W. J. BEATTIE.

FOLDING MACHINE.

APPLICATION FILED APR. 23, 1915.

1,167,329.

Patented Jan. 4, 1916.

7 SHEETS—SHEET 1.

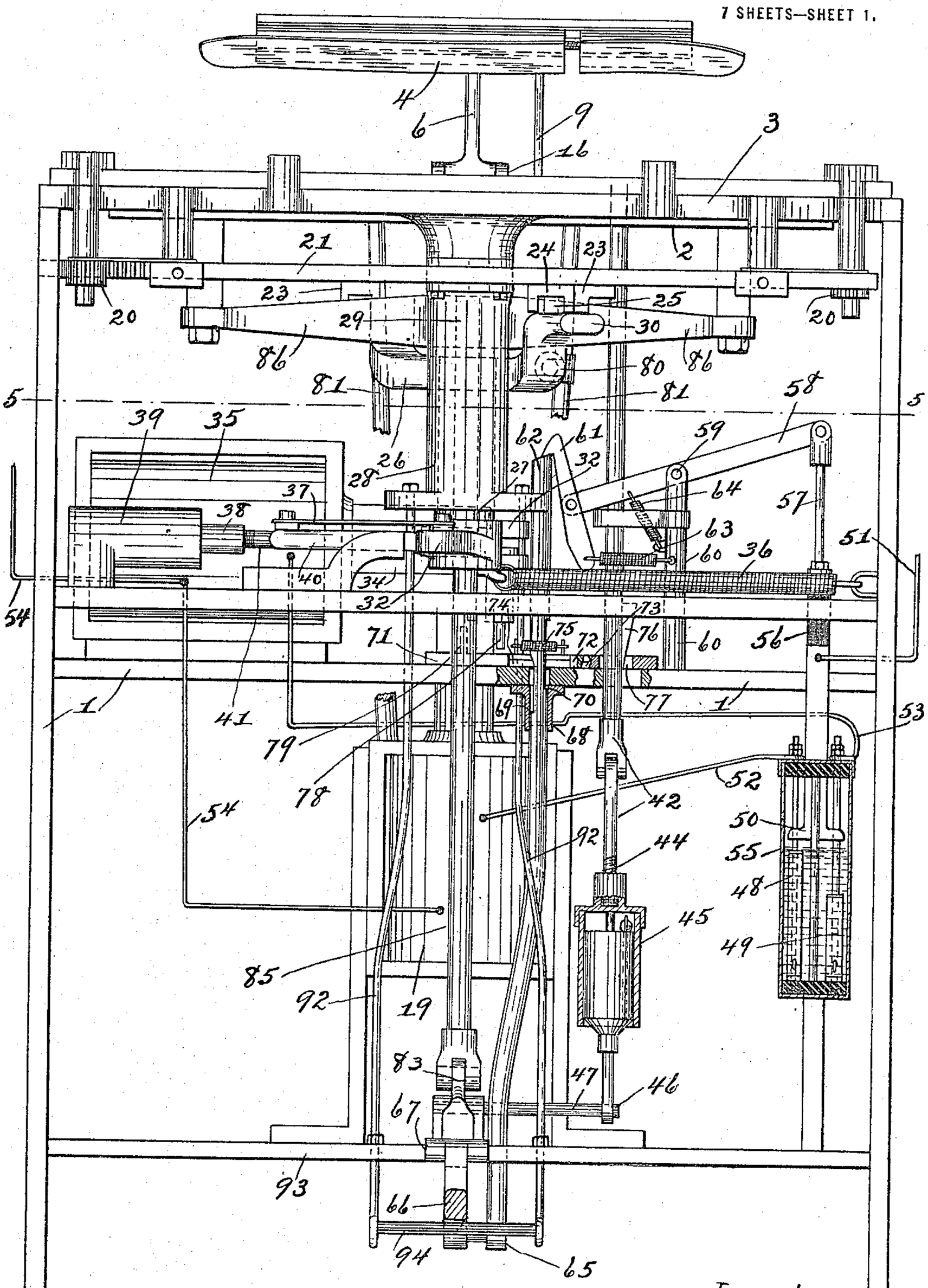

Fig. 1.

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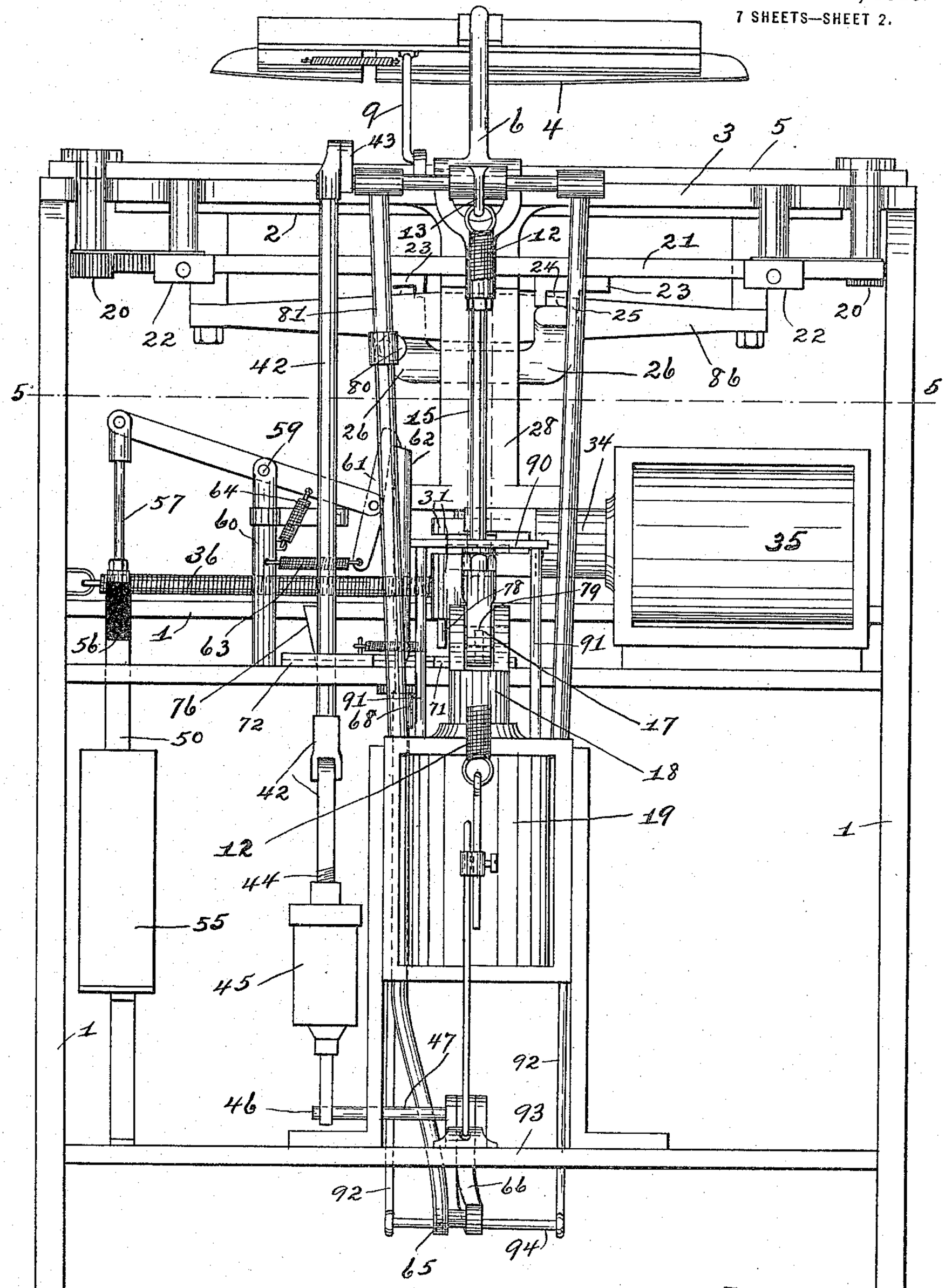

Fig. 2.

