

No. 713,267.

Patented Nov. 11, 1902.

J. WOLF.  
COMBINED DOOR SPRING AND CHECK.

(Application filed Oct. 12, 1901.)

4 Sheets—Sheet 1.

(No Model.)

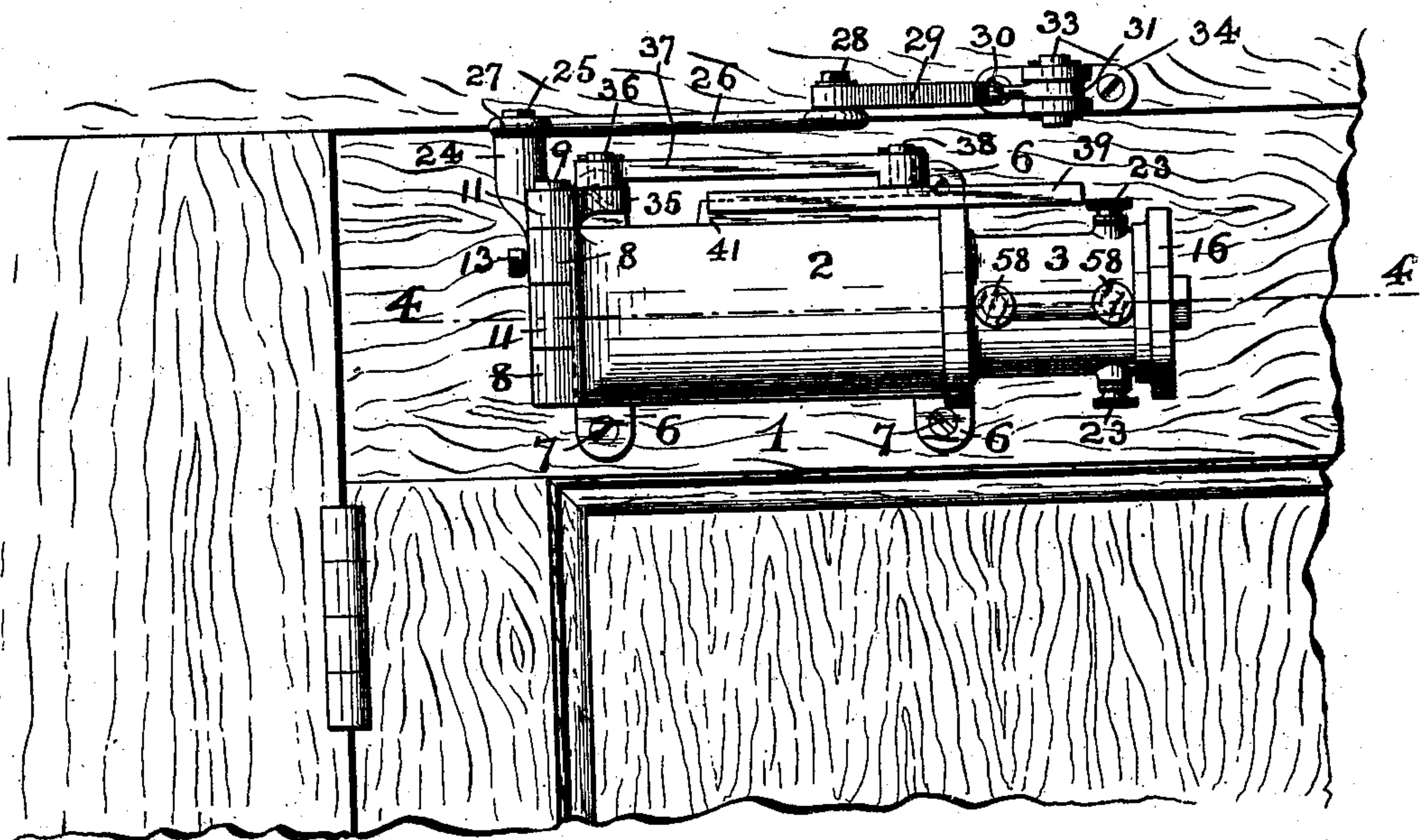


FIG. 1

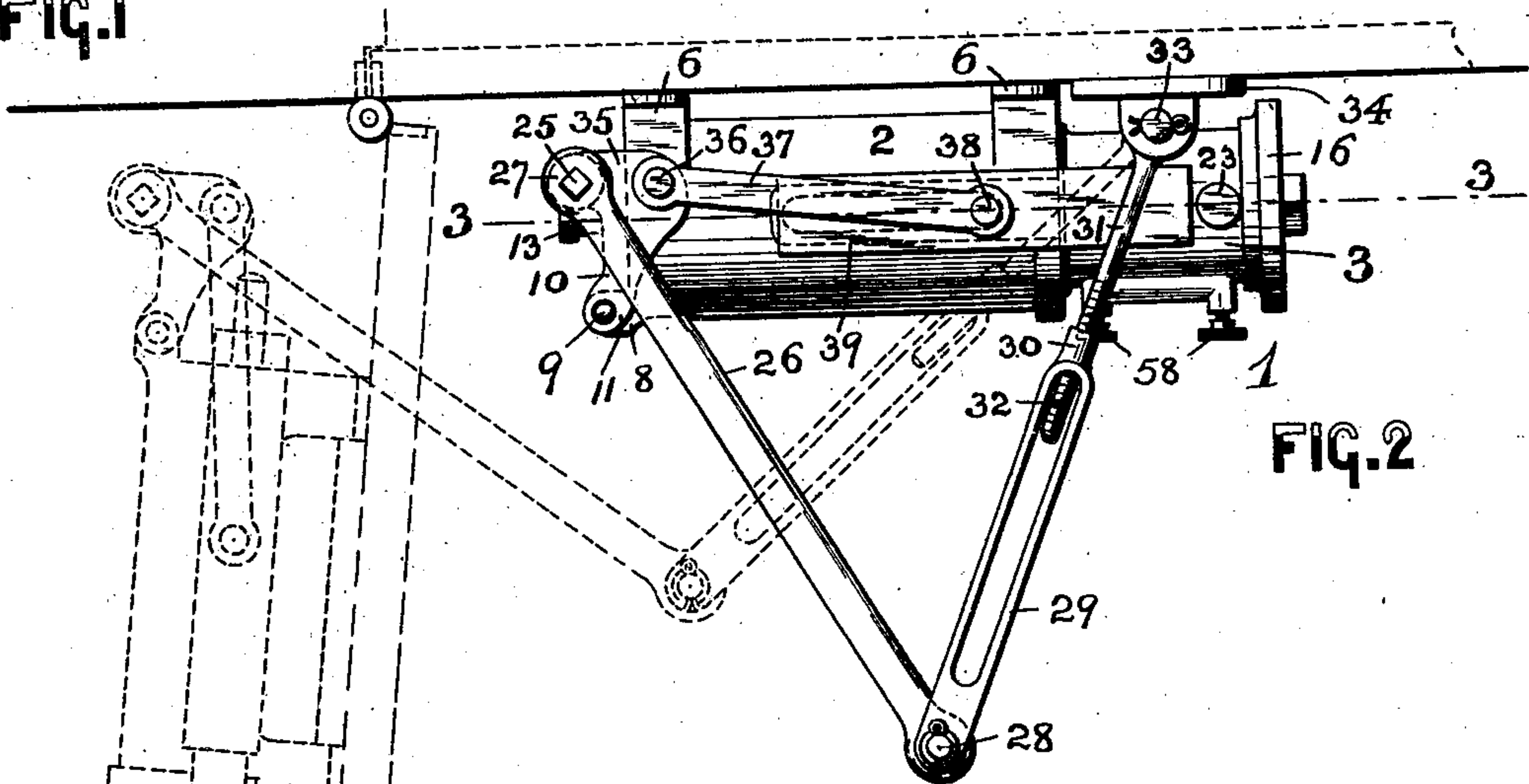


FIG. 2

WITNESSES:

*Geo. S. Richards*  
*Fred Jamison*

INVENTOR:

