Sept. 3, 1929. B. E. MILLS 1,727,127

SWITCH MECHANISM FOR ELECTRICALLY OPERATED MUSICAL INSTRUMENTS

Filed April 8, 1927 4 Sheets-Sheet 1

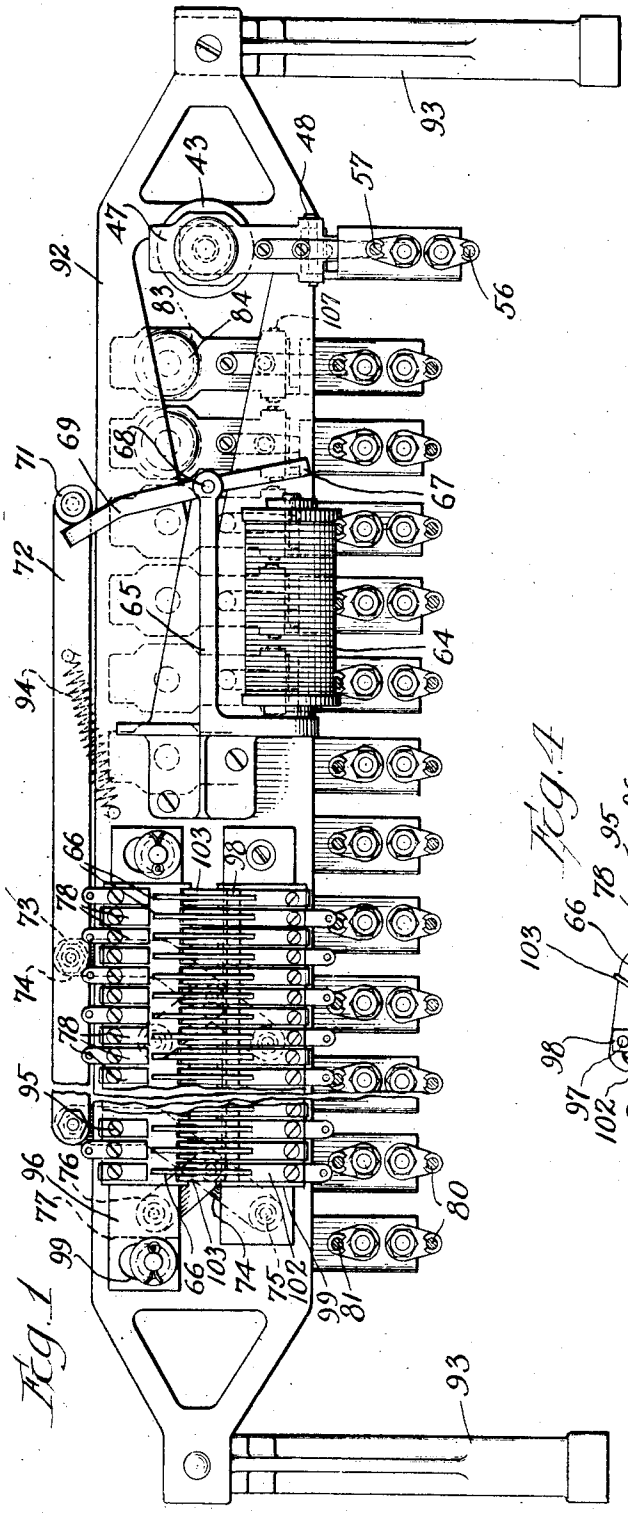



Fig. 1