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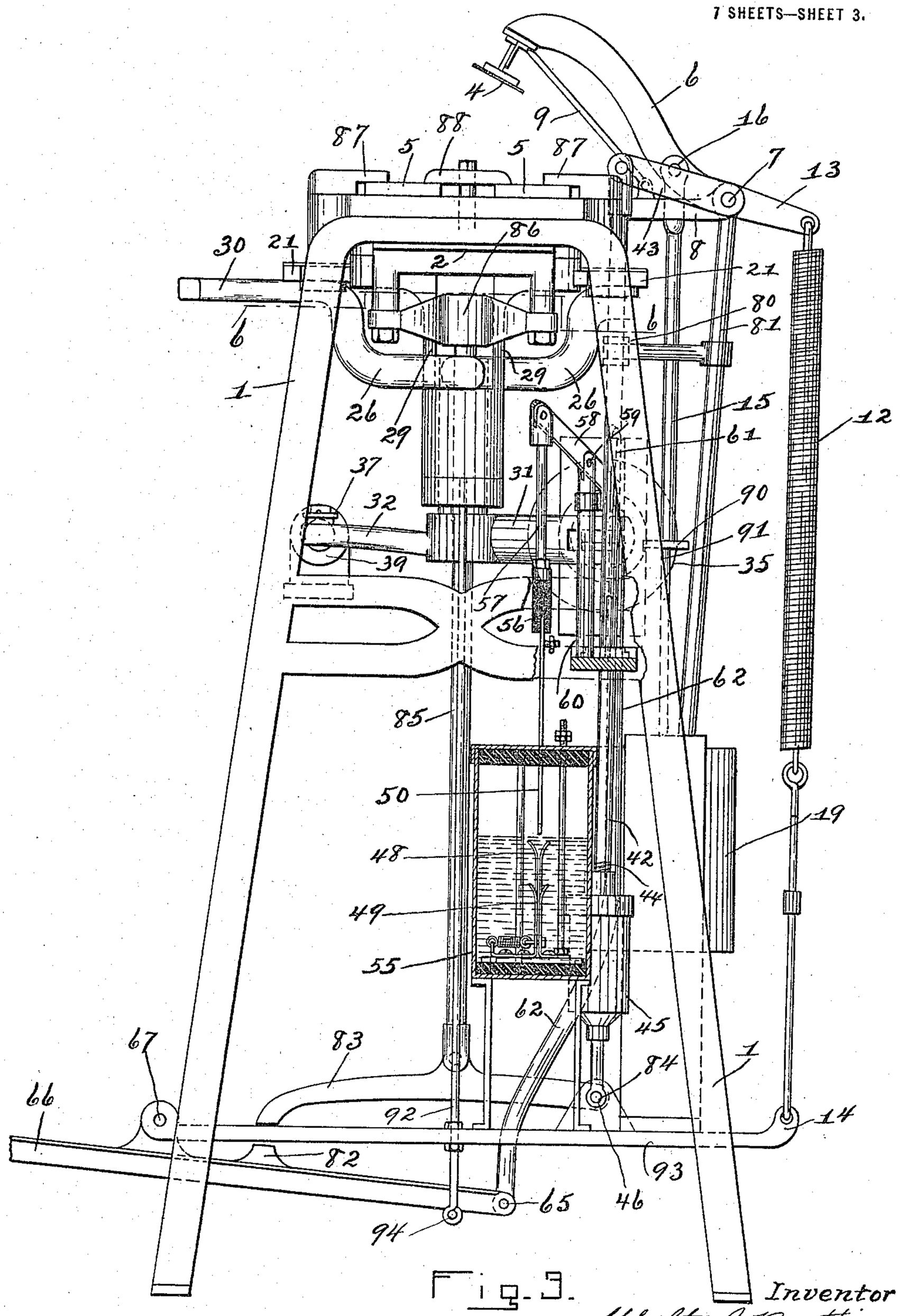

Fig. 3.

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7 SHEETS—SHEET 4.

Fig. 4

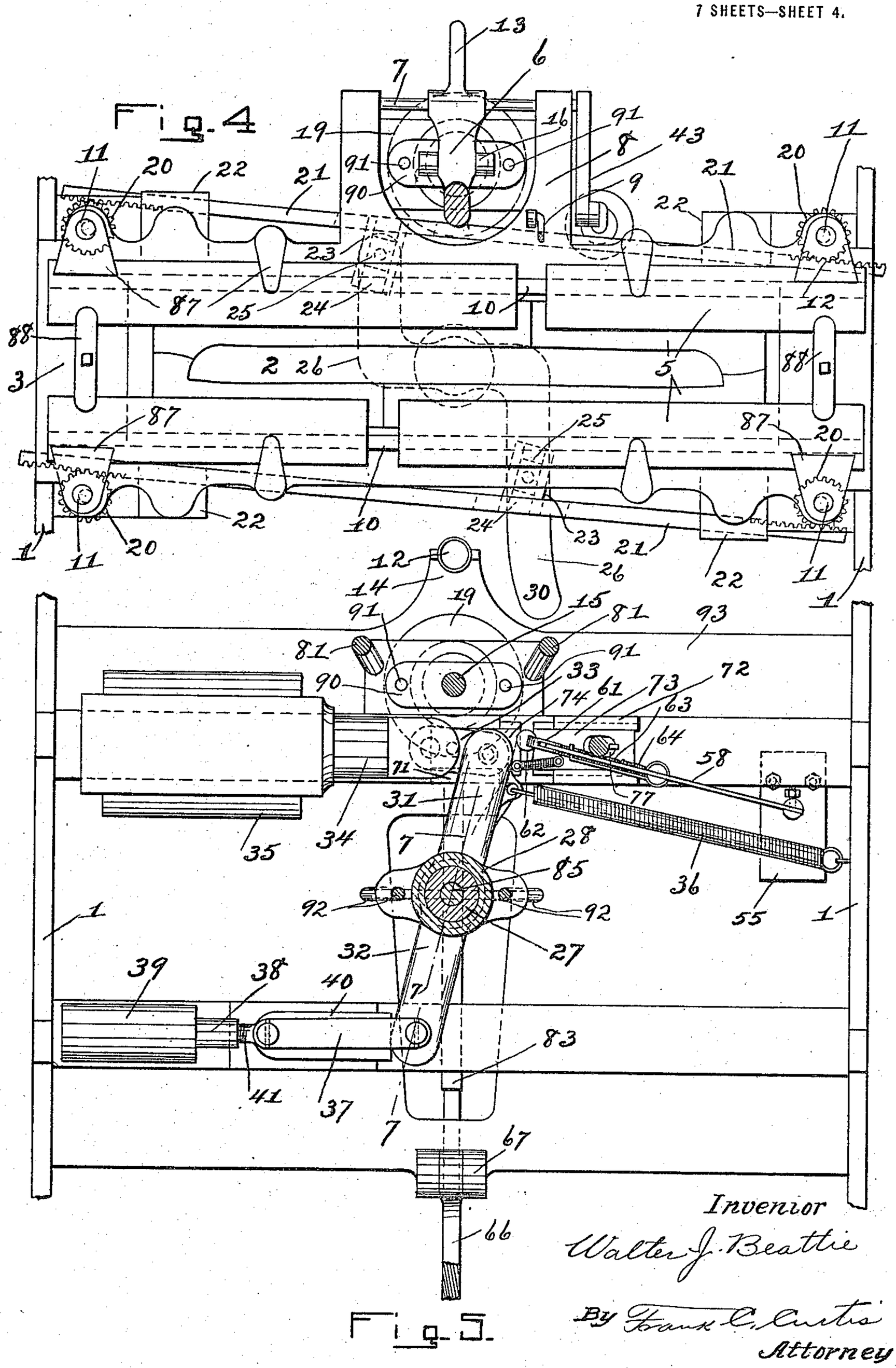

Fig. 5.

