E. W. SWEIGARD.

PNEUMATIC PRINTING FRAME.

APPLICATION FILED SEPT. 4, 1914.

1,166,945. Patented Jan. 4, 1916.

2 SHEETS—SHEET 1.

Fig. 1. Fig. 2.

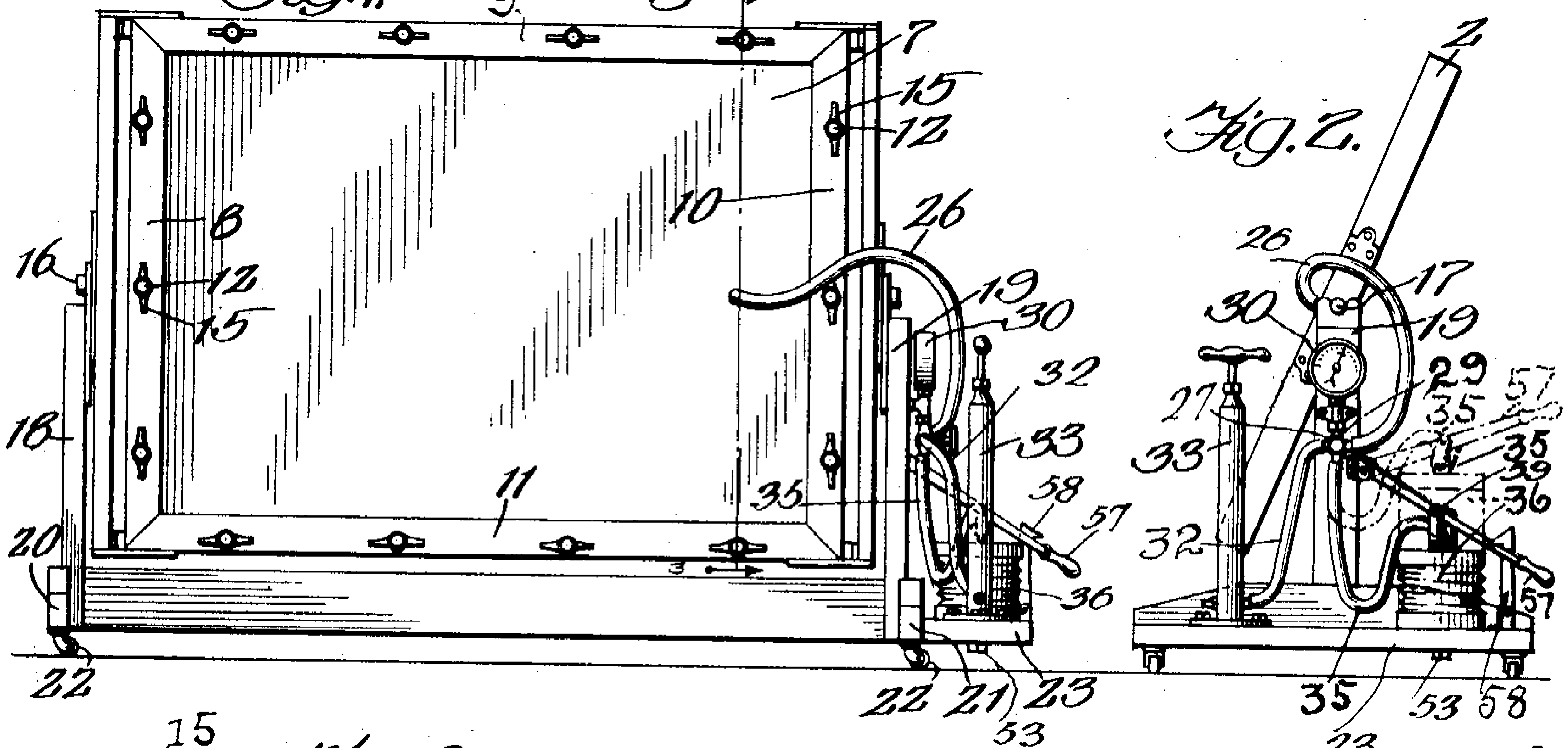


Fig. 3.

