F. B. LITTLE.

COUPLER FOR ELECTRICAL MUSICAL INSTRUMENTS.

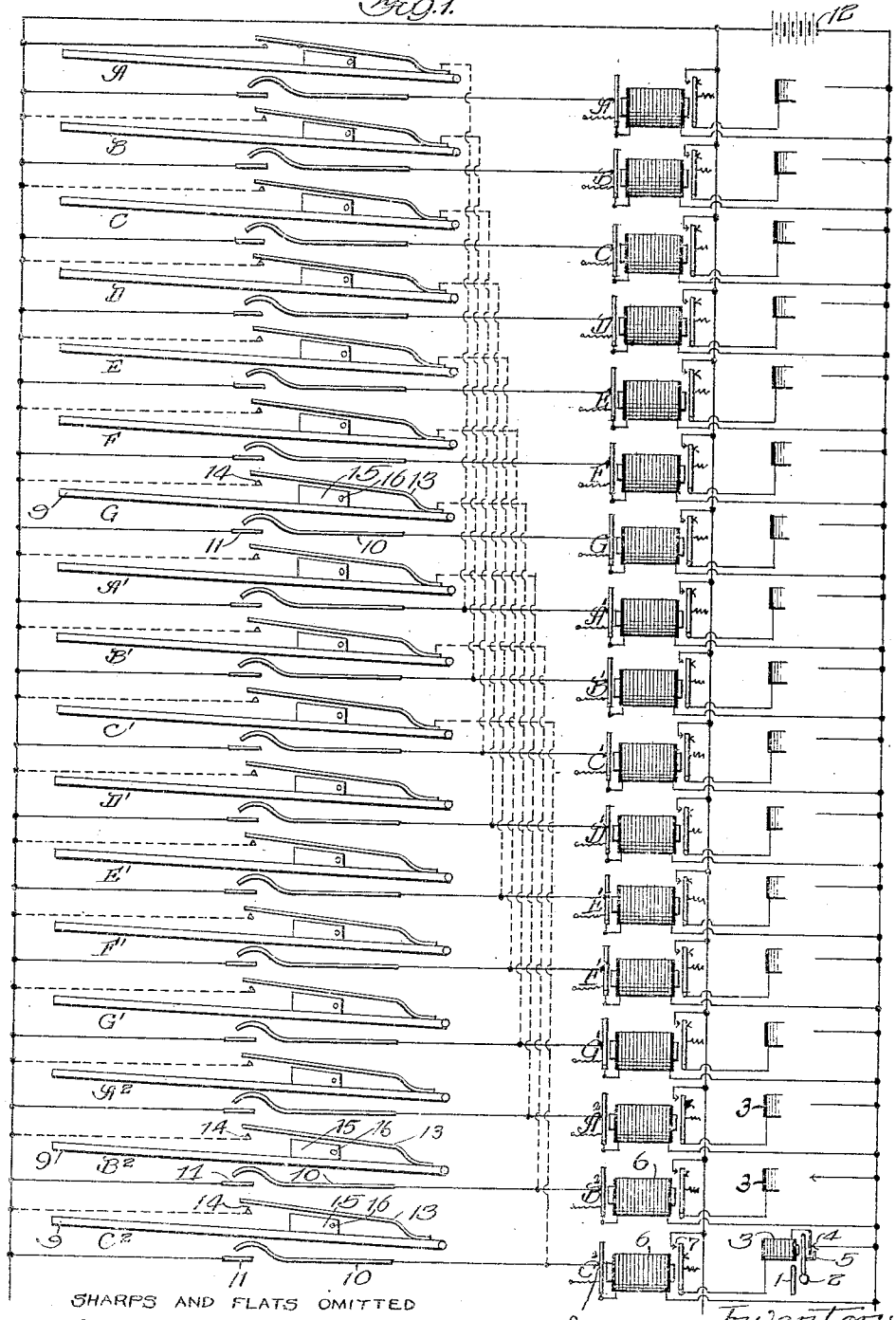
APPLICATION FILED MAR. 13, 1916.

1,291,568.

