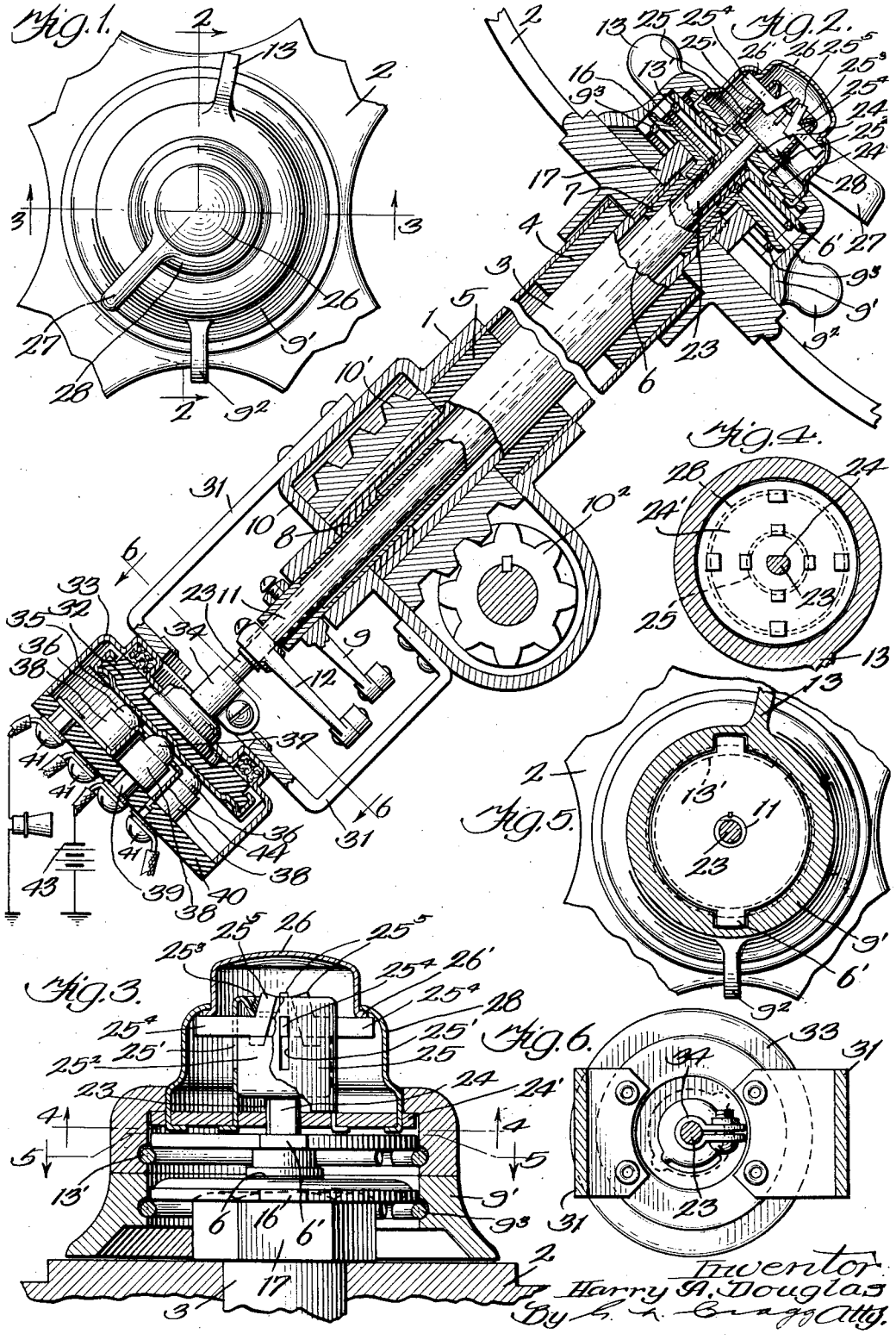
June 18, 1929. H. A. DOUGLAS 1,717,918

ELECTRIC SWITCH

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ELECTRIC SWITCH

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Fig. 7.