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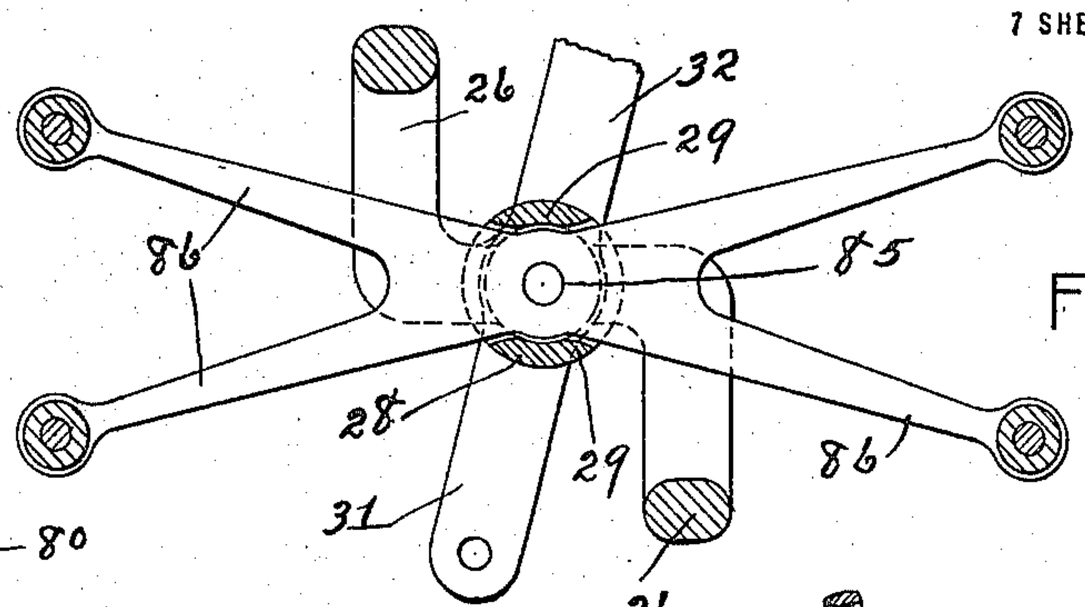

Fig. 6.

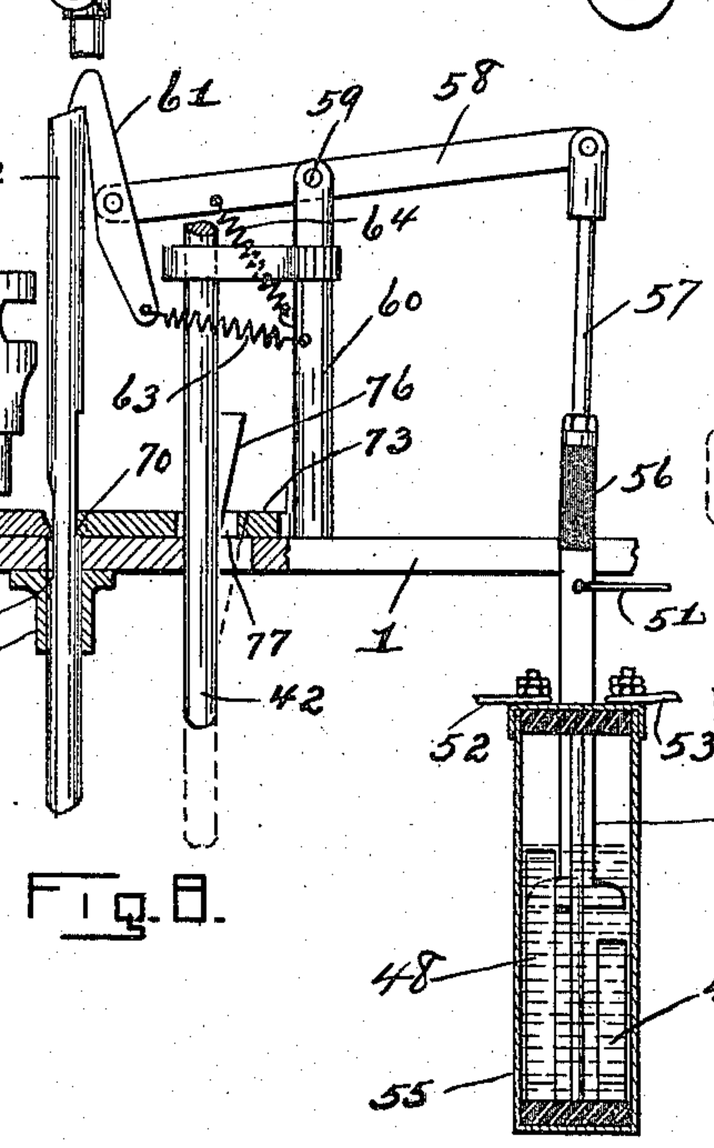

Fig. 8.

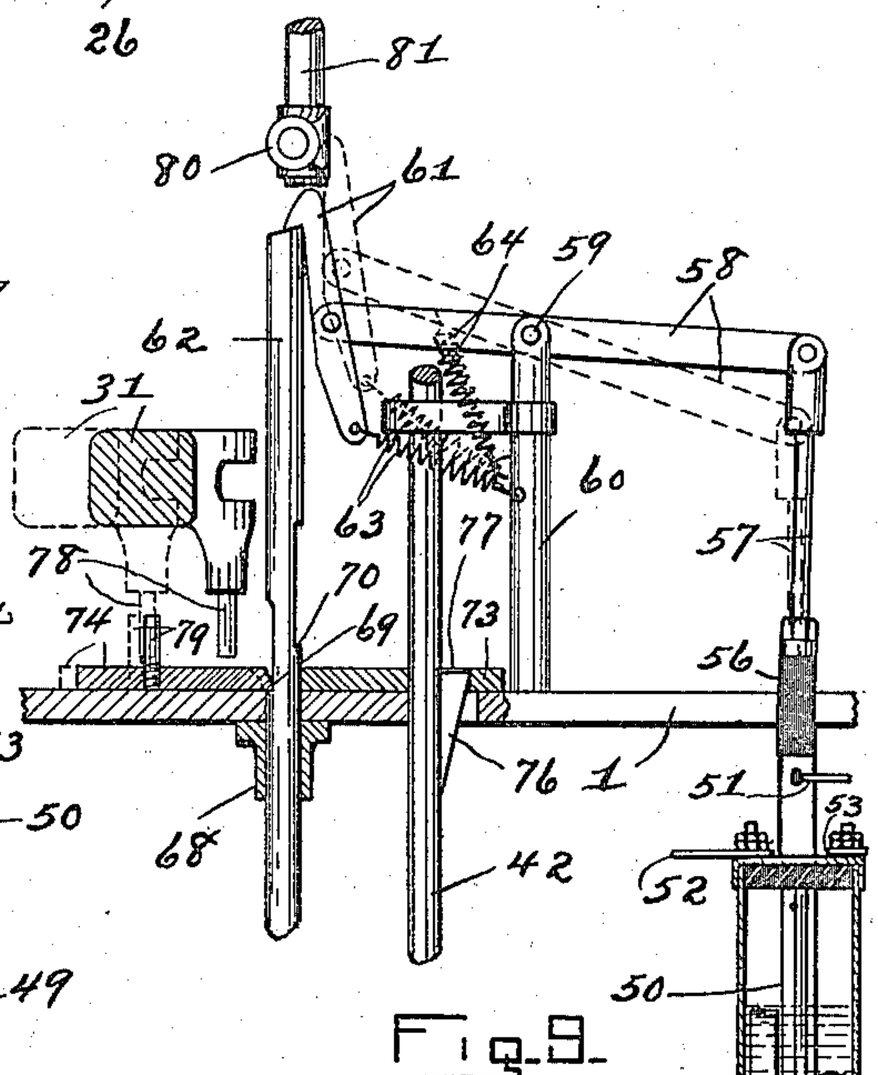

Fig. 9.