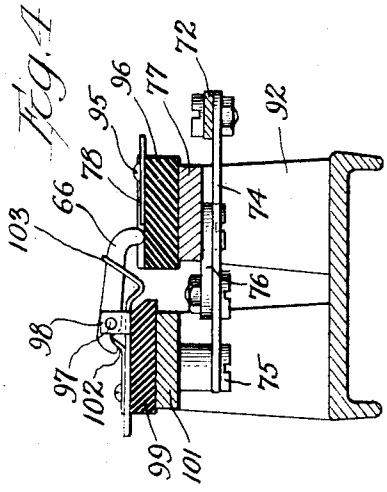



Fig. 4

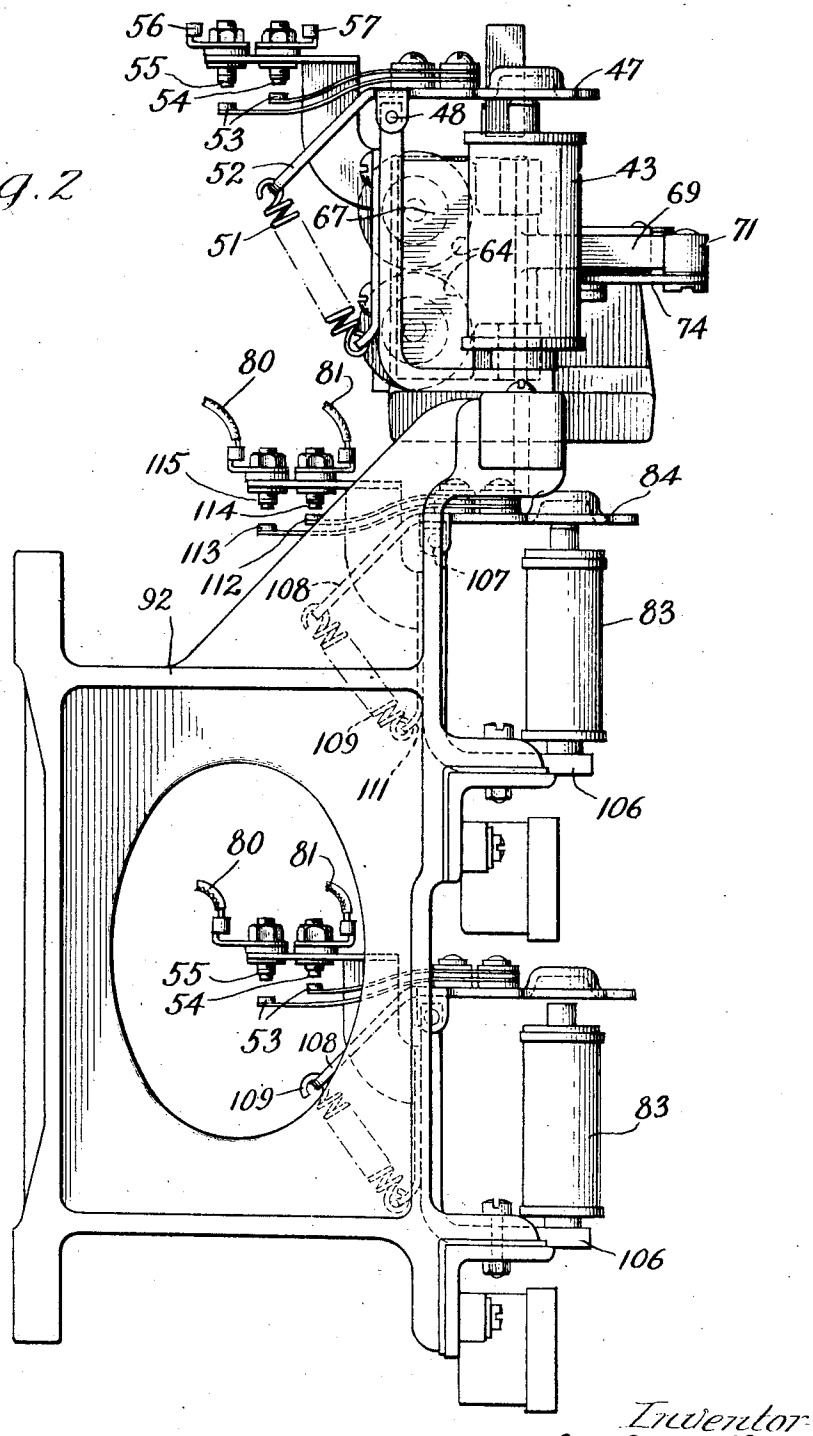
Inventor:
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SWITCH MECHANISM FOR ELECTRICALLY OPERATED MUSICAL INSTRUMENTS