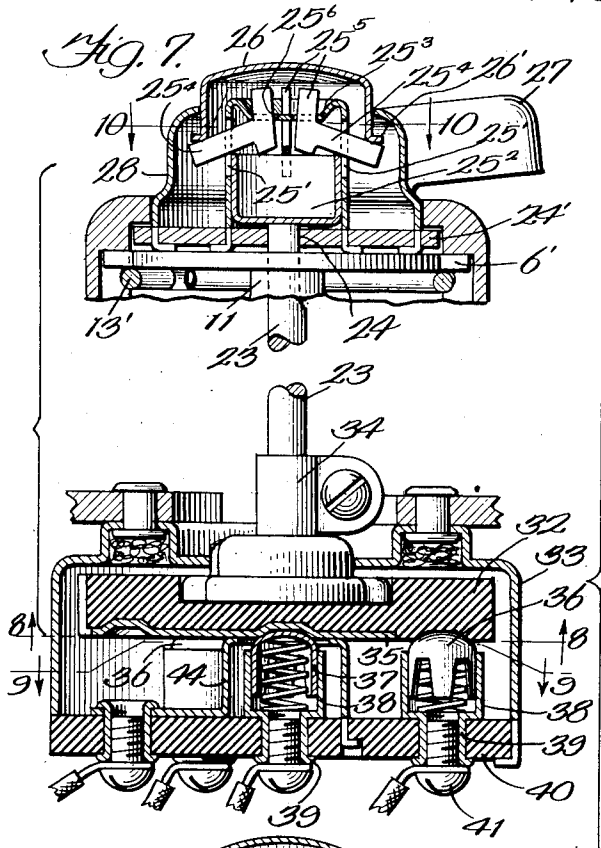



Fig. 11.

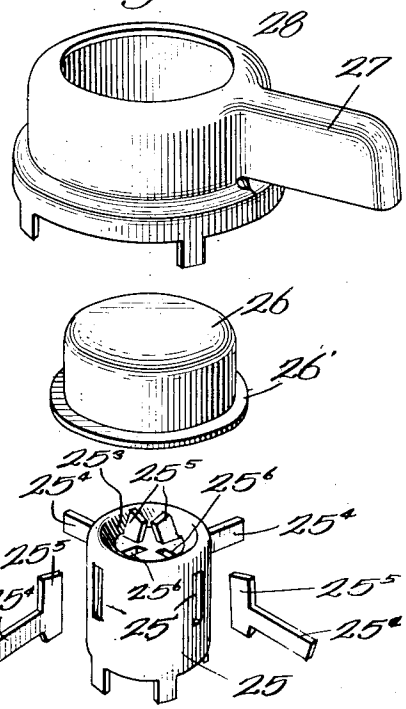



Fig. 8.

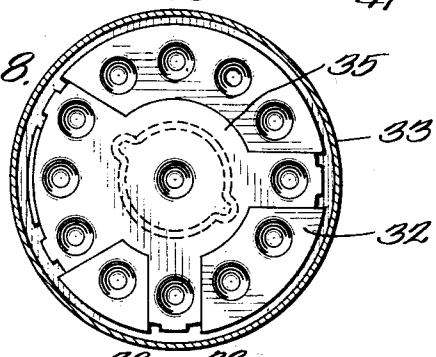



Fig. 9.

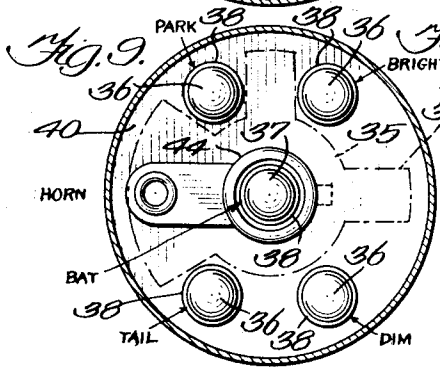
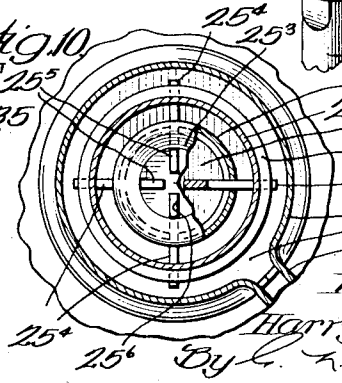



Fig. 10.




