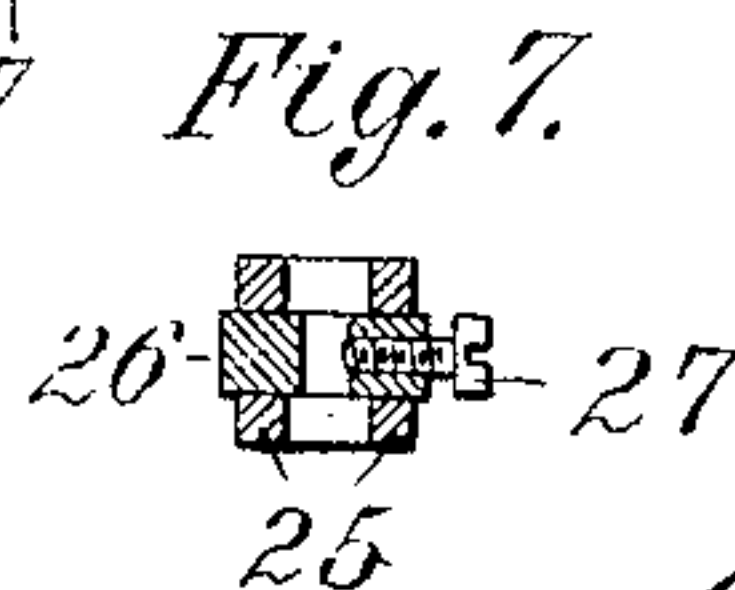
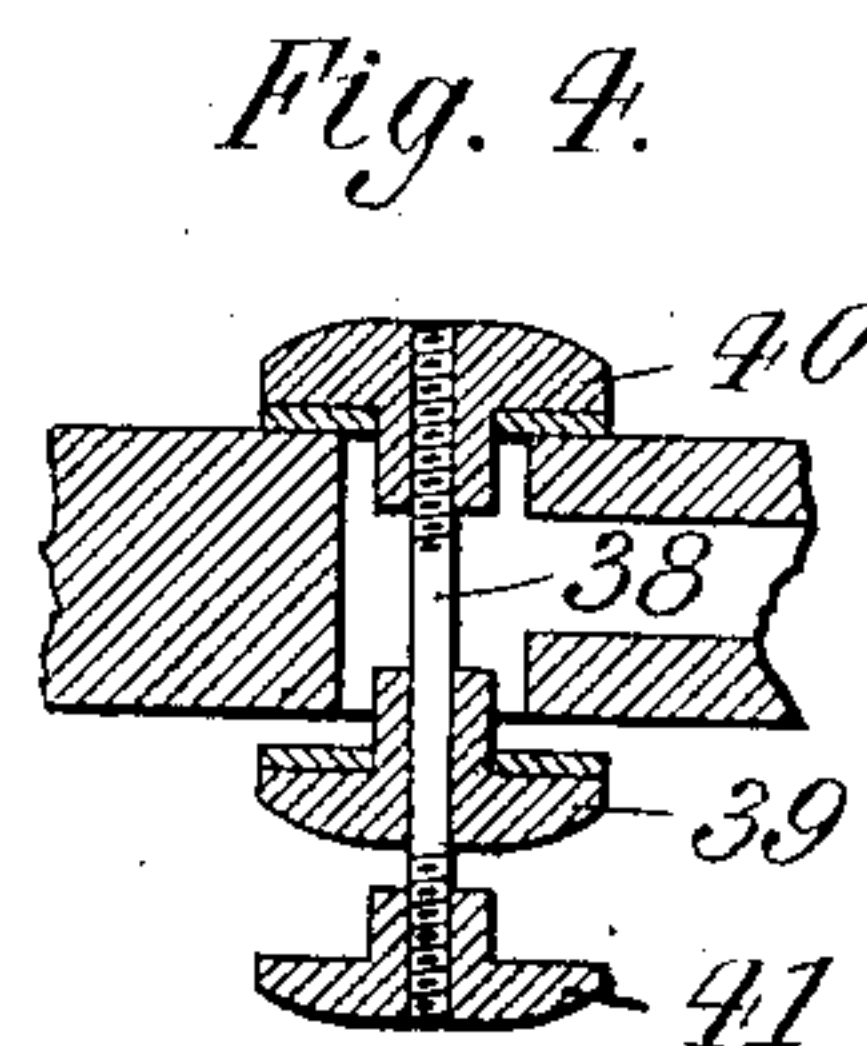
