

Sept. 29, 1925.

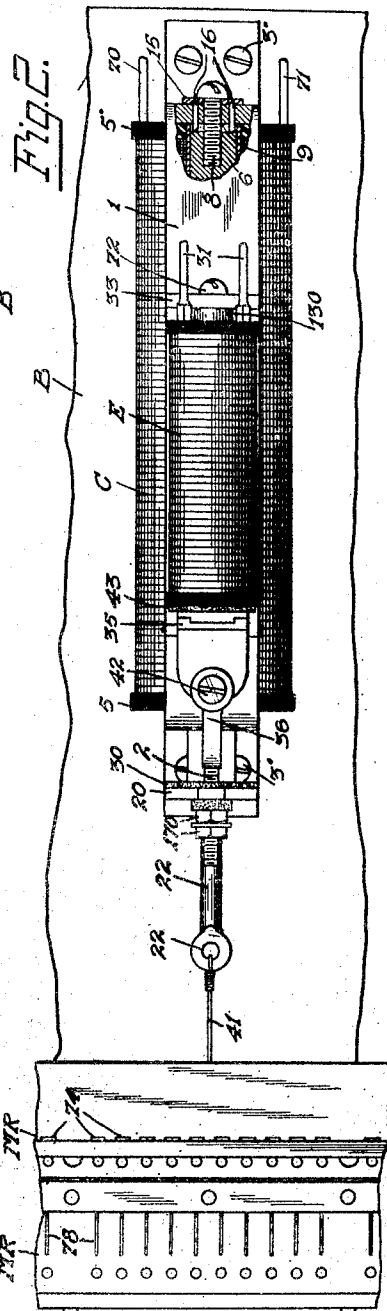
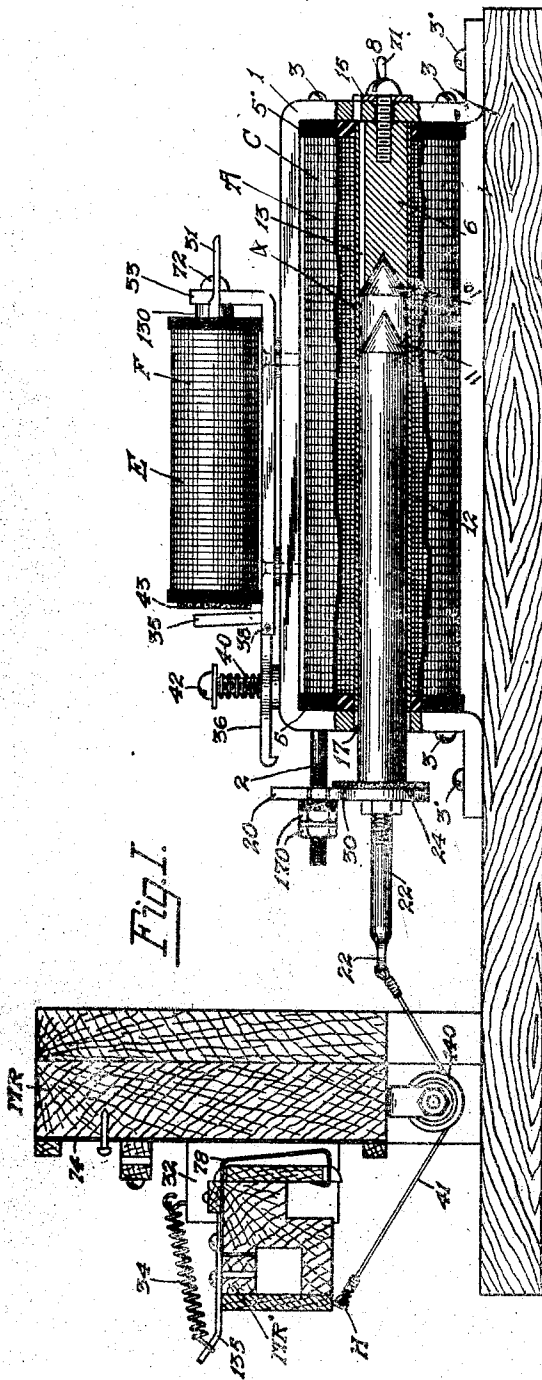
M. B. STAZAK

1,555,443

SWITCH

Filed Jan. 14, 1921

2 Sheets-Sheet 1



Inventor:  
Michael B. Stazak  
By Curtis S. Camp.  
Attorney

Sept. 29, 1925.

