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INDEPENDENTLY OPERABLE SWITCHES WITH SECOND TOUCH RELEASE

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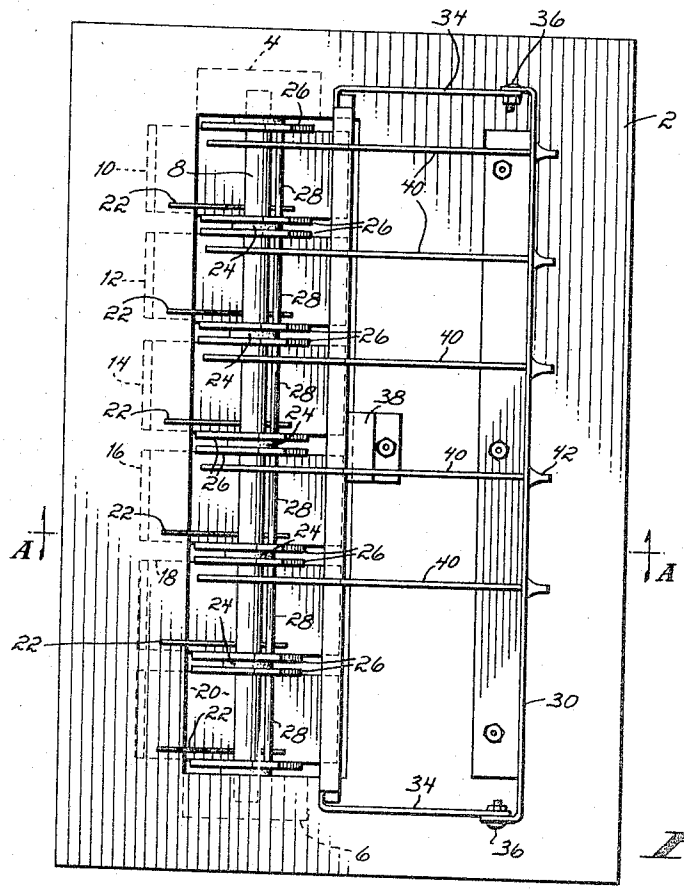


Fig. 1

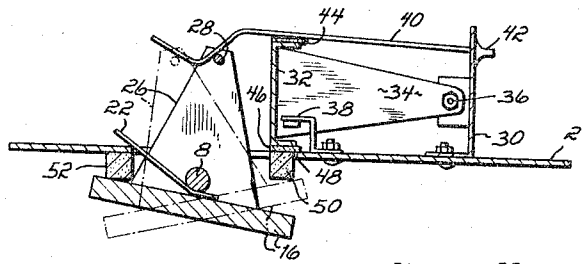


Fig. 2

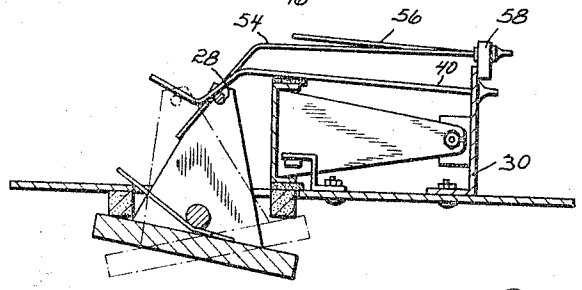


Fig. 3

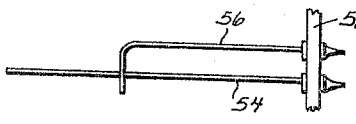


Fig. 3a

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INDEPENDENTLY OPERABLE SWITCHES WITH SECOND TOUCH RELEASE

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This invention relates to a multiple switch having a second touch release in which each individual switch has a position beyond the normal on position wherein all other switches of the group are released.

Second touch or double touch is a device found on the manuals, pedals, preset buttons and combination buttons of some theatre organs. A manual equipped with second touch can be played normally but if the finger force applied to any key is increased beyond normal, such key is depressed to a more than normal position and, in such position, actuates additional stops or couplers. The key mechanism is arranged so that, as the key is depressed, a normal force is required until the bottom of the normal action is reached. At this point, a second spring becomes effective and there is a sudden increase in the force required for further deflection. This provides a definite bottom to the normal action and prevents second touch from being actuated unintentionally. Although some skill is required on the part of the organist, manual and pedal second touch permits many effects which increase the apparent number of manuals or hands in use.