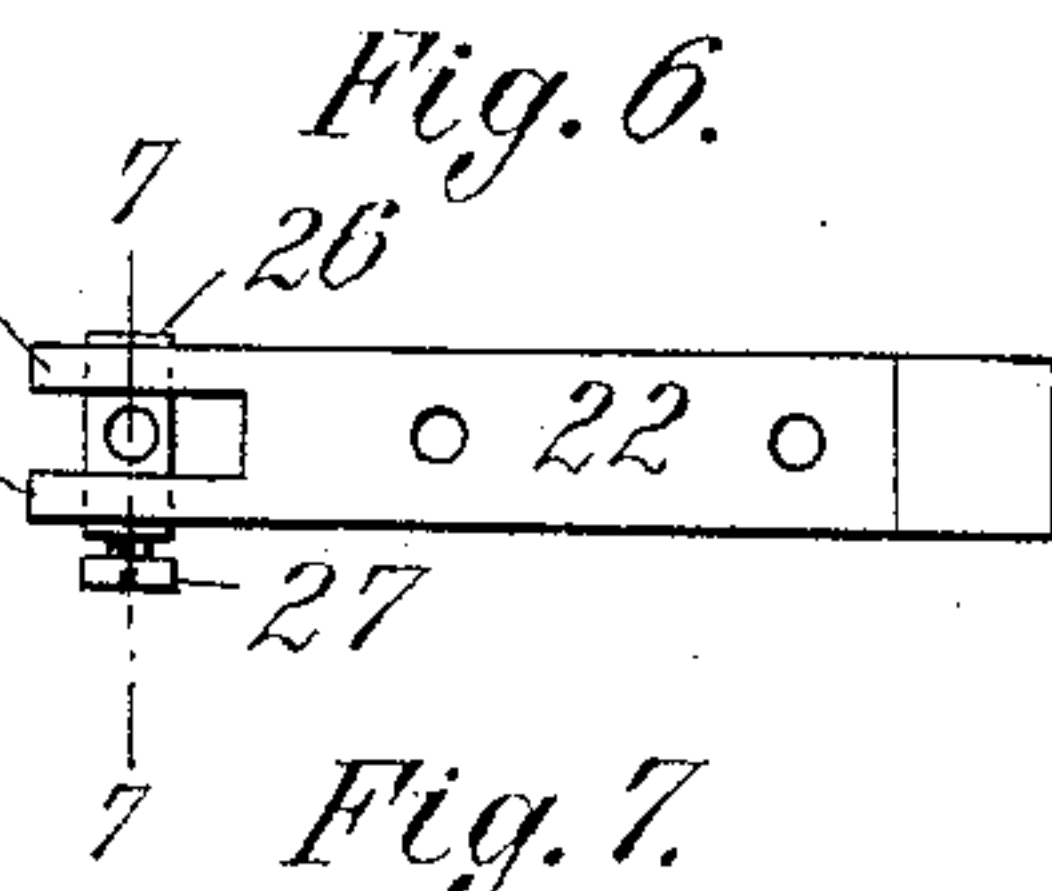
