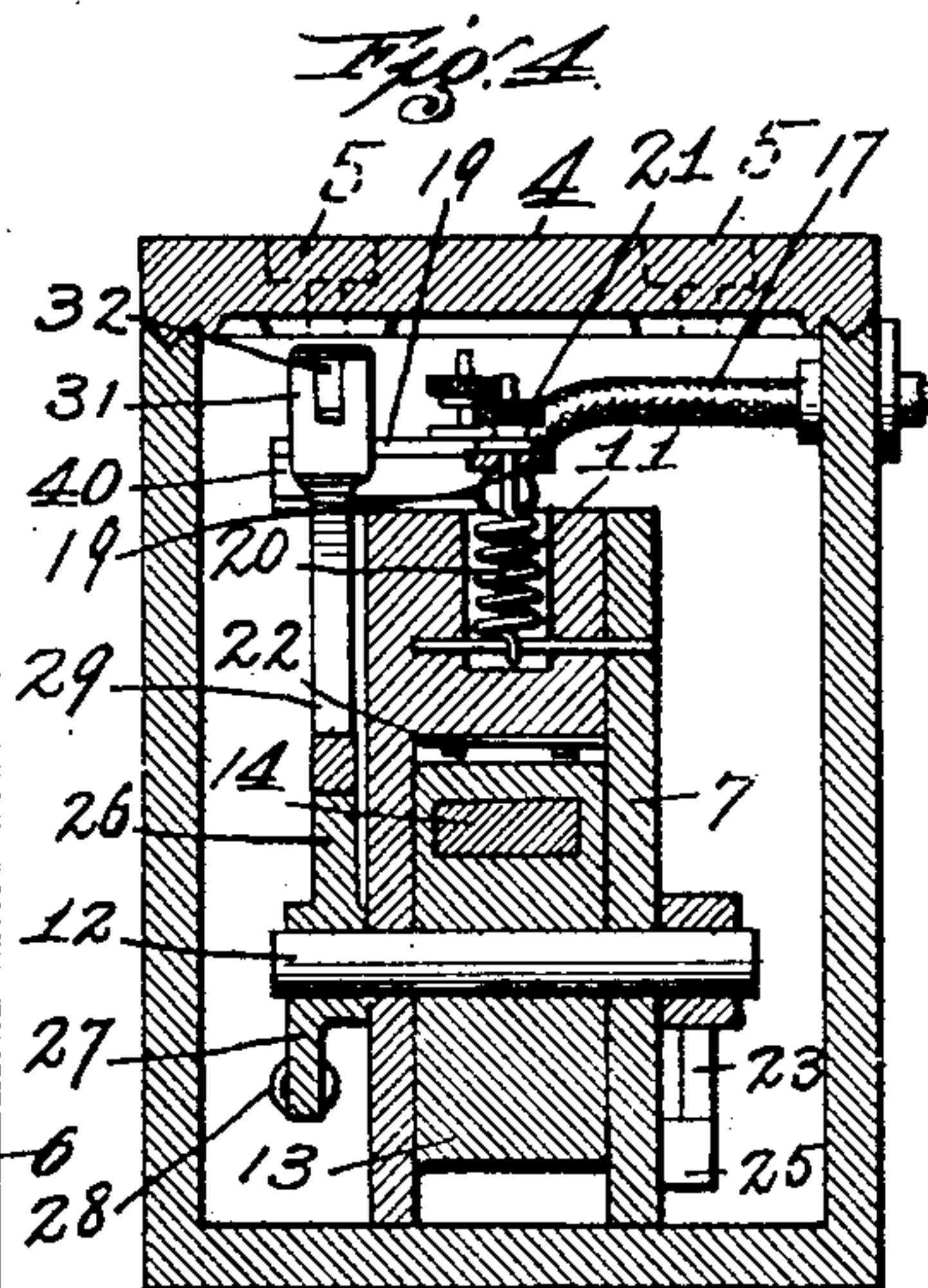