M. B. STAZAK

1,555,443

SWITCH

Filed Jan. 14, 1921

2 Sheets-Sheet 2

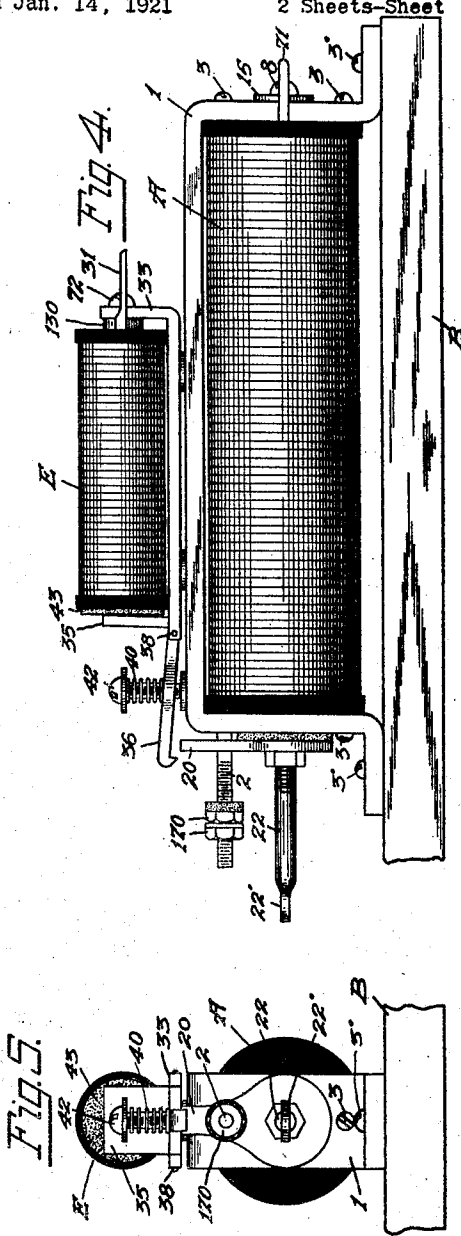
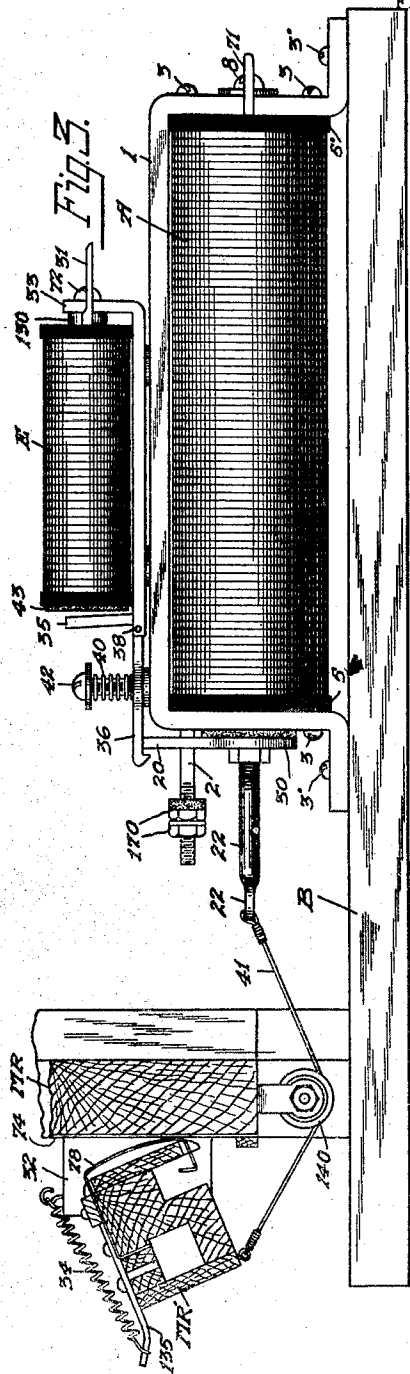
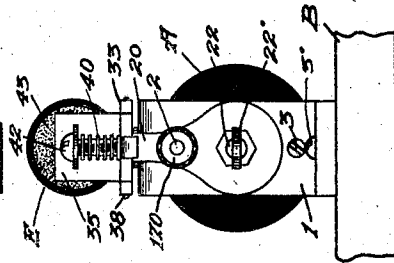


