Jan. 19, 1954 L. PELLETIER ET AL 2,666,822

STOP SWITCH

Filed Oct. 15, 1952

FIG. 1

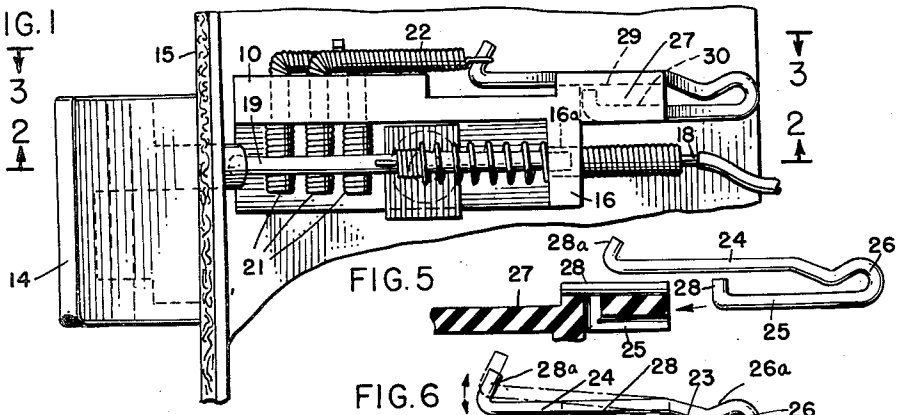


FIG. 5

FIG. 6

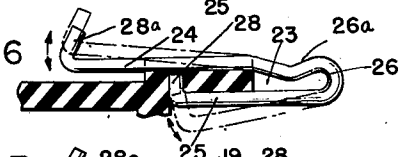


FIG. 2

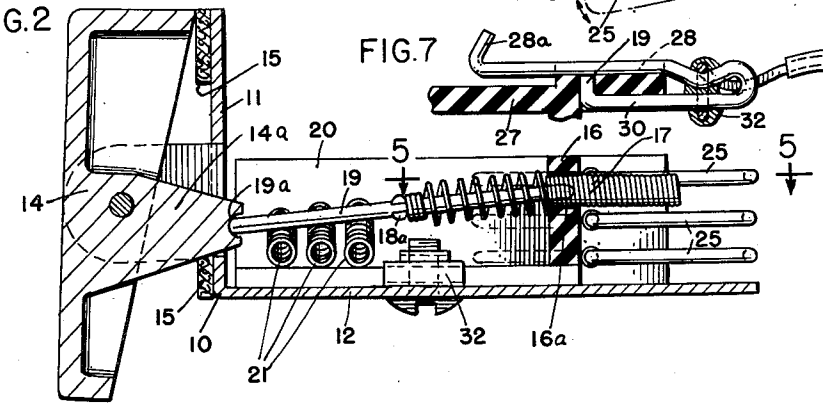


FIG. 7

FIG. 3

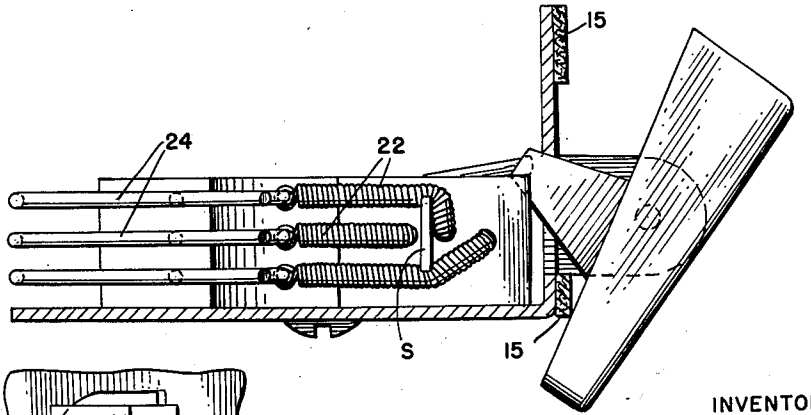
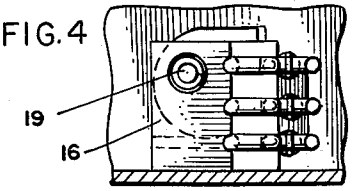


FIG. 4



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STOP SWITCH

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3 Claims. (Cl. 200—67)

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This invention relates to electric switches and particularly to switches for use in connection with electric organs of the class employing tone signal generators respectively producing audible tone signals at the frequencies of different notes of a musical scale, an essential feature of the invention residing in the provision of new and novel means actuable by a tiltable tablet for impressing upon a signal output circuit a waveform which is the sum of a given number of harmonically related frequencies.