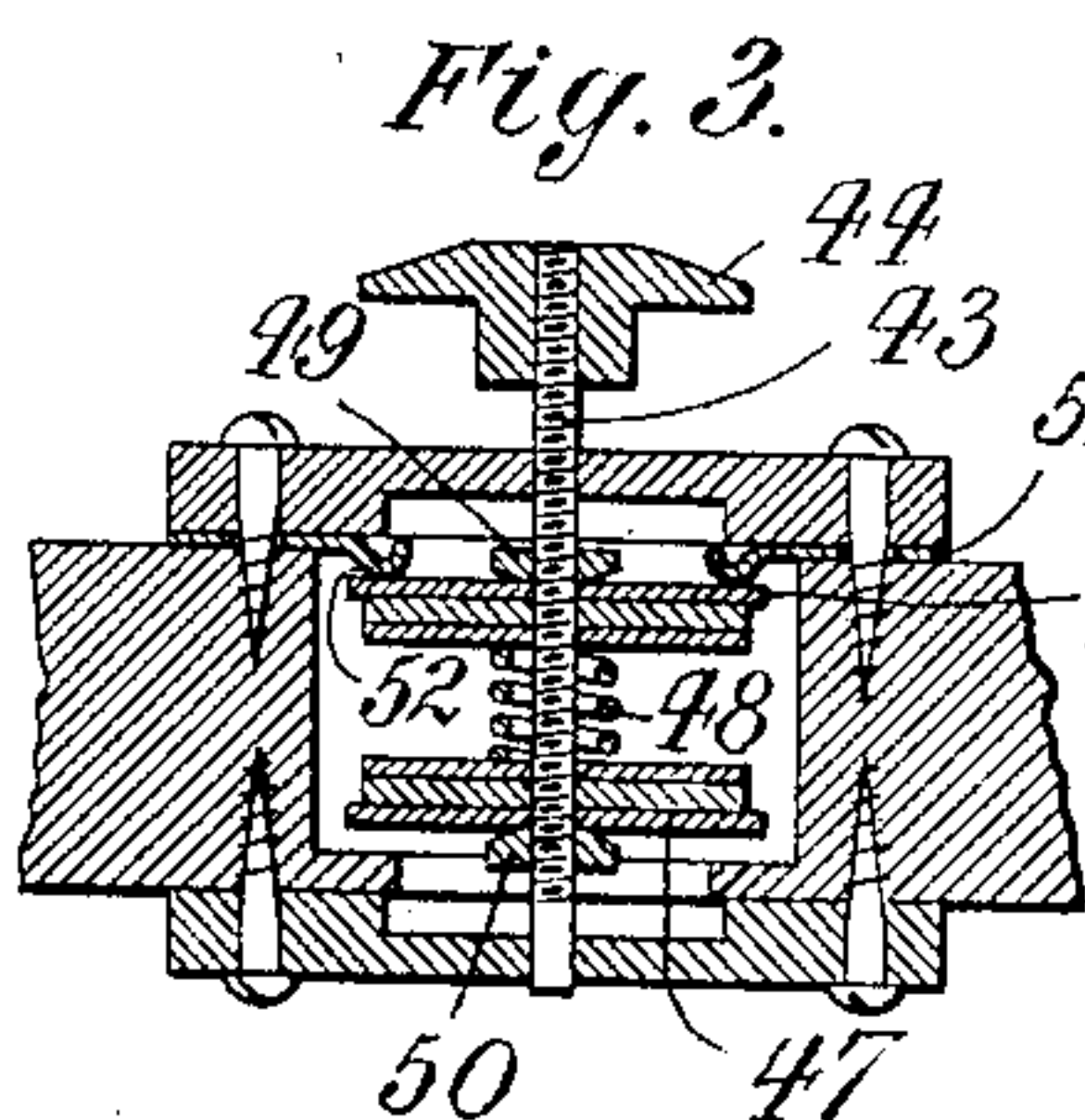
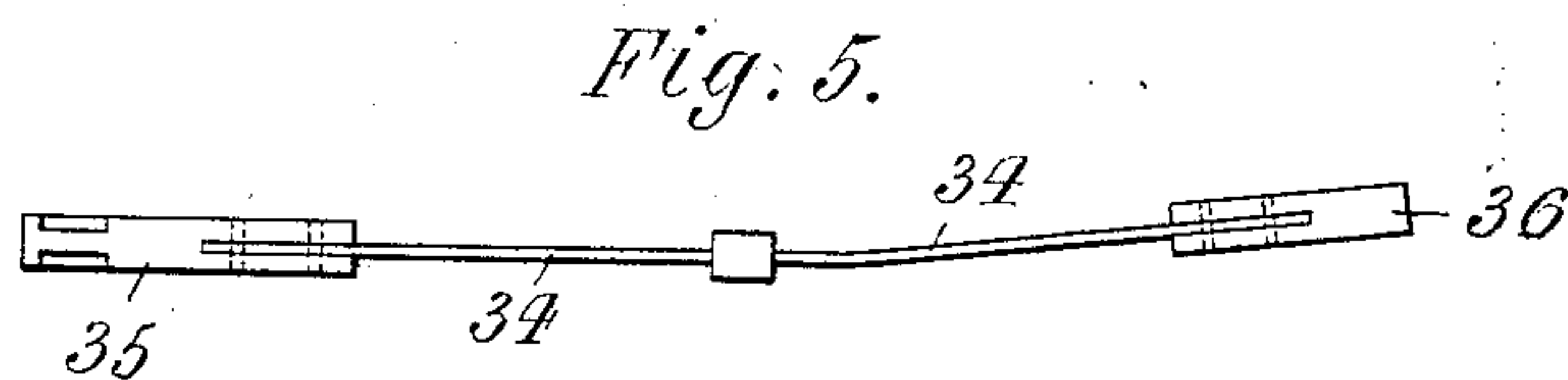