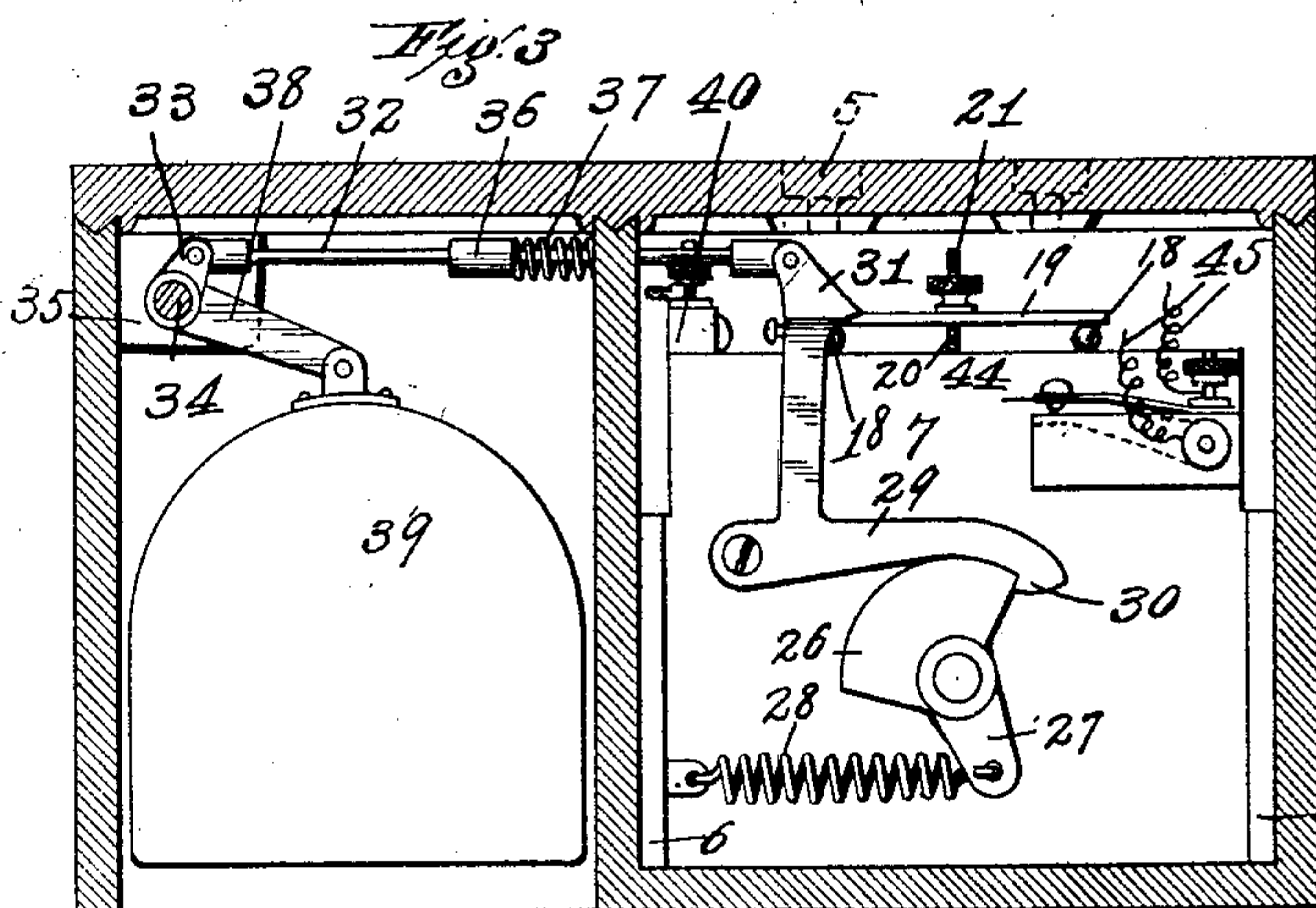
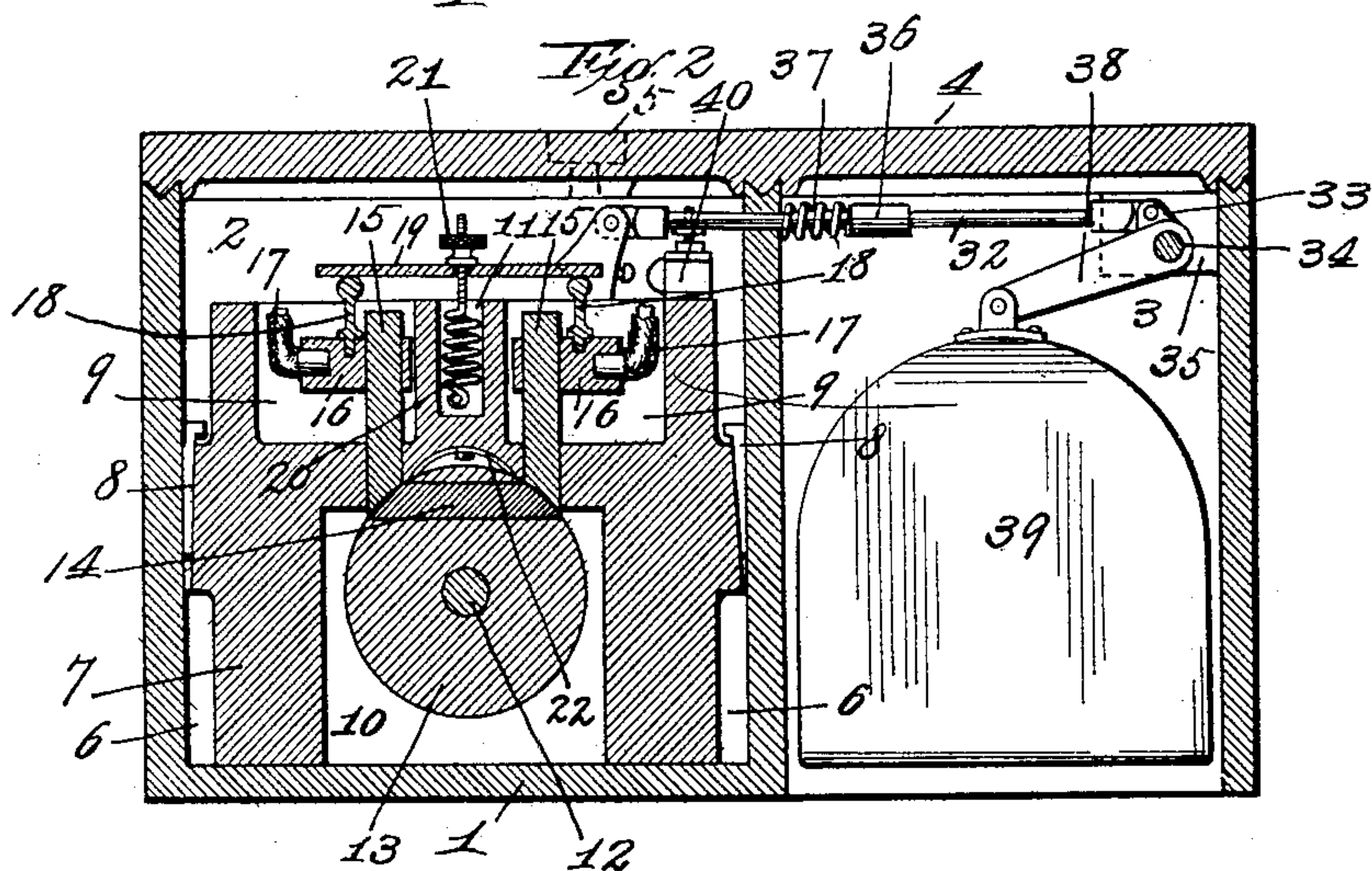
