B. C. WEBSTER.

ELECTRIC SWITCH.

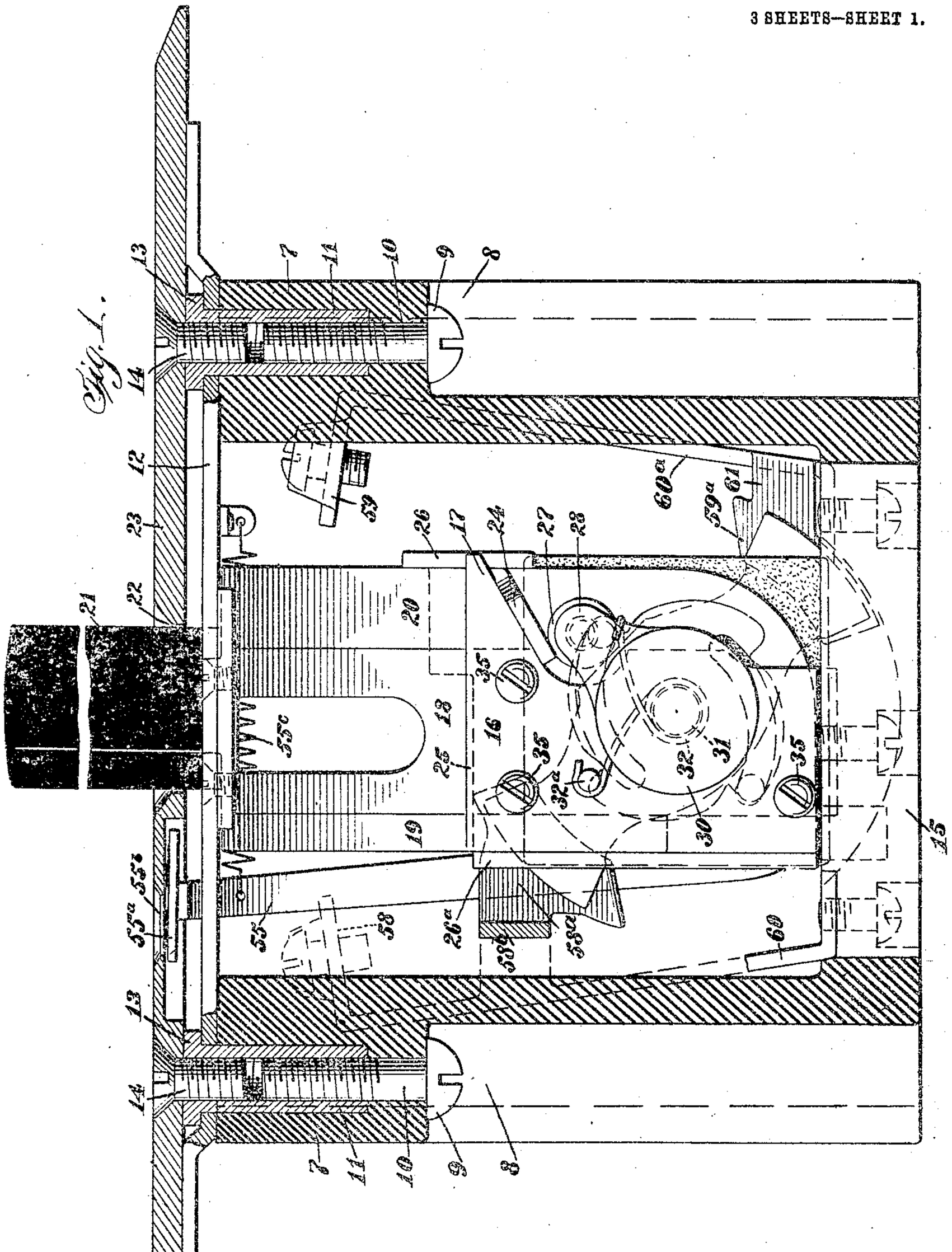
APPLICATION FILED MAY 20, 1909.

969,581.

Patented Sept. 6, 1910.