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Fig. 2




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SWITCH MECHANISM FOR ELECTRICALLY OPERATED MUSICAL INSTRUMENTS

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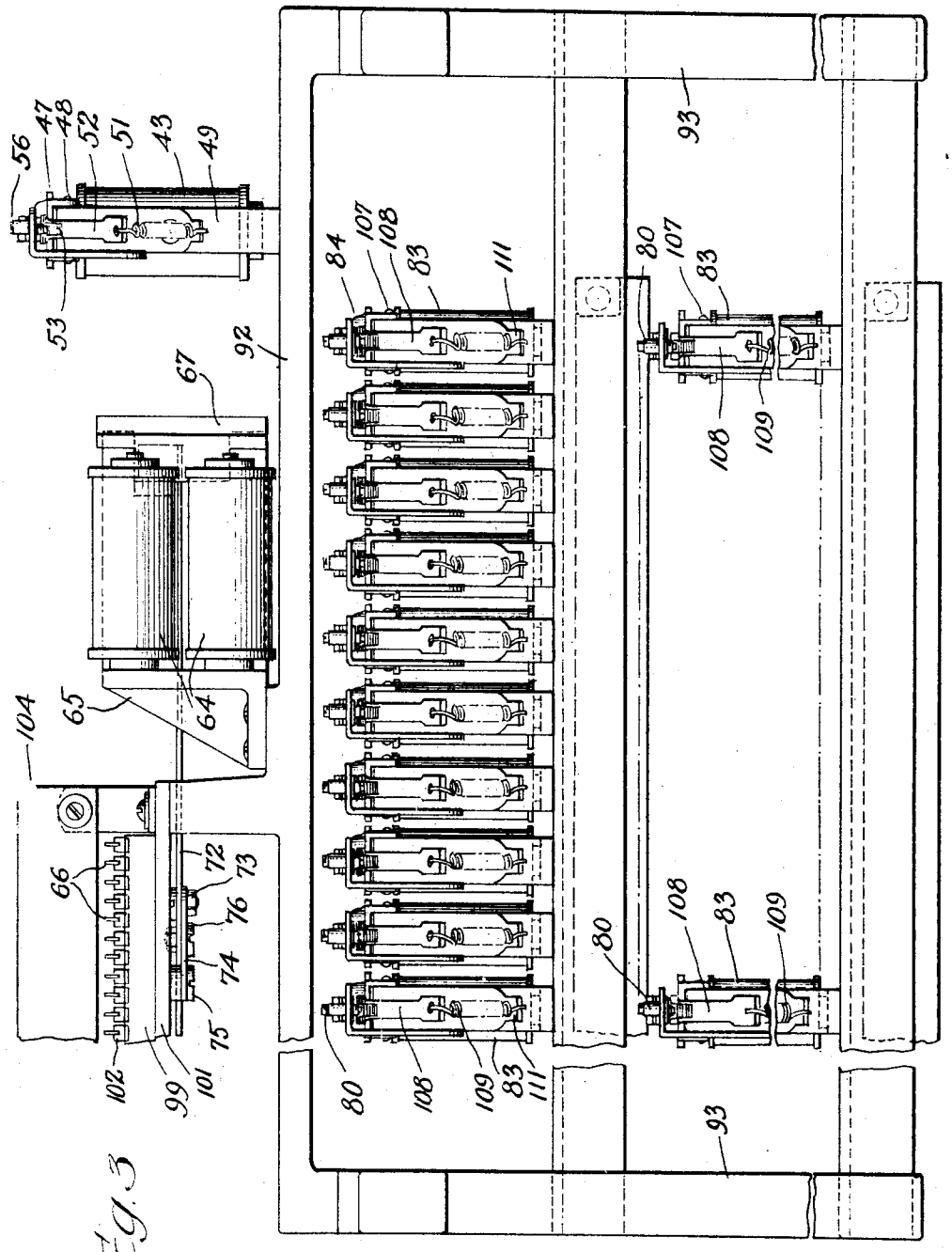