Patented Jan. 14, 1919.

2 SHEETS—SHEET 1.

Fig. 1.



SHARPS AND FLATS OMITTED FOR SAKE OF CLEARNESS

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2 SHEETS—SHEET 2.

Fig. 2.

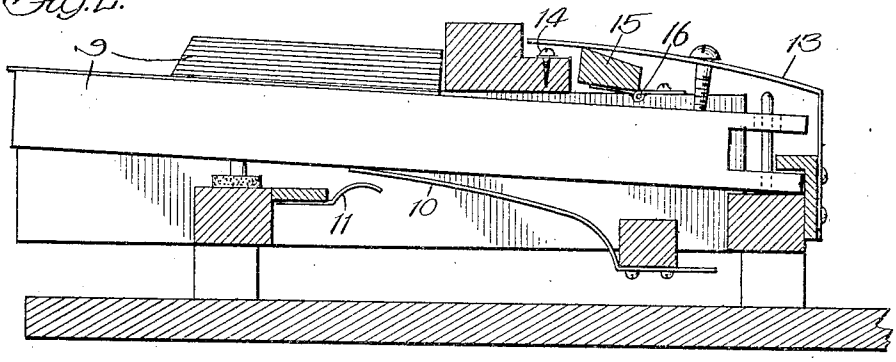


Fig. 3.

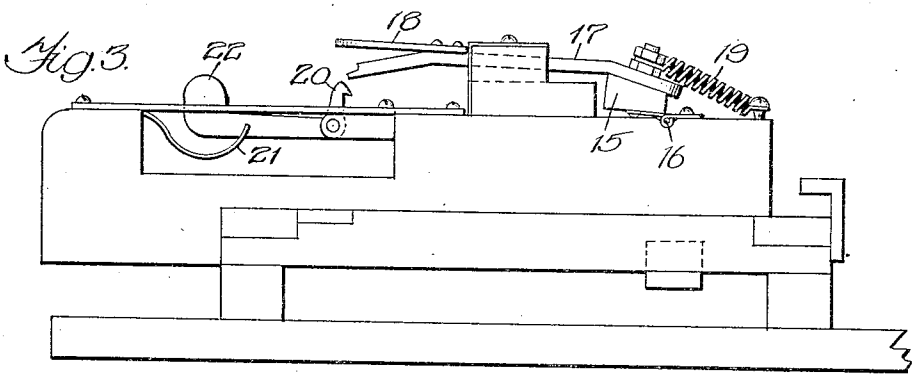
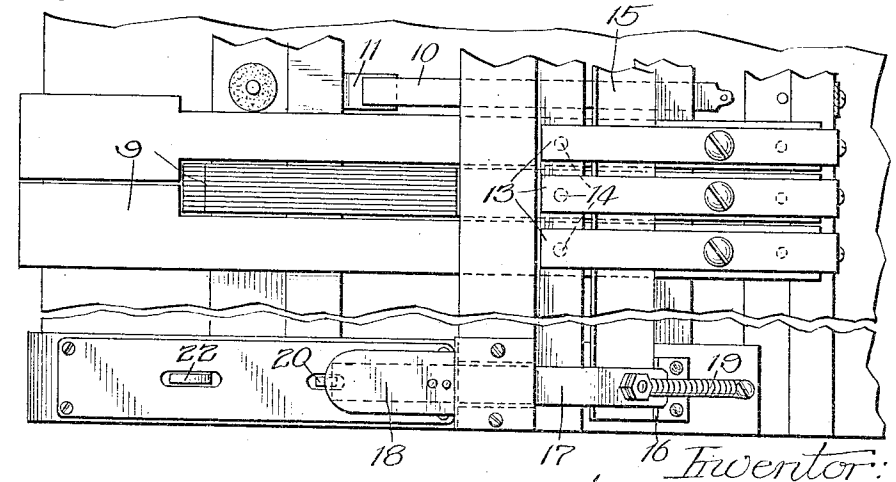


Fig. 4.



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UNITED STATES PATENT OFFICE.

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COUPLER FOR ELECTRICAL MUSICAL INSTRUMENTS.