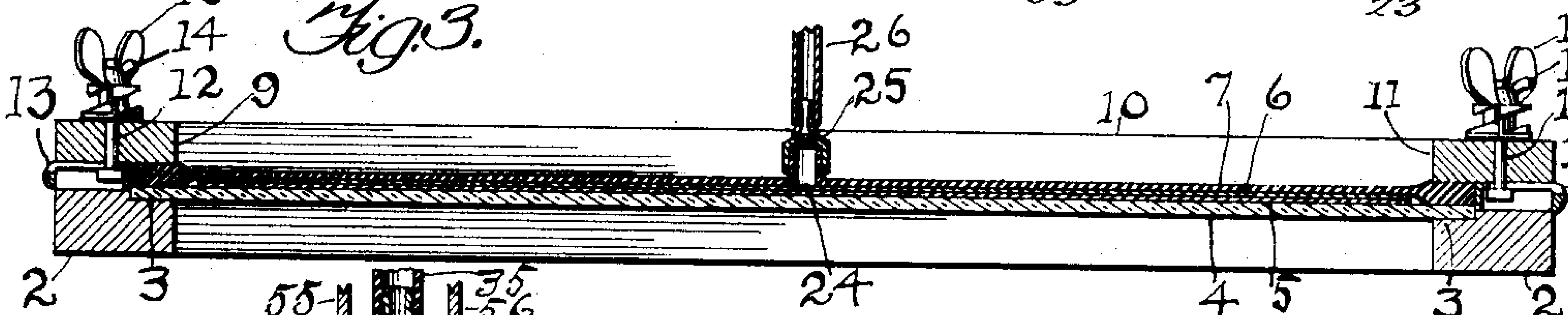


Fig. 4.

