

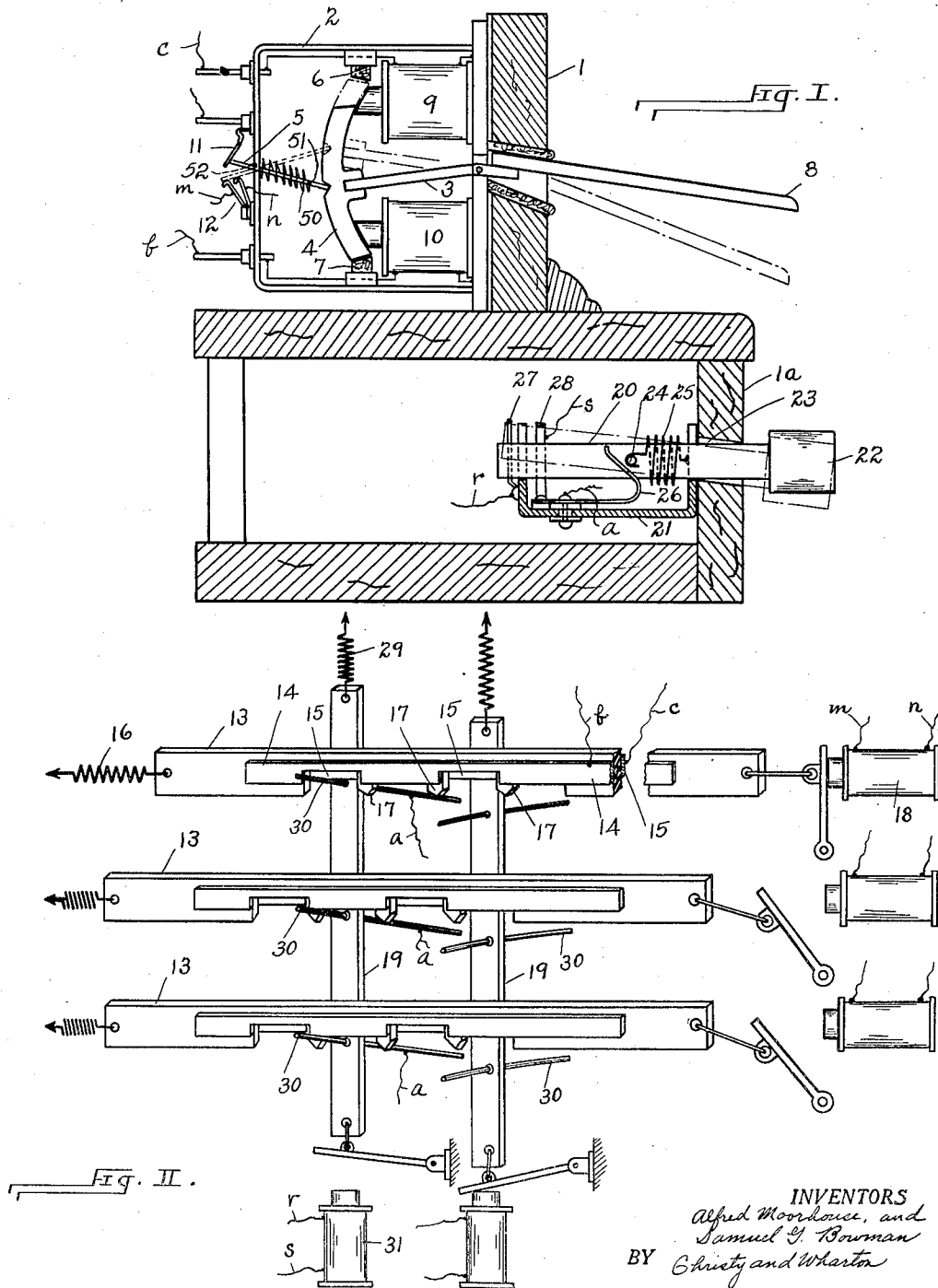
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COMBINATION STOP EQUIPMENT FOR PIPE ORGANS

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COMBINATION STOP EQUIPMENT FOR
PIPE ORGANS

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1 Claim. (Cl. 84—344)

In Letters Patent of the United States No. 1,716,651, granted June 11, 1929, for improvements in Pipe organs, we have described auxiliary apparatus, whereby the player of an organ, having shifted selectively certain pipe stops and established a certain stop combination, may, by shifting of another stop, called a combination stop, bring the auxiliary apparatus of the invention to a corresponding distinctive position; and thereafter in the course of his playing he may, by another stop-shifting operation, cause the auxiliary apparatus of the invention to effect again such a shifting of the pipe stops as to re-establish the same stop combination.