In organ nomenclature, such devices are known as "stops" and are indicative of various combinations or mixtures of tone frequencies. Sometimes, these are referred to as "couplers," which, when drawn will determine whether the sound is the combination of octavely related frequencies or the resultant of some predetermined mixture of frequencies in which the separate frequencies are not necessarily octavely related. The term "stop" as used herein, shall therefore be construed to mean a device which includes an electric switch adapted to be connected in an electrical network to impress upon the input circuit of an electroacoustical translating mechanism any predetermined waveform which is to be converted into audible sound for musical expression when the playing-keys of a keyboard are played.

An important object of the invention is the simplicity and reliability of an inexpensive device of this nature and the combination of the herein disclosed coactive elements which enables one or more circuits to be made or broken as and when desired and whereby, when a circuit is made to insure a good electrical engagement of the coactive elements.

A further object is the provision of a terminal connector which, when attached to a signal input lead and connected to the body portion of the switch cannot be accidentally disconnected when pull is applied to the lead, and whereby and when the lead is soldered to the connector, the latter is virtually locked to the body portion of said switch.

A preferred embodiment of the invention is disclosed for the purpose of illustration and description, and is shown in the accompanying drawings, wherein:

Figure 1 is a view in top plan of the device;

Figure 2 is a longitudinal section taken on the line 2—2 of Figure 1;

Figure 3 is a view similar to Figure 1 and taken on the line 3—3 of Figure 1 and looking at the opposite side of the switch;

Figure 4 is a view in end elevation of the switch;

Figure 5 is a view partly in section and partly in elevation showing the terminal connector before application thereof to the body portion of the switch and taken about on the line 5—5 of Figure 2;

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Figure 6 is a view similar to Figure 5 showing the connector applied to the body portion of the switch but before attaching the lead wire thereto, and

Figure 7 is a view similar to Figure 5 showing the terminal connector fully applied and the wire lead soldered thereto in such manner as to hold the connector more or less permanently attached to the body portion of the switch.

In carrying the invention into practice, 10 represents a substantially L-shaped frame having a vertical flange 11 and a horizontal flange 12. Tiltably mounted on the vertical flange 11 is a tablet 14 whose axis is horizontal so that the tablet is free to tilt respectively towards and away from the flange 11. To suppress any metallic noise when manipulating the tablet, said flange 11 is faced with strip felt 15 against which the tablet will contact as it is pivoted from one possible angle of adjustment to the other.

Fixedly mounted on the flange 12 is the body portion of the coactive elements of our improved switch. This portion is formed of any well known, hard insulating material. Said portion includes an integral branch 16 which is vertically disposed, and, as shown, said branch is formed with a horizontal hole 16a through which a coil spring 17 passes with a snug fit of the spring in said hole. Attached by solder to the spring is a signal output lead 18 which may be connected in an electrical network wherein means are provided for amplifying the output signal voltage and translating same into audible sounds for musical expression. A musical instrument with which the switch may be used so as to function in the manner just stated is disclosed in the Larsen Patent No. 2,403,090 of July 2, 1946. The forward end of said spring is drawn out axially of the spring so as to space the wound portions of the spring apart from each other and, as shown, the extreme front wound portions of the spring are reduced and arranged in close confinement with the flattened portion 18a of a rigid metal rod 19 which passes through the spring and whose rear end is coaxial relative to said hole 16a. Forwardly of the front end of said spring, the rod 19 projects toward the inner face of the tablet 14 and extends at a downward angle and has its forward extremity seated in a recess 19a in a camming lug 14a which projects rearwardly from said inner face of said tablet in a plane slightly lower than on a line with the supporting axis of said tablet. Thus, it is appreciated that the hole 16a is at a higher elevation than the front end of said rod. In this manner and by virtue of the resiliency of said spring 17, there is, so to speak, a toggle action of the rod, such that when the tablet is tilted in one possible direction, the rod will tilt upwardly, whereas, when the tablet is tilted in the opposite direction, the rod will move downwardly with the back end of the rod functioning fulcrum-like within the rearmost end

of said spring or specifically the portion of the spring which is embraced by the walls of said hole 16. It is to be understood that the inner diameter of the spring at said hole is less than the outside diameter of said rod in order that there will be necessary freedom of rocking motion of the rod in response to actuation of said tablet 14.