**JOSEF WOLF,**

BY

*Fred C. Fraentzel,*  
ATTORNEY



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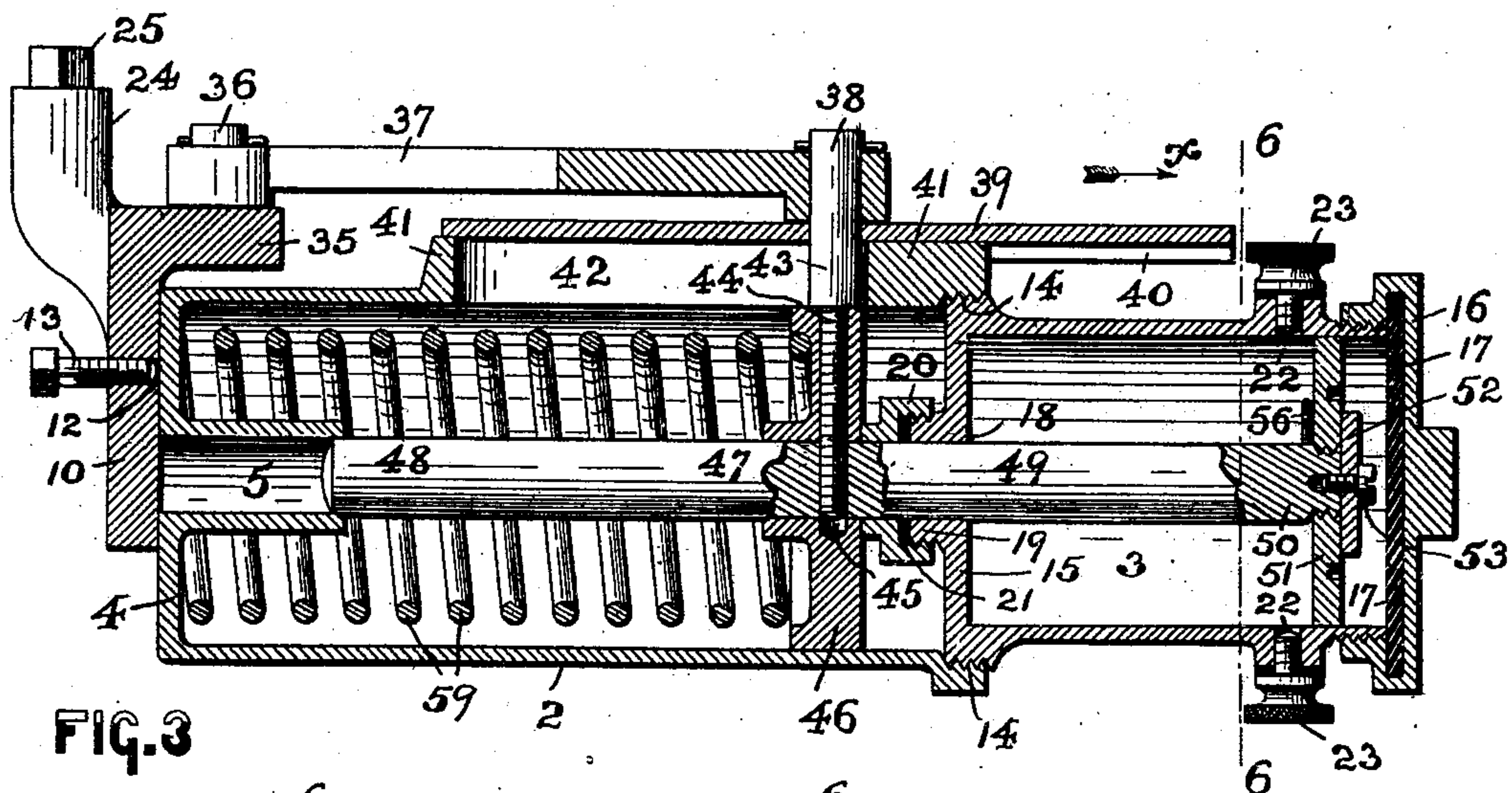
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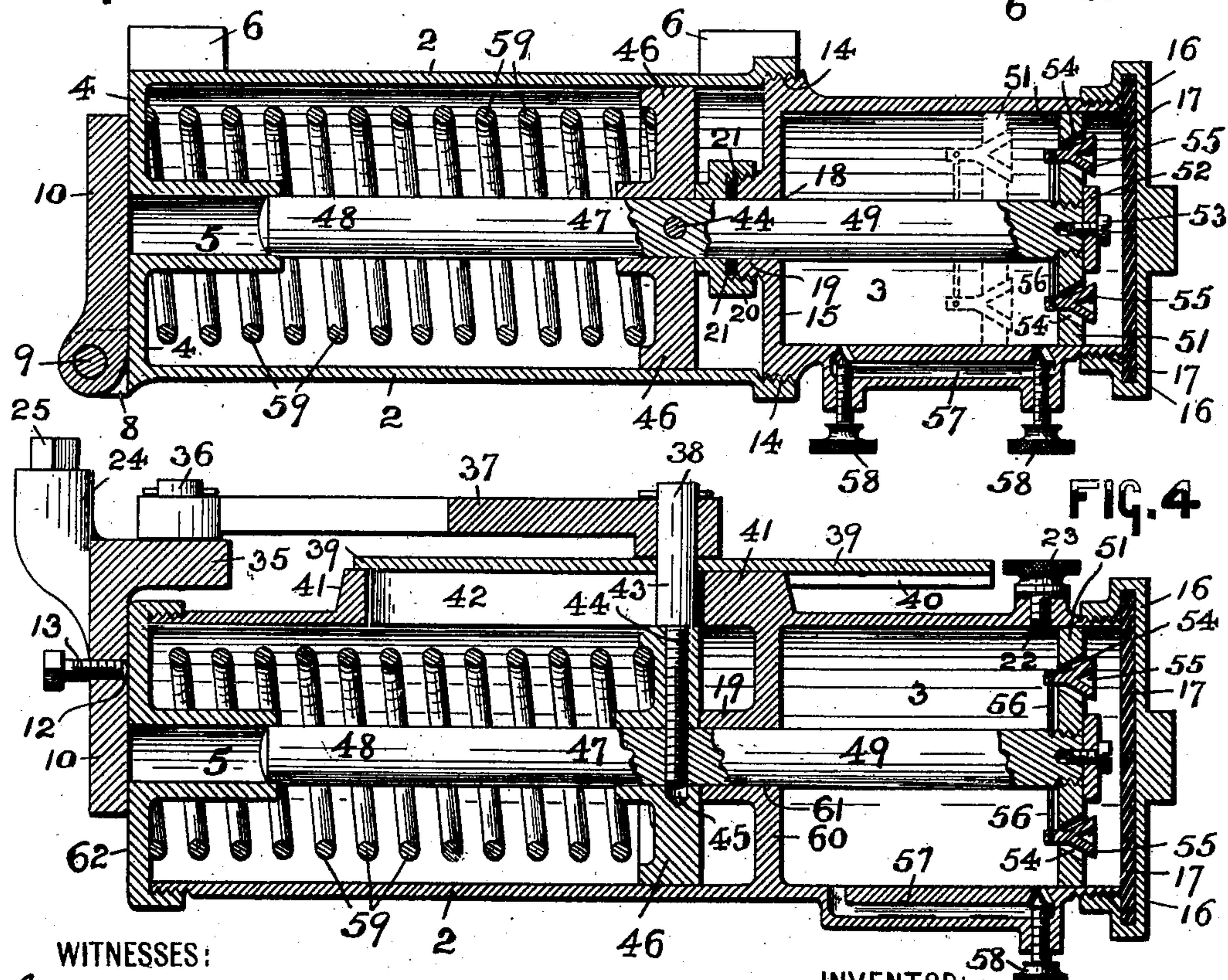
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**FIG. 3**



