

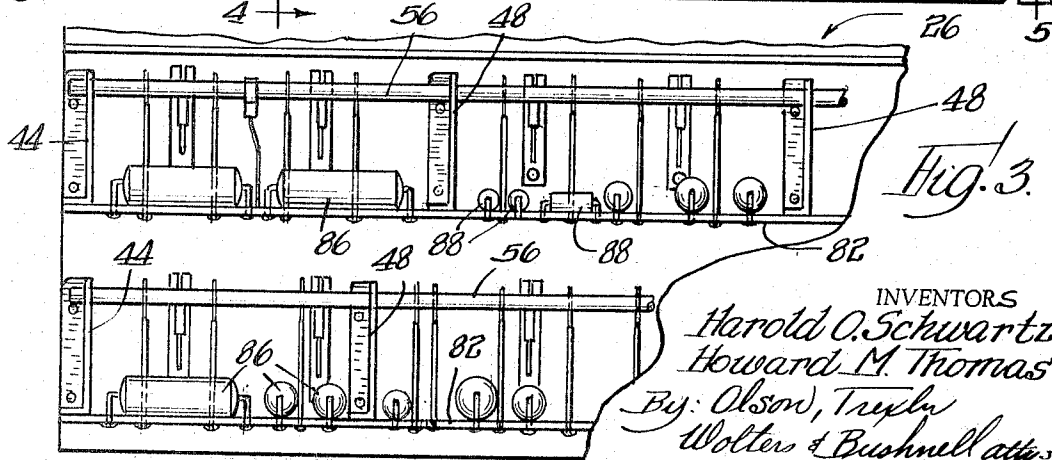
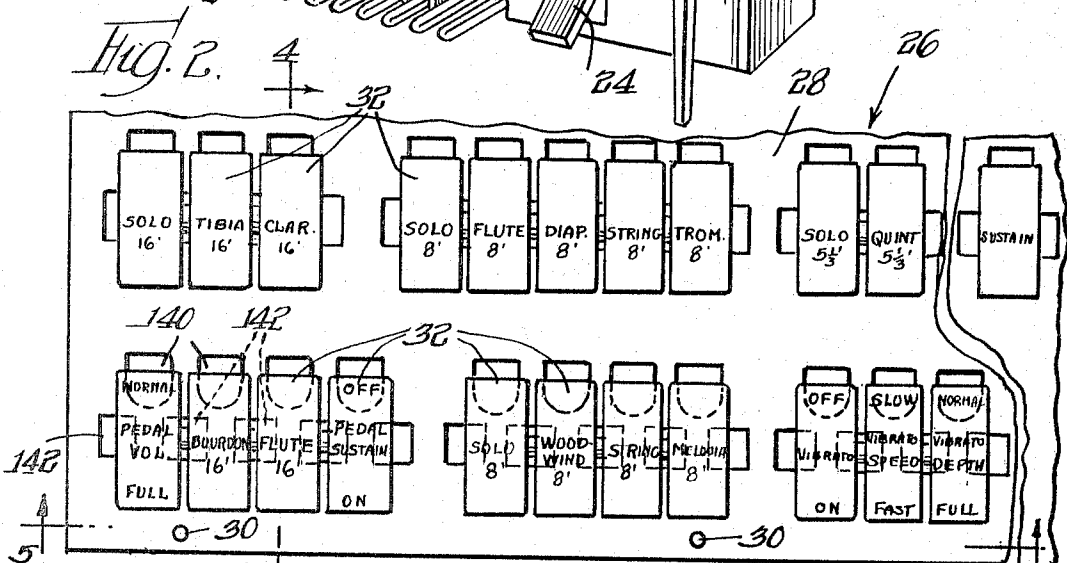
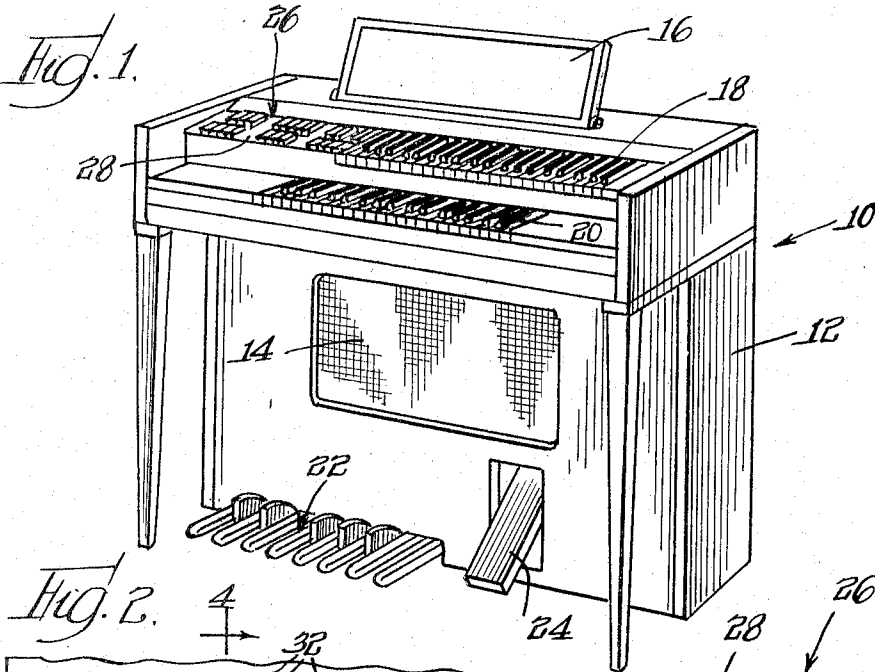
May 2, 1967

