

June 25, 1963

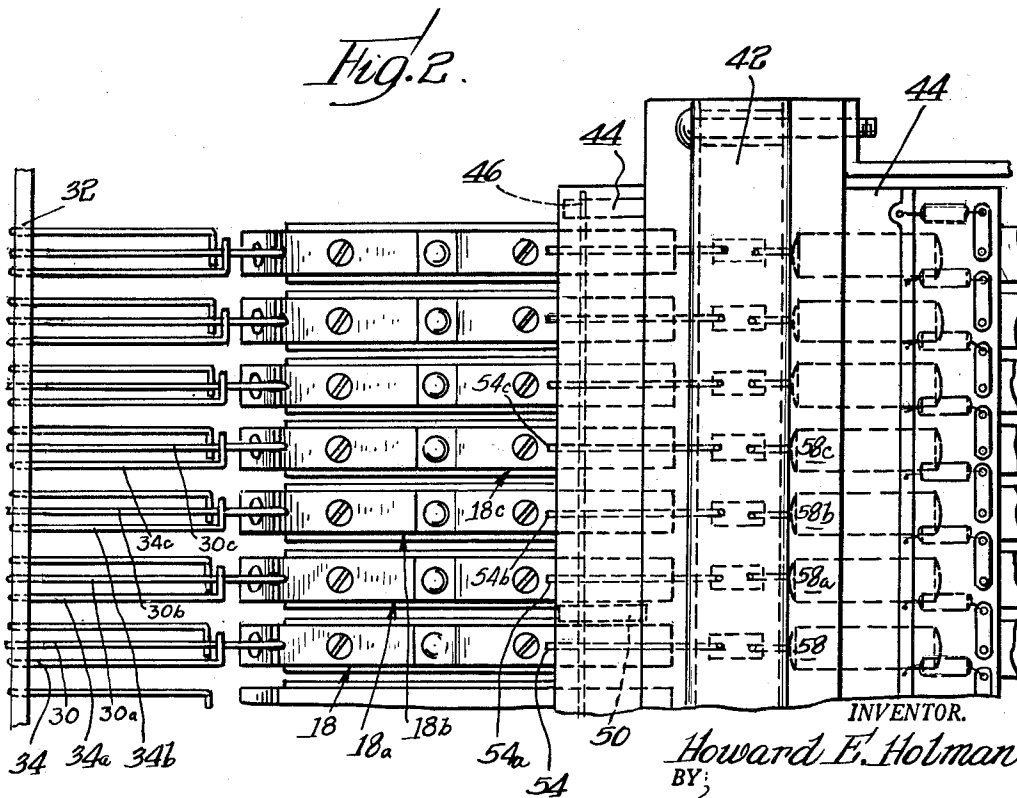
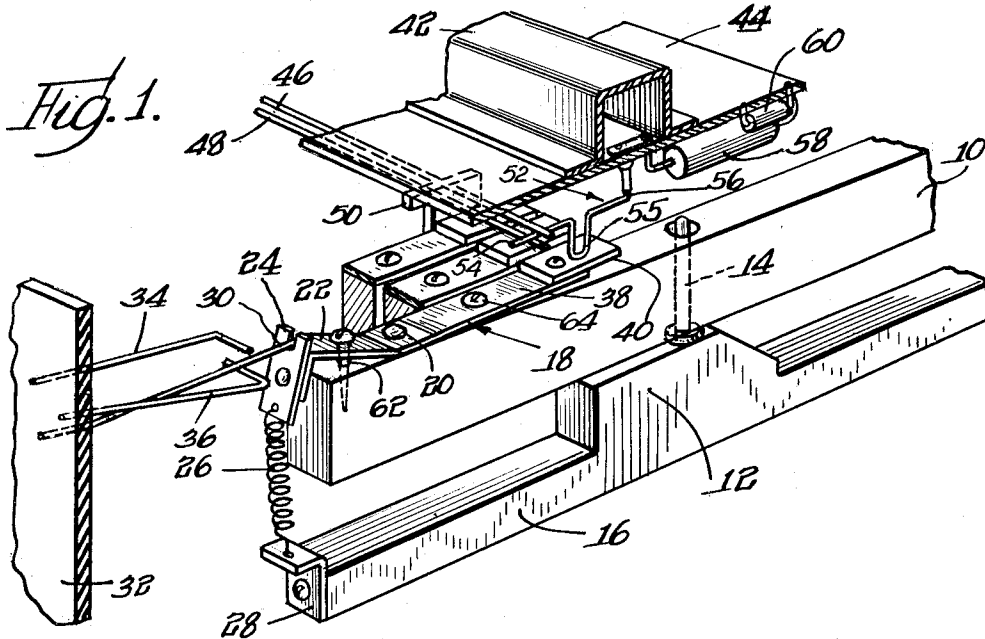
H. E. HOLMAN

3,095,465

SWITCH FOR ELECTRONIC MUSICAL INSTRUMENTS

Filed Oct. 8, 1959

2 Sheets-Sheet 1



INVENTOR.