**FIG. 4**

**WITNESSES:**

Geo. St. Richardy FIG. 5

2 Fred Garrison

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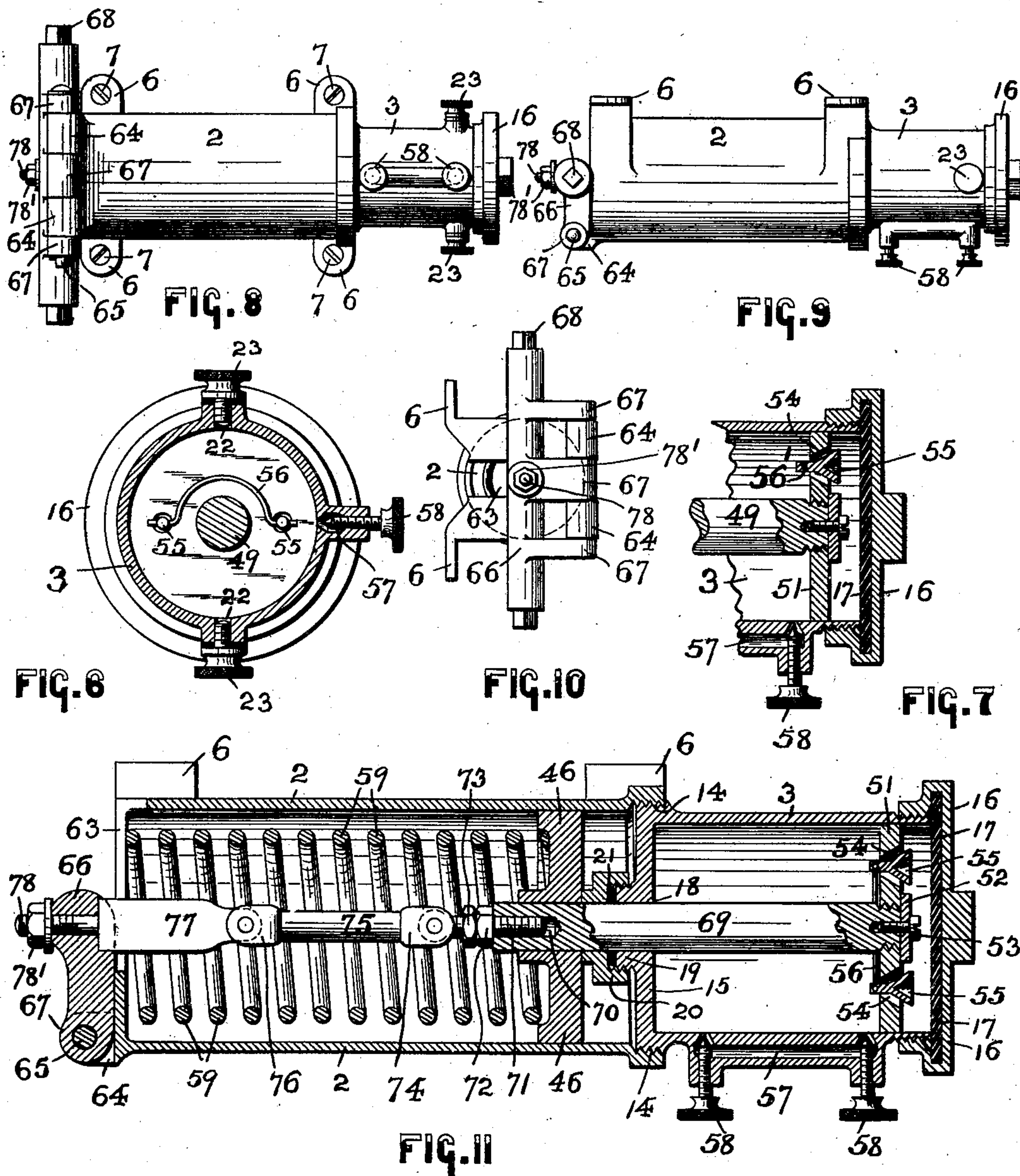