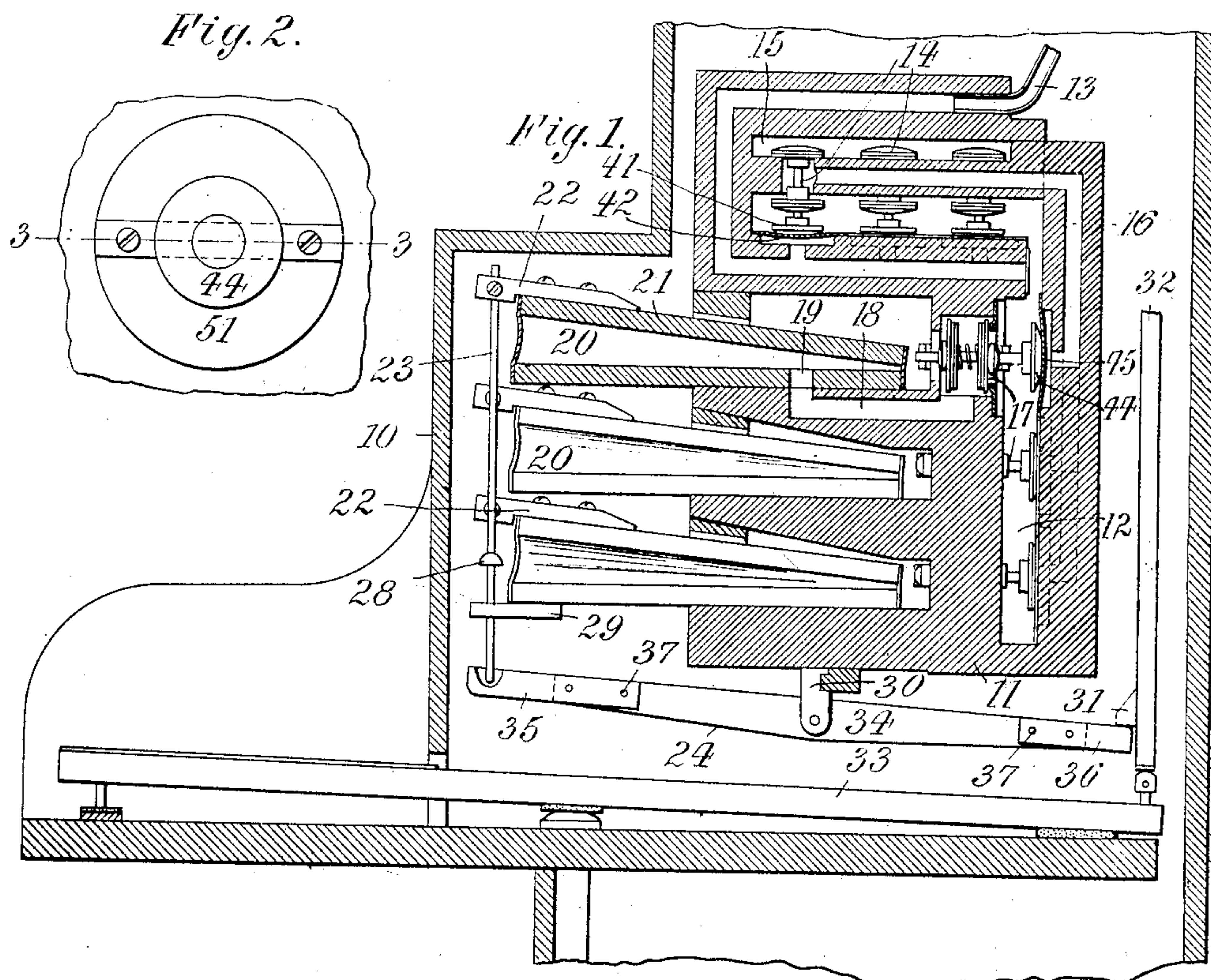