Howard E. Holman

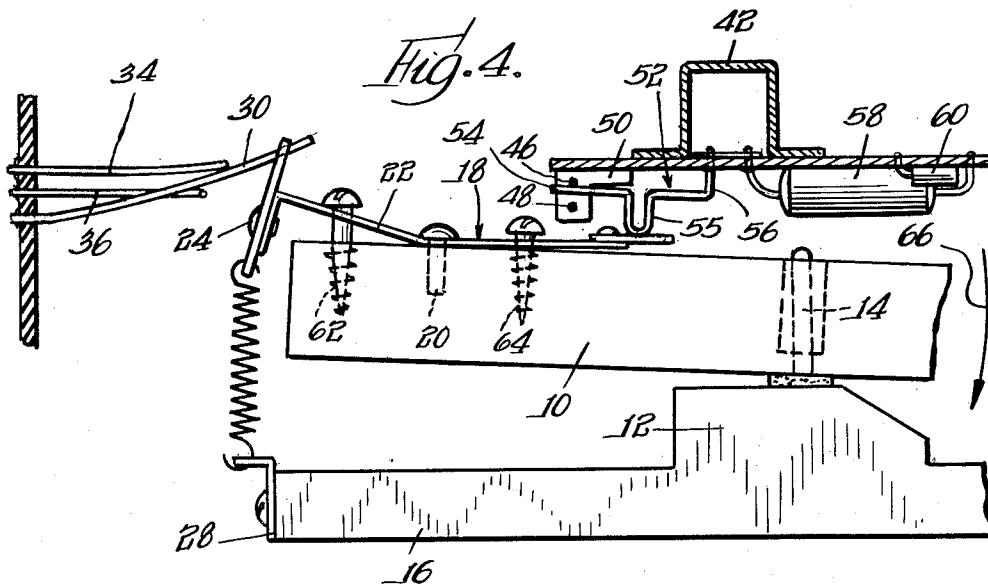
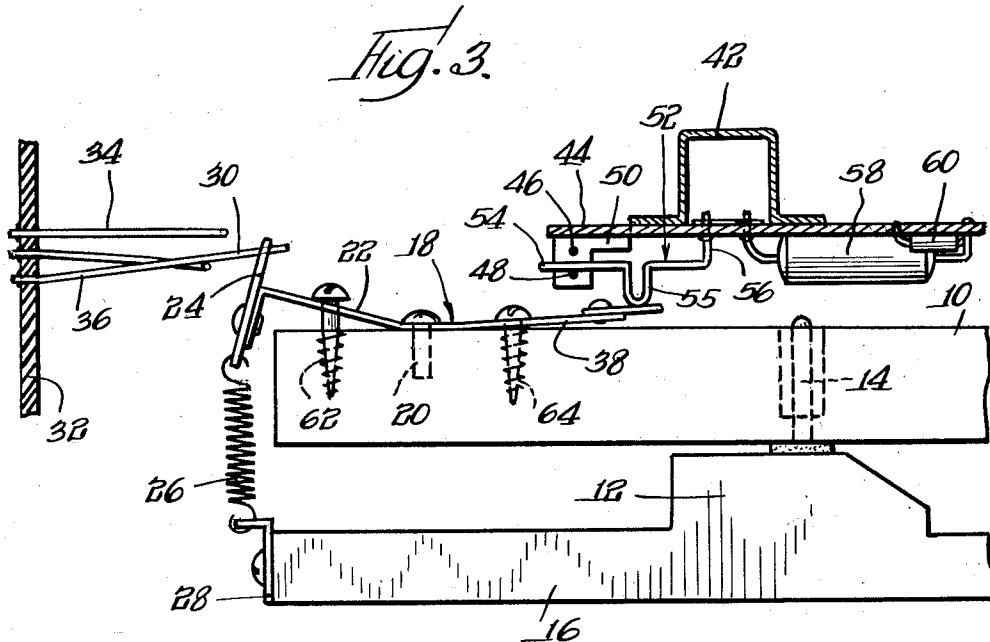
BY: Olson & Trevel attys.