1,291,568. Specification of Letters Patent. Patented Jan. 14, 1919.

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To all whom it may concern:

Be it known that I, FREDERICK B. LITTLE, citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Couplers for Electrical Musical Instruments, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to couplers for electrical musical instruments which employ electro-magnets incorporated in their sound producing devices and keys for controlling the operation of the electro-magnets. By means of my invention each of a plurality of keys may control the operation of a plurality of sound producing devices by means of switches individual to such sound producing devices. I provide means by which one of the switches controlled by each such key may be rendered ineffective so as to reduce the number of sound producing devices governed by that key.

As I have embodied the invention each key in each octave except the highest octave is adapted to control two switches and the sound producing devices individual to such switches, the keys in the last octave being each preferably limited to the operation of one sound producing device only and the switch which controls that device. Each key that is adapted to control two switches and the sound producing devices individual thereto is also provided with means for rendering one of these switches inoperative, whereby the performer may include or exclude the extra sound producing device at will.

Unitary means are desirably employed in connection with all of those keys that are provided each with two switches for throwing the extra switches into and out of service simultaneously.

I will explain my invention more fully by reference to the accompanying drawings showing the preferred embodiment thereof and in which Figure 1 is a diagrammatic view illustrating one circuit arrangement; Fig. 2 is a sectional view taken transversely of the keyboard and showing one key and two switches governed thereby, this figure also illustrating means for rendering one of these switches ineffective; Fig. 3 is a side view, particularly illustrating the mechanism for rendering the extra switches inoperative; and Fig. 4 is a plan view illustrating a part of a bank of keys and the mechanism associated therewith.

Like parts are indicated by similar characters of reference throughout the different figures.

The sound producing devices may include any suitable or desired form of electro-magnetic mechanism. In the embodiment of the invention illustrated, each sound producing device includes a sounding bar 1, a hammer 2 for operating it, and an electro-magnet 3 whose armature carries the hammer. A switch 4 is included in circuit with the winding of the magnet. The switch contacts are adapted to be separated by the switch actuator 5 carried by the armature of the magnet before the hammer 2 has quite completed its movement toward the sounding bar, the final part of the movement of the hammer being due to the momentum imparted to the hammer by the energized magnet. A second electro-magnet 6 has one armature switch 7 included in circuit with the winding of the magnet 3 and a second armature switch 8 in circuit with the winding of the magnet 6, the arrangement being such that when circuit is closed through the winding of the magnet 6 the magnet 3 will be repeatedly operated, the magnet 6 operating to interrupt the circuit of the associate magnet 3 at the armature switch 7. In Fig. 1 I have shown only the elements 1, 2, 4 and 5 that pertain to one sound producing device, it being understood that each of the other circuit interrupting magnets 6 illustrated has in association with it a magnet 3 and the elements 1, 2, 4 and 5 correlated to this magnet. In this figure the armatures 8 belong to the magnets 6. The various elements of the apparatus are merely diagrammatically and not structurally shown. The manual key 9 is individual to each magnet 6, the keys 9 being arranged in a bank as in a piano keyboard to be manipulated by the performer. In Fig. 1, the letters A to G, A^1 to G^1, A^2, B^2, C^2 are also applied to the keys 9 there illustrated, and the circuit-interrupting magnet 6 respectively individual to such keys, to indicate more clearly the octave coupling of said magnets 6 and the sound producing bars individual thereto. Each manual key 9 is normally elevated by a leaf

spring 10, this spring being depressed each time the key having it is played upon. In addition to performing this mechanical function each spring 10 desirably also constitutes a contact spring that is brought into engagement with a contact 11 whenever the key 9 having such spring is sufficiently depressed and as the contacts 10 and 11 are serially related to the corresponding circuit interrupting magnet 6, circuit is closed through this magnet each time the contacts 10 and 11 are brought together, the established circuit being traceable from one pole of the battery 12, through the winding of said circuit-interrupting magnet 6, the vibrating armature switch 8 of such magnet, the engaged contacts 10 and 11, back to the battery. Each energized magnet 6 establishes circuit for the magnet 3 individual thereto, which circuit may be traced from the battery 12, through the switch 4, the winding of the magnet 3, the armature switch 7, back to the battery.