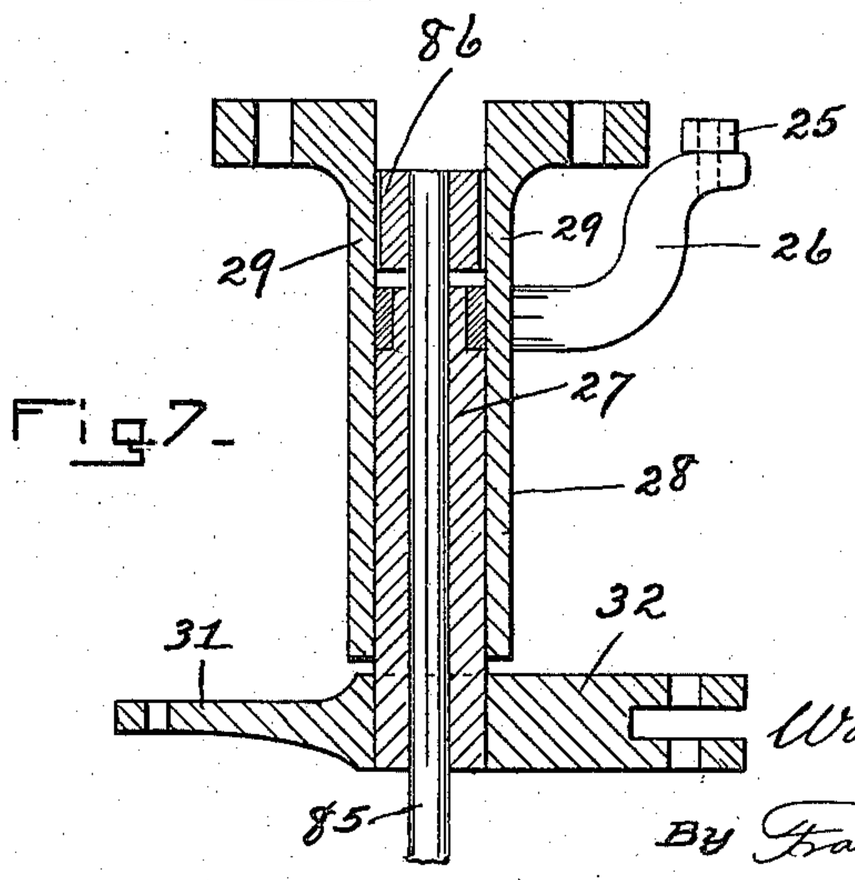

Fig. 7.

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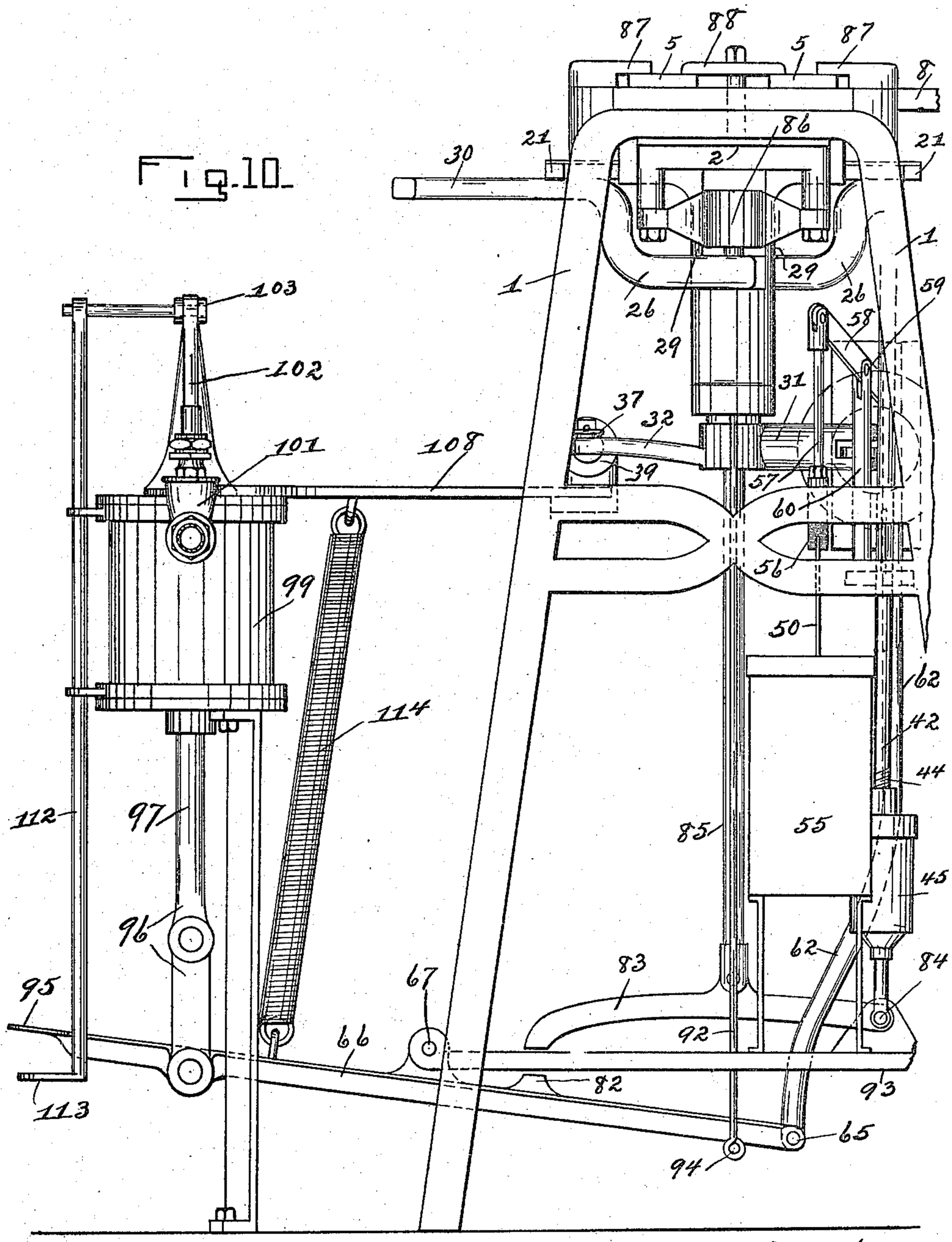
7 SHEETS—SHEET 6.

Fig. 10.



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7 SHEETS—SHEET 7.

Fig. 12.