3,095,465

SWITCH FOR ELECTRONIC MUSICAL INSTRUMENTS

Filed Oct. 8, 1959

2 Sheets-Sheet 2



INVENTOR.

INVENTOR:
Howard E. Holman

BY

BY
Olson & Trepka
attys.

1

3,095,465

SWITCH FOR ELECTRONIC MUSICAL INSTRUMENTS

Howard E. Holman, Corinth, Miss., assignor to The Wurlitzer Company, Chicago, Ill., a corporation of Ohio

Filed Oct. 8, 1959, Ser. No. 845,117

8 Claims. (Cl. 84—1.01)

This invention relates generally to electrical switches and especially to switches for electronic musical instruments.

Switches for electronic musical instruments and the like commonly comprise complex arrangements of intricately shaped parts which require insulating guide assemblies in order to prevent accidental shorting. Switches so comprised are difficult to assemble and expensive to manufacture. Therefore, an important object of the present invention is to provide an improved switch for electronic musical instruments which is simply constructed and which is economical to manufacture.

Another object of the invention is to provide a switch arrangement of the type described which is characterized by a minimum number of operating parts.

Still another object of the invention is to provide a switch arrangement for electronic musical instruments which obviates the need for complex insulating guide assemblies.

Additional objects and features of the invention pertain to the particular structure and arrangements whereby the above objects are attained.

In order that the principle of the invention may be readily understood, a single embodiment thereof applied to an electronic organ, but to which the application is not to be restricted, is shown in the accompanying drawings wherein:

FIG. 1 is a perspective view of an electronic organ key associated with a switch arrangement in accordance with the present invention;

FIG. 2 is a fragmentary plan view of a multiplicity of organ keys each being associated with a switch arrangement in accordance with the showing of FIG. 1;

FIG. 3 is an elevational side view in partial cross-section of the showing of FIG. 1, illustrating the switch in its normal or rest position; and

FIG. 4 is an elevational side view in partial cross-section of the showing of FIG. 1 illustrating the switch in its operating position.

Referring now in detail to the drawings, specifically to FIG. 1, an organ key 10 is shown pivotally mounted to a balance rail 12 by means including a balance rail pin 14 in accordance with customary practice. The balance rail 12 is integrally joined to a keybed 16 which extends across the body of an electronic organ to support the multiplicity of keys normally provided.

Rearwardly of balance rail pin 14, a rigid switch arm 18 is secured to the key 10 by means of a fastening screw 20. Switch arm 18 extends an end portion 22 to overhang the rear end of key 10, an electrically insulating tab 24 being affixed to end portion 22 by a rivet or other suitable means. A tension spring 26 advantageously extends between the tab 24 and a bracket 28 secured to the keybed 16. Spring 26 serves to bias the keyboard end of organ key 10 in a vertically upward direction.

Tab 24 is further adapted to serve as a contact pusher; and accordingly, a whisker wire contact 30 is suitably secured to a circuit board 32 to extend toward key 10 and to reside in a slot provided in the tab 24, board 32 acting as a structure means for supporting the contact 30. Contact 30 is preferably associated with the signal input

2

circuit which incorporates the continuously operating oscillators customarily incorporated in an electronic organ.

Circuit board 32 is spaced rearwardly apart from key 10 in order to extend a pair of generally L-shaped, fixed contact elements 34 and 36 in the direction of tab 24. Fixed contact elements 34 and 36 are adapted to sandwich contact element 30 between their free ends; and since contact element 30 is arranged to make connection with contact element 36 in the normal or rest position, contact element 36 is preferably associated with ground. Contact element 34 is consequently associated with the signal output circuit which is printed or otherwise suitably applied to board 32.

Board 32 extends across the body of the organ to support and make suitable connections with the contact elements associated with each of the organ keys, as is best shown in FIG. 2.

While the striking of the musical note is achieved through contact elements 30, 34 and 36, it is sometimes desirable to actuate simultaneously the percussion effects of the organ notes. Accordingly, switch arm 18 includes an upwardly canted, forwardly extending end portion 38 having an electrically insulating tab 40 secured thereto as by rivets or other suitable means.

Disposed across the body of the organ above tab 40 is a channel element 42. Channel element 42 supports a percussion circuit board 44 from which a pair of electrical conductors 46 and 48 depend in vertically aligned, parallel relationship. Conductors 46 and 48 are mounted to the circuit board 44 by means of a number of electrically insulating brackets 50 spaced at intervals along the board 44. Furthermore, conductors 46 and 48 are preferably associated respectively with the percussion circuit and with power.