No. 860,851.

PATENTED JULY 23, 1907.

J. CARRUTHERS.  
PNEUMATIC FOR AUTOPNEUMATIC PIANOS.

APPLICATION FILED MAR. 9, 1907.



Witnesses:  
Arthur E. Gumpfer.  
William Schuly.

Inventor:  
James Carruthers  
by *Stanley B. Bieser* Atty.



# UNITED STATES PATENT OFFICE.

JAMES CARRUTHERS, OF NEWARK, NEW JERSEY.

## PNEUMATIC FOR AUTOPNEUMATIC PIANOS.

No. 860,851.

Specification of Letters Patent.

Patented July 23, 1907.

Application filed March 9, 1907. Serial No. 361,459.

*To all whom it may concern:*

Be it known that I, JAMES CARRUTHERS, a citizen of Great Britain, residing at Newark, Essex county, State of New Jersey, have invented new and useful Improvements in Pneumatics for Autopneumatic Pianos, of which the following is a specification.

This invention relates to an improved construction of the pneumatics which are controlled by a perforated music sheet and actuate the hammers of a piano.

The invention has reference more particularly to novel means for regulating the force and touch of the action and to various features of construction, all as hereinafter more fully pointed out.

In the accompanying drawing: Figure 1 is a vertical transverse section of part of a piano embodying my invention; Fig. 2 a front view of the secondary valve; Fig. 3 a cross section on line 3—3, Fig. 2. Fig. 4 a cross section through the primary valve; Fig. 5 a top view of the composite lever; Fig. 6 a top view of the bellows flange, and Fig. 7 a section on line 7—7, Fig. 6.

Within the piano-case 10 is secured a block 11 containing the vacuum chamber 12 from which the air is permanently exhausted in the usual manner. The perforated music sheet controls an air pipe 13 for each of the piano-hammers, the air flowing through said pipe acting upon a primary pneumatic 14 controlling valve 14 to open the same and cause air to enter from air chamber 15 into duct 16. This air will open the secondary valve 17 by means of its pneumatic 45 and thereby place a channel 18 of block 11 under suction. Duct 18 communicates by port 19 with the bellows 20, which is so fitted to the block that its forward or expansible end is directed towards the front of the piano case. From the upper movable board 21 of bellows 20 projects forwardly a flange 22 to which is adjustably secured a rod 23, connected at its lower end to the forward end of a power transmitting lever 24. Lever 24 is fulcrumed to a flange 30 of block 10, and engages at its rear end a nose 31 of abstract 32. The lever is arranged directly above the corresponding key 33 which is used when the piano is to be played by hand.