H. O. SCHWARTZ ETAL
STOP TABLET AND FILTER ASSEMBLY WITH IMPROVED
SEPARABLE RESILIENT POSITIONING MEANS

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2 Sheets-Sheet 1



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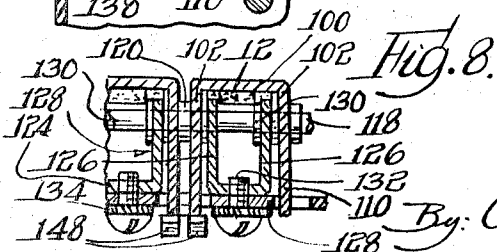
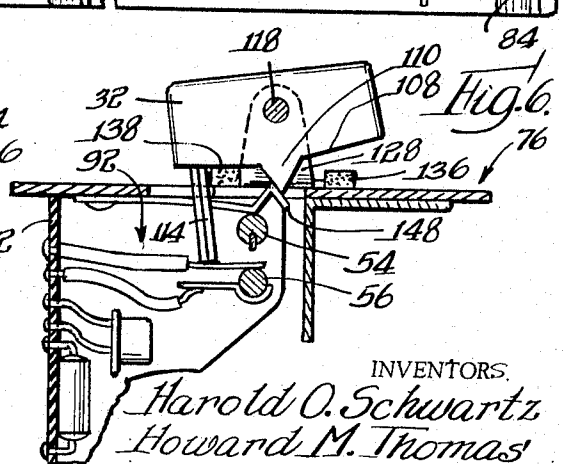
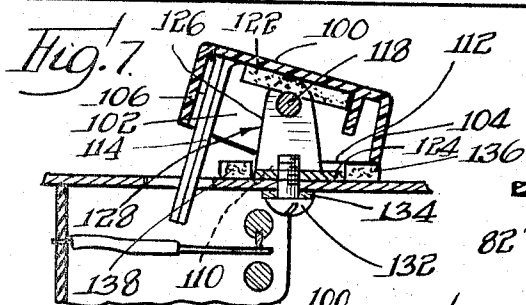
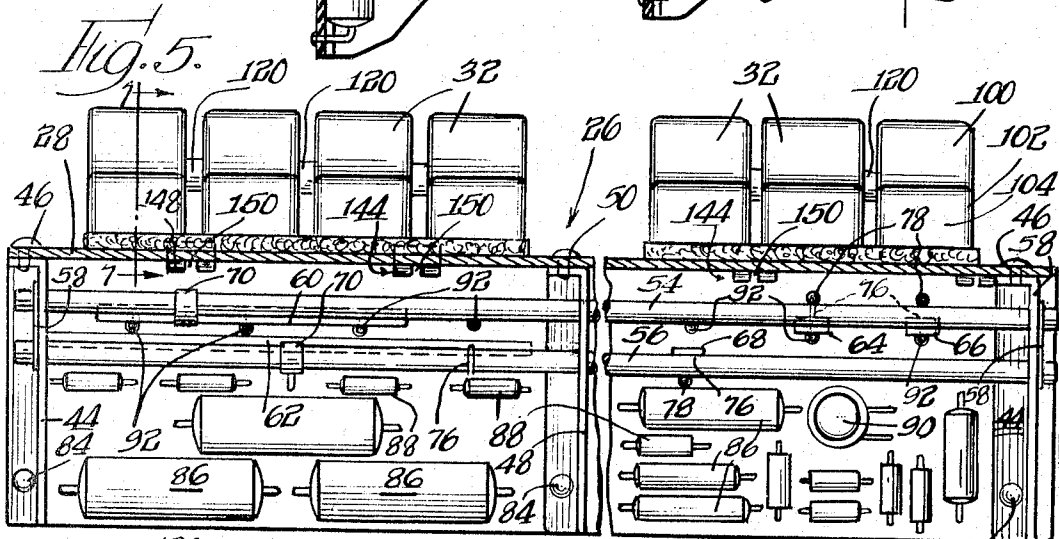
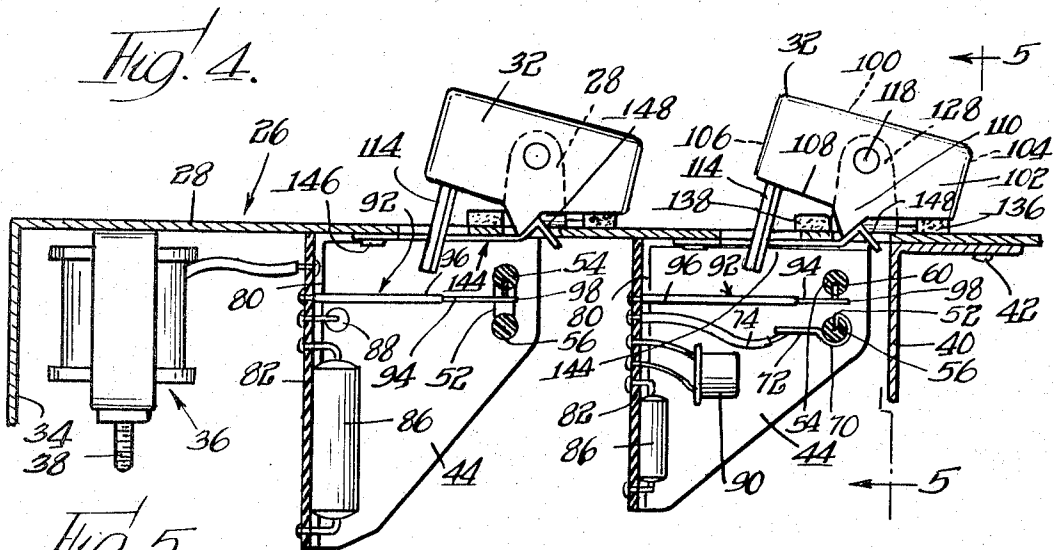
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STOP TABLET AND FILTER ASSEMBLY WITH IMPROVED SEPARABLE RESILIENT POSITIONING MEANS

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 10 Claims. (Cl. 200—6)

This invention relates to the electronic musical arts, and more particularly to a stop tablet and filter rail assembly for an electronic organ.

Electronic organs are now well known in the art. The most satisfactory of these instruments generally produce electronic oscillations which are rich in harmonics, and various filters are utilized for selecting desired harmonic structures in order to simulate the common stops of a pipe organ. Stop tablets and filters for this purpose are well known, and heretofore, they have required rather considerable hand wiring and adjustment, all of which has added unduly to the cost of electronic organs.