FIG. 3

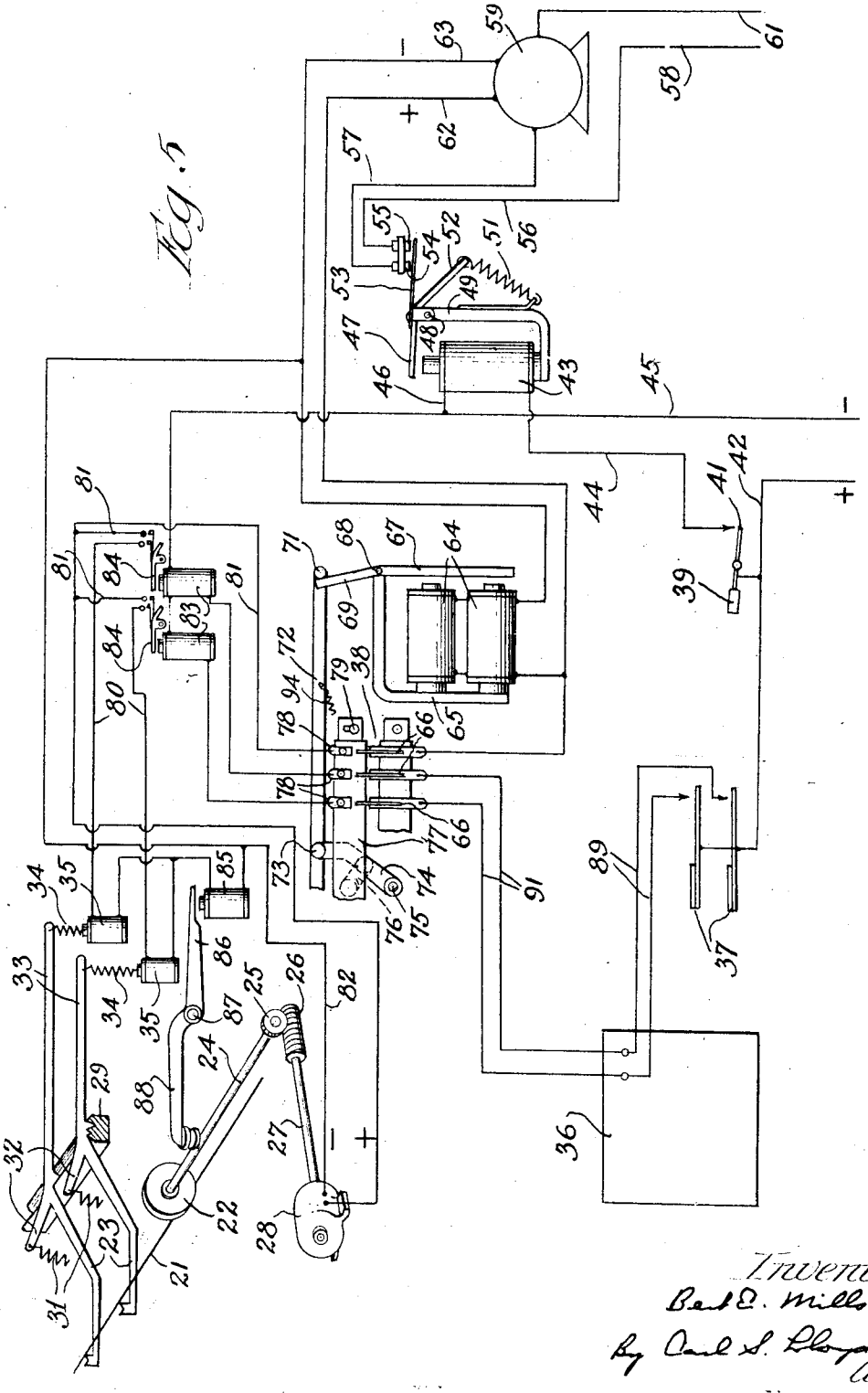
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SWITCH MECHANISM FOR ELECTRICALLY OPERATED MUSICAL INSTRUMENTS

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Fig. 5



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Patented Sept. 3, 1929. 1,727,127

# UNITED STATES PATENT OFFICE.

BERT E. MILLS, OF OAK PARK, ILLINOIS, ASSIGNOR TO MILLS NOVELTY COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

## SWITCH MECHANISM FOR ELECTRICALLY-OPERATED MUSICAL INSTRUMENTS.

Application filed April 8, 1927. Serial No. 181,937.