In order to provide selective operation of the percussion circuit, a moveable contact element 52 extends an end portion 54 between the conductors 46 and 48 and depends an offset mid-portion 55 adjacent the tab 40. Contact element 52 is secured to circuit board 44 by a mounting post 56. Advantageously, a resistor 58 is electrically connected in series between contact element 52 and a capacitor 60.

So that the musical note circuit associated with circuit board 32 may be actuated slightly ahead of the percussion circuit associated with circuit board 44, the positions of end portions 22 and 38 are arranged to be adjusted by means of the adjusting screws 62 and 64 respectively.

It has been found that the illustrated arrangement of conductors 46 and 48 and of contacts 30, 34, 36 and 52 produces a switch which exhibits little or no tendency to develop accidental short circuits. Consequently, the need for insulating assemblies guiding the several contacts is precluded.

For purposes of providing an easy understanding of the invention, it is advantageous to provide at this juncture a functional description of the mode in which the component parts thus far identified cooperate. Turning therefore to FIG. 3 in which the rest or normal configuration is illustrated, it will become apparent that the moveable contact element 30 normally makes connection with the grounded fixed contact element 36. Also, in this normal or rest position, moveable contact element 52 normally has its end portion 54 disposed in electrical connection with the power input conductor 48. With the percussion switch "on" the normal disposition of contact element 52 permits capacitor 60 to be charged through resistor 58.

With particular reference now to FIG. 4, it will become apparent that, when organ key 10 is depressed in the general direction indicated by arrow 66, the signal input of the musical note circuit will be connected to the signal

output by means of moveable contact 30 being repositioned into electrical connection with fixed contact 34. Simultaneously, the pivotal movement of key 10 will cause tab 40 to encounter mid-portion 55 urging contact 52 upwardly so that the end portion 54 makes connection with the percussion output conductor 46. Contact 52 being so disposed, capacitor 60 will discharge through resistor 53 so as to control amplifier conduction effectuating the appropriate percussion.

It will be realized that release of organ key 10 will allow the biasing spring 26 to return the key 10 to its rest position. Once again moveable contact 30 will be connected to grounded fixed contact 36; and contact element 52 will be connected with the power input conductor 43 whereby capacitor 60 will be restored for charging.

As will become apparent, a switch such as has been hereinabove described, is advantageously associated with each of the organ keys displayed in the keyboard. FIG. 2 shows a portion of such a multiple arrangement; and insofar as duplicate elements have been illustrated, like numerals have been used to denote like elements, the suffix letters "a," "b," etc. being applied to the duplicate members.

While a particular embodiment of the invention has been shown, it will be understood, of course, that the invention is not limited thereto since many modifications may be made; and it is, therefore, contemplated to cover by the appended claims any such modifications as fall within the true spirit and scope of the invention.

The invention is claimed as follows:

1. A switch arrangement for electronic musical instruments comprising: a keybed; a key pivotally mounted to said keybed; structure means located rearwardly of said key; at least one fixed contact element extending from said structure means toward said key; a rigid switch arm fastened to said key; a first movable contact element fastened to said structure means to extend into operable relationship with said fixed contact element and said switch arm; a pair of electrical conductors extending transversely of said key; and a second movable contact element extending between said conductors in operable relationship with said switch arm, whereby depression of said key repositions said first movable contact element with respect to said fixed contact element while simultaneously repositioning said second movable contact element with respect to said electrical conductors.

2. A switch arrangement for electronic musical instruments comprising: a keybed; a key pivotally mounted to said keybed; structure means located rearwardly of said key; at least one fixed contact element extending from said structure means toward said key; a rigid switch arm fastened to said key, having one end overhanging said key and the opposite end canted upwardly from said key; a first movable contact element fastened to said structure means to extend into operable relationship with said fixed contact element and said switch arm; a pair of electrical conductors extending transversely of said key; and a second movable contact element having a straight end portion extending between said conductors, and an offset mid-portion depending into operable relationship with the canted end of said switch arm, whereby depression of said key repositions said first movable contact element with respect to said fixed contact element while simultaneously repositioning said second movable contact element with respect to said electrical conductors.