Accordingly, it is an object of this invention to provide a stop tablet and filter assembly which is simpler and more economical to fabricate than any heretofore known in the art.

More particularly, it is an object of this invention to provide a stop tablet and filter assembly requiring no individual hand adjustment for the parts after installation.

It is further an object of this invention to provide a stop tablet and filter assembly which is fabricated as a plurality of sub assemblies, each readily handled separately and mounted on a common mounting base with great facility.

Furthermore, it is an object of this invention to provide a stop tablet and filter assembly for an electronic organ wherein stop tablets and resilient position retaining means therefor are separately mounted, yet require no adjustment after assembly.

It is another object of this invention to provide improved stop tablets in which actuators cooperable with switch contacts are fabricated integral with stop tablets.

Still another object of this invention is to provide a stop tablet and filter assembly utilizing printed circuits wherein movable switch contacts are assembled direct with the printed circuits.

Other and further objects and advantages of the present invention will be apparent from the following description when taken in connection with the accompanying drawings wherein:

FIG. 1 is a perspective view of an electronic organ constructed in accordance with the principles of the present invention;

FIG. 2 is a fragmentary plan view of a stop tablet and filter assembly constructed in accordance with the present invention;

FIG. 3 is an upwardly directed horizontal view taken from beneath the stop tablet and filter assembly of FIG. 2, and also of a fragmentary nature;

FIG. 4 is a cross sectional view on an enlarged scale taken along the line 4—4 in FIG. 2;

FIG. 5 is a view partially in section taken at right angles to FIG. 4, and specifically along the line 5—5 in FIG. 2 and in FIG. 4;

FIG. 6 is a cross sectional view similar to a portion of FIG. 4, but showing the parts in a different position of operation;

FIG. 7 is a cross sectional view through a stop tablet taken along the line 7—7 in FIG. 5; and

FIG. 8 is a cross sectional view along the line 8—8 in FIG. 7.

Referring now in greater particularity to the drawings,

and first to FIG. 1, there is shown an electronic organ 10 constructed in accordance with the principles of the invention. The organ includes a housing or case 12 of more or less conventional design, having a loud-speaker grille 14 therein with one or more loud-speakers housed behind it. The organ is provided with a music rack 16, and with an upper manual or keyboard 18, and a lower manual or keyboard 20. The organ further has a pedal board or plurality of pedals 22, and a swell pedal 24.

In addition to the foregoing, the organ is provided with a stop tablet and filter assembly or unit 26 disposed immediately to the left of the upper manual 18, and substantially on a common plane therewith. This assembly or unit comprises a panel 28 provided with suitable apertures 30 FIG. 2 for receipt of screws to mount the panel on supporting parts of the organ housing 12. A plurality of stop tablets 32 is pivotally mounted on the panel 28, and since these stop tablets are clearly labeled in FIG. 2 as to their individual function, further identification of the individual tablets is thought to be unnecessary.

It will be seen in FIG. 4 that the back edge of the panel 28 is provided with a downturned flange 34 to render the panel more rigid. Immediately adjacent this flange there is mounted a plurality of inductances 36, spaced across the width of the panel. These inductances form parts of filter circuits, and preferably are adjustable by means of screws 38 accessible through apertures (not shown) in the top of the panel, the screw heads projecting to about the level of the panel. The rear portion of the panel, as will be understood, is hidden below the upper portion of the organ housing or case 12.

A reinforcing angle member 40 extends across the underside of the front edge of the panel to reinforce the same, and is secured in place by screws 42.

At the opposite sides or ends of the panel there are provided pairs of sheet metal brackets 44 secured to the underside of the panel by means of screws 46 (FIG. 5). Between each pair of end brackets 44 there is provided a pair of intermediate brackets 48 of like shape, held in place by screws 50 extending through the panel 28 and threaded into the peripheral flanges of the brackets.