This invention relates to electrically operated musical instruments and has for its main object the provision of a switch mechanism whereby a plurality of instruments, operated by different circuits and electrical devices, may be played from a single keyboard or series of controls, without confusion between their respective circuits and the electrical devices included therein.

The embodiment of the invention shown in the drawings and hereinafter to be described, is a combination organ and self-playing violin installation, the violin and playing instrumentalities being of the general type shown in prior patents, such, for example, as Patent No. 855,021, granted May 28, 1907, to Henry K. Sandell, and Patent No. 1,558,113, granted October 20, 1925, to me.

In accordance with my invention, it is possible to install a self-playing violin, of the type above identified, in conjunction with another instrument, as, for example, an organ, without changing the organ installation and without requiring particular location of the self-playing violin with reference to the organ, the two instruments being electrically connected in such a way that the violin instrument may be placed in any convenient location, even though remote from the organ, and both instruments played from a single keyboard or series of controls.

As will appear from the following specification, provision is made by the invention for completely disconnecting the electrical units associated with the different instruments so that the association of the violin or other instrument with the organ in no way interferes with the separate playing of the latter, even though the regular keyboard of the organ console be used to play both instruments.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings,

Figure 1 is a plan view of a selected embodiment of the switch and associated instrumentalities provided by my invention;

Fig. 2 is an end elevational view, looking toward the left in Fig. 1;

Fig. 3 is a side elevation of the mechanism shown in Figs. 1 and 2, the same being broken away for convenience in illustration;

Fig. 4 is an enlarged detail view of certain of the switch elements; and

Fig. 5 is a combined wiring diagram and diagrammatic view of certain of the mechanism associated with the electric circuits illustrated.

Referring first to the diagram of Fig. 5, the reference character 21 indicates one of the strings of a violin, which, as above stated, may be of the general type fully shown and described in said prior patents, from which it will appear that the instrument is mechanically played by rotatable bows 22, one for each string and by fingering devices 23, of which I have shown but two in the drawing. The bow is carried upon a shaft 24, carrying at its rear end a worm gear 25, meshing with a worm 26 upon or connected with the armature shaft 27 of an electric motor 28, which may be suitably mounted and connected with an electric circuit, which will presently be outlined. The fingering devices 23 are pivotally supported upon a bar 29 and the forward ends, or fingers, thereof are adapted to be normally held in down position beneath the strings by means of springs 31, connected at one end to arms 32 on the fingering devices and at the opposite end to some fixed point. The rear ends 33 of said devices are connected by springs 34 to finger magnets 35, which are adapted to be energized at suitable times in the playing of the instrument, as will be hereinafter described.

The organ may be of any usual or preferred type and has not been illustrated other than to show diagrammatically the junction board 36 and two console keys 37, it being understood that the playing of the keys ordinarily establishes contacts in a small voltage circuit leading through the junction block to the valves of the organ, which are actuated thereby to play the instrument. Obviously, a small voltage is sufficient for this purpose, it being unnecessary to have anything like the voltage which is required for the actual playing of an instrument in the manner of the violin above described and diagrammatically illustrated in Fig. 5. In accordance with my invention, the electrical apparatus associated with the violin

is adapted to be connected, when desired, with the junction block of the organ so that the console keys may be utilized to play the violin, the connection being established and broken by means of a switch mechanism shown diagrammatically at 38.

