the frame, and a further movement of shaft 38, acting through spring 43, transmits independent motion to lever 35, thus giving the stroke to the piston.

As before stated, the elevation of the pump with its nozzle is effected through the medium of spring 33, and to antagonize the movement of said spring and hold the pump and nozzle down in its normal or depressed position a lever 52 is provided, one end engaging an adjustable nut or bearing 53 on rod 30 and the opposite end projecting beneath lever 35, so that when the latter is depressed by the descent of shaft 38 rod 30 will be elevated against the tension of its spring, thereby permitting the pump to descend within the melting-pot and withdraw its nozzle from the nozzle-plate.

As hereinbefore stated, one of the functions of stop 22 is to insure the registry of the inlet-passage in the piston with the inlet-port in the cylinder while the pump is not in action, a function incident merely to this special variety of inlet; but its principal function is that of a clamp or holder for arresting the piston and holding it against motion within the cylinder immediately the pump has performed its office of filling the mold and while the nozzle is being withdrawn and held removed from the mold or nozzle-plate.

In metal-injecting mechanism of this class as heretofore constructed and arranged considerable annoyance, delay, and injury has been occasioned by the untimely discharge of metal from the nozzle. This occurs at irregular intervals and unexpected times and has a tendency to choke the nozzle, bespatter the machine, and leave deposits upon the face of the nozzle or nozzle-plate, such as prevent accurate seating, with the result in the latter case of an insufficient filling of the mold and a violent scattering of molten metal when the pump is brought into action. This defect, it has been discovered, is produced by the false or unintentional movements of the piston within the cylinder, sometimes referred to as the "dancing" of the piston, due in part to the reaction or springing of the actuating devices or to the rebound of the piston after the injecting-stroke has been accomplished and the nozzle is withdrawn and held removed from its seat on the mold. An effective remedy has been provided by the interposition of stop 22, against which the piston is caused to bear just before head 39 contacts with head 46 as shaft 38 descends. The effect of this is to put a slight tension or pressure upon lever 35 sufficient in amount to firmly clamp the piston against stop 22 as the nozzle leaves its seat, and to thus hold it against motion within the cylinder until the nozzle is again elevated and seated preliminary to the next cast. By this means the expulsion or overflow of metal is prevented except when an intentional stroke is made, the piston being automatically clamped and immovably held at all other times.

Owing to the fact that the connections at the power ends of levers 35 and 36 have their vertical axes to one side of the axis about which the swinging frame 2 is turned, the movement of the latter to withdraw the melting-pot from beneath the mold would cause lever 52 to engage link 37 and either prevent or limit such turning. To provide against this and permit the melting-pot to be swung back clear of the mold, lever 52, through which motion is communicated in one direction to the pump, has its fulcrum supported in a bearing 54, resting loosely upon bracket 31, attached to the swinging frame 2, said bearing 54 being sustained in position by the passage therethrough of rod 30. This leaves the lever 52 free to swing laterally about the axis of rod 30, and in order to retain its inner end or that portion engaged by lever 35 in proper place when in operative position said lever is extended laterally, as at 56, and the head 46 is provided with a curved wing or extension 57. As the frame 2 is swung about its vertical axis the inner end of lever 52 rides against its curved surface 57, being held thereto by the engagement of its flange or lateral extension 56 with link 37, the bearing 54 sliding on its seat to accommodate such movements.

The weight of shaft 38 and its connections is amply sufficient to effect the lowering of the pump, and it is only required that efficient means be provided for elevating said shaft, and thereby causing the elevation of the pump and the actuation of the pump-piston at the proper time. The actuating mechan-

ism provided for this purpose consists of a bell-crank lever 60, mounted in bearings on the base section or frame and engaging bearings on shaft 38, the opposite arm of said lever being connected by a rod or link 61 to an arm 62 on sleeve 63, the latter provided with a second arm 64, carrying pivoted latch 65, between which and a shoulder 66 on said arm is received the arm 67, connected by a link 68 to the main pump-actuating lever of the machine. This arm 67, which constitutes the driving-arm of the clutch, is mounted upon a shaft 69, supported in bearings upon the main frame and extending through sleeve 63. Arm 64 carries a spring-seated sustaining or stop pin 71, which contacts with a portion of the main frame 1 when the shaft 38 is at the lower extreme of its movement, said spring-seated pin serving to hold and sustain the arm 64 and its connections in position to insure the engagement of arm 67 by latch 65. To secure this result, the spring-seated pin 71 is caused to engage its bearing before the driving-arm 67 completes its movement in the direction of arm 64, so that in the event the latch is raised to permit the independent return of the driving-arm 67, thus throwing the pump out of action, the spring will slightly advance arm 64, and thus bring it well within the range of arm 67 on its return movement, thereby insuring the reëngagement of the latch should it at the time be released or removed from the influence of its trip.