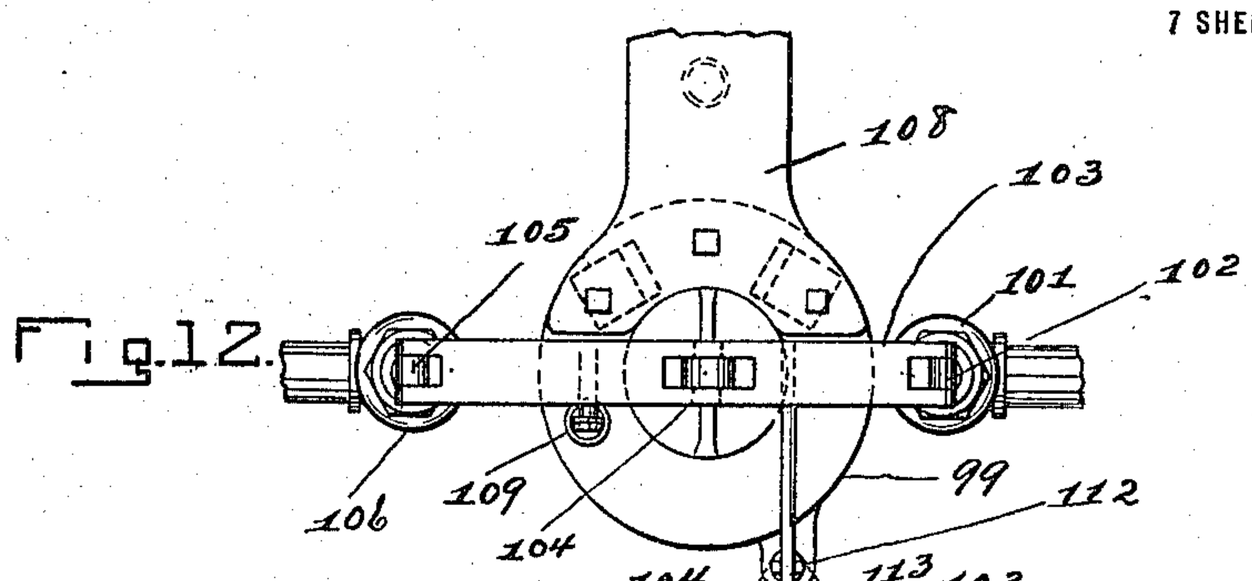
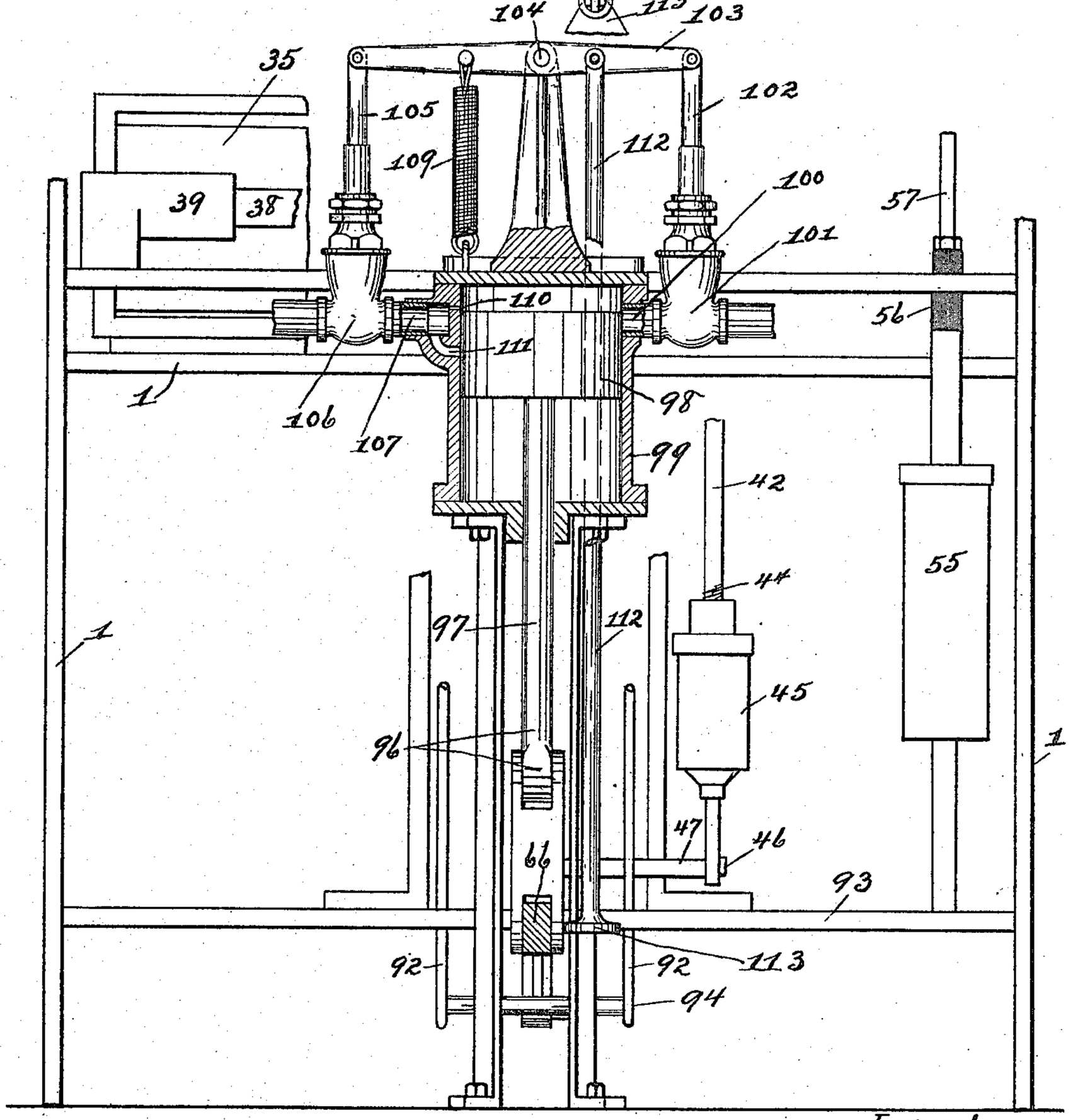


Fig. 11.



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UNITED STATES PATENT OFFICE.

WALTER J. BEATTIE, OF COHOES, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO BEATTIE MANUFACTURING COMPANY, OF COHOES, NEW YORK, A CORPORATION OF NEW YORK.

FOLDING-MACHINE.

1,167,329. Specification of Letters Patent. Patented Jan. 4, 1916.

Application filed April 23, 1915. Serial No. 23,369.

To all whom it may concern:

Be it known that I, WALTER J. BEATTIE, a citizen of the United States, residing at Cohoes, county of Albany, and State of New York, have invented certain new and useful Improvements in Folding-Machines, of which the following is a specification.

The invention relates to such improvements and consists in the novel construction and combination of parts hereinafter described and subsequently claimed.

Reference may be had to the accompanying drawings, and the reference characters marked thereon, which form a part of the specification.

Similar characters refer to similar parts in the several figures therein.

The invention relates to machines for inturning the edges of fabric blanks such as are used in the manufacture of collars and cuffs.

The principal object of the invention is to render the movable shaping and infolding mechanisms automatic, and to provide means whereby the operator can, at will, induce their automatic operation.

Other objects will appear in connection with the following description.

Figure 1 of the drawings is a view in front elevation, partly in vertical section, of a folding-machine embodying my invention. Fig. 2 is a rear elevation of the same. Fig. 3 is an end elevation, partly in vertical section, of the same. Fig. 4 is a plan view of the top of the machine with the templet-arm broken away and shown in horizontal section. Fig. 5 is a horizontal section taken on the broken line 5—5 in Fig. 1. Fig. 6 is a horizontal section taken on the broken line 6—6 in Fig. 3, showing in plan the spider whereby the movable bed is supported. Fig. 7 is a vertical section taken on the broken line 7—7 in Fig. 5. Fig. 8 is a view partly in section and partly in front elevation showing in detail the switch-mechanism. Fig. 9 is a similar view showing different positions of the switch-operating mechanism. Fig. 10 is a view similar to Fig. 1, partly broken away, showing my improved compressed-air mechanism for actuating the main operating-lever. Fig. 11 is a view in front elevation, partly in vertical section, of said compressed air mechanism, and certain other parts of the machine. Fig. 12 is a top plan view of the compressed air mechanism broken away from other parts of the machine.

Referring to the drawings wherein the invention is shown in preferred form, 1 is the frame of the machine, and 2 is a bed upon which the blanks are placed to be folded, which bed is vertically movable in an opening in the top, 3, of the frame.