Inventor:
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By L. L. Bragg Atty.

Patented June 18, 1929. 1,717,918

# UNITED STATES PATENT OFFICE.

HARRY A. DOUGLAS, OF BRONSON, MICHIGAN.

## ELECTRIC SWITCH.

Application filed May 5, 1928. Serial No. 275,339.

My invention in its broader aspect relates to switches which are operated by push buttons. In a more specific aspect, the invention also relates to a structure inclusive of two switches, one switch having a push button control contact and the other switch having a rotatable contact.

The invention has for its object the provision of a construction whereby the force of the push button is increased to compensate for the spring pressure to which the push button is subject, this spring pressure being marked where the two switches are so related that the push button also receives the spring pressure of the switch having the rotatable contact.

The invention is of particular service in connection with switching mechanism that is provided at the lower ends of the steering columns of automotive vehicles and which is preferably operated in the region of the steering wheels that are at the upper ends of the steering column. A switch made in accordance with my invention is inclusive of two complemental contacts, one movable toward and from the other, a push button in actuating relation to the aforesaid movable contact to bring it into engagement with the other contact, there being spring means for separating said movable contact from the other contact upon release of the push button, and a leverage device through which the push button operates upon said movable contact and arranged to respectively reduce the motion and increase the force of said movable contact with respect to the motion of and force applied to the push button.

When such a structure is employed in an automotive vehicle for controlling the horn or signaling circuit and the switch contacts of such circuit are at the lower end of the steering column, a push rod is interposed between the push button and the movable contact, this rod being depressed by the button to close the contacts and being elevated by a spring of the switch. In accordance with common practice, a lighting switch may also be controlled by said rod which, in such event, is mounted to turn in order that it may turn the rotating element of the latter switch. Such rod, therefore, encounters the spring pressure of both switches, this spring pressure being transmitted by the button, which button, consequently, was hitherto difficult to operate. The leverage device which I employ offsets the spring pressure upon the button and enables the button to be operated with sufficient ease.

I will explain my invention more fully by reference to the accompanying drawings illustrating two embodiments thereof and in which Fig. 1 is a top view of a portion of a steering wheel showing a part of mechanism of my invention above the wheel; Fig. 2 is a sectional view on line 2—2 of Fig. 1, the horn circuit being also diagrammatically illustrated; Fig. 3 is a sectional view on line 3—3 of Fig. 1; Fig. 4 is a sectional view on line 4—4 of Fig. 3; Fig. 5 is a sectional view on line 5—5 of Fig. 3; Fig. 6 is a sectional view on line 6—6 of Fig. 2; Fig. 7 is a view, on a larger scale, of the upper and lower portions of the structure shown in Fig. 2, the intermediate portion of the structure being removed; Fig. 8 is a sectional view on line 8—8 of Fig. 7; Fig. 9 is a sectional view on line 9—9 of Fig. 7; Fig. 10 is a sectional view on line 10—10 of Fig. 7; and Fig. 11 is a view of component parts in separated relation.

The structure illustrated is inclusive of a stationary tubular steering column 1 which is suitably anchored upon the vehicle and above the upper end of which the steering vehicle wheel 2 is mounted and keyed to the hollow vehicle steering shaft 3. This steering shaft is adapted to turn within bearings 4 and 5 that surround it and are surrounded by the column which carries these bearings. Said steering shaft 3 encloses a rotatable hollow shaft 6 which is coaxial with the shaft 3 and column, this hollow shaft being spaced apart from the shaft 3 by bearing sleeves 7 and 8 and being connected with the spark controlling lever 9. The upper end of the hollow shaft 6 is suitably coupled with the hub 9′ of a hand operated spark controlling lever $9^2$, this hub and lever being located above the steering wheel and coaxial therewith. The shaft 6 also passes through and is rotatable within a wall of the gear casing 10 which is in fixed relation to the steering column. This gear casing encloses the worm 10′ that is fixed upon the steering shaft 3 and the worm wheel $10^2$ through which the shaft 3 and the worm 10′ operate the steering ground wheels.