Supported in bearings on the main frame and parallel with shaft 69 are two longitudinally-movable shafts 72 and 76, of which the last named is the galley-trip shaft for starting the galley in motion. Shaft 72 is furnished with a collar or projection 73, located normally to one side of the plane in which latch 65 vibrates, but so related thereto that when said shaft is shifted said collar 73 will stand in the path of the latch as arm 64 is forced backward by arm 67 to lower the pump. The tail of the latch striking collar 73 causes the latch to be withdrawn from engagement with arm 67 during its next movement in a direction to actuate the pump, thereby suspending the action of the latter. A spring 74 serves to hold shaft 72 retracted, with its collar 73 removed from the path of the latch, and a link 75 is arranged to engage the shaft for moving it in opposition to said spring. This link 75 is furnished with a pin or bearing 78, against which bears an arm 77, carried by the galley-trip shaft 76. The shaft 76 is also provided with a controlling pivoted bar 79 opposite the lower ends of the two justifying-wedge levers 80 80. (Indicated by dotted lines in Fig. 8.) These two levers 80 engage bar 79 on opposite sides of its pivot, and when either or both of said levers 80 are actuated to set the justifying wedge or wedges arm 77 will be advanced and, acting through link 75, will move shaft 72 longitudinally, thereby not only starting the galley mechanism, but also moving the collar 73, so as to raise latch 65, and thereby suspend the pump action during the next forward movement of arm 67. The single spring 74 serves not only to retract shaft 72, but also to restore bar 79 and its connections when the pressure of lever or levers 80 is withdrawn, as occurs after the justifying-wedge has been shifted and is lowered to position.

A comparison of the present pump mechanism with that of the prior patent will show at a glance its advantages in the way of simplicity and certainty of action, while the transfer of the movement for connecting and disconnecting the nozzle and mold from the melting-pot to the pump not only diminishes the resistance to be overcome in performing these offices, but renders the apparatus more stable, diminishes the power expended, and avoids defects inherent in a movable melting-pot and arising principally from the waved action of the molten metal and its reaction upon the metal contained in the passage leading to the nozzle. In addition to this the facilities afforded for the ready removal and insertion of the pump as a whole are of material advantage in the working of the machine, as by swinging the frame carrying the melting-pot back, as is necessary to permit free access to the pump and nozzle, the actuating devices are automatically disconnected, so that by means of a wooden or other non-conducting handle 81, secured to the upper end of the piston, the pump can be at once lifted out from the melting-pot for inspection, repair, or substitution, as circumstances may require.

The employment of spring 43, through which the movements of head 39 are transmitted to lever 35 in effecting the pumping movement, is of considerable value, owing to the fact that it not only interposes a yielding driving connection, but one whereby the power of the stroke can be regulated to suit the requirements. The degree of the initial compression of spring 43 measures the force of the piston at the beginning of its stroke and the power increases in proportion as the spring is compressed, either by adjustment or by the vertical motion of shaft 38 after head 46 has been arrested by the contact of its limiting-nuts 45 with the frame. It also affords a convenient means for adjusting the force of the stroke while the machine is in action.

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

1. In a metal-injecting mechanism, such as described, the combination with the receptacle for the molten metal, of a pump immersed in the metal and movable therein to bring its nozzle temporarily in contact with the nozzle plate or mold; substantially as described.

2. In a metal-injecting mechanism, such as described, the combination with a fixed melting-pot, of a submerged pump movable vertically within the pot for the purpose specified.

3. In a metal-injecting mechanism the combination with a melting-pot fixedly attached to a swinging support or frame, of a pump separate from said pot and movable therein, as and for the purpose set forth.

4. In a metal-injecting mechanism the combination with a casing and a melting-pot detachably supported therein, of a pump located and independently movable within said melting-pot, substantially as described.

5. In a metal-injecting mechanism, the combination to form a casing for the reception of the melting-pot, of the outer section with its inturned upper flange and lower supporting-lugs, the inner section engaging the said flange of the outer section and provided with supports for the melting-pot, and the clamping-sections detachably secured to the outer section and engaging the base of the inner section to sustain the latter in position; substantially as described.

6. In a metal-injecting mechanism, the combination with the casing and the melting-pot removably supported therein, of a pump movable within the melting-pot and supported by mechanism mounted upon the casing; substantially as described.

7. The combination with the melting-pot and the pump, of a supporting and lifting mechanism engaging the pump at two or more widely-separated points; substantially as described.

8. The combination with a melting-pot and a submerged pump, of spring-actuated supporting and elevating devices engaging the pump for reciprocating the latter independently of the pot; substantially as described.

9. In a metal-injecting mechanism, the combination with the melting-pot, of a pump separate therefrom but movable therein, the two pump-supporting levers, the one engaging the arm of the pump in proximity to the nozzle and the other the pump-frame in proximity to the cylinder; substantially as described.