A templet, 4, coöperates with the bed, 2, to hold the blank in position upon the bed, 2, while the edges of the blank are inturned over the edges of the templet by means of infolders, 5, movable inwardly and outwardly over the bed, 2. The templet is mounted upon an arm, 6, pivoted at 7 upon a bracket, 8, projecting from the frame of the machine whereby the templet is adapted to be moved toward and from the bed. The templet may be of any known form. For certain purposes I prefer to employ a templet which is automatically expansible and contractible by means of an eccentrically connected link, 9, in substantially the manner shown and described in U. S. Letters Patent No. 972,320, granted to me October 11, 1910, for folding-machines. As this feature of the templet, however, forms no part of the present invention, a detailed description thereof will not be necessary.

For certain purposes of the invention the infolders may be moved inwardly and outwardly in any known manner. I have shown four infolders arranged two along the front of the bed and two along the rear of the bed. The members of each pair of infolders are movably interconnected by means of a bar, 10, fixed to one of the infolders and slidably mounted in a channel in the companion infolder, each of the infolders being engaged by an eccentric, 11, operated by suitable mechanism, whereby the infolders can be moved toward and from each other in the manner set forth in U. S. Letters Patent No. 1,071,677, granted to John Maitland and myself August 26, 1913.

The templet is normally held raised from the bed by means of a coil-spring, 12, connecting a rearward extension, 13, of the templet-arm, 6, with a bracket, 14, project-

ing from the frame of the machine. The templet-arm is adapted to be drawn downward to force the templet against the bed, or the interposed blank, by means of a rod, 15, pivoted at 16, upon the templet-arm, and pivotally connected at 17, with the core, 18, of a solenoid, 19, whereby, when an electric current is passed through the circuit of the solenoid, said rod, 15, will partake of the downward movement of the core, 18, and thus move the templet down upon the bed.

As a preferred means for operating the infolders, 5, I rotatively mount upon the frame of the machine in fixed relation to the respective eccentrics, 11, pinions, 20, the pinions for each pair of infolders being engaged by a toothed rack, 21, capable of longitudinal sliding movements through a pair of slideways, 22, on the frame of the machine. The racks, 21, are preferably severally obliquely arranged with respect to a line extending from center to center of the two pinions engaged by the rack, whereby the rack engages the outer side of one and the inner side of the other of a pair of pinions, 20, by which arrangement similar converging, or similar diverging, movements can be imparted to both infolders operated by said rack. Upon each rack, 21, is fixed a block, 23, provided with a cam-groove, 24, which groove is engaged by a follower, 25, which followers are mounted respectively upon arms, 26, projecting in opposite directions from the upper end of a sleeve, 27, rotatively mounted within a hollow-post, 28, forming part of the frame of the machine and rigidly connected with the top of the machine by means of vertical members, 29, through the space between which members the arms, 26, project and are free to play. The arm, 26, at the front of the machine is extended to form a handle, 30, whereby the infolders can be operated by hand when desired.

A pair of arms, 31 and 32, project in opposite directions from the lower end of the sleeve, 27, the arm, 31, being connected by a link, 33, with the core, 34, of a solenoid, 35, so arranged that when an electric current is passed through the circuit of said solenoid, the movement of the core, 34, will be imparted through arm, 31, sleeve, 27, and arms, 26, to the respective racks, 21, to operate the infolders in an inward direction. A coil-spring, 36, which connects the arm, 31, with the frame of the machine, tends to yieldingly hold the infolders withdrawn to their outermost position. The arm, 32, is flexibly connected by a link, 37, with the piston-rod, 38, of a pneumatic or oil dash-pot, 39. The piston-rod, 38, is provided with an extension, 40, capable of screw-adjustment at 41, upon the main piston-rod, which extension makes contact with the end of the arm, 32. A movement of the arm, 32, caused by the energization of the solenoid, 35, causes the link, 37, to withdraw the piston-rod, 38, while movement of the arm, 32, induced by the spring, 36, is transmitted directly to the extension, 40, to force the piston-rod, 38, farther into the dash-pot, 39, which thus serves to cushion the return movement of the infolders when released from the control of the solenoid, 35, to the action of the spring, 36.

A jointed rod, 42, is pivotally connected at its upper end with an arm, 43, fixed upon the shaft, 7, which forms the pivot for the templet-arm, 6, and said rod has at its lower end an adjustable screw-threaded connection at 44, with the cylinder, 45, of a pneumatic or oil dash-pot, the piston of which has a fixed support at 46, upon an arm, 47, projecting from the frame of the machine, whereby the downward movement of the templet is cushioned to prevent its too forcible engagement with the bed.

From the foregoing it will be seen that by energizing the solenoids, 19 and 35, successively, the templet will be automatically forced down upon the bed and the infolders will then be automatically moved inward over the edges of the templet.

I have shown in the drawings a preferred form of switch and switch-operating mechanism whereby the operator can induce such successive energization of said solenoids in which I employ a switch having two pairs of jaws, 48 and 49, adapted to be successively engaged by the switch-blade, 50, the jaws, 48, being somewhat longer than the jaws, 49. The switch-blade, 50, is connected by wire, 51, with one of the terminals of a source of electrical supply. The longer switch jaws, 48, are connected by wire, 52, with one terminal of the solenoid, 19, and the shorter switch jaws, 49, are connected by wire, 53, with one terminal of the solenoid, 35. The other terminals of the solenoids are connected by wire, 54, with the other terminal of the source of electrical supply, said source not being shown.

The switch-mechanism is preferably contained within a switch-box or cylinder, 55, containing a quantity of oil in which the switch jaws, 48 and 49, are submerged. The switch-blade, 50, is mounted by means of an insulated joint, 56, upon a rod, 57, pivotally connected with one arm of a lever, 58, fulcrumed at 59, upon a post, 60, erected from the frame of the machine. Upon the other end of the lever, 58, is pivoted a hook, 61, adapted to engage the upper end of a vertically reciprocatory rod, 62, the hook, 61, being normally held in engagement with the end of the rod, 62, by means of a coil-spring, 63, and the lever, 58, being normally held by a spring, 64, in a position such that the

switch-blade, 50, is held in an elevated position out of contact with the switch jaws, 48 and 49. The lower end of rod, 62, is pivotally connected at 65 with the inner end of a foot- or power-actuated lever, 66, which is fulcrumed at 67 upon the frame of the machine. The rod, 62, passes through a vertical slideway, 68, on the frame of the machine, and the rod is cut away on its opposite sides to form thereon shoulders or offsets at 69 and 70.

Just above the vertical slideway, 68, a pair of horizontal slideways, 71 and 72, are mounted upon a horizontal member of the frame, 1, on opposite sides of an aperture in said member through which the rod, 62, freely passes; and movable horizontally in these slideways are slides, 73 and 74, which are yieldingly held against the opposite sides of the rod, 62, by means of a coil-spring, 75. These slides, 73, and 74, form stops which automatically arrest the upward movement of the rod, 62, at successive points in such movement. The shoulder, 70, is located in advance of the shoulder, 69, with reference to such upward movement of the rod, 62, and the arrangement is such that the upward movement of the rod, 62, will be arrested by the shoulder, 70, after the switch-blade, 50, has engaged the switch-jaws, 48, and before it has engaged the switch-jaws, 49. The upward movement of the rod, 62, is thus arrested by the shoulder, 70, at a point where the solenoid, 19, is energized by the closing of the circuit through the switch-blade, 50, and the longer switch-jaws, 48. The solenoid, 19, being thus energized, causes the templet to be drawn down upon the bed through the medium of the rod, 15, and also causes the rod, 42, to be forced downward to cushion the engagement of the templet with the bed by means of the dash-pot, 45.

The rod, 42, carries a wedge, 76, both the rod and wedge passing through a slot, 77, in the slide, 74, the wedge, 76, being adapted to engage the outer end-wall of said slot, 77, to force the slide, 73, out of the path of the shoulder, 70, thus permitting the upward movement of the rod, 62, to be resumed. This secondary upward movement of the rod, 62, is arrested when the shoulder, 69, engages the slide, 74. The shoulder, 69, is so located that by the time it has engaged the slide, 74, the switch-blade, 50, will have made contact with the switch-jaws, 49, while maintaining its contact with the switch-jaws, 48, thus energizing the solenoid, 35, to cause an inward movement of the infolders, as above described, while the templet is held down upon the bed, or the interposed blank, by the action of the solenoid, 19, which continues to be energized.