3 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

Walton Harrison

INVENTOR

Benjamin C. Webster

BY Munn & Co

ATTORNEYS

B. C. WEBSTER.

ELECTRIC SWITCH.

APPLICATION FILED MAY 20, 1909.

969,581.

Patented Sept. 6, 1910.

3 SHEETS—SHEET 2.

Fig. 2.

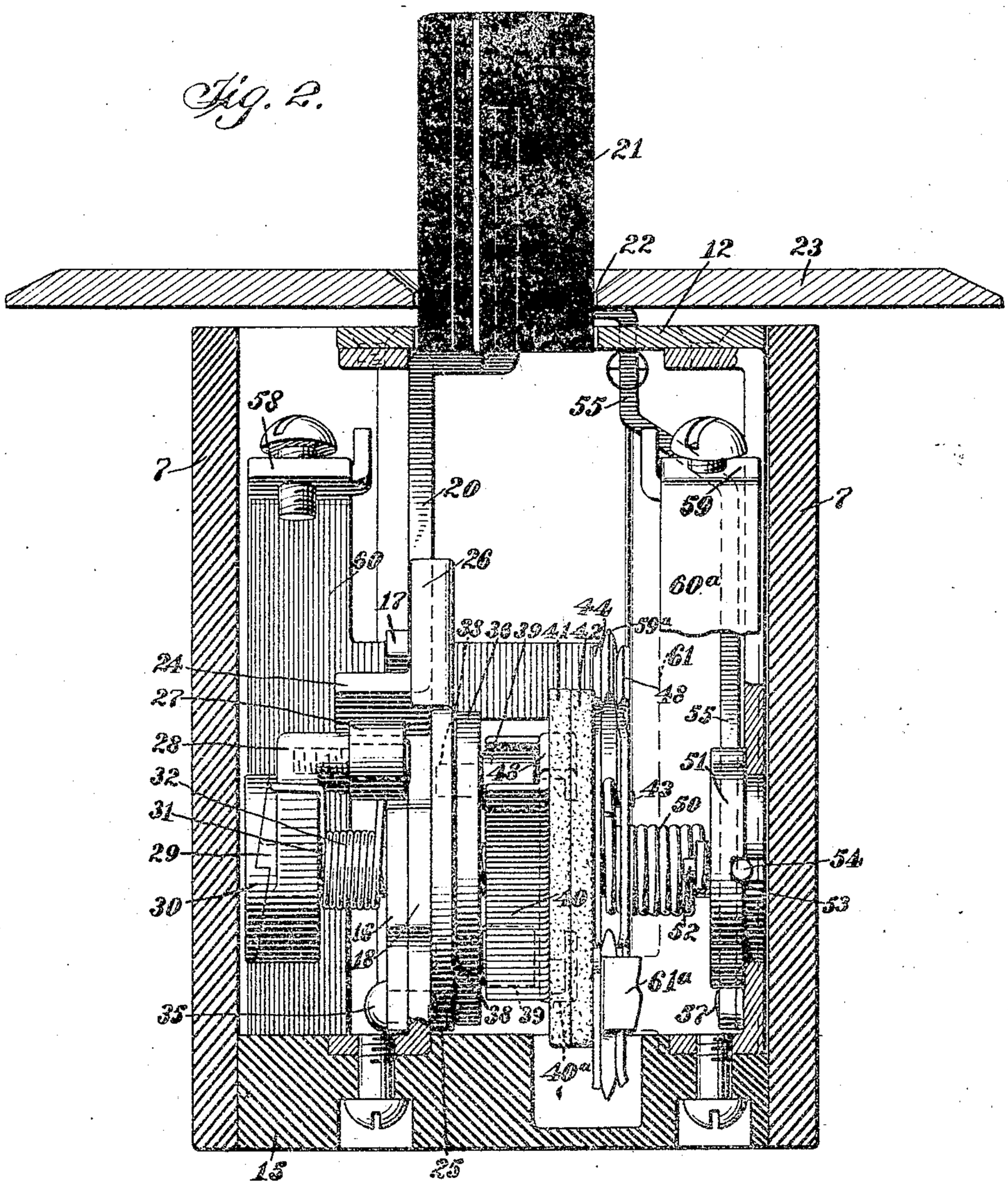
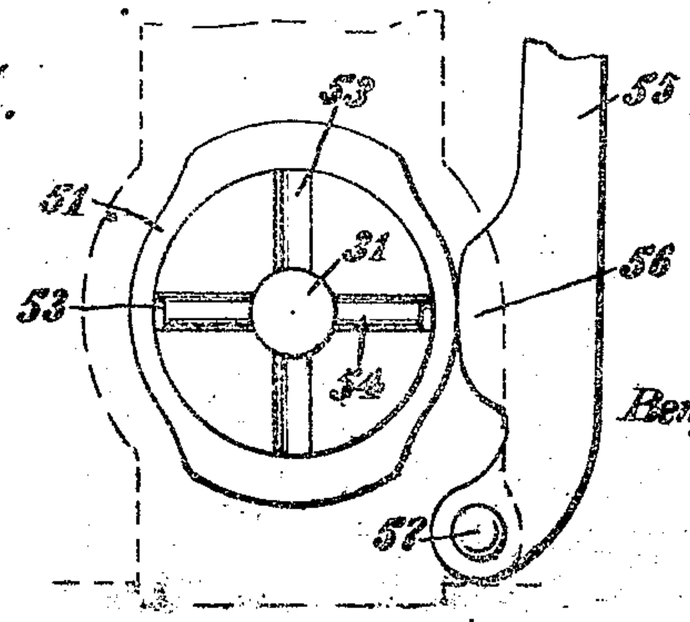