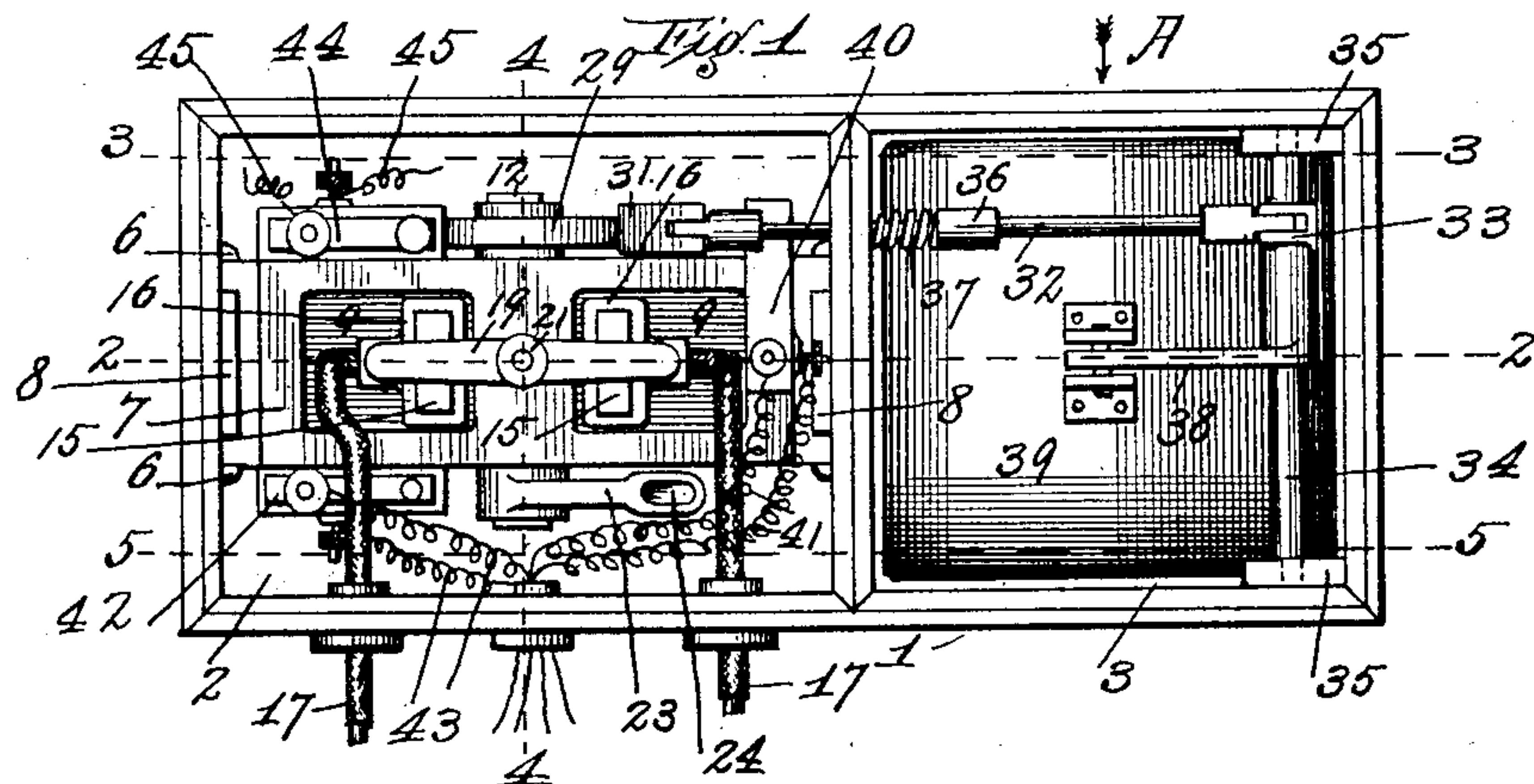