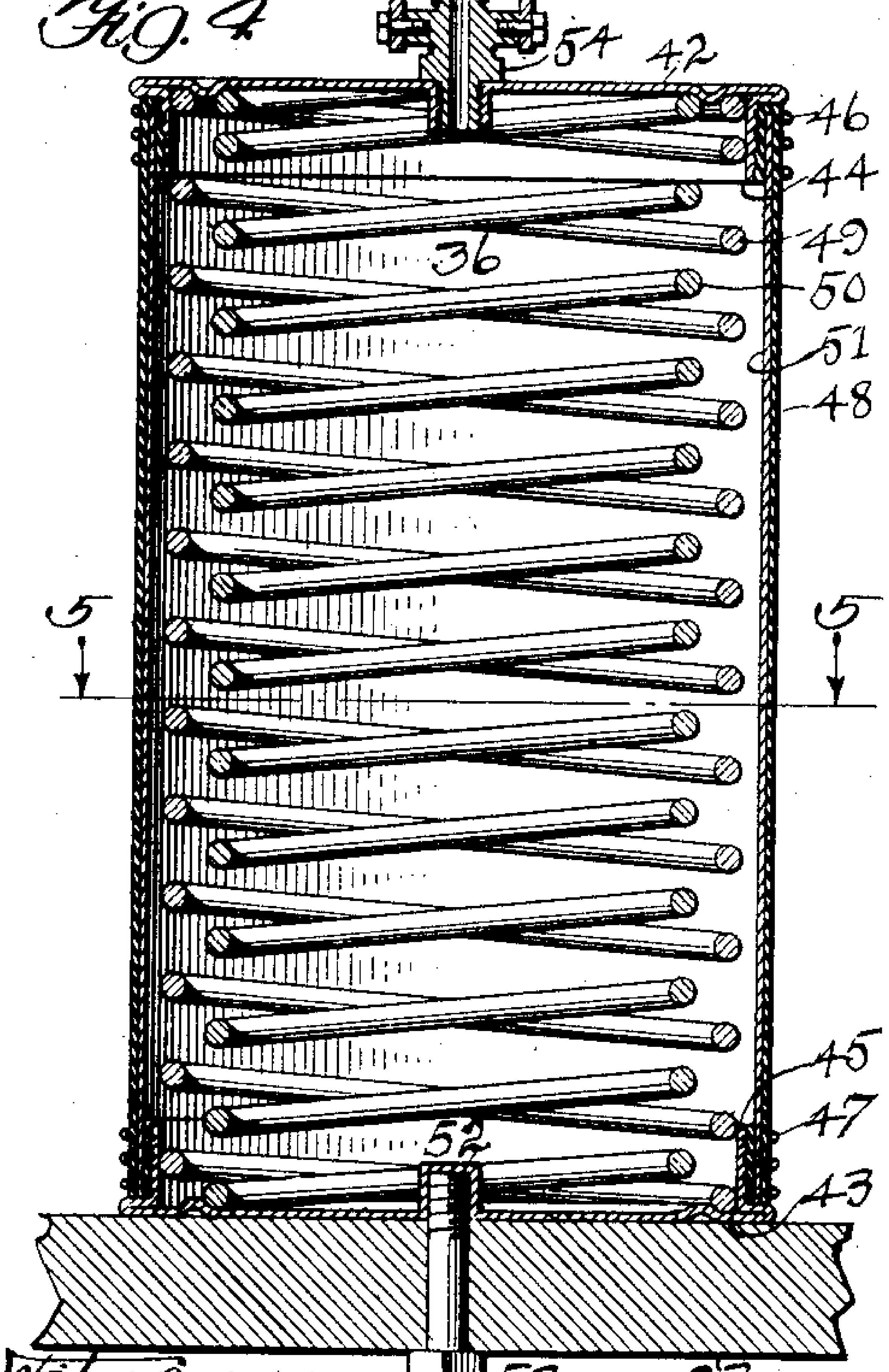


Fig. 5.