3. A switch arrangement for electronic musical instruments comprising: a keybed; a key pivotally mounted to said keybed; structure means located rearwardly of said key; at least one fixed contact element extending from said structure means toward said key; a rigid switch arm fastened to said key, having one end overhanging said key and the opposite end canted upwardly from said key; biasing means disposed between said keybed and the overhanging end of said switch arm; a first movable contact element fastened to said structure means to extend

into operable relationship with said fixed contact element and said switch arm; a pair of electrical conductors extending transversely of said key; a second movable contact element having a straight end-portion extending between said conductors, and an offset mid-portion depending into operable relationship with the canted end of said switch arm; and capacitor means electrically connected to said second movable contact element, whereby depression of said key repositions said first movable contact element with respect to said fixed contact element while simultaneously repositioning said second movable contact element with respect to said electrical conductors in order to permit discharge of said capacitor means.

4. A switch arrangement for electronic musical instruments comprising: a keybed; a key pivotally mounted to said keybed; structure means located rearwardly of said key; at least one fixed contact element extending from said structure means toward said key; a rigid switch arm fastened to said key, having one end rearwardly overhanging said key and the opposite end canted upwardly and forwardly from said key; a first movable contact element fastened to said structure means to extend into operable relationship with said fixed contact element and said switch arm; a pair of electrical conductors extending in vertically aligned, parallel relationship transversely of said key spaced thereabove; and a second movable contact element having a straight wire end-portion extending between said conductors, and an offset mid-portion depending into operable relationship with the canted end of said switch arm, whereby depression of said key repositions said first movable contact element with respect to said fixed contact element while simultaneously repositioning said second movable contact element with respect to said electrical conductors.

5. A switch arrangement for electronic musical instruments comprising: a keybed; a key pivotally mounted to said keybed by balance rail means; structure means located rearwardly of said key; at least one L-shaped fixed contact element extending from said structure means toward said key; a rigid switch arm fastened to said key, having one end rearwardly overhanging said key and the opposite end canted upwardly and forwardly from said key; biasing means, including a tension spring disposed between said keybed and said switch arm; a first movable, straight wire contact element fastened to said structure means and received in a slot in an insulating tab secured to said switch arm to extend into operable relationship with said fixed contact element; a pair of electrical conductors extending in vertically aligned parallel relationship transversely of said key spaced thereabove; and a second movable contact element having a straight wire end-portion extending between said conductors, and an offset mid-portion depending into operable relationship with the canted end of said switch arm, whereby depression of said key repositions said first movable contact element with respect to said fixed contact element while simultaneously repositioning said second movable contact element with respect to said electrical conductors.

6. A switch arrangement for electronic musical instruments comprising: a keybed; a key pivotally mounted to said keybed by balance rail means; structure means located rearwardly of said key; a pair of L-shaped fixed contact elements extending from said structure means toward said key; a rigid switch arm fastened to said key, having one end rearwardly overhanging said key and the opposite end canted upwardly and forwardly from said key; biasing means, including a tension spring disposed between said keybed and said switch arm; a first movable, straight wire contact element fastened to said structure means and received in a slot in an insulating tab secured to said switch arm to extend into operable relationship with said fixed contact elements; a pair of electrical conductors extending in vertically aligned, parallel relationship transversely of said key spaced thereabove; a second

5

movable contact element having a straight wire end-portion extending between said conductors, and an offset mid-portion depending into operable relationship with the canted end of said switch arm; and capacitor means electrically connected to said second movable contact element, whereby depression of said key in opposition to said biasing means repositions said first movable contact element with respect to said fixed contact elements while simultaneously repositioning said second movable contact element with respect to said electrical conductors in order to permit discharge of said capacitor means.

7. A switch arrangement for electronic musical instruments comprising: a keybed; a key pivotally mounted to said keybed; structure means located rearwardly of said key; an L-shaped, fixed contact element extending from said structure means toward said key; a rigid switch arm fastened to said key; a first movable, straight wire contact element fastened to said structure means to extend into operable relationship with said fixed contact element

6

and said switch arm; a pair of electrical conductors extending transversely of said key; and a second movable contact element extending between said conductors in operable relationship with said switch arm, whereby depression of said key repositions said first movable contact element with respect to said fixed contact element while simultaneously repositioning said second movable contact element with respect to said electrical conductors.

8. A switch arrangement according to claim 7 wherein said first movable contact element is a straight, whisker wire contact element.

References Cited in the file of this patent

UNITED STATES PATENTS

2,587,458	Fritts	Feb. 26, 1952
2,630,503	Larsen et al.	Mar. 3, 1953
2,846,916	Osborne et al.	Aug. 12, 1958
2,931,877	Henley	Apr. 5, 1960
2,963,564	Cutler et al.	Dec. 6, 1960