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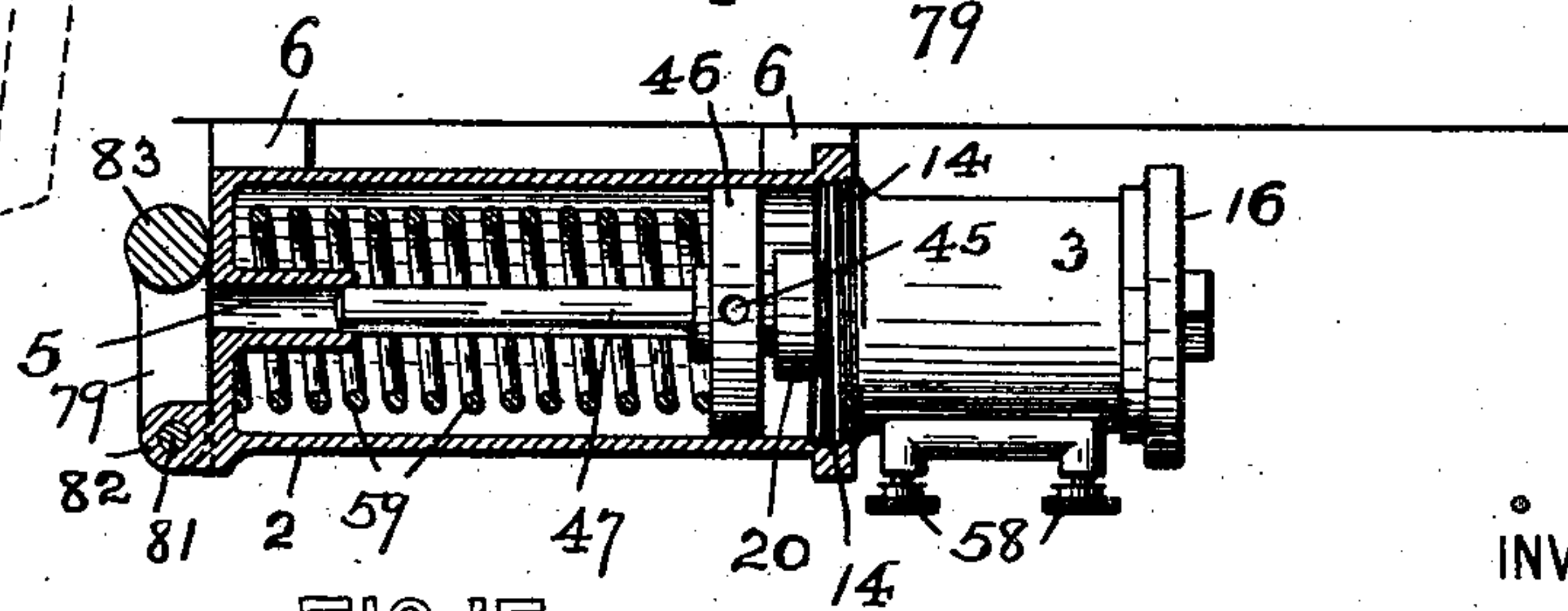
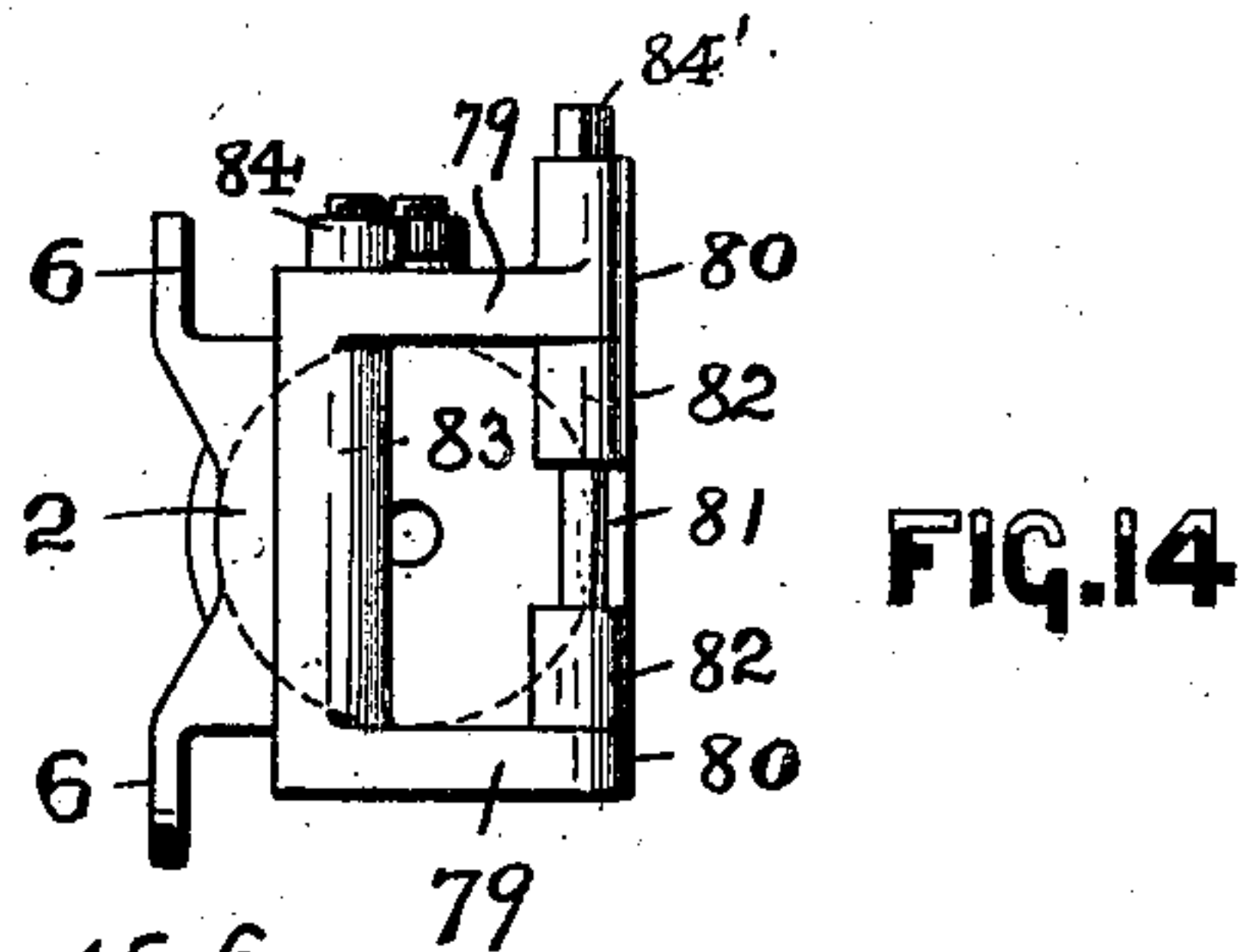