The apparatus of the patent named involved the pneumatic operation of certain movable parts, to establish particular positions of a multiplicity of electrical make-and-break devices. Our present invention contemplates the accomplishment of the same general end by motive power that is wholly electric, and consists in the means for such accomplishment.

In the accompanying drawing Fig. I is a view in vertical and transverse section of the tablet-board of an organ, equipped with means responsive to the usual pipe stops and combination stops for controlling the electric apparatus of our present invention; and in exemplary way Fig. II shows such electric apparatus diagrammatically in perspective.

Referring, first, to Fig. I of the drawing, upon the back of the tablet-board 1 of the organ is mounted a succession of rectangular metal frames 2. These frames are electrically insulated in such mounting and stand apart one from another. In each frame on one side is pivoted a metal bar 3 which terminates in an arc-shaped cross-arm 4 of iron. The center of curvature of the arc coincides with the center of pivoting of the bar. Each frame on the opposite side includes a slot 52 through which extends a finger 5, of copper or other suitable conducting material. The finger at its inner end is articulated in a notch in the cross-arm 4, and a coiled compression spring 50 is arranged on the finger between the frame 2 and a shoulder 51 on the finger. In known way, as the bar 3 is swung vertically across the dead center between the two pivot points, spring force is exerted, tending to swing the bar 3 upward or downward, as the case may be, and to hold the cross-arm 4 in abutment upon either the insulating cushion 6 above or the insulating cushion 7 below.

Means are provided for swinging the bar 3, both manually and directly, and mechanically

and indirectly. In order that the organist may swing the bar 3 manually and directly, the bar is prolonged through a slot in the tablet-board 1 in an extension 8 of ivory, or a substitute for ivory. The means for swinging the bar 3 mechanically and indirectly are found in electromagnets 9 and 10, mounted within the frame, with respect to both of which the cross-arm 4 serves in turn as an armature. The extension 8 and its associated elements comprise a pipe stop in the sense herein used.

The finger 5, protruding at its distal end from the frame 2, is adapted alternately to make and break electrical contact with a contact-piece 11, borne by (though insulated from) frame 2, and alternately to close and open electric communication across two circuit contacts 12.

In the drawing the bar 3 is shown in its lower position in full lines, the cross-arm 4 being held under slight but sufficient spring tension upon cushion 7. In this position—the “off” position—the finger 5 makes contact with contact-piece 11, and through the conductive body of the finger, the contact-piece is grounded to the metal frame 2 to which one terminal of each magnet (9 and 10) is grounded. When, under the hand of the organist, or by the energizing of the electromagnet 9, the bar 3 is swung upward to dotted line position—the “on” position—the finger 5 electrically closes the contacts 12. In the set of pipe stops of the above-described structure, each pipe stop controls, through known means, the operation of a particular set of organ pipes, and with the set of such pipe stops the apparatus for controlling stop combinations in accordance with our present invention is organized.

The apparatus includes a plurality of bars 13 mounted in parallelism and severally reciprocable longitudinally through a definite and limited range. Each bar is formed of insulating material, and carries insulated one from the other (conveniently upon its opposite faces) two plates 14 and 15 of conducting material. These two plates are castellated, each along one margin, and they are so mounted upon the bar that the castellated margins project beyond the edge (as here shown the nether edge) of the bar 13. The two plates are so relatively placed upon the bar 13 that the high region of one plate stands opposite the low region upon the other. The insulating bar itself is provided with outstanding blocks 17. The blocks stand out, beyond the high regions of the castellated margins of the plates 14 and 15, and form with the edges of the plates notches. The bottoms of the notches are of conducting

material, but the sidewalls are of insulating material.