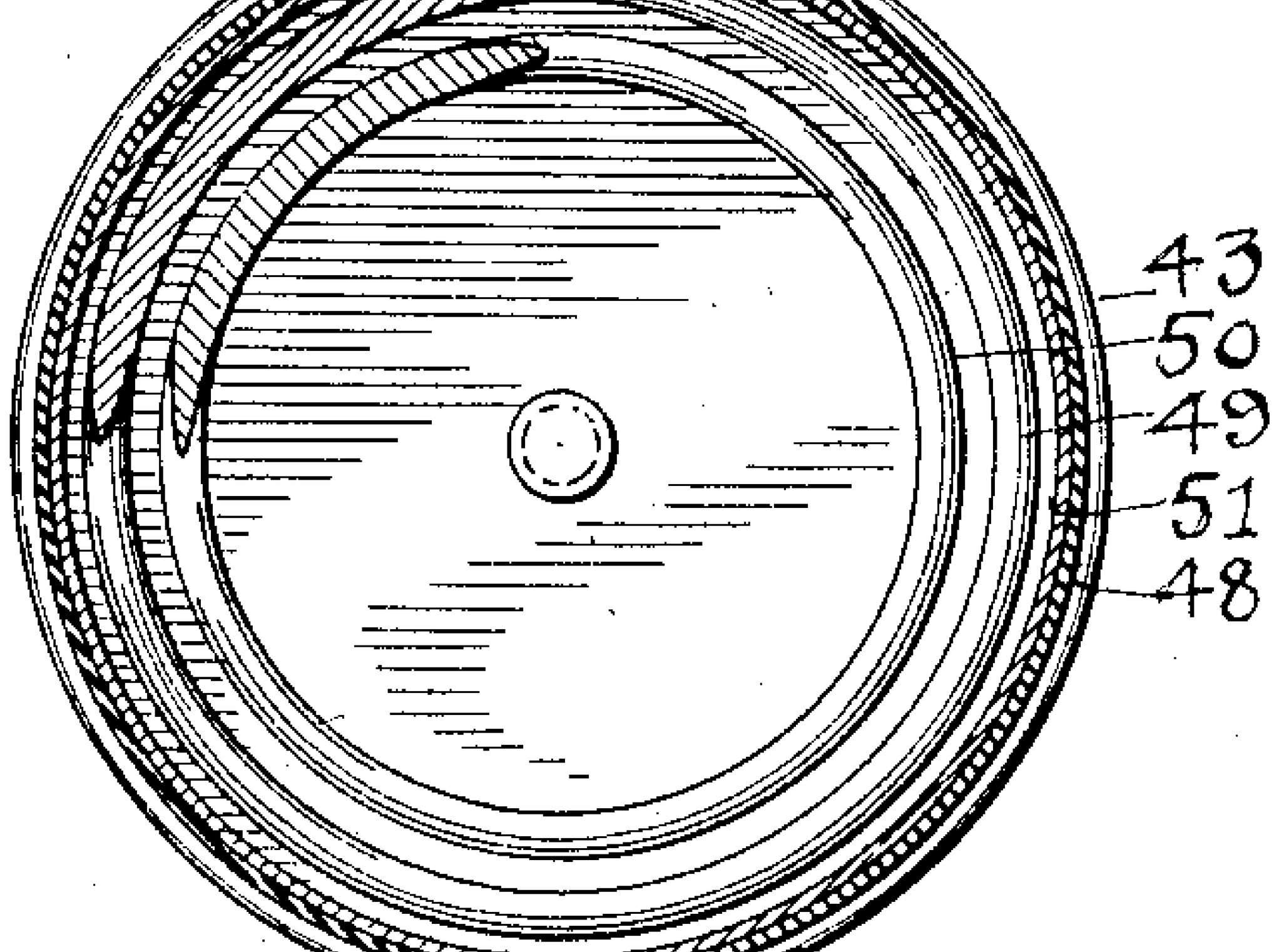
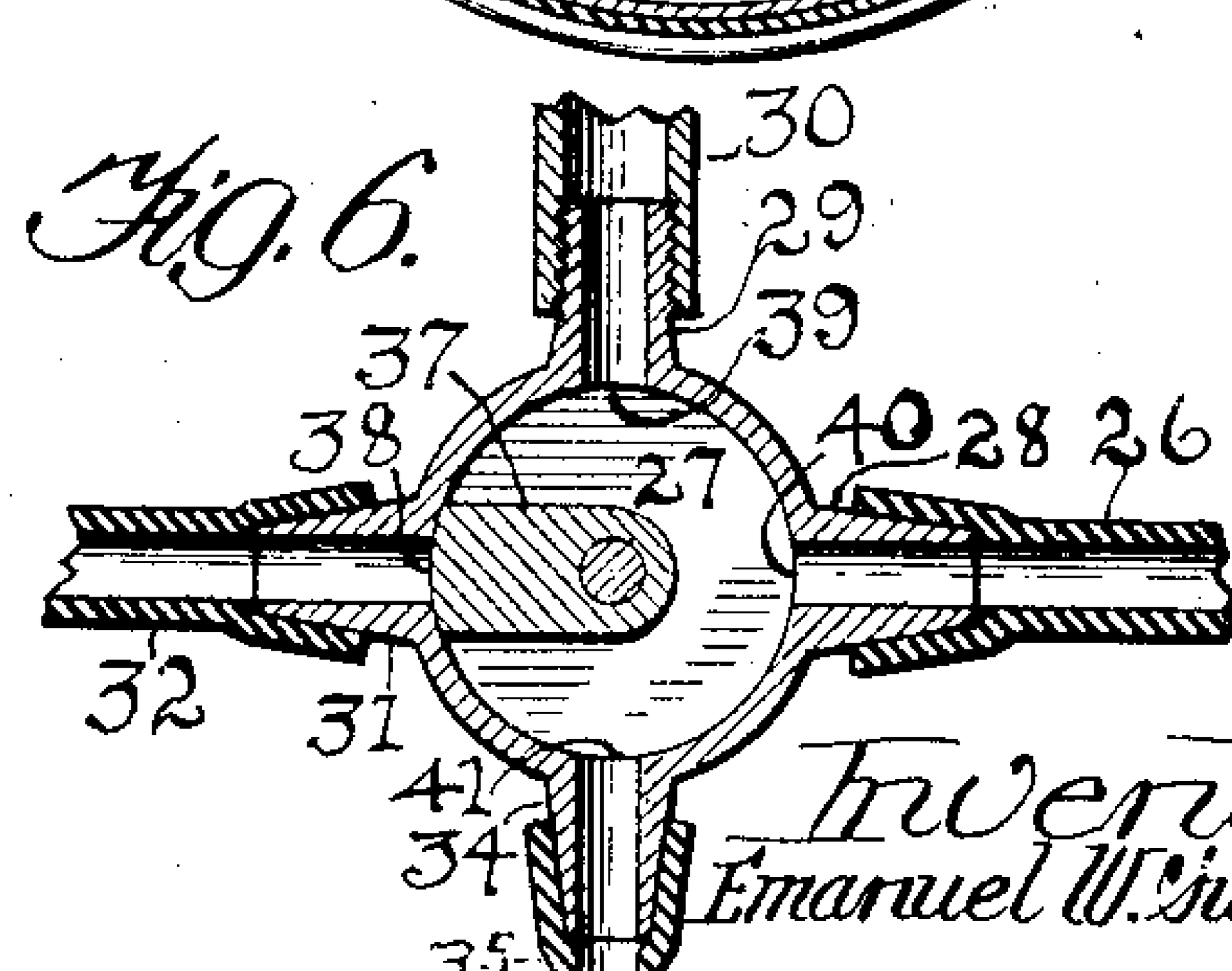


Fig. 6.