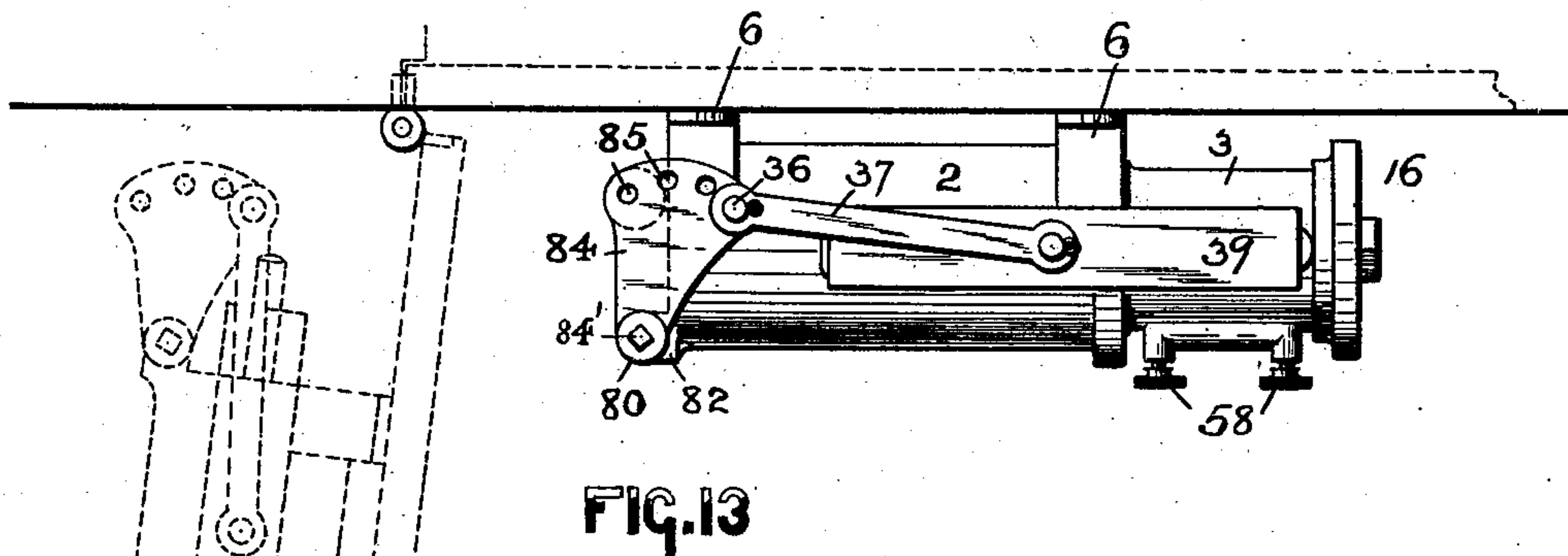
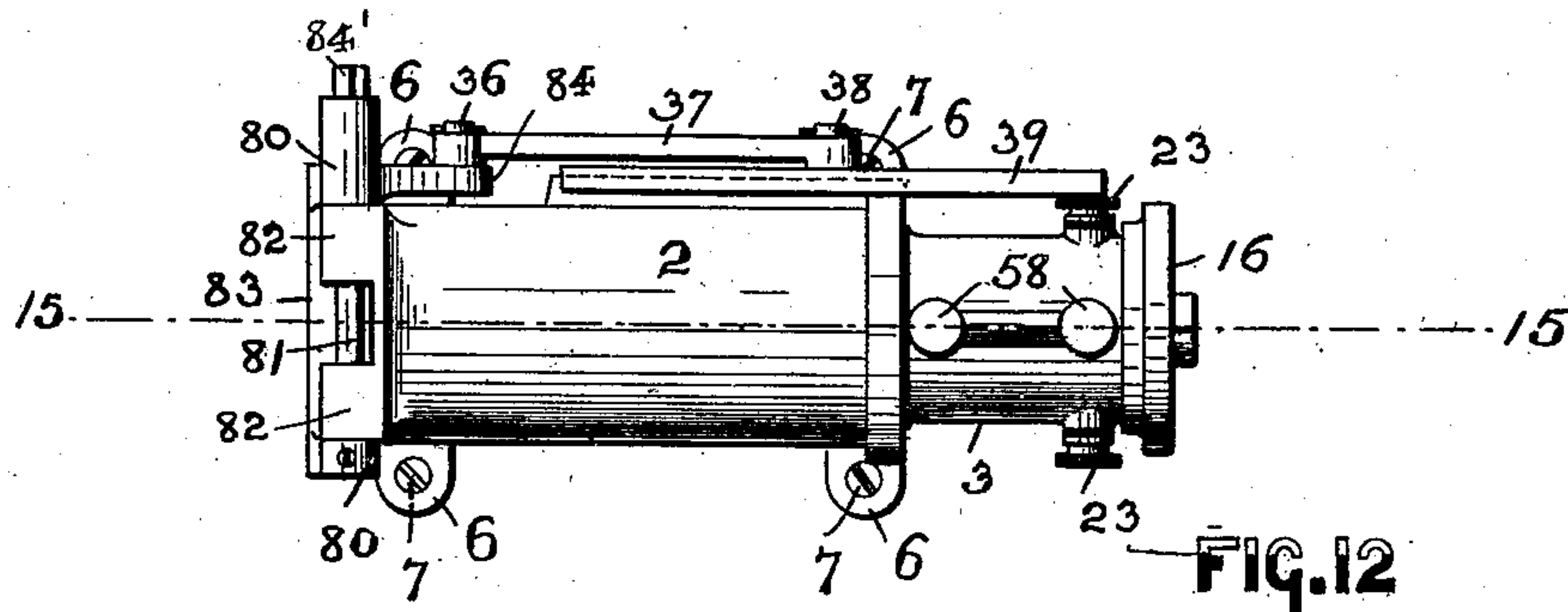
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(No Model.)