J. L. HORNIG.  
ELECTRIC SWITCH.

No. 561,588.

Patented June 9, 1896.



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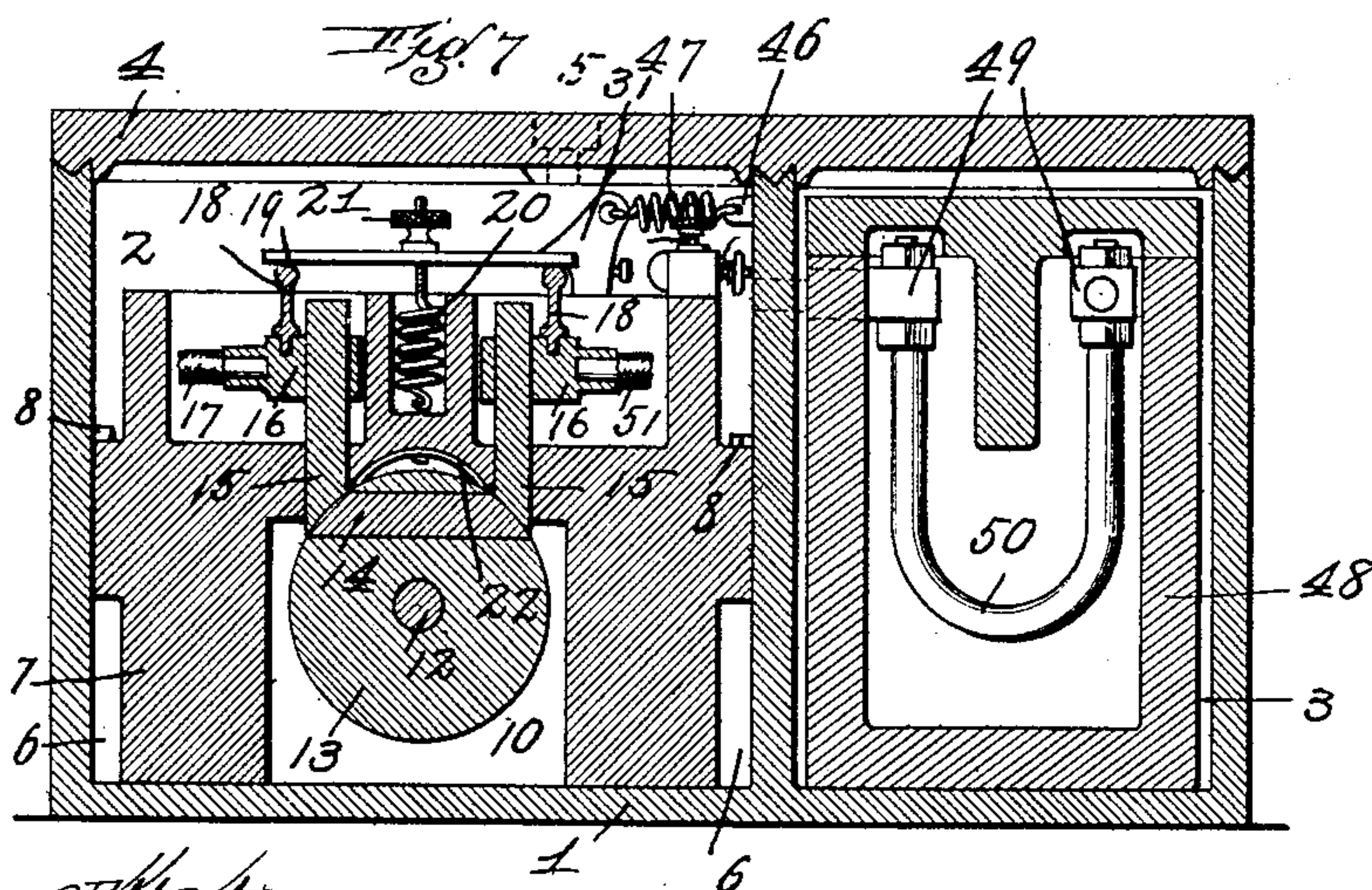