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2 SHEETS—SHEET 2.

Fig. 7.

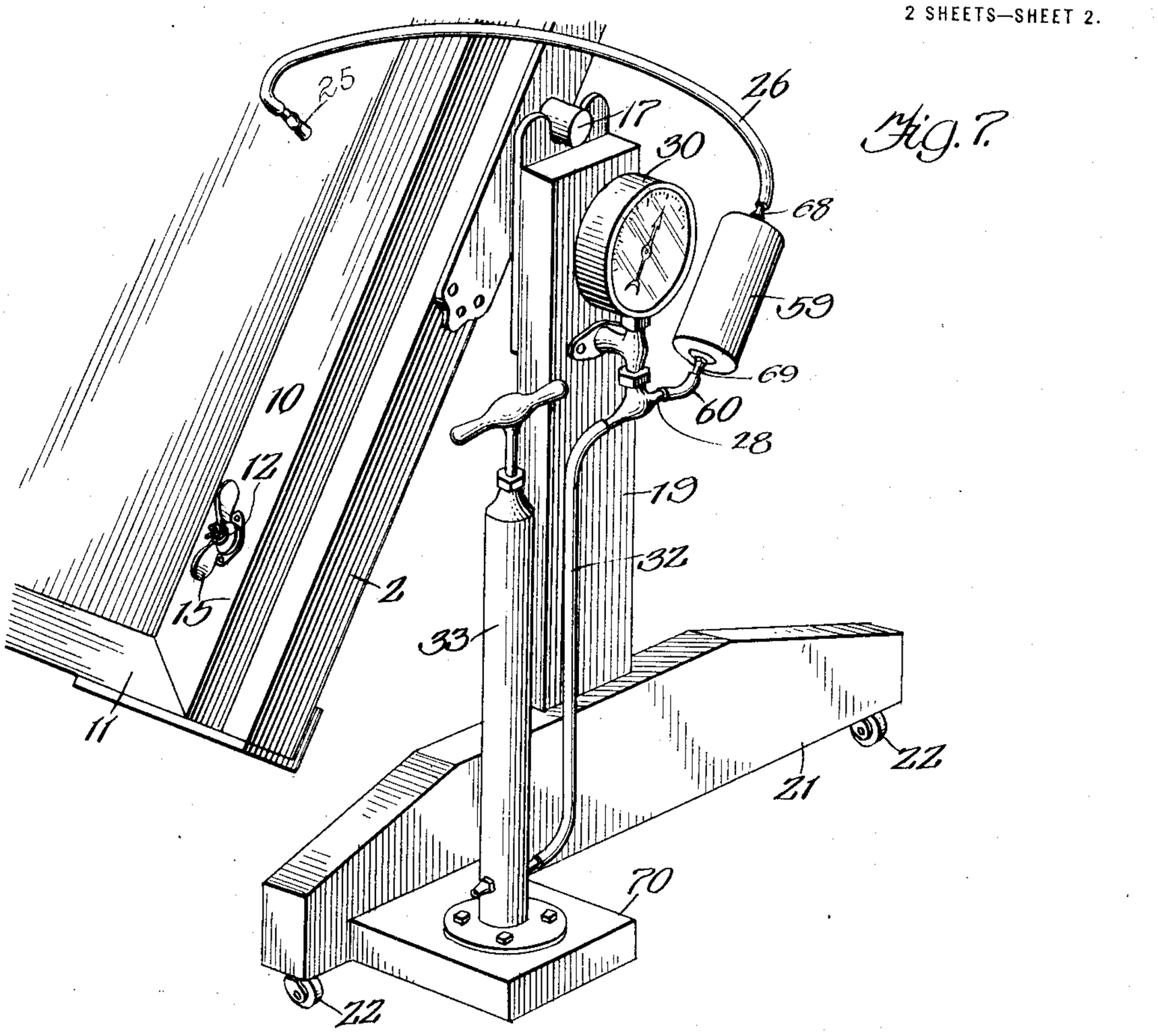
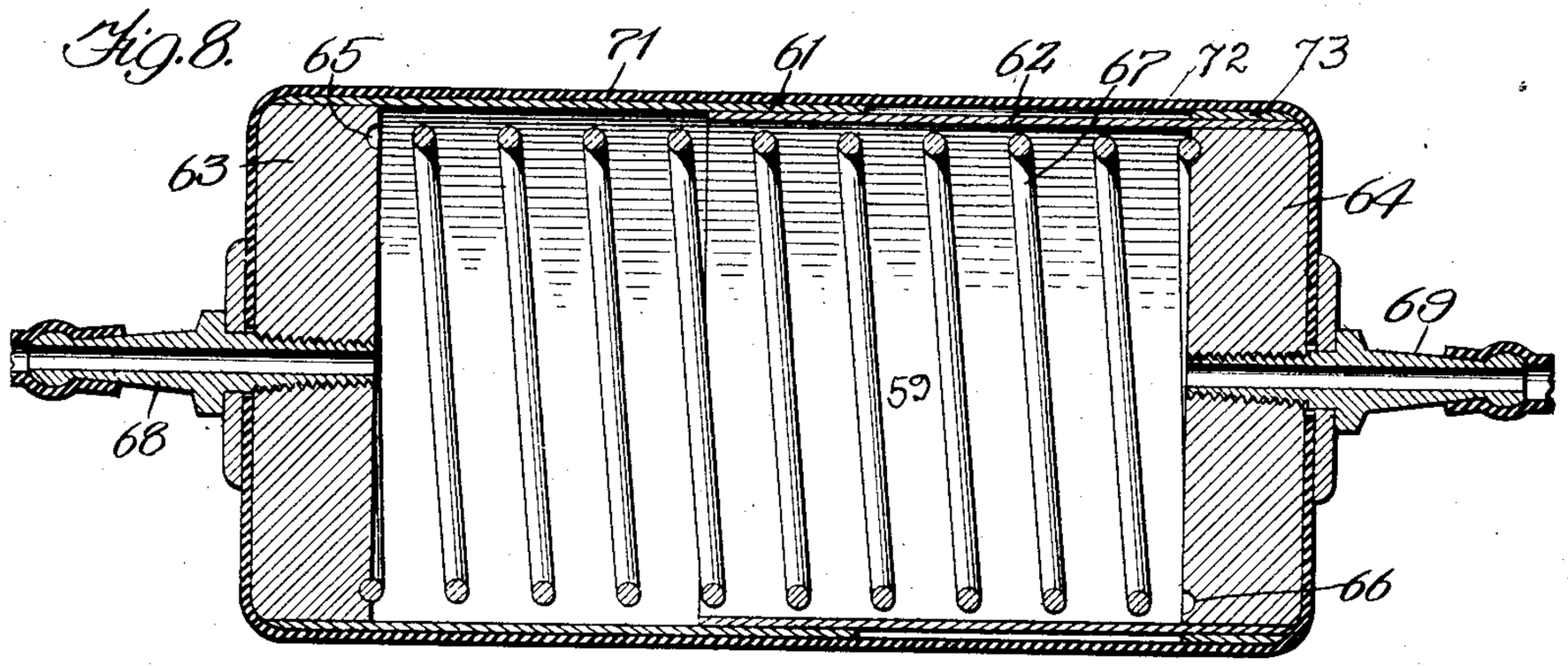


Fig. 8.



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PNEUMATIC PRINTING-FRAME.

1,166,945. Specification of Letters Patent. Patented Jan. 4, 1916.

Application filed September 4, 1914. Serial No. 860,155.

To all whom it may concern:

Be it known that I, EMANUEL W. SWEIGARD, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Pneumatic Printing-Frames, of which the following is a specification.

My invention relates to printing frames in which light, acting through a negative on a sensitized sheet of paper or metal, is the printing force, and has particular reference to frames in which atmospheric pressure, or a vacuum, is substituted for mechanical means, such as springs, for effecting a close contact between the negative and sensitized sheet, or pressing the back and front of the frame toward each other.