The apparatus includes one such bar for each pipe stop on the tablet-board of the organ, and means are provided that, on the shifting of a pipe stop from "off" to "on" position, the corresponding bar 13 is shifted throughout its range of reciprocation from one limit to the other; that is to say, from inactive to active position. This range of reciprocation may be equal to the length of one of the alternate high and low regions of the castellations of the plates 14 and 15. These bars 13 will hereinafter be distinguished as pipe-stop bars.

The bar 13 is held normally in "off" position by the tension of a spring 16; from this position it is shifted against the tension of the spring to "on" position by the energizing of an electro-magnet 18 with whose armature it is linked; and the electro-magnet is energized by the shifting of the pipe stop on the tablet-board of the organ to "on" position. That is, an electric circuit *m*, *n*, deriving electric energy from any convenient source, is closed through contacts 12 (Fig. I) and the electro-magnet 18 (Fig. II), when the stop 8 is pressed into its dotted line position.

Associated with the assembly described of the pipe-stop bars are one or more bars 19, one for each combination stop on the tablet-board of the organ. These bars 19 will hereinafter be distinctively spoken of as combination-stop bars.

The combination stops consist each in a bar 20 of electrical conducting metal mounted in vertical slots formed in the legs of a U-shaped metal bracket 21; the bracket is mounted on the rear face of the tablet-board panel 1a, and the bar 20, extending through a slot 23 in the panel, is provided with a head 22 of ivory or the like. A metal pin 24 extends in the line of sight, Fig. I, from the side of the bar, and, by shifting the bar axially inward, against the tension of a spring 25, the pin 24 electrically engages a contact 26 mounted on, but insulated from, the bracket 21. Upon relieving pressure on the head of the bar, the spring restores the parts to the positions illustrated in full lines, and electrical engagement of the pin 24 with contact 26 is interrupted. The combination-stop bar 20 is adapted electrically to unite two contacts 27 and 28, and to such end the bar is angularly movable from full-line position to dotted line position. The organist merely presses vertically downward on the head 22, to effect such angular movement of the bar and electrical union of the contacts 27, 28. The spring 25 is effective also to return the bar from the dotted-line to the full-line position.

Each bar 19 extends in parallelism to the plane in which the bars 13 lie; it is spaced at an interval from the bars 13; and it extends in a direction transverse, to, and, conveniently, at right angles to, the bars 13. It is equipped with a plurality of outstanding pins 30, aligned upon it, and spaced at intervals corresponding to the intervals of succession of the adjacent bars 13. The bar 19 is reciprocable in the direction of its length through a definite and limited range. In the drawing, of the two combination-stop bars shown, that on the right is at one end of its range of reciprocation (the inactive position), while the bar on the left is at the opposite end of its range (the active position). When a combination stop 20, 22 on the tablet-board of the organ is tilted from full-line to dotted line position, the corresponding bar 19 is shifted from the active position of the bar 19 shown on the left in

the drawing to the inactive position of the bar shown on the right.

The bar 19 is normally held in active position under the tension of a spring 29; from such position it is shifted to inactive position in response to the energizing of an electro-magnet 31, with whose armature it is linked; and electro-magnet 31 is energized on the tilting of the combination stop on the tablet-board of the organ, and the closing of contact 27, 28 in the energizing circuit *r*, *s* of the electro-magnet.

When the bar 19 is in active position the pins 30 that it bears make contact with one or the other of the plates 14, 15 of the successive pipe-stop bars 13; and, according as the particular bar 13 is in "off" or "on" position, the contact will be with plate 14 or 15.

The pins 30 are flexible and resilient, and they are long, in that their extent is substantial, beyond the region of normal contact with the plates 14 and 15. In consequence, when a bar 19 is in active position and its pins are in the notches of the bars 13 and in selective engagement with the plates 14 and 15 of the bars 13, the bars 13 may severally be shifted at the will of the organist in response to the shifting of the pipe stops in the tablet-board of the organ, and yet (because of the length and flexibility and resilience of the pins) the contacts of the pins 30 with particular plates of the pipe-stop bars will continue, unbroken. In such subsequent shifting of the bars 13 the outstanding blocks 17 are effective to isolate each pin within a notch, to retain it within the notch, and to prevent cross contact through the pin from the plate on one side of the bar 13 to the plate on the other side.