Preset buttons are usually located between manuals and are operated by the thumb of the organist while playing. Actuation of a preset button causes the stop combination in use to be instantly replaced by another stop combination associated with that preset button. Second touch has been used on preset buttons to provide a pedal stop combination appropriate to the manual stop combination controlled by the normal touch of the preset button.

Combination buttons are the same as preset buttons except for the method of setting up the stops to be controlled by a given button. A combination button can be set up from the front of the console but a present button has either a permanently wired-in set of stops or a setting-up switchboard at the rear of the console. Combination buttons are sometimes referred to as pistons.

One application of the multiple switch with second touch release of the present invention is to the stop tabs of a musical instrument having second touch cancel wherein each stop tab has a second touch position beyond the normal on position which cancels or returns to the off position all the other stop tabs of the group. Organists frequently are required to make rapid and extensive changes in registration, i.e., selection of the combination of stops employed, while playing. Preset and combination buttons are provided to solve this problem in large organs. In smaller organs, second touch cancel can be of great assistance in making rapid changes in registration by significantly reducing the number of finger motions required.

In addition to use in musical instruments, the multiple switch of the present invention has wide application in other fields, for example, in intercom systems to provide rapid change from conference operation to individual station operation or vice versa.

The invention will be further illustrated by reference to the accompanying drawings in which

FIGURE 1 is a bottom view of one embodiment of the multiple switch of the present invention, having second touch cancel, shown applied to the stop tabs of an electric organ,

FIGURE 2 is a sectional view taken on line A—A of FIGURE 1,

FIGURE 3 is a sectional view, similar to FIGURE 2, showing electrical contacts actuated by movement of the stop tabs,

FIGURES 3*a* illustrates the electrical contacts shown in FIGURES 3, as viewed from the top of that figure.

It will be understood by one skilled in the art that since FIGURE 1 is a bottom view of the structure of the present invention, and since FIGURES 2 and 3 are cross sectional views of FIGURE 1 (in the direction of arrows A—A), the structure illustrated in FIGURES 2 and 3 is shown substantially upside down with respect to its normal orientation in an organ console. The various elements and their interaction, as shown in FIGURES 2 and 3, will be described with respect to their orientations in those figures.

Referring to FIGURE 1, a multiple switch with second touch cancel is shown having the base plate **2** and a pair of tab shaft mounting blocks **4** and **6**, shown in phantom, secured to the upper side thereof. The tab shaft **8** is supported by the mounting blocks **4** and **6** and has the stop tabs **10**, **12**, **14** , **16**, and **18** pivotally mounted thereon. A cancel tab **20** is also pivotally mounted on the tab shaft **8**. Each of the tabs **10**, **12**, **14**, **16**, **18**, and **20** is provided with a tab return spring **22** which continually biases each of the tabs toward the off position. The tabs are spaced by individual felt washers **24**.

As best shown in FIGURE 2, each of the tabs, **10**, **12**, **14**, **16**, **18**, and **20** is supported on the tab shaft **8** by a pair of generally triangular mounting arms **26**, each pair of arms being joined at their upper ends by the tab pins **28**. The base plate **2**, as best shown in FIGURE 2, has the detent spring mounting bracket **30** bolted thereto, the mounting bracket being connected to the bar **32** by the arms **34**. The arms **34** are pivotally connected to the bracket **30** by the pivot pins **36**. Also secured to the base plate **2** is the second touch lever stop **38**. A plurality of detent springs **40** are secured to the detent spring mounting bracket **30** by soldering, as shown at **42**. The left-hand ends of the detent springs, viewed in FIGURE 2, engage with the tab pins **28**.

As best shown in FIGURE 2, the upper surface of the second touch bar **32** has a felt strip **44** cemented thereto and a similar strip **46** is cemented to the lower surface of the bar **32**. The ends of the felt strip **46** rest on the upper surface of the base plate **2** and do not pass through the aperture **48** therein, due to a greater width of the strip **46**. The felt pad **50** cemented to the strip **46** passes through the aperture **48** in the base plate **2** since the aperture is wider than the pad. The felt pad **50** serves as a mechanical stop for all the tabs in the normal on position and the felt pad **52** serves as a mechanical stop for all tabs in the off position.