The brackets 44 are provided adjacent their top front edges with slots 52 having circular end portions with restricted interconnecting vertical central sections. Each slot is more or less in the form of two key holes with the narrow portions forming continuations of one another. Elongated insulating rods 54 and 56 are mounted in these slots in vertically spaced relation to one another. Although the specific construction of these rods is not critical relative to the present invention, satisfactory rods have been constructed of fiberglass reinforced plastic. The insulating rods 54 and 56 are retained in the circular portions of the slots 52, and are too large to move into the restricted portions. Metallic clips 58 are secured to the rods at the ends thereof to hold them against movement longitudinally of their axes.

The rods are provided with conductive inserts as best seen in FIGS. 4 and 5. Some of these inserts are elongated in nature as the inserts 60 and 62, while others of the inserts are of rather short length, as the inserts 64, 66, and 68. Metallic clips 70 encircle the elongated inserts 60 and 62 and are provided with tabs 72 for the soldering of wires 74 to make electrical connection with the inserts. As will be understood, the clips are soldered to the conductive inserts. In addition, C-shaped clips 76 also encircle the inserts to help to hold them in place.

Each of the short conductive inserts 64, 66, and 68 is provided with a conductive extension 76 extending diametrically through the insulating rod 54 or 56, for a solder connection 78 at the other side of the rod.

Each of the brackets 44, 48 is provided with vertical

flanges 80 along the rear edges thereof, and printed circuit boards 82 are secured to these flanges by fasteners 84, such as screws or snap fasteners. The printed circuit boards are provided with additional components forming with the inductances 36 portions of filter circuits. Such components include, by way of example, capacitors 86, resistors 88, and one or more transistors 90. As is well known in the art, the printed circuit boards comprise insulating bases with conductive areas thereon. The specific electrical connections between the inductances 36, capacitors 86, resistors 88, and transistors 90 is not critical to the present invention, and hence are not discussed herein.

In addition, each printed circuit board 82 is provided with a row of horizontally disposed, horizontally spaced flexible switch contacts 92 extending at right angles from the board. Each such switch contact includes a shank 94 of resilient electrically conductive material, such as beryllium copper having an insulating plastic sleeve 96 over a portion thereof, and having a welded-on contact element 98 at the outer end thereof, preferably of a precious metal, such as silver or an alloy thereof. However, as will be understood, the entire shank and tip could be a single portion. The contact elements 98 of the flexible contacts 92 are disposed between the pairs of insulating rods 54 and 56, and normally are positioned so as to engage either the upper rod 54 or one of the conductive inserts therein. The flexible contacts are designed and intended for deflection vertically downwards, and upon such deflection the contact elements or tips 98 are brought into engagement with the underlying lower rods 56 or conductive inserts therein. For example, with reference to FIG. 5, the three left-most flexible contacts 92 normally engage the upper inserts 60, and are deflectable downwards into engagement with the lower insert 62. The contact 92 which is fourth from the left normally engages the upper insulating rod 54, and is deflectible downwards into engagement with the lower insert 62.

The two right most contacts 92 respectively normally engage the inserts 64 and 66, and are deflectible from engagement with these inserts into engagement with the insulating rod 56, while the situation is substantially reversed with regard to the third contact 92 from the right, this contact normally being in engagement with the upper insulating rod 54 and deflectible downwards into engagement with the insert 68. As will be understood, whether the contacts are up or down determines which of the various circuit components including the inductances, capacitors, resistors and transistors are connected or simply through connected in order to produce the requisite tone filtering.

Each of the flexible contacts 92 is interconnected with the other circuit components of the printed circuit board, and the particular connections thereof are not critical to the present invention. Furthermore, each of the resilient contacts is arranged to be deflected by one of the stop tablets 32, as best will be understood with reference to FIGS. 4-8.

Each stop tablet 32 includes an inverted, hollow box-like body comprising a top wall 100, depending side walls 102, a front end wall 104 and a rear end wall 106. The side walls have a bottom edge 108 with a wedge-like projection 110 substantially at the center thereof. A transverse reinforcing flange 112 extends between the side walls 102, somewhat rearwardly of the front end wall 104. In addition, there is an integral, depending actuator 114 joined to the rear wall 106 and the top wall 100. This actuator is of generally flat construction, having a central longitudinally extending reinforcing rib 116.