Fig. 7.



WITNESSES

L. Emmett Hardie

Walton Harrison

INVENTOR

Benjamin C. Webster

BY Munn & Co

ATTORNEYS

B. C. WEBSTER.

ELECTRIC SWITCH.

APPLICATION FILED MAY 20, 1909.

969,581.

Patented Sept. 6, 1910.

3 SHEETS—SHEET 3.

Fig. 3.

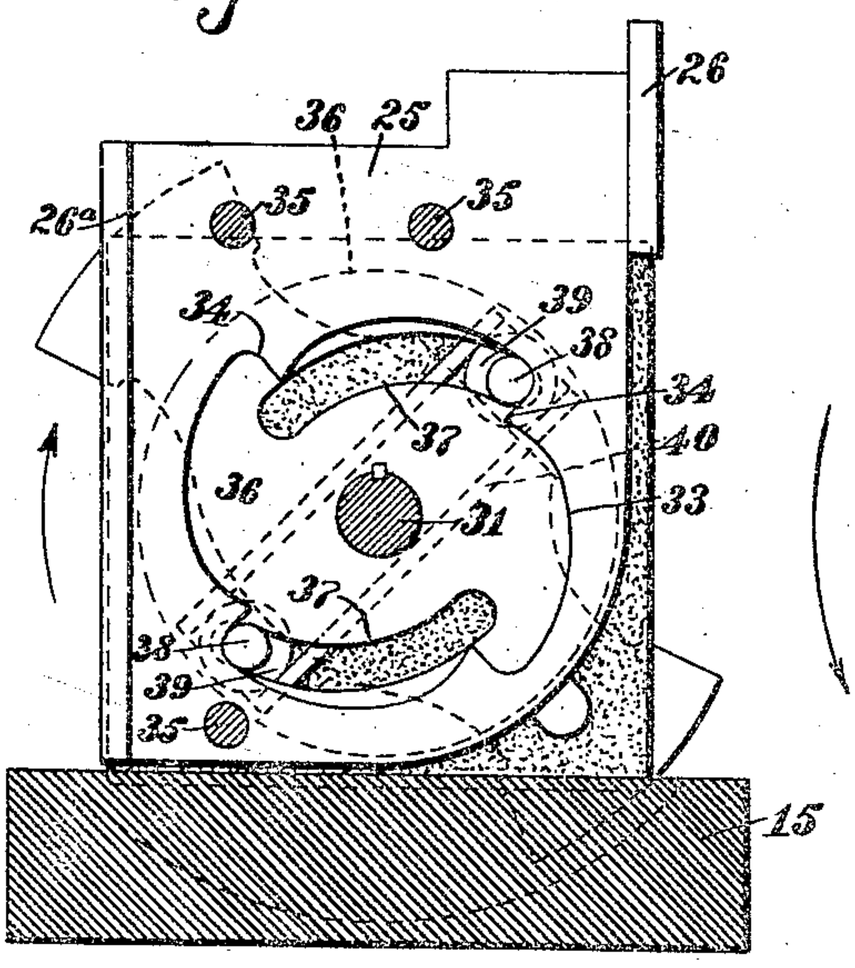


Fig. 4.