A pin, 78, depends from the arm, 31, in position to engage a pin or lug, 79, projecting upwardly from the slide, 74, near the end of the movement of said arm, 31, induced by the action of the solenoid, 35; so that as the folding movement of the infolders is completed, the slide, 74, is withdrawn from the path of the shoulder, 69, permitting the rod, 62, to be forced farther upward until the hook, 61, is automatically released from its engagement with the end of the rod, 62, by the engagement of the beveled end of said hook, 61, with a roller, 80, mounted upon one of a pair of brace-rods, 81, for the frame of the machine, as indicated by dotted lines in Fig. 9. The final downward movement thus permitted the outer end of the lever, 66, causes a lug, 82, on the inner end of said lever to engage and force upwardly one end of a pressing lever, 83, fulcrumed at its other end at 84, upon the frame of the machine, and pivotally connected intermediately of its ends with a reciprocatory rod, 85, which extends freely upward through the sleeve, 27, and has fixed upon its upper end a spider, 86, upon which is mounted the movable bed, 2, whereby the infolded edges of the blank are pressed between the vertically movable bed, and the infolders which are supported to resist the upward movement of the bed by means of overhanging arms, 87 and 88. The final movement of the lever, 66, whereby the pressing of the blank is accomplished, is accompanied by the automatic release of the hook, 61, from the rod, 62, which permits the switch-mechanism to be restored to its normal open position due to the action of the spring, 64.

The main operating lever, 66, may be actuated by the foot of the operator or by any suitable power-mechanism. I have shown the front end of said lever, 66, provided with a foot-rest, 95, whereby said lever can be operated as a treadle. In Figs. 10 and 11, I have shown said main operating lever, 66, connected by a link, 96, with the piston-rod, 97, of a piston, 98, within a compressed-air-cylinder, .99, which is provided at 100, with an outlet controlled by a valve, 101, the stem, 102, of which valve is connected by a lever, 103, fulcrumed at 104, upon said cylinder, 99, with the valve-stem, 105, of a valve, 106, which controls an inlet or supply-pipe, 107, leading to said cylinder from a source of supply of compressed-air, not shown.

The compressed-air-cylinder, 99, is mounted in fixed relation to the frame, 1, of the machine as by one or more brackets, 108.

A coil-spring, 109, tends to hold the valve, 106, closed and the valve, 101, open.

The cylinder, 99, is provided near its upper end with an inlet-port, 110, communicating with the supply-pipe, 107, and with the

space above the piston, 98; and is provided at some distance below the inlet-port, 110, with a considerably larger inlet-port, 111, communicating with the supply-pipe, 107.

A rod, 112, is connected at its upper end with the valve-actuating lever, 103, and has on its lower end a foot-rest, 113, whereby the rod can be depressed to operate the lever, 103, against the force of its spring, 109, to open the inlet-valve, 106, and simultaneously close the outlet-valve, 101.

A coil-spring, 114, tends to hold the front end of the lever, 66, in raised position.

In operating the machine, the operator presses down upon the foot-lever, 113, thereby closing the outlet-valve, 101, and opening the inlet-valve, 106, which permits compressed-air to enter from the supply-pipe, 107, through the inlet, 110, causing the piston, 98, and the front end of the main operating lever, 66, to be forced downward. The inlets, 110, and 111, are so spaced apart that by the time the piston, 98, has descended sufficiently to uncover the larger inlet, 111, the movement imparted to the lever, 66, and rod, 62, will have operated the switch-mechanism to force the templet, 4, down upon the bed or interposed blank, and to move the infolders inwardly over the edges of the templet, as above set forth. As soon as the larger inlet, 111, is uncovered by the piston, 98, the increased supply of compressed-air which is thereby permitted to enter the cylinder, 99, will quickly and forcibly depress said piston and the front end of the lever, 66, to accomplish the pressing of the blank between the movable bed, 2, and the overhanging infolders.

The operation of the machine is as follows: The parts being in normal position, a blank is placed upon the bed with the edges of the blank overlapping the edges of the plates of the infolders. The operator then presses steadily downward with his foot upon the treadle at 99, or upon the foot-rest, 113, which induces operation of the compressed air mechanism, the first effect of which is to force upward the rod, 62, to the limit permitted by the engagement of the shoulder, 70, with the slide, 74, as shown in Fig. 8, which movement is sufficient to close the circuit of the solenoid, 19, and move the templet, 4, down upon the blank and bed, and simultaneously, through the medium of the wedge, 76, release the rod, 62, from the slide, 73, permitting the rod, 62, to rise under the continued downward pressure upon the outer end of lever, 66, to the limit permitted by the engagement of the shoulder, 69, with the slide, 74, as shown in Fig. 9, which latter movement is sufficient to close the circuit of the solenoid, 35, while also maintaining the circuit of the solenoid, 19, closed. The templet is thus held down upon the bed while the infolders are moved inwardly to infold the edges of the blank over the edges of the templet; and as the infolding movement is completed, the slide, 74, is withdrawn by engagement of the pin, 78, with the pin, 79, as indicated by dotted lines in Fig. 9, permitting a further movement of the outer end of the treadle or lever, 66, which, through the lever, 83, rod, 85, and spider, 86, forces upwardly the bed, 2, to press the infolded edges of the blank between the bed and the infolders.

If desired the infolders may be heated by any of the known methods.

A bearing-plate, 90, for the rod, 15, is mounted upon the upper end of a pair of posts, 91, which extend upwardly from the housing of the solenoid, 19, forming part of the frame of the machine.

A pair of stay-rods, 92, connect the post, 28, with a horizontal member, 93, of the frame, depending ends of these stay-rods being connected together by a cross-bar, 94, which forms a stop for the return movement of the foot-lever, 66.

The shape of the templet and the shape and number of infolders may be varied as desired to adapt the machine for the particular blank to be folded.

What I claim as new and desire to secure by Letters Patent is—

1. In a folding-machine, and in combination, a bed; a templet movable toward and from the bed; infolders movable inwardly and outwardly over the bed; a pair of solenoids, one having a core operatively connected with the templet, and the other having a core operatively connected with the infolders; and switch-mechanism having means whereby the electric circuits of the respective solenoids are successively closed.

2. In a folding-machine, and in combination, a bed; a templet movable toward and from the bed; infolders movable inwardly and outwardly over the bed; a pair of solenoids, one having a core operatively connected with the templet, and the other having a core operatively connected with the infolders; and switch-mechanism controlling electric circuits of the respective solenoids and having contacts arranged successively whereby the solenoid connected with the templet is energized in advance of the solenoid connected with the infolders.

3. In a folding-machine, and in combination, a bed; a templet movable toward and from the bed; infolders movable inwardly and outwardly over the bed; a pair of solenoids, one having a core operatively connected with the templet, and the other having a core operatively connected with the infolders; switch-mechanism controlling the electric circuits of the respective solenoids and having a pair of successively ar-

ranged switch-members connected with the respective solenoids, and a movable switch-member engageable successively with said successively arranged switch-members, foot-actuated mechanism for moving said movable switch-member into engagement with the successively arranged switch-members; a stop adapted to arrest the movement of the foot-actuated mechanism after the movable switch member has engaged the first, and before it has engaged the other, of the successively arranged switch-members; and stop-releasing mechanism actuated by movement of the core of the first-energized of said solenoids.

4. In a folding-machine, and in combination, a bed; a templet movable toward and from the bed; infolders movable inwardly and outwardly over the bed; a solenoid having a core operatively connected with the templet adapted to force the templet down upon the bed when the solenoid is energized; and a dash-pot arranged to cushion the engagement of the templet with the bed.