Another hollow shaft 11 is surrounded by the aforesaid column, shaft 3 and hollow shaft 6 and is coaxial therewith, this shaft 11 being coupled with gas controlling lever mechanism of which a part 12 is illustrated and having

a control lever 13 upon its upper end and above the wheel whereby it may be turned. A flange 16 is fixed upon the upper end of the stationary shaft 6 and overlies the bearing sleeve 7, the upper end of the steering shaft 3 and the nut 17 which is screwed upon the upper end of the steering shaft 3 to maintain the steering wheel 2 in assembly with this shaft. The lever hub 9′ is held in place by means of a spring ring $9^3$ which is partially received with an annular groove formed in said hub and which underlies and engages the flange 16. A flange 6′ is secured to the upper end of the hollow shaft 6, the hub of the control lever being held in place and upon the upper side of the hub 9′ by means of a spring ring 13′ which is received within an annular groove formed in its hub and which underlies and engages the flange 6′.

The rod 23 is rotatable and slidable within the hollow shaft 11. The lower end of this rod extends below the steering column and its upper end passes through and terminates above the steering wheel 2. The upper end portion of the rod 23 is flat in part, as indicated at 24, this flattened end of the rod passing through the correspondingly shaped hole in the disc 24′ and being slidable in this hole. A member of the leverage device, preferably in the form of a shell 25, is fixed upon the disc 24′ and is disposed upon the upper side of this disc. This shell has guiding formations which are preferably slots 25′ in the sides of and extending along the shell. Another member of the leverage device is preferably in the form of a plunger $25^2$ which has telescopic or sliding relation with the member 25, being preferably surrounded by the latter member to be in telescopic relation therewith. The shell 25 has an upper end wall $25^3$. A number of levers are assembled with the members 25, $25^2$, each of these levers being preferably a bar of T shape. The stems $25^4$ of the bars pass through and are movable along the slots 25′. The outer ends of the stems of the bars are engaged by the push button 26. The inner ends of the stems of the bars immediately adjacent the heads $25^5$ of the bars have fulcrum engagement with the depressed portion of the end wall $25^3$ of the shell 25. Each of the bars engages the movable member $25^2$ between the ends of the bars and at places more removed from the places of engagement of the button with the bars than the places of engagement of the bars with the movable member $25^2$ whereby motion and force of the movable member $25^2$ are respectively reduced and increased with respect to the motion of and force applied to the push button, as will readily be understood by an inspection of Figs. 3 and 7. The effective length of each of the T shaped bars is coextensive with the stems of such bars, the T heads serving to retain the bars in place, these T heads passing through openings $25^6$ in the end wall of the member 25. The lighting lever or handle 27 has its hollow hub portion 28 also fixed upon the disc 24′. This hub surrounds the complemental members 25, $25^2$ and the push button, this button passing through an opening formed in the upper side of this hub and having a flange 26′ which is received within said hub and engages the portion of the hub which surrounds the opening through which the button passes.

The switching mechanism which is controlled by the rod 23 is carried at the lower end of a bracket structure 31 which is carried upon the lower end of the stationary steering column 1 by being secured to the gear casing 10. This switching mechanism is inclusive of a lighting switch and a signaling or horn switch. The lighting switch is inclusive of a contact carrier in the form of a disc 32 which is provided within an inverted cup shaped casing 33 that is carried by the brackets 31. A coupling device 34 is secured upon the lower end of the rod 23 and is received at its lower end within a recess formed in the top side of the disc 32, the coupling device being adapted to turn said disc when said rod is turned. A metallic contact plate 35 is fixed upon the bottom side of the disc 32 and is formed with radiating contacting fingers 35′ which are engageable with the metallic contacts 36 that pertain to the different lighting circuits, as indicated in Fig. 9. Said contact plate is constantly engaged by a metallic contact 37 which is located in line with the rod 23. The various contacts 36 and 37 are received within metallic sleeves 38 which are provided with reduced continuations 39 which are rigidly assembled with the insulating disc 40 which is secured to the bottom of the casing 33 to close the same. Said sleeve continuations 39 are interiorly threaded to receive the binding screws 41 which serve to clamp the various circuit wires in place.