As shown in FIGURE 2, the tab 16 is in the normal off position and is shown in phantom in the normal on position. Any further counter-clockwise rotation of the tab **16**, shown in FIGURE 2, will raise the felt pad **50**, the bar **32** and the detent spring **40**, such further movement beyond the position shown in phantom being the second touch position. The second touch position is limited by engagement of the lower part of the bar **32** with the second touch lever stop **38**.

In operation, when any tab, such as tab **16**, is depressed beyond the normal on position shown in phantom in FIGURE 2, the felt pad **50** will move upwardly through the aperture **48** in the base plate **2** and, since it is cemented to the felt strip **46**, which is, in turn, cemented to the bar member **32**, the bar member **32** will be raised and will pivot about the pivots **36**. The upward movement of the bar member **32** raises all of the detent springs **40** away from all of the tab pins **28**, thus releasing the detent action, and all tabs, except the one being actuated, which are in the on position, i.e., the position shown in phantom in

FIGURE 2, will return to the off position as a result of this spring action exerted by the tab return springs **22**. The second touch force required to raise the bar **32** is much greater than the normal detent action force; this provides a bottom for the normal action and prevents second touch from being actuated unintentionally.

The tab **20** has no detent action and acts only as a cancel tab, always returning to the off position.

Referring to FIGURES 3 and 3*a*, the wires **54** and **56** are silver-plated spring wires used as electrical contacts, the wires being soldered to the insulating mounting bracket **58** which is, in turn, mounted on the detent spring mounting bracket **30**. One pair of contact wires **54** and **56** is provided for each tab. The left-hand end of the wire **54** extends downwardly as shown in FIGURE 3 and engages with the tab pin **28** on one side of the detent spring **40**. Thus, moving a tab to the on position causes the contact wire **54** to move upwardly and make contact with the fixed contact wire **56** thereby completing an electrical circuit or controlling a mechanical device.

Each of the tabs **10**, **12**, **14**, **16**, and **18** can be placed in the on or off position independently of the others and the organist selects a desired combination of stops by placing the corresponding tabs in the on position using only the normal on position. When it is desired to make a change in registration, the organist depresses the tab corresponding to the first stop of the new registration to the second touch position. This cancels all stops of the previous registration and leaves the first tab of the new registration in the on position. The organist than adds the other stops of the new registration by depressing the appropriate tabs to the normal on position.

It will be obvious to those skilled in the art that many modifications may be made within the scope of the present invention without departing from the spirit thereof, and the invention includes all such modifications.

What is claimed is:

1. A multiple switch comprising,

a frame,

a plurality of actuators,

means mounting each of said actuators on said frame for selective movement between a first position, a second position and an override position,

biasing means mounted on said frame and biasing said actuators to said first position,

holding means mounted on said frame,

said holding means being movable between a hold position for releasably maintaining said actuators in a selected one of said first and second positions and a release position to enable said biasing means to move said actuators to said first position,

release means movably mounted on said frame and normally in a position to be contacted by any one of said actuators when any one of said actuators is in said second position,

said release means movable with any one of said actuators upon movement of any one of said actuators into said override position, and

means associated with said release means to contact said holding means and move said holding means into said release position upon movement of any one of said actuators into said override position, whereby movement of any one actuator into its override position enables said biasing means to become effective to move all other actuators to said first position.

2. A multiple switch as set forth in claim **1** in which each actuator comprises a tab with means provided to permit said tab to be rocked to and from said first and second positions and into said override position.

3. A multiple switch as set forth in claim **1** in which said release means is pivotally mounted on said frame and normally held by said holding means in position to be contacted by any one actuator in said actuator's second position.

4. A multiple switch as set forth in claim **3** in which said holding means comprises a spring offering a force that must be overcome in moving an actuator from said second position to said override position.

5. A multiple switch as set forth in claim **1** in which said first position of any one actuator constitutes an off position and in which said second position of any one actuator constitutes an on position.

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