The general object of my invention is to provide improved means for sustaining the vacuum between the front and back and to make it possible to use a simple hand pump without the necessity of operating such pump continuously throughout an exposure. To this end my invention provides means for automatically keeping up suction after the pump has ceased to operate, exemplified in the present illustrations in a collapsible or telescopic auxiliary vacuum chamber which tends to expand and draw air from the vacuum space between the front and back of the printing frame.

With this object in view my invention consists in the novel construction, combination and arrangement of parts hereinafter described in detail, illustrated in the accompanying drawings and incorporated in the appended claims.

In the drawings—Figure 1 is a side elevation of a large printing frame mounted on a stand and equipped with my invention. Fig. 2 is an end elevation of same, the dotted lines indicating the form of the auxiliary air-chamber before pumping up of vacuum. Fig. 3 is an enlarged section taken substantially on line 3—3 of Fig. 1. Fig. 4 is an enlarged vertical section through the auxiliary air chamber shown in Figs. 1 and 2. Fig. 5 is a section taken on line 5—5 of Fig. 4. Fig. 6 is an enlarged section of the valve controlling passages leading to the pump, the printing frame, the air-pressure gage and the auxiliary chamber, respectively. Fig. 7 is a perspective view showing on a larger scale a section of printing frame with a modified form of my invention applied thereto. Fig. 8 is a longitudinal and enlarged section through the auxiliary vacuum chamber shown in Fig. 7.

In the several views is shown a conventional form of printing frame comprising a front frame 2 having a ledge 3 supporting the usual glass 4 back of which is laid a negative 5 and a sensitized sheet 6 held by a flexible back or mat 7 clamped at its edges to the front by a back frame composed of separate rails 8, 9, 10 and 11 secured to the front frame by means of bolts 12 whose heads engage slotted castings 13 secured to the front, but these details form no part of the present invention. The bolts 12 are provided with wing-nuts 15 and cam members 14 which when loosened permit lateral and outward movements of the rails 8 to 11 and release of the back 7.

The ends of the printing frame are provided with trunnions 16 and 17 secured to the front frame 2 and revolubly mounted in the upper ends of standards 18 and 19 rising from feet or base portions 20 and 21 provided with casters 22. On the foot or base portion 21 is a platform 23 on which the major portions of my improvements are mounted.

Through the back 7 enters an air passage 24 provided with a nipple 25 to which an air tube 26 is connected. This air tube leads to a valve chamber 27 having a nipple 28 to which the tube 26 is connected, a nipple 29 connected with a vacuum gage 30, a nipple 31 connected with a tube 32 leading to a hand pump 33, and a nipple 34 leading into an inlet tube 35 of a vacuum chamber 36 shown in Figs. 1, 2 and 4. As shown in Fig. 6 within the valve chamber 27 is a valve 37 that is rotatable to control either one of four ports 38, 39, 40 and 41. When the valve closes the port 39 the gage 30 is cut off from communication with the printing frame, pump and auxiliary chamber, and when the valve closes the port 41 the auxiliary chamber is excluded from the combination. For the purpose of repairs or otherwise it may be desirable to disconnect the pressure gage, for very brief exposures it may be unnecessary to form a vacuum in the vacuum chamber 36 and after each pumping up of printing frame, or printing frame and auxiliary chamber, the port 38 leading to the pump will be closed to obviate any possible leakage of air by way of the pump 33.

The auxiliary vacuum chamber 36 is a collapsible vessel consisting of preferably sheet iron ends 42 and 43 stamped to form flanges 44 and 45 to which are secured by bands 46 and 47 preferably cylindrical rubber walls 48. The chamber is kept normally expanded by means of a pair of helical springs 49 and 50 which bear against said ends. Between the rubber coating and the springs is a canvas covering 51 which protects the rubber wall against abrasion from contact with the springs. The springs, as shown, are coiled in opposite directions to improve the support for the canvas and rubber against inward collapse through the springs. In the end 43 is a threaded socket 52 that is engaged by the threads of a bolt 53 by means of which the vessel is secured to the platform or base 23. In the end 42 is secured a bored nipple 54 with which the tube 35 is connected. On this nipple are mounted bearing members 55 and 56 with which a lever 57, fulcrumed at 59, is connected. By means of this lever the chamber 36 is collapsed endwise against the tension of the springs and the lever is held down temporarily by a hook 58 secured to the platform 23. By exhausting the air by means of the pump 33, or other means, the atmospheric pressure will keep the vessel collapsed, the springs being of a strength that will not overcome the air pressures after a vacuum has been created within the chamber 36.