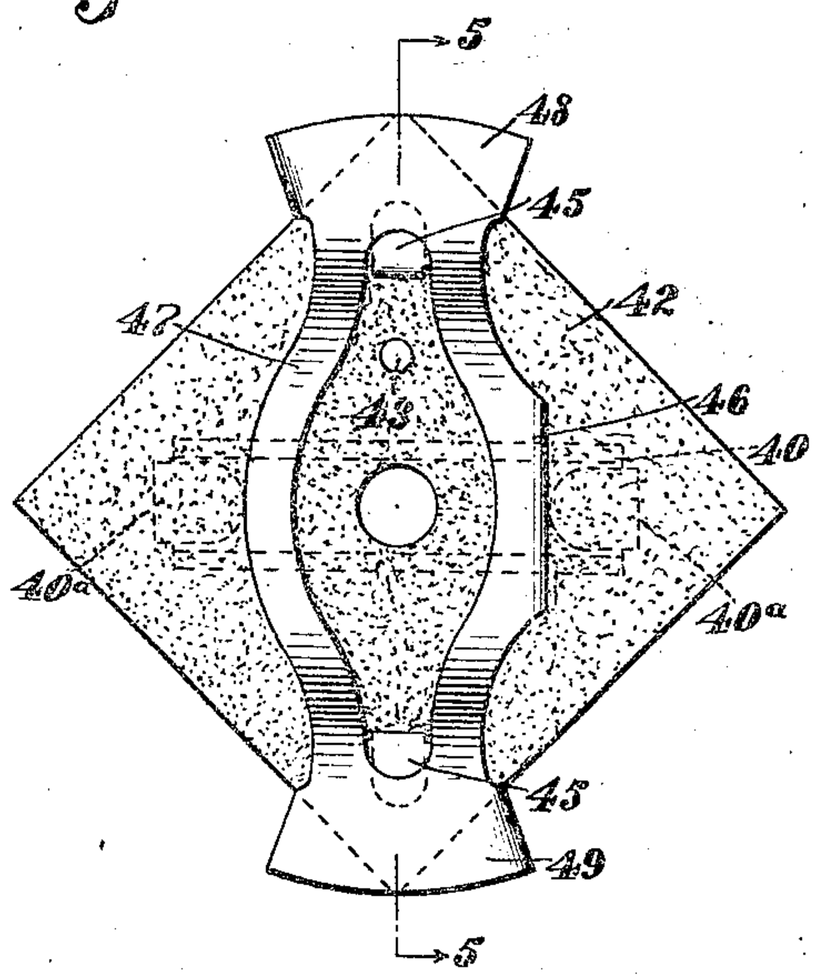


Fig. 6.