In order to form the adjustable connection between the parts 22 and 23, the slotted forward end 25 of flange 22 is traversed by a bearing 26 which is vertically perforated for the reception of rod 23. A clampscrew 27 received by a tapped axial bore of bearing 26 is adapted to impinge against rod 23 and thus hold the same in position. The adjustment thus obtained is utilized to bring the rear end of lever 24 snugly up against the lower side of abutment 31, such adjustment therefore producing the same effect as that of the capstan. Upon rod 23 is mounted a button 28 which is vertically adjustable thereon and is adapted to contact with a fixed

stop or abutment 29. By properly setting this button, the play of the rod 23 may be made to correspond to the distance traveled by the key, if the instrument is played by hand.

It will be seen that by the construction described, the connection between the bellows 20 and its motion transmitting rod 23, is arranged in the front part of the piano-case where it is readily accessible, so that the force of the stroke and the touch may be easily regulated.

Lever 24 is so constructed that it may be readily bent to the right or left, so as to conform to any of the usually occurring "breaks" of the action. To this effect the main body of the lever is composed of a flat metal bar 34, the thickness of which is such that it may be readily bent sidewise. The ends of bar 34 are tipped by wooden end-pieces 35, 36, which are slotted for engagement by said bar, to which they are riveted as at 37. The front end-piece 35 is pivotally connected to rod 23, while the rear end-piece 36 extends beneath those 31 of abstract 32.

The primary valve 14 is composed of a valve-stem 38 carrying a pair of valve-disks 39, 40. Of these, lower disk 39 is fast on the stem, while upper disk 40 is screwed thereon so as to be adjustable and permit the play of the valve to be regulated. Upon the lower end of stem 38 is screwed a button 41 which is thus also adjustable. This button rests upon the usual diaphragm 42, and thus lifts the valve when air is admitted through pipe 13.

The secondary valve 17 is composed of a threaded stem 43, upon the rear end of which is screwed the actuating button 44 that bears against the diaphragm 45. Upon stem 43 are loosely mounted a pair of valve-disks 46, 47, each composed preferably of a first layer of cardboard, a second layer of felt and a third layer of leather. Between disks 46, 47, stem 43 is surrounded by a coiled spring 48 that bears against the inner faces of such disks. Their outer faces are engaged by nuts 49, 50, of stem 43. By manipulating these nuts, the position of the disks on stem 43 and the spacing between them may be regulated.

To insure tightness, the seat for the rear valve-disk 46 is formed of an annular metal plate 51 having a bead 52 against which disk 46 is adapted to bear.

I claim:

1. A device of the character described, comprising a bellows having a movable board, a slotted flange projecting forwardly therefrom, a perforated bearing extending across the slotted end of the flange, a rod engaging the bearing, means for clamping the rod to the bearing, a lever engaged by the rod, and an abstract engaged by the lever, substantially as specified.

2. A device of the character described, comprising a piano-case, a bellows having a forwardly extending expansible end, a rod adjustably secured thereto, a button adjustable upon the rod, a fixed abutment adapted to be

engaged by the button, a lever engaged by the rod, and an abstract engaged by the lever substantially as specified.

3. In a device of the character described, a bellows, a rod secured thereto and an abstract, combined with a  
5 lever between rod and abstract, said lever being composed of a flat metal bar and wooden end-pieces, substantially as specified.

4. In a device of the character described, a bellows, a rod secured thereto and an abstract, combined with a

lever between rod and abstract, said lever being composed 10 of a flat metal bar and slotted wooden end-pieces engaging said bar, substantially as specified.

Signed by me at New York, city, (Manhattan,) N. Y.,  
this 8th day of March, 1907.

JAMES CARRUTHERS.

Witnesses:

FRANK V. BRIESEN,  
WILLIAM SCHULZ.