10. In a metal-injecting mechanism as a means for detachably connecting the pump to its supporting mechanism, the combination with the pump provided with lateral arm or extension and a nozzle, of a lever provided with a pivotal point of support engaging a bearing on the pump, and a second lever provided with a plurality of furcated arms for engaging a horizontal flange on the pump-frame; substantially as described.

11. The combination with the pump provided with a socket and a horizontal flange or shoulder, of a lever provided with vertical support or pivot bearing engaging said socket, a second lever provided with two furcated arms for receiving the flange, and a latch for locking the pump against lateral motion about said vertical support or pivot; substantially as described.

12. In a metal-injecting mechanism the combination with the pump and its vertically and laterally movable supporting-frame, of the pump-actuating devices connected to the actuating mechanism on the fixed section at a point eccentric to the axis about which the said supporting-frame moves, whereby when the frame is swung to withdraw the pump from operating position the actuating devices will be automatically disconnected therefrom; substantially as described.

13. In a metal-injecting mechanism, the combination with the vertically-movable pump and its vertically-adjustable pivotally-swinging supporting-frame, of the connected pump-actuating levers detachably connected to the pump-frame and piston at one end and pivotally attached to the actuating devices on the main frame on a line eccentric to the axis of the swinging frame; substantially as described.

14. In a metal-injecting mechanism such as described, wherein a vertically-movable pump is supported upon a frame or support pivotally connected to the fixed frame, the combination with the spring-actuated rod for elevating the pump and a pair of connected levers engaging the pump-frame and its piston respectively for actuating the latter, of a lever engaging said spring-actuating rod and projecting beneath one of the pump-actuating levers, said lever being supported in a laterally-movable bearing, substantially as and for the purpose set forth.

15. In a metal-injecting device provided with a force-pump the combination with the piston and its actuating devices, of a brake or holder engaging the piston to prevent false strokes or dancing after its effective stroke or while the nozzle is withdrawn from the mold.

16. In a metal-injecting mechanism, the combination with the pump-frame and its piston, the connected actuating-levers, and the actuating devices engaging the latter, of the stop on the pump-frame engaging the piston to limit its motion and prevent vibration; substantially as described.

17. In a metal-injecting mechanism, the combination with the pump-frame and its piston and the actuating-lever therefor, of the spring interposed between the driving-head or connection and the piston-actuating lever; substantially as described.

18. In a metal-injecting mechanism such as described, the combination with the connected pump-actuating levers and the driving member—such as head 39—through which power is transmitted to actuate the pump-piston, of a spring interposed between said driving and driven members, and means for adjusting the tension of said spring; substantially as described.

19. In a metal-injecting mechanism, such as described, the combination with the connected pump-actuating levers, of a driving connection—as shaft 38—connected to one of the pump-actuating levers, a connection—as shaft 44—attached to the other pump-actuating lever, a stop for limiting the movement of this last-named connection, and a spring interposed between said connection and the

driving connection, whereby the movement of the driving connection will cause a corresponding movement of the other connection until the latter is arrested by the stop, the spring yielding to permit further motion of the driving connection; substantially as described.

20. In a metal-injecting mechanism, such as described, as a means for actuating the pump, the combination with the pair of connected pump-actuating levers and the heads to which they are respectively connected, of the two vertically-movable shafts each connected to one of said heads, a bearing or arm on one of said shafts, a spring interposed between said bearing and the other shaft movable with the latter, and an actuating-lever engaging the shaft provided with the bearing engaging the spring, substantially as and for the purpose described.

21. In a metal-injecting mechanism such as described, the combination with the actuating devices for transmitting motion to the connected pump-actuating levers simultaneously and separately, and the driving mechanism therefor, of the spring-seated stop for sustaining the driven member; substantially as described.

22. In a metal-injecting mechanism, such as described, the combination with the driving-arm—as 67—the driven arm—as 64—and its latch, of the longitudinally-movable shaft provided with a hub movable into the plane of vibration of the latch, to disconnect the latter from the driving-arm; substantially as described.

23. In a metal-injecting mechanism, such as described, the combination with the longitudinally-movable galley-trip shaft, of the bar pivoted on said shaft in position to be engaged by the justifying-wedge-shifting levers; substantially as described.

24. The combination with the actuating mechanism for shifting the galley-trip shaft, to throw the pump out of action, of a bar pivoted on said actuating mechanism at a point intermediate the two justification-wedge levers, whereby either or both of said levers become effective for actuating said galley-trip shaft; substantially as described.

25. The combination with the driving connection including a latch, of a tripping mechanism therefor including a longitudinally-movable shaft with collar, a spring and link, a second longitudinally-movable shaft provided with means for engaging the link and carrying a centrally-pivoted bar and two tripping bars or levers one on each side of the pivot of said bar; substantially as described.

JOHN SELLERS BANCROFT.

Witnesses:
FRANK G. GRIER,
JOSEPH B. CHURCH.