4 Sheets—Sheet 4.



WITNESSES:

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FIG. 15

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# UNITED STATES PATENT OFFICE.

JOSEF WOLF, OF BLOOMFIELD, NEW JERSEY, ASSIGNOR OF ONE-HALF TO  
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## COMBINED DOOR SPRING AND CHECK.

SPECIFICATION forming part of Letters Patent No. 713,267, dated November 11, 1902.

Application filed October 12, 1901. Serial No. 78,407. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEF WOLF, a citizen of the United States, residing at Bloomfield, in the county of Essex and State of New Jersey, have invented a certain new and useful Improvement in a Combined Door Spring and Check; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to numerals of reference marked thereon, which form a part of this specification.

This invention relates particularly to that class of door-checks commonly termed "liquid checks;" and the invention consists in the novel construction of combined door spring and check hereinafter fully set forth, as well as in the novel arrangements and combinations of the various devices and their parts, all of which will be fully described in detail in the accompanying specification and then finally embodied in the clauses of the claim, which form a part of this specification.

The principal object of this invention is to provide a novel construction of combined door spring and check in which the door is in part closed by the action of a spring and its closing action then checked by the cushioning of a liquid against the returning piston of the device, after which the door is finally and positively closed without noise.

A further object of this invention is to provide a liquid door-check the parts of which are capable of adjustment that the closing device may be made to check the closing movements of the door at different points and also to quickly close the door or to retain the door in an opened position, according to different degrees of angles at which the door can be opened relative to the position of the door-frame.

Further objects of the present invention are simplicity and cheapness of construction, a perfect guiding means for the piston or plunger rod within the cylinder, a packing means to prevent leakage of the checking fluid employed, and to provide such improvements in the various details of the construction of the device that an efficient and per-

fectly and positively operating door-check will be the result, which can be readily attached in position for either right or left doors and for closing and checking heavy as well as light doors.

The invention is clearly illustrated in the accompanying drawings.

Figure 1 is a front elevation of a combined door spring and check embodying the principles of my present invention, the said view representing portions of a door and door-frame to which the various parts of the combined door spring and check are secured; and Fig. 2 is a top edge view of the combined door spring and check in its inactive position after the door has been closed, said view also representing in dotted outline the positions of the parts of the door closing and checking device when the door has been opened and holding the door in its open relation to the door-frame. Fig. 3 is a longitudinal vertical section of a combined door spring and check, illustrating the inner arrangement of the working parts of the device, said section being taken on line 3 3 in Fig. 2; and Fig. 4 is a horizontal section of the device, said section being taken on line 4 4 in Fig. 1. Fig. 5 is a longitudinal vertical section of a combined door spring and check, illustrating a slightly-modified arrangement of some of the working parts of the device. Fig. 6 is a vertical cross-section taken on line 6 6 in Fig. 3 looking in the direction of the arrow *x* in said figure; and Fig. 7 is a vertical section of a portion of a cylinder and the plunger or piston therein, the latter being provided with one valve for the passage of the checking fluid therethrough instead of two valves, as in the other figures of the drawings. Fig. 8 is a face view, and Fig. 9 a top edge view, of a modified form of combined door spring and check, but still embodying the various principles of my invention; and Fig. 10 is an end view of the same. Fig. 11 is a central longitudinal vertical section, on an enlarged scale, of the combined door spring and check represented in said Fig. 8, illustrating a differently-arranged means for actuating the plunger or piston. Fig. 12 is a front view, and Fig. 13 a top edge view, of a combined door spring and check of still another modified form of construction.



Fig. 14 is an end view of the same; and Fig. 15 is a horizontal section taken on line 15 15 in said Fig. 12, but the cylinder containing the checking liquid in this view being represented in elevation.

Similar characters of reference are employed in all of the said above-described views to indicate corresponding parts.

In the said drawings in Figs. 1 to 7, inclusive, the reference character 1 indicates the complete device, the same comprising a cylinder 2, formed with a spring-containing chamber and a checking-liquid cylinder 3. The said cylinder 2 has a closed end 4, provided with a tubular bearing or guide 5, said cylinder also being provided with suitably-disposed legs 6, formed with perforated ears for the reception of screws 7, by means of which the said cylinder can be secured in position upon the face of a door, as illustrated in Figs. 1 and 2. The said closed end 4 is also formed with a pair of perforated ears or lugs 8 for the reception of a pin 9, on which is also arranged, by means of perforated ears 11, a hinge-plate 10, for the purposes to be presently described. This plate 10 is provided with a screw-threaded hole 12 for the reception of a set-screw 13, the one end of which rests against the outer face of the said closed end 4 of the cylinder 2 when the door is closed. The opposite end of the cylinder 2 is made with an internal screw-thread 14, into which is screwed the screw-threaded end 15 of the checking-fluid cylinder 3. The opposite end of this cylinder 3 is closed by means of a screw cap or head 16 and a packing-disk 17, and the end 15 is provided with a bearing 18, which has an externally-screw-threaded hub 19 for the arranging thereon of a stuffing-box 20 and a suitable packing 21. The said cylinder 3 is also provided with one or more screw-threaded openings 22 and screw-caps 23 or other similar devices, through which the checking fluid can be admitted or removed from the said cylinder 3, the said caps 23 serving to close the said openings 22 after a sufficient quantity of the checking fluid has been fed into the cylinder. The said hinge-plate 10 is also formed with an upwardly-extending post 24, having a squared or other suitably-shaped receiving end 25, (see Fig. 3,) on which may be arranged the squared or other suitably-shaped socket 27 of a link 26. The opposite end of this link 26 is pivotally connected, by means of a pin 28, with another link 29, which is provided with a screw-threaded receiving-socket 30, in which is adjustably arranged the screw portion 32 of a rod 31. The opposite end of said rod 31 is pivotally attached, by means of a pin 33, to a bracket 34, which is secured upon the face of that part of the door-frame directly above the door, all of which is clearly illustrated in Figs. 1 and 2 of the drawings. The said hinge-plate 10 is also provided with a laterally-extending ear or lug 35, which has secured thereto a pin 36, with which is pivotally connected upon its upwardly-project-