5. In a folding-machine, and in combination, a bed; a templet movable toward and from the bed; infolders movable inwardly and outwardly over the bed; a solenoid having a core operatively connected with the infolders adapted to force the infolders inwardly when the solenoid is energized; a spring for imparting a return movement to the infolders; and a dash-pot arranged to cushion the return movement of the infolders.

6. In a folding-machine, and in combination, a vertically movable bed; a templet movable toward and from the bed; infolders movable inwardly and outwardly over the bed; a pair of solenoids, one having a core operatively connected with the templet, and the other having a core operatively connected with the infolders; switch-mechanism controlling the electric circuits of the respective solenoids and having a pair of successively arranged switch-members connected with the respective solenoids, and a movable switch-member engageable successively with said successively arranged switch-members; a bed-raising member; foot-actuated mechanism for inducing operation of first the movable switch-member and afterward the bed-raising member; a stop adapted to arrest the movement of the movable switch-member after it has engaged the first, and before it has engaged the other, of the successively arranged switch-members; mechanism actuated by movement of the core of the first energized of said solenoids for releasing said stop; a second stop adapted to arrest the movement of the movable switch-member after it has engaged the second of the successively arranged switch-members and before said bed-raising member is actuated; and mechanism actuated by movement of the core of the other of said solenoids, when energized, for releasing said last-mentioned stop.

7. In a folding-machine, and in combination, a bed; a templet movable toward and from the bed; infolders movable inwardly and outwardly over the bed; a pair of solenoids, one having a core operatively connected with the templet, and the other having a core operatively connected with the infolders; and switch-mechanism controlling the electric circuits of the respective solenoids and having a circuit-closing blade and two pairs of jaws in the path of said blade, one pair of said jaws being longer than the other pair and connected with the templet-operating solenoid, the shorter pair of jaws being connected with the infolder-operating solenoid.

8. In a folding-machine, and in combination, a vertically movable bed; a templet movable toward and from the bed; infolders movable inwardly and outwardly over the bed; a pair of solenoids, one having a core operatively connected with the templet, and the other having a core operatively connected with the infolders; switch-mechanism controlling the electric circuits of the respective solenoids and having a circuit-closing blade and two pairs of jaws in the path of said blade, one pair of said jaws being longer than the other pair and connected with the templet-operating solenoid, the shorter pair of jaws being connected with the infolder-operating solenoid; a bed-raising member; a switch-blade-operating lever; a spring tending to withdraw the switch-blade from said switch-jaws; a longitudinally movable rod having a pair of shoulders one in advance of the other; a hook pivoted on said switch-blade-operating lever adapted to be engaged by said rod; foot-actuated mechanism for inducing movement of said rod to cause the switch-blade to engage successively both pairs of switch-jaws and for thereafter operating the bed-raising member; a stop in the path of the first of said shoulders on said rod adapted to be engaged thereby after the switch-blade has engaged the longer pair of jaws, and before it has engaged the shorter pair of jaws; means actuated by movement of the core of the first-energized of said solenoids for releasing said stop; a second stop in the path of the other of said shoulders adapted to be engaged thereby after the switch-blade has engaged the shorter pair of jaws and before the bed-raising member has been actuated; and mechanism actuated by movement of the core of the other of said solenoids when energized for releasing said last-mentioned stop.

9. In a folding-machine, and in combina-

tion, a bed; a templet coöperative with the bed; a pair of separate infolders movable inwardly and outwardly over the bed; eccentrics for actuating said respective infolders; pinions in fixed relation to the respective eccentrics; and a rack slidably mounted obliquely to a line extending from center to center of said pinions in engagement with the outer side of the pinion for actuating one of said infolders, and with the inner side of the pinion for actuating the other of said infolders.

10. In a folding-machine, and in combination, a vertically movable bed; a templet movable toward and from the bed; infolders movable inwardly and outwardly over the bed; a pair of solenoids, one having a core operatively connected with the templet and the other having a core operatively connected with the infolders; switch-mechanism controlling the electric circuits of the respective solenoids and having a pair of successively arranged switch-members connected with the respective solenoids, and a movable switch-member engageable successively with said successively arranged switch-members; a bed-raising member; a main operating lever for actuating first the movable switch-member and afterward the bed-raising member; a stop adapted to arrest the movement of said main operating lever after the movable switch-member has engaged the first, and before it has engaged the other, of the successively arranged switch-members; mechanism actuated by movement of the core of the first-energized of said solenoids for releasing said stop; a second stop adapted to arrest the movement of said main operating lever after the movable switch-member has engaged the second of the successively arranged switch-members and before said bed-raising member is actuated; mechanism actuated by the mechanism of the core of the other of said solenoids, when energized, for releasing said last-mentioned stop; and valve-controlled compressed-air-mechanism operatively connected with said main operating lever.

11. In a folding-machine, and in combination, a vertically movable bed; a templet movable toward and from the bed; infolders movable inwardly and outwardly over the bed; a pair of solenoids, one having a core operatively connected with the templet and the other having a core operatively connected with the infolders; switch-mechanism controlling the electric circuits of the respective solenoids and having a pair of successively arranged switch-members connected with the respective solenoids, and a movable switch-member engageable successively with said successively arranged switch-members; a bed-raising member; a main operating lever for actuating first the movable switch-member and afterward the bed-raising member; a stop adapted to arrest the movement of said main operating lever after the movable switch-member has engaged the first, and before it has engaged the other, of the successively arranged switch-members; mechanism actuated by movement of the core of the first-energized of said solenoids for releasing said stop; a second stop adapted to arrest the movement of said main operating lever after the movable switch-member has engaged the second of the successively arranged switch-members and before said bed-raising member is actuated; mechanism actuated by the movement of the core of the other of said solenoids, when energized, for releasing said last-mentioned stop; a cylinder and piston, one movable relatively to the other and connected with said main operating lever, and the other fixed; a valve-controlled outlet from said cylinder; and a valve-controlled compressed-air supply-pipe, said cylinder being provided with an inlet port of comparatively small area and with an inlet port of comparatively large area successively arranged longitudinally of the cylinder.

12. In a folding-machine, and in combination, a vertically movable bed; a templet movable toward and from the bed; infolders movable inwardly and outwardly over the bed; a pair of solenoids, one having a core operatively connected with the templet and the other having a core operatively connected with the infolders; switch-mechanism controlling the electric circuits of the respective solenoids and having a pair of successively arranged switch-members connected with the respective solenoids, and a movable switch-member engageable successively with said successively arranged switch-members; a bed-raising member; a main operating lever for actuating first the movable switch-member and afterward the bed-raising member; a stop adapted to arrest the movement of said main operating lever after the movable switch-member has engaged the first, and before it has engaged the other, of the successively arranged switch-members; mechanism actuated by movement of the core of the first-energized of said solenoids for releasing said stop; a second stop adapted to arrest the movement of said main operating lever after the movable switch-member has engaged the second of the successively arranged switch-members and before said bed-raising member is actuated; mechanism actuated by the movement of the core of the other of said solenoids, when energized, for releasing said last-mentioned stop; a cylinder and piston, one movable relatively to the other and connected with said main operating lever, and the other fixed, said cylinder being pro-

vided with an inlet-port of comparatively small area and an inlet-port of comparatively large area successively arranged longitudinally of the cylinder; an outlet-pipe leading from said cylinder; a valve controlling said outlet-pipe; a compressed-air supply-pipe connected with said cylinder in communication with both of said inlet ports; a valve controlling said compressed-air supply-pipe; a spring tending to hold said compressed-air-pipe-valve closed and said outlet-pipe-valve open; and foot-actuated mechanism for simultaneously operating said valves in opposition to the force of said spring.

In testimony whereof, I have hereunto set my hand this 20th day of April, 1915.

WALTER J. BEATTIE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."