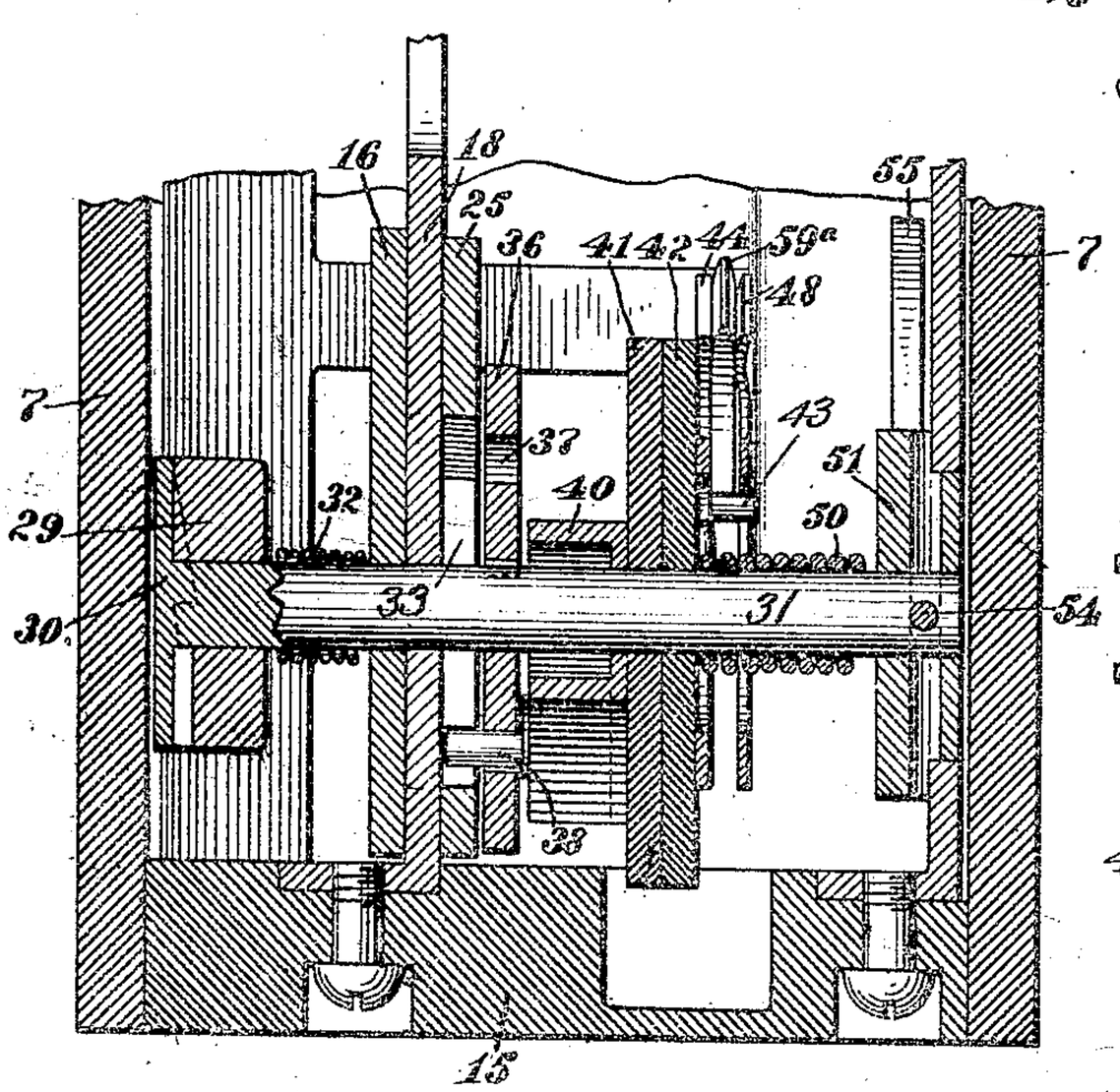
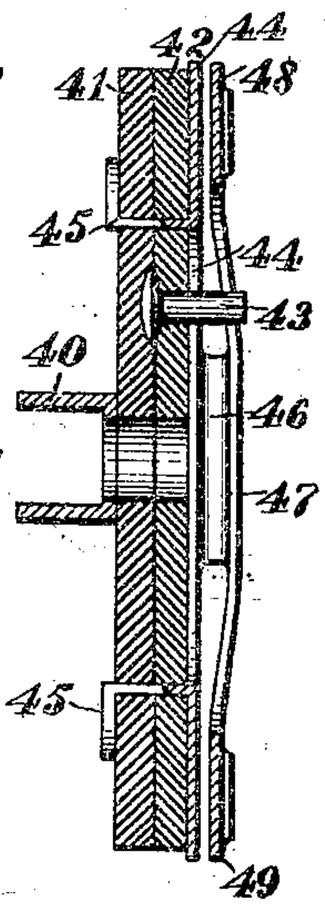


Fig. 5.