Extending through a longitudinally disposed, vertical flange 20 of said body portion of the switch are three closely wound coil springs 21 which are spaced apart from each other and disposed so as to provide a slightly forwardly inclined row of springs, each of which constitutes an electrical contact element. By this arrangement of said contact springs, it manifestly follows that they are in the path of movement of said rod 19 and can be simultaneously engaged with said rod or similarly disengaged therefrom according as the tablet is tilted in one direction or the other about its supporting axis. To this point and assuming that the rod is connected in an electrical network in which signals are to be translated into audible sounds, it follows that if each of said springs is connected to a signal supply source, signals from harmonically related sources will be impressed on said rod and in turn, impressed on the input circuit of said network.

Each of said springs 21 has an extension 22 with which there is a terminal connector 23. As these connectors are the same in all essential respects, a description of one will suffice for all. Reference should therefore be had to Figures 5, 6 and 7 for the details of construction of each individual connector. At Figure 5, it is noted that the connector consists of a single piece of heavy gauge spring wire, bent on itself to provide a long leg 24 and a short leg 25, the latter and the former connected together by a loop 26. Formed in the lug 27 of said body portion of the switch is a hole 28. Formed on the free end of the short leg 25 is an offset portion 29. Formed on the free end of the long leg 23*a* is an angular hook-like extension to which the branch 22 of a respective contact spring 21 is attached. As shown at Figure 6, the terminal connector straddles the lug 27 with a part of the long leg seated in a groove 29 in one face of the lug. At the opposite side of the lug the short leg is received in a similar groove and the offset portion 19 is received in the hole 28. Under the normal spring urge of the connector, the legs 24 and 25 tend to spring towards each other and to be retained in their respective grooves 29 and 30. When the connector is applied as shown at Figure 6, a signal input wire 31 is soldered at 32 to the loop end of the connector and by this soldered connection, the legs 24 and 25 are prevented from becoming dislodged from their intended positions should any great pull be applied to the lead wire 31. In this manner, the connector is firmly attached to the body portion of the switch and the coactive element of the switch maintained in coactive relationship.

The switch may be attached to the horizontal flange 12 in any well known manner, preferably by bolting same thereto as at 32. To give added resiliency to the loop 26, the leg 24 is bent inwardly at 25*a* towards the leg 25.

From the above description, it is noted that the herein disclosed multiple contact switch is exceedingly strong and durable; that the various elements that comprise it are each and all of them of a rugged nature capable of withstanding considerable hard usage, and that by reason of the niceties of construction and the relationship of the parts, the switch is positive acting, and such that when harmonically related input signal voltages are applied to the spring contactors 21, said voltages will be effectively impressed on the conductive rod 19 and conducted to the network where they are to be utilized for the production of audible sounds.

As shown at Figure 3, the branches 22 of the springs 21 are in parallel spaced apart relation. Three springs are shown, the outmost ones of the set being extended over a spacer S of the hard insulating member so as to prevent the springs from engaging each other.

What we claim as our invention is:

1. In an electric switch, a contact element, a member of hard insulating material supporting said contact member, said member having a portion formed at its opposite sides with horizontally disposed grooves and a transverse hole communicating with one of said grooves, and a terminal connector comprising a single piece of spring wire bent on itself to provide a long leg and a short leg, the latter disposed in parallel relation to the former, between which said legs, said portion of the aforementioned member is received, said legs being respectively accommodated in part in the respective grooves and one of said legs having an offset extremity which extends into said hole and the other of said legs having means thereon for attachment thereto of a contact element.

2. A switch according to claim 1, wherein the two legs of said connector are connected together by a loop to which a signal conductor is adapted to be attached and soldered to secure the conductor to the connector and to prevent relative separation of said legs and disconnection of the connector from said member when pull is applied to said connector at said loop.

3. An electric switch comprising a frame having a manually actuable member which is tiltable about a horizontal axis, said member having a lug situated below the aforementioned horizontal axis, means of hard insulating material rigidly supported by said frame, an electrical conductor of resilient material supported by said insulating means at a point above the plane of said horizontal axis, a rigid rod of conductive material fulcrumed at one end and electrically connected to said conductor and having its opposite end seated in the recess of the aforementioned lug, said means of resilient material being formed and adapted to exert a yielding force against said rod tending to tilt the rod in one direction and to also tilt said manually actuable means to one of two possible conditions of adjustment, and a resilient contact device supported by said means of insulating material and disposed respectively to engage and disengage said electrical conductor in response to actuation of said manually actuable member, said contact device being flexible in a vertical plane so as to be flexed and to have rubbing engagement with said rod.

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