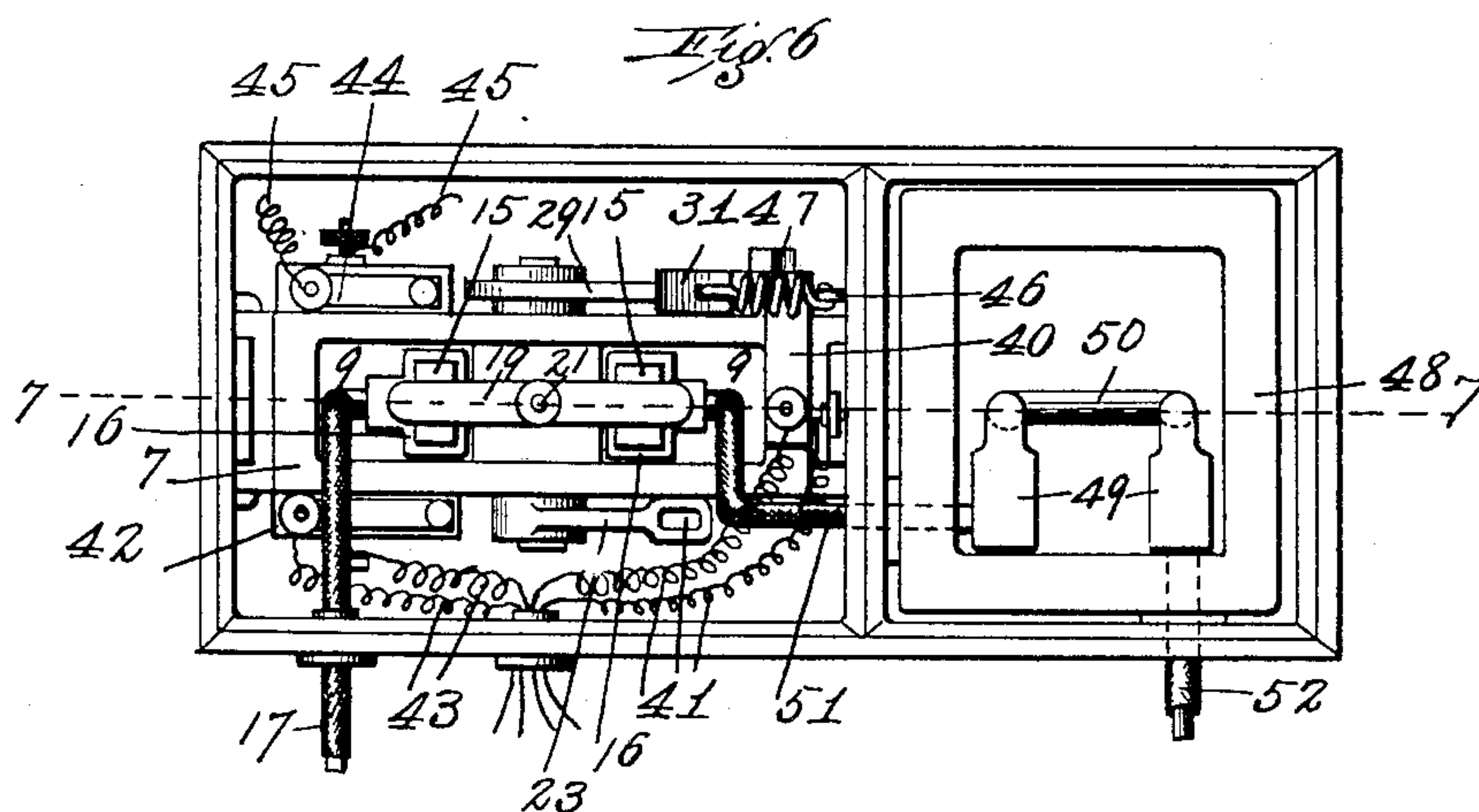
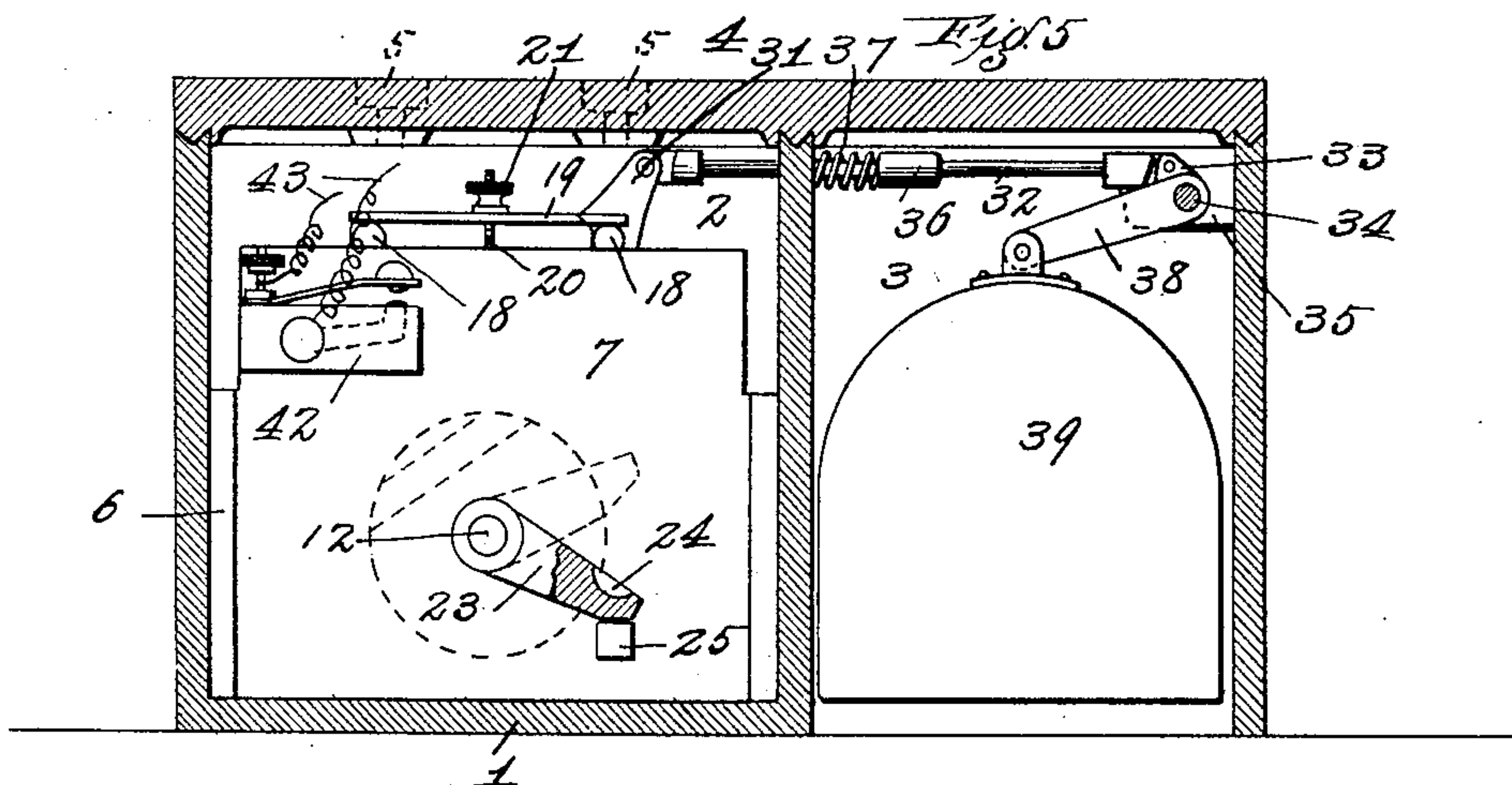
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Attys