WITNESSES

F. G. Hackenberg
Walton Harrison.

INVENTOR

Benjamin C. Webster

BY Munn & Co

ATTORNEYS

UNITED STATES PATENT OFFICE.

BENJAMIN CHESTER WEBSTER, OF BRIDGEPORT, CONNECTICUT.

ELECTRIC SWITCH.

969,581. Specification of Letters Patent. Patented Sept. 6, 1910.

Application filed May 20, 1909. Serial No. 497,159.

To all whom it may concern:

Be it known that I, BENJAMIN CHESTER WEBSTER, a citizen of the United States, and a resident of Bridgeport, in the county of Fairfield and State of Connecticut, have invented a new and Improved Electric Switch, of which the following is a full, clear, and exact description.

My invention relates to electric switches, my more particular purpose being to provide an improved type of so-called snap switch, possessing certain structural advantages whereby its efficiency is greatly increased.

More particularly stated, my invention comprehends a switch having a revoluble shaft which is turned step by step by the depression of a button by hand, and connected with the revoluble shaft are certain parts of improved construction for bringing the contact members into and out of engagement with each other under conditions insuring reliability and certainty of action.

My invention further relates to various details of construction looking toward the general improvement of the efficiency of switches.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a substantially central longitudinal section through the switch casing, showing the various movable and stationary parts; Fig. 2 is a cross section through the same; Fig. 3 is a detail showing the revoluble shaft carrying a cam disk and associated with other parts for the purpose of periodically locking and releasing the commutator in order to enable the latter to turn quickly, step by step, and always in the same direction; Fig. 4 is a detail plan view showing the commutator complete; Fig. 5 is a longitudinal section upon the line 5—5 of Fig. 4, looking in the direction of the arrows; Fig. 6 is a fragmentary section through the revoluble shaft and parts associated therewith for the purpose of enabling the step by step movement of the shaft to periodically actuate the commutator; and Fig. 7 is a fragmentary elevation showing the means whereby the rotation of the shaft actuates the indicator.

A casing 7 made of insulating material and having generally the form of a box is provided with apertures 8 and within the latter are screw heads 9 integral with screws 10 which detachably engage threaded sleeves 11, these sleeves being secured rigidly within the substance of the casing. At 12 is a metallic plate which engages the casing 7. The sleeves 11 are each provided with an annular flange 13 which engages the plate 12 and holds the same firmly in position upon the casing. Screws 14 are detachably fitted into the threaded sleeves 11.

The casing 7 is provided with a base plate 15 of insulating material serving as a support for various metallic parts contained within the casing. A metallic plate 16 is provided with a beveled surface 17, and rests flatly against another plate 18, which is disposed in immediate engagement with the plate 16 and is stationary in relation to the base plate 15. Two slide rods 19, 20 are connected integrally together and supported upon them is a button 21 which extends through a hole 22 in a face plate 23 which engages the flanges 13 of the sleeves 11 and is held rigidly in relation to these sleeves by aid of the screws 14. The slide rod 20 is provided at its lower end with a lug 24 integral with it and inclined slightly as indicated in Fig. 1, for the purpose of engaging the beveled surface 17, thus forming a limiting stop to prevent excessive upward travel of the slide rods 19, 20 and the button 21.

Disposed parallel with the stationary plate 16 is another stationary plate 25, the guide 18 and the slide rods 19, 20 being disposed intermediate these two stationary plates. The stationary plate 25 is provided with a lug 26 integral with it and preferably made by bending one of its edges as indicated in Fig. 1. The opposite edge of the plate 25 is bent so as to form a projecting flange 26ª which comes out substantially flush with the outer face of the plate 16. The slide rods 19, 20 are thus effectively encompassed on all sides and have no movement except a sliding movement in the general direction of their length.