Fig. 5.



## UNITED STATES PATENT OFFICE.

MICHAEL B. STAZAK, OF CHICAGO, ILLINOIS, ASSIGNOR TO KELLOGG SWITCHBOARD AND SUPPLY COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

## SWITCH.

Application filed January 14, 1921. Serial No. 437,181.

*To all whom it may concern:*

Be it known that I, MICHAEL B. STAZAK, a citizen of the United States of America, and residing in Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Switches, of which the following is a description.

My invention has to do with a switch of the type operated by a solenoid magnet such as is used in connection with a group of contacts for electrically operated organs, and which contacts are closed simultaneously when the solenoid magnet is operated. Associated with the solenoid magnet is a relay provided with a latching armature, used in connection with the said solenoid magnet for the purpose of releasing said contacts when they have been closed by the magnet so that they are allowed to reopen.

For this specification and description of my invention I have shown my invention in connection with a group of contacts as used in electrically operated organs, but my invention may be used for making contacts in other kinds of apparatus, as will be readily seen and understood from reading the following detail description.

For a more complete understanding of my invention reference may be had to the accompanying drawings, in which like reference characters in the several views denote like parts, and in which

Fig. 1 is a side elevation of the switch of my invention, illustrating it in operative association with a movable contact carrying rack and its associated contacts;

Fig. 2 is a plan view of the switch of Fig. 1;

Fig. 3 is a view similar to Fig. 1, but showing the switch in its operated locked position and illustrating the contacts of the pivoted rack when in engagement with their associated stationary contacts;

Fig. 4 is a view similar to Fig. 3, but showing the latching armature in its attracted position to permit the restoration of the solenoid latching plate and pivoted contact carrying rack and of the solenoid; and

Fig. 5 is an end view of the solenoid and magnet.

As thus illustrated in the several views, my invention comprises a solenoid magnet A, which is provided with a U-shaped iron 1,

to the legs of which the solenoid magnet A is suitably fastened by means of screws 3. The said iron 1 is also provided with a guiding member 2, the use of which will be hereinafter described. The switch is securely fastened to a base B by the screws 3'.

The solenoid magnet A comprises an energizing winding C wound upon a suitable tube between the spool heads 5 and 5', 70 and 71 being the terminals for the energizing winding C of the solenoid magnet A. A core 6 is provided for the solenoid magnet A and is of a size to permit its insertion in the tube. To prevent the rotation of the core 6 in the tube, the end of said core 6 is provided with a transverse slot 9 and a washer 15 provided with a pair of pins 16 which pass through suitable openings in the leg of the iron and extend therethrough and enter the said slot. A screw 8 passes through suitable orifices in the washer 15 and leg of the iron 1 and has screw-threaded engagement with a suitably tapped orifice in the thread of the core 6. The screw 8 thus holds the core 6 in position in the tube, and the pins 16 of washer 15 in association with the slot 9 in the end of the core 6 to prevent the said core from rotating.