The side walls 102 of all of the stop tablets are apertured, and a pivot rod 118 extends through such apertures. The stop tablets, as will be understood, are molded of a suitable plastic, and all of the stop tablets on a pivot rod 118 are spaced apart by plastic washers 120

interposed between them. Such washers preferably are of a plastic having low frictional characteristics. In addition, as may be seen in FIGS. 7 and 8, each stop tablet has a strip of felt 122 trapped between the top wall 100, and the pivot rod 118, to aid in noise reduction and in holding a stop tablet wherever set.

As will be observed in FIG. 2, there may be anywhere from one to five stop tablets on a single pivot shaft. The mounting of the pivot shaft is by means of a bracket at each end thereof, or a single bracket in the case of a single stop tablet. The brackets are shown in FIGS. 7 and 8, and each is of U-shaped outline, having a bight 124 and a pair of side arms or flanges 126, the entire bracket being identified by the numeral 128. C-shaped washers 130 are received against one of the bracket legs 126 of each bracket and received in annular grooves in the pivot shaft 118, whereby to hold the pivot shaft against longitudinal movement. Screws 132 having lock washers 134 thereon are passed through the panel 28 and threaded into respective apertures in the bights 124 of the brackets 128 to mount the assembly of brackets, pivot shafts, and stop tablets.

As will be seen in FIGS. 4, 5, and 6, strips of felt 136 and 138 are provided under the front and rear ends of the stop tablets to keep noise down.

In order to provide clearance space for the actuators 114 the panel or plate 28 is provided with apertures 140 underlying the rear portion of each stop tablet. In addition, rectangular aperture 142 underly edge portions of each stop tablet to provide clearance for the wedge-shaped detents 110 on the stop tablets. The confronting detents 110 of adjacent stop tablets share a common hole or aperture 142. Beneath each such common aperture there is mounted a spring member 144 FIGS. 4-6 in the form of an elongated blade having its base riveted to the plate or panel 28 at one end 146, and having at the other end thereof a camming of detent formation 148. Each end 148 is bifurcated as indicated at 150 in FIG. 5, whereby to provide a pair of spaced detents respectively cooperable with detents 110 of adjacent stop tablets. Each spring blade 144 throughout most of its extent underlies the panel in surface engagement therewith, whereby the upward position of each detent 148 is predetermined without the necessity of hand adjustment or calibration. Similarly, the position of each stop tablet is predetermined by its cooperation with the brackets 128 and the pivot rods 118 and spacer washers 120. Accordingly, no adjustment is necessary between the spring detents and the stop tablets. Operation of a stop tablet to move its accompanying movable switch contact 92 from the normal raised position to the lowered position may be seen by comparing FIGS. 4 and 6.

Positioning of the movable switch contacts 92 is accurately predetermined through their association with the printed circuit boards. Since these printed circuit boards are carried by the same brackets 44 as carry the insulating rods 54, and 56, they are relatively predetermined as to position, and no final hand adjustment is necessary.

The specific example of the invention as herein shown and described is for illustrative purposes only. Various changes in structure will no doubt occur to those skilled in the art, and will be understood as forming a part of the present invention insofar as they fall within the spirit and scope of the appended claims.

The invention is hereby claimed as follows:

1. In an electronic organ, a stop tablet and filter assembly comprising a panel, a plurality of stop tablets movably carried from said panel, a pair of elongated insulating members, means supporting said elongated insulating members from said panel in fixed relation thereto, said insulating members being parallel to one another and one thereof being spaced from said panel a greater distance than the other, fixed contact members comprising conductive elements carried by said pair of elongated

insulating members, a printed circuit board supported from said panel substantially at right angles thereto, a plurality of flexible movable contact members extending from said printed circuit board substantially at right angles thereto and having conductive end portions thereof disposed between said pair of elongated insulating members in proximity to conductive elements carried thereby, and actuator means connected to said stop tablets to operatively interconnect said stop tablets and said movable flexible contact members selectively to control the condition of engagement and disengagement thereof with said conductive elements.