The various contacts 36 and 37 are in the form of inverted cups and receive the coiled springs 42 which press upwardly upon these contacts and press such contacts against the disc 32 or against the plate 35 depending upon the location of the contacts and the position of said plate. These springs do not offer objectionable resistance to the turning movement of the handle 27 when the lighting circuits are to be adjusted but do offer too much resistance to the depressions of the button 26 when the signaling or horn circuit is to be closed unless the leverage device of my invention is employed. When said button is depressed, the movement of the member $25^2$ and the rod 23 along the axis of the rod is reduced with respect to similar movement of the push button when the push button is depressed to close the signaling or horn circuit because of the interposition of the levers $25^4$ between the push button and the parts $25^2$, 23.

The force with which the parts $25^2$, 23 is moved is correspondingly increased to offset the heavy pressure of the springs 42 sufficiently to render the operation of the push button easy. The signaling or horn circuit which is controlled by the longitudinal movements of the rod 23 is inclusive of the plate 35 which is permanently grounded through the contact 37 and the battery 43. This circuit is also inclusive of the grounded metallic shell 44 which surrounds the contact 37 and the sleeve 38 containing this contact. This shell 44 is normally out of circuit connection with any of the circuit making and breaking parts within the switch casing, as illustrated most clearly in Fig. 2, this shell being then spaced apart from the plate 35. When the rod 23 is depressed, the plate 35 is brought into contact with the shell 44 to close the signaling or horn circuit. Obviously, this circuit may be closed when the lighting circuits are in any adjustment or condition.

Changes may be made without departing from the invention.

Having thus described my invention, I claim:

1. An electric switch including two complemental contacts, one movable toward and from the other; a push button in actuating relation to the aforesaid movable contact to bring it into engagement with the other contact, there being spring means for separating said movable contact from the other contact upon release of the push button; and a leverage device through which the push button operates upon said movable contact and arranged to respectively reduce the motion and increase the force of said movable contact with respect to the motion of and force applied to the push button.

2. The structure of claim 1 wherein the movable contact laps the contact complemental thereto and the push button is in pushing relation to the movable contact.

3. An electric switch including two complemental contacts, one movable toward and from the other; a push button; two members relatively movable along the line of movement of the button, one being in actuating relation to said movable contact and the other having a guiding formation extending longitudinally thereof; and a bar engaged at one end by the push button and at its other end by the member having the guiding formation, the bar engaging the aforesaid movable member between the ends of the bar and at a place more removed from the place of engagement of the button with the bar than the place of engagement of the bar with the member having the guiding formation, said guiding formation directing the movement of the bar, whereby the motion and force of said movable contact are respectively reduced and increased with respect to the motion of and force applied to the push button.

4. The structure of claim 3 wherein the movable contact laps the contact complemental thereto and the push button is in pushing relation to the movable contact.

5. The structure of claim 3 wherein one of the relatively movable members surrounds the other.

6. The structure of claim 3 wherein one of the relatively movable members surrounds the other and the movable contact laps the contact complemental thereto, the button being in pushing relation to the movable contact.

7. An electric switch including two complemental contacts, one movable toward and from the other; a push button; two members relatively movable along the line of movement of the button, one being in actuating relation to said movable contact; and a lever operable by the push button and in operating relation to the member that is in actuating relation with the movable contact, this lever being fulcrumed on the other of the aforesaid members and at a place enabling the motion and power of said movable contact to be respectively reduced and increased with respect to the motion of and force applied to the push button.