ing part the end of a connecting rod or link 37. This rod or link 37 has its opposite end pivotally arranged upon a pin or stud 38 of a slide 39, provided with guide-flanges 40, substantially as illustrated. This slide is capable of a reciprocatory sliding motion upon a guide 41 on said cylinder 2, and 42 is a longitudinally-disposed slot, which is surrounded by the said guide 41 and extends through the wall of the cylinder 2, so as to provide communication with the interior of the said cylinder. The said pin or stud 38 is also provided with a downwardly-extending part 43, which is movably arranged in the slot 42 and has a screw end 44. This screw end is secured directly into a properly-arranged screw-socket 45 in a disk 46 and passes directly through the said disk and through a portion of a plunger or piston rod 47, as illustrated, whereby the said disk 46 is secured in its fixed position upon said rod 47 and is capable of a reciprocatory sliding motion within the said cylinder 2. The said plunger or piston rod 47 has one portion 48 thereof slidably arranged in the bearing or guide 5 in the closed end 4 of the cylinder 2, while its opposite portion 49 passes through the stuffing-box 20 and the bearing 18 in the closed end 15 of the checking-fluid cylinder 3. The extreme free end 50 of the said portion 49 is preferably made screw-threaded, as shown, and has arranged thereon a plunger or piston 51, which may be held in place against turning by means of a washer 52 and a screw 53. One or more cone-shaped valve-seats 54 may be placed in the said plunger or piston 51, in which are arranged the cone-shaped valves 55, the same being held against displacement by means of a suitably-bent wire bar or rod 56, as shown in Figs. 3, 4, 5, 6, and 11, or by means of a short pin 56', as represented in Fig. 7. The said cylinder 3 is also provided with a liquid-conveying duct 57, leading from one interior end of the cylinder 3 to the other interior end, and may be provided with one or two regulating-screws 58, as indicated in the several figures of the drawings, by means of which the communicating openings of the duct 57 with the interior of the cylinder 3 can be regulated to increase or decrease the passage of the checking fluid through the said duct during the forward and backward movements of the said plunger or piston 51, as will be clearly understood. Encircling the inwardly-extending portion of the bearing or guide 5 and the member 48 of the plunger or piston rod 47 is a coiled spring 59, the respective ends of which bear against the inner face of the closed end 4 of the cylinder 2 and the one face of the cylindrical disk or plate 46. Instead of constructing the two cylinders 2 and 3 separately and securing them together in the manner indicated more especially in Figs. 3 and 4 the said cylinders 2 and 3 may be cast in one piece, in which case the spring-cylinder and the checking-fluid cylinder are separated by means of an integrally-formed dividing-wall 60, in which



there is a bearing 61 for the passage there-through of the plunger or piston rod 47, as clearly indicated in Fig. 5 of the drawings. In this construction in order that the parts  
 5 can be properly assembled the cylinder 2 has an open end, to which is secured in any suitable manner a detachably-arranged cap 62, which is provided with a bearing or guide 5, similar to and for the same purposes as the  
 10 bearing or guide in the closed end 4 of the cylinder illustrated in said Figs. 3 and 4. The operation of these forms of combined doorsprings and checks, (illustrated in said Figs. 1 to 7, inclusive,) is as follows: After  
 15 the cylinder 3 has been filled with a sufficient quantity of the checking fluid the various parts of the device are secured in their operative positions against the face of the door and the door-frame in the manner represented  
 20 in Figs. 1 and 2. When the door is opened, the cylinder 2 (and cylinder 3 connected therewith) will move with the door, while the hinge-plate 10, being pivotally connected to the checking and closing device, will swing on the  
 25 pivotal pin 9. The pivotal point of support 33 being fixed to the door-frame, the result will be that the rod 31 and the link 29, with the link 26, will force the hinge-plate 10 from its normal position against the outer face of  
 30 the closed end 4 of the cylinder 2 to a position indicated in the dotted outline in Fig. 2 of the drawings. At the same time the member 35 of the said plate 10 causes the link 37 to draw the slide 39 and the piston-rod 47 and disk 46  
 35 in a direction toward the closed end at the point of the pivotal connection of the cylinder 2 with the said hinge-plate 10, whereby the coils of the spring 59 are sufficiently compressed to cause the closing action of the de-  
 40 vice after a person has entered and has released his or her hold on the door. During the opening movements of the internally-arranged parts of the device as the piston-rod 47 and disk 46 are drawn inward the said rod  
 45 causes the plunger or piston 51 to be drawn in an inward direction, and the checking fluid in the cylinder 3 passes through the valves in said piston or plunger 51 and the duct 57 from the back of the said piston or plunger to  
 50 the front thereof without interfering with the easy movements of the parts, so that the door can be easily opened. After the person has entered and the door is released the tension of the compressed coils of the spring 59 will cause  
 55 the door to close rapidly, thereby causing the return of both the disk 46 and the piston or plunger 51 to their initial starting positions, whereby the liquid in front of the piston closes the valve or valves in said piston, and  
 60 when the latter has reached approximately the position indicated in the dotted outline in Fig. 4 the liquid is sufficiently compressed to form a cushion, which fully checks the closing movement of the door just prior to its  
 65 being finally closed. The liquid then slowly escapes from in front of the plunger or piston 51 into the duct 57 and then again into the

cylinder 3 back of the said plunger or piston, whereby the door is permitted at this point to close slowly and without slamming or noise. 70 By means of the set-screw 13 the hinge-plate 10 can be brought closer to or farther away from the ends 4 or 62 of the spring-cylinders 2, whereby the relative positions of the disk 46 and the piston 51 in the respective cylin- 75 ders 2 and 3 are correspondingly changed to cause the device to check sooner or later during the closing movement of the door, as may be desired.

In Figs. 8, 9, 10, and 11 I have illustrated 80 still another form of combined door spring and check, in which construction the spring-cylinder 2 is formed in its closed end with an opening 63. Pivotaly secured between per- 85 forated ears or lugs 64 of said cylinder, on a pin 65, are arms 67 of a modified form of hinge-plate 66. This plate is also formed with a squared or other suitably-shaped projection 68, to which may be connected the link mech- 90 anism 26 29 and rod 31. (Represented in Figs. 1 and 2 of the drawings.) In this construction of combined door spring and check I employ a short piston or plunger rod 69, on which the disk 46 and piston 51 are arranged, said 95 plunger or piston rod being provided with a screw-socket 70 for the reception of a screw-pin 71, securely held in place against turning by a pair of jam-nuts 72 and 73. Pivotaly attached to said screw-pin 71 is an eye 100 portion 74 of a link 75. This link 75 has its opposite end 76 pivotally attached to a member 77, which is provided with a screw-post 78, extending through a hole in the hinge-plate 67 and held in place by means of a nut 78', as shown. The arrangement and opera- 105 tions of these several parts will be clearly understood from an inspection of Fig. 11 of the drawings.

In lieu of the two forms of hinge-plates hereinabove described I may employ in con- 110 nection with the cylinder 2 the form of hinge-plate represented in Figs. 12 to 15, inclusive. This form of hinge-plate consists, essentially, of a pair of arms 79, provided with bearings 80 for arranging said arms on a pivotal pin 115 81, which is placed in the perforated ears or lugs 82 of the cylinder 2. The said arms are also connected by a bar 83, and 84' is a squared portion on one of said bearings 80, to which the link mechanism previously described is 120 attached. The said hinge-plate in this construction may also be formed with a plate-like member 84, in which there is a series of holes 85, as illustrated in Fig. 13. By con- 125 necting the end of the link 37 with the various holes 85 or by using links 37 of different lengths the throw of the disk 46 and the piston 51 may be varied at will, whereby the door can be made to close automatically at different points of its open relation to the 130 door-frame, and also the tension of the coils of the spring 59 may be varied to suit doors of different sizes and different weights.