2. The assembly as set forth in claim 1 and further including means pivotally mounting said stop tablets on the side of said panel opposite to the elongated insulating members, said panel being provided with apertures to accommodate the actuator means, and further including detent means acting between said stop tablets and said panel and tending to hold said tablets respectively in either of two predetermined positions.

3. The assembly as set forth in claim 2 wherein the detent means comprises a projection on the underside of each stop tablet, and a plurality of flat springs carried against the underside of the plate opposite to said stop tablets, said plate being provided with aperture means to effect cooperation of said springs and said projections.

4. The assembly as set forth in claim 3 wherein a plurality of stop tablets is pivoted in side by side relation, wherein said spring means comprises a single spring between a pair of stop tablets, said spring having a bifurcated tip the adjacent portions of which cooperate with different ones of said pair of said stop tablets.

5. The assembly as set forth in claim 4 and further including a common pivot for a plurality of stop tablets in side-by-side relation.

6. In an electronic organ, a stop tablet and filter assembly comprising a panel, a plurality of stop tablets, means mounting said stop tablets for pivotal movement on one side of said panel, fixed contact means carried from said panel on the opposite side thereof from said stop tablets, movable contact means carried from said panel adjacent said fixed contact means and selectively cooperable therewith, actuator means connected to said stop tablets to operatively interconnect said stop tablets and said movable contact members selectively to control the condition of engagement and disengagement thereof with said fixed contact means, said panel having aperture means therein to accommodate said actuator means, and detent means acting between said stop tablets and said panel and tending to hold said stop tablets respectively in either of two predetermined positions, said detent means comprising a plurality of spring members secured substantially flat against the face of said panel opposite said stop tablets, said panel having aperture means therein to accommodate coaction between said springs and said stop tablets.

7. The assembly as set forth in claim 6 wherein a plurality of stop tablets is pivoted in side-by-side relation, wherein the springs are less in number than said

stop tablets and comprise a spring common to a pair of adjacent stop tablets, said common spring having a bifurcated tip with the two portions thereof respectively cooperating with adjacent stop tablets.

8. The assembly as set forth in claim 7 and further including a common pivot for a plurality of side by side stop tablets.

9. In an electronic organ, a stop tablet and filter assembly comprising a panel, a plurality of stop tablets, means pivotally mounting a plurality of said stop tablets in side-by-side relation on said panel on one side thereof, each of said stop tablets being hollow and opening towards said panel, a bracket disposed within each of the end stop tablets of a given plurality thereof and mounted on said panel, a common pivot extending between said brackets and pivotally mounting a plurality of stop tablets, detent means comprising projections on said stop tablets and a plurality of springs secured substantially flat against said panel on the opposite side thereof from said tablets, said panel being apertured to provide for cooperation between said springs and said stop tablets and thereby to afford positioning of said stop tablets in either of two predetermined positions, fixed contact means carried from said panel on the side thereof opposite said stop tablets, movable contact means cooperable selectively with said fixed contact means, and actuator means connected to said stop tablet to operatively interconnect said stop tablets and said movable contact means, said panel being apertured to accommodate said actuating means.

10. In an electronic organ, a base means, first and second elongated spaced-apart insulating members fixedly supported by said base means, fixed contact members comprising conductive elements mounted on said elongated insulating members, a printed circuit board supported by said base means, a plurality of movable flexible contact members extending from said circuit board with a conductive portion of said contact members positioned intermediate said first and second elongated insulating members in proximity to said conductive elements, a plurality of actuator means supported by said base means and associated with said flexible members, said actuator means being pivotal relative to said base means from a first position to a second position to selectively control the condition of engagement and disengagement of said movable flexible contact members with said conductive elements, and flexible detent means connected to said base means and positioned in resilient engagement with protuberances projecting from said actuator means to retain said actuator means in either said first or said second position.

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