The switch is normally open so that the violin is entirely dissociated with the organ and has no effect whatever upon the playing of the latter. When, however, it is desired to play the violin, the starting switch 39 is actuated, establishing contact at 41 between one side 42 of a small voltage line, carrying, for example, 10 volts, thereby energizing a starting magnet 43, connected with the positive side of the line through a wire 44 and the contact 41 and with the other, or negative side 45 of the line by a wire 46. The armature 47 associated with said magnet is pivoted at 48 upon a frame part or bracket 49 and is normally held out of contact by means of a spring 51, connected at one end with said bracket and at the other end with an arm 52 on said armature. A contact member 53 is carried by said armature 47 and is adapted to engage contacts 54 and 55, connected respectively by wires 56 and 57 with one side 58 of a relatively high voltage service line, such as a 110 volt alternating current line and with a rectifier 59, which is also connected with the other side 61 of said alternating current line. A direct current line 62, 63, beyond the rectifier, leads to switch magnets 64, mounted upon a bracket 65, and to a contact 66 of the switch. Said magnets 64 are for the purpose of actuating a switch lever 67 and, consequently, must be relatively powerful, being connected in the 110 volt line. For convenience as to size, two magnets are employed and upon being energized, actuate the lever 57, which is pivoted at 68 to the frame and has an extension 69 beyond the pivot, engaging a stud 71 upon a link 72, which is connected at 73 with a lever 74, pivotally connected at 75 with a fixed point on the frame and having a link connection 76 with a bar 77 forming a part of the switch and carrying contacts 78. Said bar 77 is mounted for lateral movement, having a screw and slot connection at 79 with the frame and, obviously, when the link 72 is shifted to the right, viewing Fig. 5, the bar 76 is shifted laterally so as to establish contact between the members 66 and 78. The first contact at the right, viewing Fig. 5, energizes the bow motor 28, the wiring being indicated at 81 and 82. Each of the other contacts is adapted to establish connection with one of a series or battery of magnets 83, which actuate double contact devices 84, making circuits 81, 80, 82 through finger magnets 35 and bow raising and lowering magnets 85, the armature 86 of which is pivoted at 87 and connected with an arm 88 secured to the bow shaft 24. The playing of the keys selectively energizes the magnets 83, said keys being connected through wires 89, the junction block 36 and wires 91 with the contacts 66. It will be understood that after the starting switch 39 has been actuated, the violin is connected into the 110 volt line, which, through the wire 63, 81, is connected with the contact devices 84, and when the latter are actuated by the magnets 83, the main circuits are closed for playing the violin, in a known manner.

Referring now to the other figures of the drawing, it will be noted that the magnets 83 are mounted in a double row or series in a frame 92, supported at the ends by uprights 93, there being one of said magnets for each of the keys used to play the violin. The starting magnet 43 is mounted upon the top of said frame and the armature 47 thereof, with its double contacts 53, is clearly shown in Fig. 2. The switch magnets 64 are shown in each of Figs. 1, 2 and 3, from which the construction of the switch mechanism hereinbefore described will be understood more in detail. In Fig. 1, I have shown a spring 94 for restoring the link 72 and armature 67 to the position shown in said Fig. 1 after the magnets 64 have been deenergized. This action shifts the switch bar 77 to the outer position shown in Figs. 1 and 4 of the drawing, from which it will be seen that the contacts 78 are secured by screws 95 to an insulating plate 96. The contacts 66 are pivoted at 97 to lugs 98 upon an insulating plate 99 secured to a fixed bar 101. Spring members 102 serve to hold the pivoted contact 66 in the down position and said contacts are arranged between fixed guides 103.

The magnets 83 are mounted in the manner shown best in Fig. 2, being supported on lateral extensions 106 upon the frame 92, there being, as shown, a double row or battery of said magnets, though it will be understood that they may be arranged and mounted in any desired manner. Since they are merely duplicates one of another, a description of one will give a full understanding of them all.

The armature 84 is pivotally mounted at 109 upon the frame and has a rearward and downward extension 108, beyond said pivot, which is connected by a spring 109 with a fixed part 111 upon the frame. The spring 109 thus tends to hold the armature away from the magnet, but the tension thereof is overcome when the magnet is energized, permitting the armature to turn on its pivot. Contacts 112 and 113 are adapted to engage respectively contacts 114 and 115, which are associated respectively with the main line 81 shown in the diagram of Fig. 5 and with a wire 80 leading to one of the finger magnets 35, as previously described. It will be

apparent that the closing of the contacts associated with any particular magnet 83, which is accomplished by energizing said magnet by the depression of its control key 37, closes the circuit from the main line to the finger magnet, which is connected in series with the bow magnet 85, and that the playing of the violin instrument from the organ keyboard is, in this manner, rendered possible. When it is desired to disconnect the violin instrument, the starting switch 39 is actuated to break the contact 41 thus breaking the main circuit and deenergizing the switch magnets 64, with the result that the switch 38 is opened. This operation completely cuts out the magnets 83 and associated wiring, so that there can be no "sneak back" to interfere with the playing of the organ, as might occur in the event that the main line 62, 63 were broken without complete dissociation of the violin magnets 83 through the operation of said switch 38.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangements of the parts without departing from the spirit and scope of the invention, or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. The combination with a plurality of electrically controlled musical instruments of a series of magnets associated with one of the instruments and individually controllable to sound particular notes, a single series of controls for playing both instruments, and a switch mechanism operable by the player for establishing or breaking lines of electrical communication between said series of controls and said series of magnets whereby the latter may be individually energized or deenergized by operation of said controls.