# UNITED STATES PATENT OFFICE.

JULIUS L. HORNIG, OF ST. LOUIS, MISSOURI.

## ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 561,588, dated June 9, 1896.

Application filed August 26, 1895. Serial No. 560,622. (No model.)

*To all whom it may concern:*

Be it known that I, JULIUS L. HORNIG, of the city of St. Louis, State of Missouri, have invented certain new and useful Improvements in Electric Switches, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to an improved electric switch; and it consists in the novel construction, combination, and arrangement of parts hereinafter described and claimed.

In the drawings, Figure 1 is a top plan view of my improved switch, the top plate thereof being removed. Fig. 2 is a longitudinal sectional view taken approximately on the indicated line 2 2 of Fig. 1. Fig. 3 is a longitudinal sectional view taken approximately on the indicated line 3 3 of Fig. 1 and looking in the direction of the arrow A, same figure. Fig. 4 is a vertical cross-sectional view taken approximately on the indicated line 4 4 of Fig. 1. Fig. 5 is a longitudinal sectional view taken approximately on the indicated line 5 5 of Fig. 1. Fig. 6 is a top plan view of a modified form of my improved switch. Fig. 7 is a longitudinal sectional view taken approximately on the indicated line 7 7 of Fig. 6.

Referring by numerals to the accompanying drawings, 1 indicates a suitable rectangular casing, the same being divided into two compartments 2 and 3, said compartment 3 having an open bottom. A top plate 4 closes the entire casing 1, and in said top plate 4 at certain points are located apertures 5. Formed integral on the inner faces of the end wall and partition between the two compartments 2 and 3 are vertically-arranged guides 6. A rectangular block of insulating material 7 is located within the compartment 2, and the ends of said block are held between the vertical guides 6. Keys 8 firmly hold said block in position. Formed in the top of said block is a pair of rectangular recesses 9, and formed in the under side of said block is a single large recess 10. A vertical bore 11 is formed in the wall between the two recesses 9. Passing entirely through the block 7 and journaled in the walls on each side of the recess 10 is a shaft 12, upon which within said recess 10 is a fixed disk 13, of suitable insulating material. Fixed in the disk 13 in such a

manner that its ends appear upon the periphery of said disk a slight distance apart is a metallic plate 14, which, when the switch is connected, occupies a horizontal plane.

Passing through suitably-arranged apertures in the partition formed between the recesses 9 and 10 in the block 7 are suitable brushes 15, the lower ends of which are so formed as to readily contact with the surface of the disk 13. When said disk 13 is in its normal position, these brushes connect directly with the plate 14. Said brushes 15 extend upwardly into the recesses 9 and have fixed in any suitable manner upon their upper ends horizontal arms 16, with which the ends of the line-wires 17 connect.

Studs 18 are fixed in and extend upwardly from the arm 16. Extending longitudinally above the block 7 and engaging directly upon the heads of these studs is a plate 19. The lower end of a retractile coil-spring 20 is fixed in the lower end of the bore 11, and the upper end of said spring extends through the aperture formed in the plate 19, and said upper end is screw-threaded in order to receive a thumb-nut 21.

Located in the recess formed in the top of the recess 10, between the lower ends of the brushes 15, in such a manner as that its ends will ride upon the periphery of the disk 13 is a section of mica 22. On that portion of the shaft 12 that projects forward from the block 7 is an arm 23, in the outer end and upper face of which is formed a recess 24.