In Figs. 7 and 8 an auxiliary vacuum chamber 59 is shown interposed between the tube 26 and the nipple 28 or port 40, a short tube 60 connecting the vessel and said nipple. An enlarged sectional view of the vessel 59 is shown in Fig. 8 as consisting of a pair of cylindrical members 61 and 62 which telescope one into the other and are respectively provided with interior wooden heads 63 and 64 having grooves 65 and 66 in which the ends of a single spring 67 are seated. Suitable bored nipples 68 and 69 form the connections between the tubes 26 and 60 and the vacuum chamber 59. A small platform 70 is provided for the pump 33. The chamber 59 has an outer covering 72 of rubber, or other air-tight material and between this and the telescopic section 62 is interposed a spacer-ring 73.

In operation the frame members 8 to 11 are moved apart, or taken off, as the case may be, the back 7 lifted and the negative and sensitized plate 5 and 6, respectively, placed on the front or glass 4. The back 7 is then replaced and the frame 8 to 11 tightened down on the edges of the back to make air-tight contact between said edges and the glass. The frame is then tilted as in Figs. 1 and 2, air is pumped out and negative and sensitized sheet exposed to the light. The small vacuum space between front and back is compensated for by the auxiliary vacuum chamber 36 or 59 by its expansion to take up any air that may leak into the vacuum space between front and back.

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

1. The combination with a printing frame, of means for producing a vacuum between the front and back of said frame, and automatic means for prolonging said vacuum.

2. The combination with a printing frame, of means for exhausting air from between the front and back of said frame, and a self-expanding vacuum chamber connected with the vacuum space in said frame.

3. The combination with the back and front of a printing frame, of means for pumping out air from between said front and back, and an auxiliary vacuum chamber connected with the space between said front and back, said chamber being contractible and expansible.

4. The combination with the back and front of a printing frame, with means for making a substantially air-tight juncture between the edges of said back and said front, an auxiliary vacuum chamber communicating with the vacuum space between said front and back, means for temporarily contracting said vacuum chamber, and means for expanding same to absorb leakages of air into said frame.

5. The combination with a printing frame operated by vacuum or atmospheric pressure, of an auxiliary vacuum chamber having a conduit connected with the vacuum space in said frame, and means causing said auxiliary chamber to automatically sustain or prolong the vacuum in said frame.

6. The combination with a printing frame having a front and back and means for sealing the edges thereof substantially air tight between their adjacent faces, of an air-exhausting mechanism, a collapsible auxiliary vacuum chamber, and means for automatically expanding the latter.

7. The combination with a printing frame provided with an air-exhausting mechanism arranged to create a vacuum between the front and back of said frame, of a collapsible vessel pneumatically connected with the space between said front and back, and means for automatically expanding or enlarging said vessel to exert a force of suction from within said frame.

8. The combination with a printing frame the front and back of which are at their edges compressed together mechanically while the intermediate adjacent faces of said front and back are compressed together by atmospheric pressure, of means

for automatically keeping up a force of suction on the vacuum space in said frame after air has been exhausted therefrom.

9. The combination with a printing frame having a flexible back and a frame compressing the edges of said back against the front of the printing frame, of an auxiliary vacuum chamber reducible in air-capacitv, means for pumping air out of said printing frame and chamber, and means automatically expanding or enlarging said chamber after air has been exhausted therefrom.

10. The combination with a printing frame having a rigid front and flexible back mechanically air-sealed to said front at its edges and having an air-space therein, of an air-pumping mechanism, a collapsible auxiliary chamber communicating with said mechanism and space, and means automaticallv expanding said chamber after it has been collapsed.

11. The combination with the air-space of a pneumatically operated printing frame, of an auxiliary vacuum chamber communicating with said air-space, a pump arranged to pump air from said air-space and chamber, means for reducing the capacity of said chamber, and means for automatically increasing its capacity.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

EMANUEL W. SWEIGARD.

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