8. The structure of claim 7 wherein the movable contact laps the contact complemental thereto and the member which is in actuating relation to the movable contact is in pushing relation to this contact.

9. The structure of claim 7 wherein the movable contact laps the contact complemental thereto and the member which is in actuating relation to the movable contact is in pushing relation to this contact, one of the relatively movable members surrounding the other.

10. The structure of claim 7 wherein one of the relatively movable members surround the other.

11. The structure of claim 1 which is also inclusive of an additional switch having complemental contacts of which one is rotatable into and out of engagement with the other and an operating lever connected with said rotatable contact for turning it, there being spring means for pressing the contacts of the additional switch together when they are in register, said push button receiving the thrust of said spring means.

12. The structure of claim 1 wherein the movable contact laps the contact complemental thereto and the push button is in pushing relation to the movable contact and which structure is also inclusive of an additional switch having complemental contacts of which one is rotatable into and out of engagement with the other and an operating lever connected with said rotatable contact for turning it, there being spring means for pressing the contacts of the additional switch together when they are in register,

said push button receiving the thrust of said spring means.

13. The structure of claim 3 which is also inclusive of an additional switch having complemental contacts of which one is rotatable into and out of engagement with the other, and an operating lever connected with said rotatable contact for turning it, there being spring means for pressing the contacts of the additional switch together when they are in register, said push button receiving the thrust of said spring means.

14. The structure of claim 3 wherein the movable contact laps the contact complemental thereto and the push button is in pushing relation to the movable contact and which structure is also inclusive of an additional switch having complemental contacts of which one is rotatable into and out of engagement with the other, and an operating lever connected with said rotatable contact for turning it, there being spring means for pressing the contacts of the additional switch together when they are in register, said push button receiving the thrust of said spring means.

15. The structure of claim 3 wherein one of the relatively movable members surrounds the other and which structure is also inclusive of an additional switch having complemental contacts of which one is rotatable into and out of engagement with the other, and an operating lever connected with said rotatable contact for turning it, there being spring means for pressing the contacts of the additional switch together when they are in register, said push button receiving the thrust of said spring means.

16. The structure of claim 3 wherein the movable contact laps the contact complemental thereto and one of the relatively movable members surround the other and which structure is also inclusive of an additional switch having complemental contacts of which one is rotatable into and out of engagement with the other, and an operating lever connected with said rotatable contact for turning it, there being spring means for pressing the contacts of the additional switch together when they are in register, said push button receiving the thrust of said spring means.

17. The structure of claim 7 which is also inclusive of an additional switch having complemental contacts of which one is rotatable into and out of engagement with the other, and an operating lever connected with said rotatable contact for turning it, there being spring means for pressing the contacts of the additional switch together when they are in register, said push button receiving the thrust of said spring means.

18. The structure of claim 7 wherein the movable contact laps the contact complemental thereto and the member which is in actuating relation to the movable contact is in pushing relation to this contact and which structure is also inclusive of an additional switch having complemental contacts of which one is rotatable into and out of engagement with the other, and an operating lever connected with said rotatable contact for turning it, there being spring means for pressing the contacts of the additional switch together when they are in register, said push button receiving the thrust of said spring means.

19. The structure of claim 7 wherein the movable contact laps the contact complemental thereto and the member which is in actuating relation to the movable contact is in pushing relation to this contact, one of the relatively movable members surrounding the other, and which structure is also inclusive of an additional switch having compemental contacts of which one is rotatable into and out of engagement with the other, and an operating lever connected with said rotatable contact for turning it, there being spring means for pressing the contacts of the additional switch together when they are in register, said push button receiving the thrust of said spring means.

20. The structure of claim 7 wherein one of the relatively movable members surrounds the other and which structure is also inclusive of an additional switch having complemental contacts of which one is rotatable into and out of engagement with the other, and an operating lever connected with said rotatable contact for turning it, there being spring means for pressing the contacts of the additional switch together when they are in register, said push button receiving the thrust of said spring means.

In witness whereof, I hereunto subscribe my name.

HARRY A. DOUGLAS.