The plunger 12 is of a size for permitting its insertion into the tube and is free to move in and out of the latter, and a suitable opening 17 in the leg of the iron 1 permits the insertion of the plunger 12 in the tube 4. The plunger end is cone-shaped, and the core 6 is provided with a conical shaped opening for receiving the plunger 12 when the same is drawn inwardly upon the energization of the solenoid magnet A. The other end of the plunger 12 is reduced and has secured thereto a latching plate 20 by means of a drive fit, said latching plate having an opening for receiving the guiding member 2. A threaded opening in the plunger is also provided for receiving a threaded arm 22, its end being provided with an eye 22'. A felt washer 30 is also provided which is slipped over the plunger 12 and engages the face 24 of the latching plate 20, preventing the said plate 20 from coming in contact with the leg of the heel iron, thus giving a silent action when the plunger end is drawn into engagement with the core 6. A groove 13 is provided on the circumferential face of the core 6, which groove is in alignment with

suitable openings in the leg of the iron 1 and washer 15. This alignment is permanently secured by means of the pins 16 which engage the transverse slot 9 as hereinbefore described, and permits air to escape when the plunger 12 is drawn to the core 6 upon the energization of the solenoid magnet A, thus preventing the formation of an air cushion between the core 6 and plunger 12.

The release relay E operatively associated with the solenoid magnet A, may comprise the usual core, energizing winding F and terminals 31, the winding F and core being suitably mounted upon a heel iron 33 by means of the screw 72. The release relay E is securely mounted in a suitable position upon the heel iron 1 of the solenoid magnet. An armature 35 is provided for the relay E and is pivotally supported between the extending portions of the heel iron 33 by means of a pivot pin 38. The angular extension 36 of the armature 35 is provided with a latching hook integrally formed therewith, for engaging the latching plate 20 which is secured to the plunger 12. A spiral tension spring 40 is provided which rests upon the upper face of the extension 36 and held in place by an adjustable machine screw 42 which extends through a suitable opening in the extension 36 and engages a suitably tapped orifice in the iron 1. A felt washer 43 is securely fastened to the face of the spool head and this prevents the armature 35 from coming in direct contact with the iron core 130, thus giving a silent action when the relay E is energized and the armature 35 is attracted. The lock nuts 170 on the screw-threaded guide member 2 serve as adjustable means to limit the back stroke of the solenoid plunger.

I will give only such brief description of the mounting contact rack as will be necessary for a clear understanding of its relation to the solenoid magnet A.

An upright contact mounting rack MR is provided with a plurality of vertical contact strips 74 suitably mounted. Another contact mounting rack MR' having a plurality of spring contacts 78 (made of phosphor bronze wire or some other similar material) is securely mounted to it and arranged in alignment to make contact with strips 74, respectively. The contact rack MR' is pivotally supported upon block 32. A spring 34 is provided for holding the rack MR' in its normal position, having its one end secured to an arm 135 secured to the rack MR' and having its other end secured to a hook on the block 32.

A suitable grooved pulley or wheel 140 is secured to the bottom of the mounting rack MR and a wire or cord 41, for operatively associating the pivoted rack MR' with the solenoid magnet A, has one end secured to a hook H fastened to the rack MR', passes

over the pulley 140 and has its other end secured to the eye 22' of the arm 22 of the solenoid magnet A.

The operation of the various parts described above will be more clearly understood from the following explanation:

The energizing winding of the solenoid magnet A is suitably connected to a restoring circuit closing switch located on the key shelf of the organ, said switch being under the immediate control of the organist. The winding of the release relay is likewise connected to a restoring circuit closing switch located on the key shelf of the organ and controlled by the organist. When the circuit controlling switch controlling the winding of the solenoid magnet is operated, current flows through the said energizing winding, causing the plunger 12 to be moved towards the core 6, and its point 11 engages the cone-shaped opening 10 in the core 6. The mounting rack MR' being connected to the plunger 12 by the cord 41, is rocked about its pivot, and this movement forces the spring wire contacts 78 into engagement with their respective contact strips 74.