A roller 27, which normally rests in engagement with the lug 24, is journaled upon a crank arm 28, this crank arm being integral with a crown wheel 29, as will be understood from Fig. 2. Mating the crown wheel 29 is another crown wheel 30, the latter being mounted rigidly upon a revoluble shaft 31. A spiral spring 32 encircles the

shaft 31 and engages the crank arm 28 and also a pin 32ª (see Fig. 1), this pin being mounted rigidly upon the stationary plate 16. The purpose of the spring 32 is to keep the crank arm 28 normally raised, and consequently to maintain the roller 27 in engagement with the lug 24; or in other words, to retract the crank arm 28 after each downward movement thereof; also by pressure against the under side of this lug to keep the button 21 and the slide rods 19, 20 in their normal positions indicated in Fig. 1.

The stationary plate 25 (see Fig. 3) is provided centrally with a mutilation 33 of irregular outline and of proper configuration to form shoulders 34 disposed equidistant. Screws 35 extend through the plate 16, guide 18 and plate 25, holding these parts rigidly together and as a whole forming a slideway for the slide rods 19, 20, as above described. Mounted rigidly upon the shaft 31 is a cam disk 36 which is provided with slots 37 of arcuate form, the inner ends of these slots being nearer to the shaft 31 than are the outer ends of the slots. The purpose of this arrangement is to enable the slots 37, or rather, the circumscribing walls thereof, to serve as cams.

Pins 38 extend through the slots 37 and normally lodge against the shoulders 34 as indicated in Fig. 3, and are adapted to be moved toward the axis of the shaft 31 whenever the cam disk 36 is turned in a clockwise direction, according to this figure, being thereby momentarily released from their engagement with the shoulders 34. Each pin 38 is provided with a cylindrical head 39 extending into a slideway 40 having generally the form of a trough. This slideway is provided at its ends with tongues 40ª (see Figs. 2 and 4), these tongues extending through a square plate 41 of insulating material and holding the slideway 40 thereupon.

Engaging the plate 41 of insulating material is a somewhat similar plate 42, also of insulating material, and projecting from the plate 42 is a metallic pin 43. A metallic plate 44 is provided with tongues 45 which extend through both of the plates 41, 42 of insulating material and hold the latter together. The plate 44 is provided with a portion 46 whereby it is connected with another plate 47, these plates being integral with each other. The plate 47 is provided with contact points 48, 49 integral with it, the outer ends of the plate 44 (see Fig. 5) also serving as contact points. The various parts shown in Fig. 4 (or in Fig. 5) together constitute a commutator which is mounted loosely upon the revoluble shaft 31 and is adapted to be turned relatively to the same.

A spiral spring 50 (see Fig. 2) encircles the shaft 31 and is disposed adjacent to the commutator, one end of this spring engaging the pin 43 carried by the commutator and the other end of said spring engaging a pin 52 which is mounted upon a cam disk 51. This cam disk is mounted upon the shaft 31, and though loose relatively to the same it normally rotates with the shaft, being for this purpose provided with notches 53 (see Figs. 2 and 7). Entering these notches is a pin 54 which extends diametrically through the shaft 31, as will be understood from Figs. 2 and 7. A lever 55 (see Figs. 1, 2 and 6) is provided with a lobe 56 integral with it and is journaled upon a pin 57 near the bottom of the casing so that the lever 55 is adapted to rock upon this pin as a center.

The parts are so arranged that rotation of the cam disk 51 causes the lever 55 to rock, as will be understood from Fig. 7. The upper end of the lever 55 carries indicator mechanism 55ª, the position of which may be noted through an opening 55ᵇ, thereby enabling the operator to ascertain at a glance the condition of the switch at any particular moment. At 58 and 59 are shown binding posts mounted upon standards 60 and 60ª. These standards are of metal and are provided with laterally-branching wings 58ᵇ and 61 integral with them. These wings terminate in contact members 58ª and 59ª, which extend partially into the path of the commutator, as will be understood from the various figures and particularly Fig. 2, so that the rotation of the commutator causes the various contact members to be engaged and disengaged, thereby controlling the electric current. Connected with the rocking lever 55 is a spiral spring 55ᶜ whereby the rocking lever, after each of its movements to the left according to Fig. 1, is retracted.