2. The combination with a plurality of electrically controlled musical instruments and electric circuits of different voltage for controlling the same of a series of magnets associated with one of the instruments and individually controllable to sound particular notes, a single series of controls for playing both instruments, and a switch mechanism operable by the player for establishing or breaking lines of electrical communication between said series of controls and said series of magnets whereby the latter may be individually energized or deenergized by operation of said controls.

3. The combination with a plurality of electrically controlled musical instruments and electric circuits of different voltage for controlling the same of a series of magnets associated with one of the instruments and individually controllable to sound particular notes, a single series of controls for playing both instruments, and a switch mechanism operable by the player for establishing or breaking lines of electrical communication between said series of controls and said series of magnets whereby the latter may be individually energized or deenergized by operation of said controls, said controls being associated with a circuit of relatively low voltage and said magnets, when energized thereby, being adapted to close a circuit of relatively high voltage for playing the instrument with which they are associated.

4. The combination with a plurality of electrically controlled musical instruments and electric circuits of different voltage for controlling the same of a series of magnets associated with one of the instruments and individually controllable to sound particular notes, a single series of controls for playing both instruments, a switch mechanism operable by the player for establishing or breaking lines of electrical communication between said series of controls and said series of magnets whereby the latter may be individually energized or deenergized by operation of said controls, said controls being associated with a circuit of relatively low voltage and said magnets, when energized thereby, being adapted to close a circuit of relatively high voltage for playing the instrument with which they are associated, and a switch operating magnet on said high voltage circuit.

5. The combination with a plurality of electrically controlled musical instruments and electric circuits of different voltage for controlling the same of a series of magnets associated with one of the instruments and individually controllable to sound particular notes, a single series of controls for playing both instruments, a switch mechanism operable by the player for establishing or breaking lines of electrical communication between said series of controls and said series of magnets whereby the latter may be individually energized or deenergized by operation of said controls, said controls being associated with a circuit of relatively low voltage and said magnets, when energized thereby, being adapted to close a circuit of relatively high voltage for playing the instrument with which they are associated, a switch operating magnet on said high voltage circuit, and a starting magnet on the low voltage circuit for closing the said high voltage circuit to energize the switch operating magnet.

6. The combination of an electrically controlled organ or the like, an electric self-playing violin adapted to be played from

the organ keyboard, a relatively high voltage electric circuit for playing the violin, a relatively low voltage circuit for controlling the playing of the organ, and means controlled through said low voltage circuit for utilizing the high voltage circuit ot play the violin.

7. The combination of an electrically controlled organ or the like, an electric self-playing violin adapted to be played from the organ keyboard, a relatively high voltage electric circuit for playing the violin, a relatively low voltage circuit for controlling the playing of the organ, means controlled through said low voltage circuit for utilizing the high voltage circuit to play the violin, and an electrically controlled switch mechanism for associating and dissociating said circuits.

8. The combination of an electrically controlled organ or the like, an electric self-playing violin adapted to be played from the organ keyboard, a violin circuit, an organ circuit, and means controlled through the organ circuit for controlling the violin circuit in playing.

9. The combination of an electrically controlled organ or the like, an electric self-playing violin adapted to be played from the organ keyboard, a violin circuit, an organ circuit, means controlled through the organ circuit for controlling the violin circuit in playing, and an electrically controlled switch mechanism for associating and dissociating said circuits.

10. The combination of a plurality of electrically controlled musical instruments, separate circuits for playing said instruments, common playing controls, and means whereby one of said circuits associated with the playing controls may be employed to control the use of another of said circuits in the playing of the instrument associated with the latter.

In witness whereof, I hereunto subscribe my name to this specification.

BERT E. MILLS.