When the switch is in its normal position, the lower end of the arm 23 engages against a lug 25, formed on the front face of the block 7. Fixed upon that portion of the shaft 12 that extends rearwardly from the block 7 is a segment 26, from which projects downwardly an arm 27. Secured to the lower end of this arm 27 is one end of a retractile coil-spring 28, the other end of said spring being fixed to the partition-wall between the two compartments 2 and 3.

Pivoted to the rear face of the block 7 is a bell-crank 29, the outer end of the horizontal arm of which is turned downwardly and provided with a hook 30, said hook normally engaging the end of the segment 26. The upper end 31 of the vertical arm of the bell-crank 29 is widened, and in said widened up-



per end 31 is pivoted one end of a horizontally arranged and moving rod 32, that extends through the partition between the compartments 2 and 3 and is pivoted to the upper end of a short vertical arm 33, that is fixed upon a rock-shaft 34, the same being mounted for rotation in bearings 35 in the upper and end corner of the compartment 3. Fixed upon the rod 32 a slight distance from the partition and within the compartment 3 is a collar 36, and located upon said rod and interposed between said collar and the partition is a coil-spring 37. An arm 38 is fixed upon the center of the shaft 34 and extends downwardly and toward the center of the compartment 3. To the outer end of this arm is pivoted in any suitable manner the upper end of a float 39, that is fitted to work freely in the lower end of the compartment 3.

Located upon the top of the block 7 and at one end thereof is an ordinary push-button 40 and its proper connections, to which the ends of suitable conductors 41 lead, said conductors 41 leading from an annunciator located in the power-house or central station, or any place desired. This push-button 40 is so located as that it will be thrown into contact when the vertical arm of the bell-crank 29 is moved rearwardly.

A second push-button 42 and its proper connections are located upon the side of the block 7, and to said push-button are fixed the ends of conductors 43, that lead to an annunciator located wherever desired. This push-button 42 is directly beneath one of the apertures 5 in the top plate 4. The remaining apertures 5 in the top plate 4 are directly above the outer end of the arm 23 and the upper widened end 31 of the vertical arm of the bell-crank 29.

Located upon the opposite side of the block 7 from the side on which the push-button 42 is located is a third push-button 44 in every way similar to the push-button 42, and to said push-button 44 are connected the ends of conductors 45, that lead to a suitably-located annunciator. One of the apertures 5 is formed in the top plate 4 directly above this push-button 44.

In the modified form of the switch shown in Figs. 6 and 7 the float 39 and the connections from said float to the upper end of the vertical arm of the bell-crank 29 are dispensed with. A perforated ear 46 is formed on the face of the partition between the two compartments in direct alinement with the upper widened end 31 of the vertical arm of the bell-crank, and a retractile coil-spring 47 is attached at one end to said ear 46 and by its opposite end to the upper end of the vertical arm of the bell-crank.

Located within the compartment 3, which in this modified form is constructed with a closed bottom, is a fuse-box 48, of any suitable insulating material. In the top of said fuse-box are suitable fuse-clamps 49, in which are held the ends of an ordinary fuse 50. A

suitable conductor 51 extends from one of the brush-holders 16 to one of the fuse-clamps 49, and from the opposite fuse-clamp a conductor 52 leads that connects with the line-wire.

The modified form of the device herein shown and described is especially intended for the underground conduit systems of electric railways, and said devices are located at suitable distances apart within the conduit, and the connections from the trolley-wire or other conductor are made to the conductors 17. Thus the entire line or trolley wire is connected in a number of sections.

When the switch is located within the conduit, the proper connections made thereto, and the mechanism within the casing is in position, as shown in Figs. 1 to 5, inclusive, the current through the trolley-wire or other conductor passes through one of the connections 17, through the brush and brush-holder in one of the recesses 9, through the plate 14, from thence through the brush and brush-holder located in the other recess 9, and from said brush-holder through the connection 17 again to the trolley-wire or conductor.

Should water accumulate and rise in the conduit, before the same can rise to such a height as to seriously affect the trolley-wire or other conductor said water will act upon the float 39 and raise the same in the compartment 3. As said float rises the arm 38 will necessarily be moved and the shaft 34 rocked. The arm 33, being fixed upon said shaft 34, will, when said shaft is rocked, move rearwardly. As the bell-crank 29 is connected to said arm 33 by the rod 32, said bell-crank will be moved sufficiently far to allow the hook 30 on the end of the horizontal arm of said bell-crank to disengage from the shoulder on the segment 26. As soon as said hook disengages, the retractile coil-spring 28 will act and the segment 26 and shaft 12 upon which said segment is fixed will be partially rotated. The disk 13, being fixed upon the shaft 12, will with this movement be also rotated, and the plate or conductor 14, passing through said disk 13, will be moved out of a horizontal plane, and the ends thereof will be out of contact with the brushes 15. Thus electrical connection through this particular switch-box is broken. As the vertical arm of the bell-crank 29 is thrown rearwardly it will engage against the push-button 40, and thereby establish a circuit through the conductors 41, that lead to an annunciator located in the central station, or wherever desired. Thus said annunciator will show that the main circuit is broken or cut out at this particular switch-box.