The operation of my device is as follows: In order to give the spring 50 the proper degree of tension the cam disk 51 is pushed a little to the left according to Fig. 2, the pin 54 being thus dislodged from the channels 53. The cam disk 51 is next rotated to an extent sufficient to adjust the tension of the spring 50 properly, and this being done it is moved to the right so that the pin 54 catches into the nearest notch 53 and forms a positive lock. When this has been done the spring 50 will maintain approximately the degree of tension given to it, though its tension may be changed at any time in accordance with the will of the operator.

In order to understand the action of the various parts it may be well to bear in mind that the shaft 31 always carries with it the crown disk 36, the relative position of these parts always remaining unchanged, and further that the shaft in turning always carries with it the cam disk 51 though the position of this cam disk, relatively to the shaft, may be adjusted at will from time to time; also that the plates 16, 18 and 25 together consti-

tute a slideway which always remains stationary; further, that the slideway 40, plates 41, 42 of insulating material and plates 44, 47 of metal, together constitute the commutator, which is revoluble in relation to the shaft 31.

Suppose, now, that the operator depresses the button 21. The slide rods 19, 20 thereupon descend, the lug 24 moves the roller 27 downward, the crank arm 28 turns a quarter of a revolution, the tension of the spring 32 is increased and the cam disk 36 (carried by the shaft 31) turns a quarter of a revolution. In doing this (see Fig. 3) the pins 38 are forced inwardly toward the shaft 31, as above described, until finally the pins 38 clear the shoulders 34. Now, since the plate 25 is stationary, and the release of the pins 38 from the shoulders 34 leaves the cam disk 36 free to turn, and since because of the disengagement of the pins 38 the commutator is now free to turn and is under tension of the spring 50, the commutator quickly makes a quarter of a revolution. In executing this movement the pins 38, being guided by the slots 37, are again forced outwardly, that is, away from the shaft 31, and consequently the pins 38 lodge against the next pair of shoulders 34, thereby bringing the commutator abruptly to a stop. Upon the button 21 being again depressed, the cycle of operations is repeated, the commutator again moving abruptly a quarter of a revolution in the same direction and again being brought suddenly to a stop. The repeated depression of the button 21 thus causes the shaft 31 to rotate step by step, and each time it is rotated one step the commutator quickly turns a quarter of a revolution and stops abruptly.

Since the plates 44 and 47 are of conducting material, each time the commutator stops the stationary contact members are either thrown into or out of electrical communication with each other. As it is a mere matter of mechanical skill to multiply the stationary contact members and connections for the same, it is easy to vary the uses to which the switch may be applied.

It will be noted from Fig. 3 that the rotation of the shaft 31 is positive and that the stopping of the commutator after each of its movements is also positive, as well as the release of the commutator each time the disk 36 is turned a quarter of a revolution; that is to say, the rotation of the disk 36 necessarily causes the cam slots 37 to force the pins 38 inwardly until they are entirely clear of the shoulders 34, and when this occurs the commutator must necessarily turn because already subjected to strong spring tension, and after the commutator moves, the pins 38 necessarily lodge against the next succeeding shoulders 34 for the reason that the cam slots 37 positively guide the pins 38 slightly away from the shaft 31 as a center, and thus bring them into square alinement with the next pair of shoulders against which they must lodge.

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

1. In a switch, the combination of a revoluble shaft, a disk journaled loosely thereupon, a spring connected with said disk, a commutator mounted loosely upon said shaft and connected with said spring, and means controllable at will for adjusting the tension of said spring.

2. In a switch, the combination of a revoluble shaft, a commutator journaled thereupon, a spring connecting said commutator with said shaft for the purpose of intermittently turning said commutator faster than said shaft, contact mechanism to be opened and closed by movements of said commutator, a cam disk mounted rigidly upon said shaft and revoluble therewith, said cam disk being provided with an arcuate slot, one end of said slot being nearer than the other end thereof to said shaft, a pin carried by said commutator, and loose relatively thereto, said pin extending through said slot, and a stationary plate provided with a shoulder for periodically engaging said pin and thereby stopping the rotation of said commutator.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

BENJAMIN CHESTER WEBSTER.

Witnesses:
GEORGE T. HATHEWAY,
EDGAR P. WEBSTER.