The sounding bars 1 are of different sizes and are preferably arranged in a chromatic scale and as all of the manual keys 9 are provided with switches 10 and 11, any sounding bar 1 individual to any sufficiently depressed key 9 is struck by the hammer 2 as a consequence of the circuits established. It may be desired not only to have the single bar 1, normally individual to each manual key, set into vibration when such key is sufficiently depressed, but it may also be desired to have another sounding bar, at a suitable interval from the first, set into vibration at the same time. I have provided means whereby two sounding bars 1 an octave apart may be set into vibration each time a manual key 9 normally individual to one of these bars is sufficiently depressed, this result desirably following the operation of any of the manual keys 9 excepting those included in the highest octave. To this end, all the keys excepting those in the highest octave, are desirably provided each with an extra switch which includes the contact spring 13 and a contact anvil 14, which contacts are serially related with the magnet 6 spaced an octave or other suitable interval apart from the magnet normally or permanently individual to the manual key 9 having such switch 13, 14. The coupling conductors are indicated by dotted lines, for the sake of clearness.

Each contact 13 is desirably in the form of a leaf spring carried by the manual key 9 and adapted, unless obstructed in its movement, to engage its complemental contact 14 each time the contact 10 is brought into engagement with its complemental contact 11, whereby two magnets 6 are included in circuit, these magnets 6 being individual to sound producing bars 1 that are spaced an octave or other suitable interval apart. The switches having the contacts 13 and 14 thus constitute coupling switches. Whenever the springs 13 are not to be effectively operated the bar 15 is turned upwardly upon its pivot 16 so that the springs 13 will engage the bar before they could reach the contacts 14. This bar constitutes the preferred means for simultaneously rendering the coupling switches ineffective and in order that it may be quickly operated it desirably carries a catch 17 that in turn carries a finger piece 18 whereby the catch may be depressed against the force of a spring 19 when the bar is to be depressed, this spring operating to bring the bar into the range of normal movement of the springs 13 when the catch is released. When the catch is depressed it engages the hook 20 which is normally pressed by the spring 21 to occupy a position in which it may hold the catch depressed against the force of the spring 19. When the coupler switches are to be rendered ineffective the finger piece 22 is depressed against the force of the spring 21 to withdraw the hook 20 from engagement with the catch 17 whereupon the spring 19 is effective to rotate the bar 15 into the range of normal movement of the springs 13 then to render the coupler switches ineffective.

While I have herein shown and particularly described the preferred embodiment of the invention I do not wish to be limited to the precise details of construction shown as changes may readily be made without departing from the spirit of my invention, but having thus described my invention I claim as new and desire to secure by Letters Patent the following:—

1. Coupling mechanism for a key-operated musical instrument including two manual keys of the instrument; two switches 10, 11, respectively operable by said keys; two electro-magnetic sound-producing devices, respectively controlled by said switches; an additional switch 13, 14, individual to and operable by one of said keys and in controlling relation to the electro-magnetic sound-producing device that is individual to the other key; a bar that is movable into position to obstruct circuit-changing movement of said additional switch to prevent operation of said additional switch; a catch for holding said bar in one of its alternative positions; and a spring for placing the bar in the other of its alternative positions when such catch is released.

2. Coupling mechanism for a key operated musical instrument including two manual keys of the instrument; two switches 10, 11 respectively operable by said keys; two electro-magnetic sound producing devices respectively controlled by said switches; an additional switch 13, 14 individual to and operable by one of said keys and in con-

trolling relation to the electro-magnetic sound producing device that is individual to the other key; and a motion-stopping element movable into position to obstruct circuit changing movement of said additional switch to prevent operation of said additional switch.

In witness whereof I hereunto subscribe my name this twenty-sixth day of February, A. D. 1916.

FREDERICK B. LITTLE.

Witnesses:
G. L. CRAGG,
ETTA L. WHITE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."