When the switch is closed and the various parts are in proper position and it is desired to break the connection through said switch, the operator passes a suitable tool downwardly through that aperture 5 that is directly above the vertical arm of the bell-crank 29, and the lower end of said tool will engage



against the inclined face on the upper end of said vertical arm, and said bell-crank will thereby be moved rearwardly far enough to allow the shoulder 30 on the horizontal arm of said bell-crank to disengage from the upper corner of the segment 26. The operations, as previously described, will then ensue and the connections will be broken. After the connection has been broken in either manner above described, and it is desired to reposition the various parts and to form a connection through the switch, the operator passes a suitable tool downwardly through that aperture 5 that is directly above the outer end of the arm 23. The lower end of said tool will engage in the recess 24 at the outer end of said arm, and said arm is moved downwardly until it engages against the stop 25. Said arm being rigidly fixed upon the shaft 12, said shaft will be partially rotated and brought into such a position as that the ends of the plate 14 will be in direct contact with the lower ends of the brushes 15. Thus the proper connection is established. When said parts have assumed this position, the hook 30 will engage over the shoulder or corner of the segment 26 and the various parts will be held in the proper positions to form a connection until said connection is broken in the manner previously described. Should the operator desire to signal to the power-house or central station, he may do so by inserting a proper tool through either of the apertures 5 that are immediately above the push-buttons 42 and 44, the conductors from said push-buttons leading to the annunciator, located as desired. The expansive coil-spring 37 is for the purpose of counterbalancing the weight of the float 39. By manipulating the nut 21 upon the upper end of the coil-spring 20 the tension of the brushes and brush-holders is changed. The piece of mica 22 is for the purpose of preventing any sparking as the switch is closed or opened. By removing the top plate 4, the keys 8, and disconnecting the end of the rod 32 from the vertical arm of the bell-crank 29 the entire block 7, with its contiguous mechanism, may be removed in order to be cleaned or repaired.

The operation of my improved switch when used in connection with a fuse-box is similar to the operation of the modified form of the device. Therefore it will not be necessary to give a detailed description thereof.

A switch of my improved construction is very compact, especially applicable for the conduits in which conductors are located, is positive in action, and possesses superior advantages in point of simplicity, durability, and general efficiency.

I claim—

1. In an improved switch, a suitable receptacle having two compartments, one having an open bottom, a block of insulating material arranged within the closed compartment, a spring-actuated disk of insulating material arranged for rotation in said block, a con-

ductor-plate located within said disk, brushes held within said block, the ends of which normally contact with the ends of the conductor-plate, said brushes being electrically connected to the line-wire, and a float in said open-bottomed compartment for automatically releasing and rotating the spring-actuated disk.

2. The combination, in an electric switch, of a suitable casing, a movable disk 13, a conductor-plate 14 fixed in said disk with its ends exposed, two contacts which coöperate with said conductor-plate, a strip of mica 22 extending on said disk from a point adjacent one of said contacts to a point adjacent the other one of said contacts, to cut off the spark at said points, and a support for the mica between the said two contacts, substantially as specified.

3. In an improved switch, a spring-actuated disk of insulating material, a conductor-plate arranged in said disk in such a manner as that its ends appear on the periphery, two contacts which coöperate with said conductor-plate, suitable mechanism for tripping said disk, and a float or its equivalent for operating said tripping mechanism.

4. In an improved switch, a suitable box or casing having two compartments, one with an open bottom, a block of insulating material arranged within the closed compartment, a shaft journaled in said block, a disk of insulating material fixed upon said shaft, a conductor arranged in said disk, a spring-actuated segment fixed upon the shaft outside the block, brush-holders arranged in the top of said block, brushes located in said brush-holders and contacting with the end of the conductor-plate in the disk, a bell-crank pivoted upon the side of the block, the horizontal arm of which normally engages the spring-actuated segment, a series of contact-buttons arranged on said block, a float arranged within the open-bottomed compartment, and suitable operating connections from said float to the vertical arm of said bell-crank.

5. In an improved switch, a suitable casing having two compartments, one having an open bottom, a block of insulating material removably located in the closed compartment, a rotating disk arranged within said block of insulating material, a conductor-plate passing through said disk in such a manner as that its ends appear adjacent one another on the periphery, a strip of mica arranged in the block of insulating material between the ends of the conductor-plate when the disk is normally arranged, a pair of brush-holders arranged in the top of said block, brushes located in said brush-holders that normally contact with the ends of the conductor-plate, a tension device for said brush-holders, a spring-actuated segment located upon the shaft on which the disk is located, a bell-crank pivoted upon the block, the horizontal arm of which is provided with a hook that engages the shoulder on the segment, a series



of push-buttons arranged upon the block and  
having conductors leading therefrom to suit-  
ably-located annunciators, a horizontally-  
moving rod pivoted to the vertical arm of the  
5 bell-crank and extending into the open-bot-  
tomed compartment, a float arranged to move  
vertically within said last-mentioned com-  
partment, and suitable connections from said

float to the rod to move the same horizon-  
tally.

In testimony whereof I affix my signature  
in presence of two witnesses.

JULIUS L. HORNIG.

Witnesses:

JOHN C. HIGDON,  
MAUD GRIFFIN.