The pins 30 are terminals of electric conductors *a* that are severally grounded to the metal frames 2 of the pipe stops, and, as already mentioned, to each frame one terminal of each of the two associated electro-magnets 9 and 10 is also grounded. The plates 14 and 15 are terminals of conductors *b* and *c* that are severally connected to the other terminals of the electro-magnets. By known means a circuit closed by the organist will be effective to energize the conductors connected across the poles of particular electro-magnets in the set of pipe stops, with the consequence and effect that the pipe stops of the set are mechanically shifted to the particular combination of which the bar 19 is master. Conveniently, the closure of the circuit here alluded to is effected by another though differently directed shift of the same combination stop on the tablet-board of the organ that is shifted to move the particular bar 19 into inactive position. Specifically, the combination stop 20, 22 is shifted axially inward, moving the pin 24 into electrical engagement with the contact 26, and closing circuits, through conductors *a*, pins 30, plates 14 or 15 (which the pins severally engage on the several bars 13), conductors *b* or *c* (depending on which plates are engaged by the pins), and electro-magnets 9 or 10 (also depending on which plates 14 or 15 are engaged by pins 30), to the grounded frames 2 of the set of pipe stops. In such way one or another of the electro-magnets in each pipe stop is energized, and each pipe stop is mechanically set in either "off" or "on" position. And thus the particular stop combination, of which the bar 19 is master, is obtained.

In the playing of the organ the organist shifts particular pipe stops, and in so doing establishes a particular stop combination. That particular stop combination is ephemeral, in that, in the

further playing of the organ, it is changed and other combinations are produced; but that particular combination may be one that in the course of playing is desirably established again. But for the apparatus to which this invention is addressed, the re-establishment of that combination is effected only by the shifting again of the pipe-stops individually—bringing those not desired to “off” position and those desired to “on” position. But, by means of the apparatus alluded to, when once a particular combination of pipe stops has been established, the organist may momentarily tilt a combination stop. Having done so, he continues to play, making changes in the stop combination as he will. When thereafter in the course of his playing he comes to the point where he desires the re-establishment of the earlier combination, it suffices that he shift axially inward that same combination stop, and thereupon, through the apparatus described, the combination is re-established.

Any number of combination stops may be provided, each involving an additional bar 19, an additional length of bars 13, and an additional pair of high and low regions in the extent of the plates 14 and 15 upon the bars 13.

In our earlier patent named, we employ pneumatically operated means to shift the component parts of the combination-controlling apparatus. Our present invention concerns the particular construction of the operating parts of this apparatus and in the electric control that preferably we provide therefor.

We claim as our invention:

In a pipe organ equipped with a plurality of pipe stops, a combination stop apparatus including a plurality of longitudinally reciprocable pipe-stop bars grouped in parallelism, each associated

with one of said pipe stops, each bar provided with a plurality of notches, the bar carrying two conducting plates electrically isolated one from the other, one plate exposed for contact in one notch and the other plate exposed for contact in the other notch, means for shifting longitudinally each pipe-stop bar in response to the shifting of the corresponding stop, a combination-stop bar arranged adjacent to the grouped pipe-stop bars extending athwart the pipe-stop bar assembly and longitudinally reciprocable, means for shifting longitudinally the combination-stop bar, the combination-stop bar being equipped with a plurality of contact pieces corresponding in number to the pipe-stop bars and spaced at intervals corresponding to the spacing of the pipe-stop bars, the contact pieces being in the form of outstanding resilient and flexible pins, the combination-stop bar in the range of its reciprocation being adapted to carry the contact pieces to and from position in the notches of the pipe-stop bars and to and from contact with the plates severally, exposed therein, a plurality of electromagnets, two associated with each pipe stop, and adapted when severally energized to bring the stop to and maintain it in one of its two positions of action and inaction, the contact pieces of the combination-stop bars establishing, when the bar is in plate-contacting position, a line of electric flow to one or the other of the electromagnets of each pair, according to the engagement of the contact piece in one or another of the notches in the corresponding pipe-stop bar, and means for simultaneously closing at will electric circuits through the so selectively positioned contact pieces and electromagnets.

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