The latching plate 20, which is securely mounted to the plunger 12, rides along on the guiding member 2 and engages the latching hook of the extension 36, pressing it upward against the tension of the spring 40, until the latching plate 20 moves beyond the latching hook when the spring 40 forces the extension 36 downward and locks the latching plate in the position as shown in Fig. 3. The plunger 12 will remain in its locked position and contact rack MR' will remain in its rocked engaging position until the organist operates the circuit closing switch which is connected with the release relay E, permitting current to flow through the energizing winding of relay E and causing the attraction of its armature 35. The armature being attracted, the extension 36 is raised upward until the latching hook clears the edge of the latching plate 20, and when in this position, as shown in Fig. 4, the plunger 12 and rack MR' restore to their normal position by the action of the tension of spring 34. The return of the contact rack MR' to its normal position breaks the contact connection between the wire spring contacts 78 and contact strips 74.

The parts all being returned to their normal position, will remain so until the solenoid magnet is energized, which will repeat the action as hereinabove described.

In illustrating my invention, I have chosen an embodiment worked out for commercial purposes, but it will be obvious to those skilled in the art that minor changes may be made without departing from the spirit of my invention, and I, therefore, do not desire to be limited to the exact structure shown, but aim to cover all such changes

and modifications which come within the spirit and scope of the appended claims.

What I claim as new and desire to secure by United States Letters Patent, is:

- 5 1. A device of the character described including a plunger, a solenoid energizable to cause the incursion of said plunger, a member secured to the free end of said plunger, a latching member provided with an opening  
10 secured on the free end of said plunger, an electromagnet mounted on said solenoid, a locking member integrally formed with the armature of said electromagnet for engaging said latching plate to lock said  
15 plunger in its incursionary position, a guiding member secured to said solenoid and adapted to engage and extend through the opening in said latching plate for guiding said latching plate in its travel to insure en-  
20 gagement of said latching plate and said locking member, a plurality of movable contact makers, stationary contacts operatively associated with said movable contact  
25 makers, but normally retained out of contactual engagement therewith, means for operatively connecting said movable contact makers with said plungers via said member  
30 secured to said plunger, said solenoid being energizable to effect the incursion of said plunger and the engagement of said latching plate and locking member, whereby said  
movable contact makers are moved into en-  
35 gagement with said stationary contacts and locked therein by the engagement of said locking member and latching plate, said  
electromagnet being energizable to release said latching plate to permit said movable  
40 contact makers and plunger to restore to normal.
2. A device of the character described including a solenoid, a plunger for said solenoid, a latching plate secured to one end of  
45 said plunger, an electromagnet mounted upon said solenoid, a locking member integrally formed with the armature of said electromagnet and adapted to engage said  
latching plate when said solenoid is energized, a guiding member secured to said

solenoid for engaging said latching plate to guide said latching plate relative to said  
locking member, a multiplicity of circuit  
controlling contacts on a pivotally support-  
ed carrier, means for connecting said carrier  
and said plunger to cause said carrier to ro-  
tate upon the energization of said solenoid,  
55 and means including a coil spring for normally maintaining said locking member in its locked position.

3. A switching device comprising a solenoid having an associated plunger, electrical  
60 contacts operable on movement of the plunger, a guide having an opening fastened to the plunger, a stationary member secured to said solenoid parallel with the plunger  
for extending through said opening to di-  
65 rect the guide and the plunger in their travel, adjustable means on said member to limit the excursion of said plunger, an electromagnet adjacent said solenoid, a catch  
integrally formed with the armature of said  
70 electromagnet and pivotally supported for engaging the guide when the solenoid energizes, said electromagnet adapted when energized to release said catch, and spring  
75 means for restoring said plunger to normal.

4. A solenoid actuated plunger having a guide member rigid with the free plunger  
end and extending at an angle with the di-  
80 rection of said plunger's travel, said guide member being provided with an opening, a stationary member secured to said solenoid and adapted to extend through said opening  
to direct the travel of said guide member,  
means secured on said stationary member for  
adjusting the normal relation of the guide  
85 member to the stationary member, a pivotally supported catch to engage said guide to hold the plunger in its incursionary position, and an electromagnet to release the  
catch, said catch being integrally formed  
90 with the armature of said electromagnet.

Signed by me at Chicago, in the county of Cook and State of Illinois, this 11 day of January, 1921.

MICHAEL B. STAZAK.