The arrangement of the various parts here-



in above described is such that when the door is opened far enough to bring the link 37, as in the drawings, from the right side of the longitudinal central axis of the plunger or piston rod 47 to the left side of said axis, as indicated in the dotted outline in Fig. 2 of the drawings, then the door will be retained in its opened position. This is due to the fact that the coils of the spring 59 within the cylinder 2 as soon as the door has passed its open position at right angles to the door-frame will again tend to assume their normally distended positions, as will be clearly evident. During the forward movements of the distending-coils of the spring the link 37 again actuates the hinge-plate 10 by moving it on the pivotal post or pin 9, whereby the device produces a pulling action upon the door and causes the latter to turn upon its hinges in an open position and holds the door in such open position, as indicated. Thus it will be seen that the device may be employed as a door-closing device as well as a door-check and also as a means for retaining the door in its opened position when it is desired to keep the door open and that without the employment of any additional or particular mechanism except that necessarily employed to produce the closing operations of the device.

Of course it will be evident that changes may be made in the several arrangements and combinations of the parts, as well as in the details of the construction thereof, without departing from the scope of my invention. Hence I do not limit my invention to the exact arrangements and combinations of the parts as herein described and as illustrated in the accompanying drawings, nor do I confine myself to the precise details of the construction of the parts comprising my present invention.

Having thus described my invention, what I claim is—

1. A combined door spring and check, comprising, a pair of cylinders 2 and 3 arranged in longitudinal alinement, said cylinder 2 having a closed end 4 and a bearing 5, and said cylinder 3 having a closed end, a dividing-wall between the said cylinders, a bearing in said dividing-wall, a piston-rod movably arranged in the bearing 5 and in the bearing in said dividing-wall and having its opposite end portions arranged, respectively, in said cylinders, a piston on the one end of said rod within said cylinder 3, a disk on a portion of said rod in the other cylinder 2, a spring encircling said rod between the closed end 4 and said disk, and means for actuating said rod, substantially as and for the purposes set forth.

2. A combined door spring and check, comprising, a spring-cylinder and a liquid checking-cylinder, arranged in longitudinal alinement, a dividing-wall between said cylinders, a bearing in said wall, a piston or plunger rod passing through the said bearing and having the opposite end portions arranged, respec-

tively, in said cylinders, a disk on said rod in said spring-cylinder, a piston or plunger on said rod in said liquid checking-cylinder, means for securing said combined cylinders to a door, a hinge-plate with which said spring-cylinder is pivotally connected, a means of connection between said hinge-plate and said disk for actuating the said rod, and an operative connecting means between said hinge-plate and the door-frame, substantially as and for the purposes set forth.

3. A combined door spring and check, comprising, a spring-cylinder and a liquid checking-cylinder, arranged in longitudinal alinement, a dividing-wall between said cylinders, a bearing in said wall, a piston or plunger rod passing through the said bearing and having the opposite end portions arranged, respectively, in said cylinders, a disk on said rod in said spring-cylinder, a piston or plunger on said rod in said liquid checking-cylinder, means for securing said combined cylinders to a door, a hinge-plate with which said spring-cylinder is pivotally connected, a means of connection between said hinge-plate and said disk for actuating the said rod, and an operative connecting means between said hinge-plate and the door-frame, consisting, essentially, of an upwardly-extending post on said hinge-plate, provided with a link-receiving portion, and an intermediately-arranged system of links between said receiving portion and the door-frame, substantially as and for the purposes set forth.

4. In a combined door spring and check, the combination, with a spring-cylinder and a liquid checking-cylinder, said cylinders being arranged in longitudinal alinement, and said spring-cylinder being provided with a longitudinally-extending opening, a dividing-wall between said cylinders, provided with a bearing, a spring-actuated disk in said spring-cylinder, a piston-rod on which said disk is arranged, a portion of the said rod extending into said liquid checking-cylinder, and a piston on said portion of the rod, a stud movably arranged in said opening in the spring-cylinder, having a screw portion tapped into said disk, and means on said spring-cylinder for securing it to a door, of a hinge-plate pivotally attached to said cylinder, and an operative connection between said stud and said hinge-plate, substantially as and for the purposes set forth.

5. In a combined door spring and check, the combination, with a spring-cylinder and a liquid checking-cylinder, said cylinders being arranged in longitudinal alinement, and said spring-cylinder being provided with a longitudinally-extending opening, a dividing-wall between said cylinders, provided with a bearing, a spring-actuated disk in said spring-cylinder, a piston-rod on which said disk is arranged, a portion of the said rod extending into said liquid checking-cylinder, and a piston on said portion of the rod, a stud movably arranged in said opening in



the spring-cylinder, having a screw portion tapped into said disk, and means on said spring-cylinder for securing it to a door, of a hinge-plate pivotally attached to said cylinder, and an operative connection between said stud and said hinge-plate, consisting, essentially, of a link pivotally connected at one end to said stud and adjustably connected at its opposite end with said hinge-plate, substantially as and for the purposes set forth.

6. In a door-check, the combination, of a checking-cylinder, with a spring-cylinder with which said checking-cylinder is connected by means of a dividing-wall, a bearing and a stuffing-box connected with said wall, and a bearing in said spring-cylinder, a piston-rod working through both of said bearings and said stuffing-box and in both cylinders, a spring on one end of said rod in said spring-cylinder, and a piston on the other end of said rod in the liquid checking-cylinder, substantially as and for the purposes set forth.

7. In a combined door spring and check, the combination, with a cylinder, having a closed end, and a piston and piston-rod, of a hinge-plate pivotally connected to said cylinder, and a means of adjustment on said hinge-plate adapted to engage the said closed end of the cylinder to regulate the throw of the

piston-rod, substantially as and for the purposes set forth.

8. In a combined door spring and check, the combination, with a cylinder, having a closed end, and a piston and piston-rod, of a hinge-plate pivotally connected to said cylinder, and a set-screw on said hinge-plate adapted to engage the closed end of the cylinder to regulate the throw of the piston-rod, substantially as and for the purposes set forth.

9. In a combined door spring and check, a cylinder, bearings at the opposite ends of said cylinder, and a piston-rod arranged and adapted to move in said bearings, all combined, with a hinge-plate, a link connection between said hinge-plate and said piston-rod for actuating said rod, and a means of adjustment on said hinge-plate constructed to engage with a portion of said cylinder to regulate the throw of the piston-rod, substantially as and for the purposes set forth.

In testimony that I claim the invention set forth above I have hereunto set my hand this 11th day of October, 1901.

JOSEF WOLF.

Witnesses:

FREDK. C. FRAENTZEL,  
GEO. D. RICHARDS.