July 29, 1941. S. T. BONILLA 2,250,522

ELECTRICAL PLAYER ATTACHMENT FOR PIANOS AND SIMILAR KEYBOARD INSTRUMENTS

Filed April 19, 1941 6 Sheets-Sheet 1

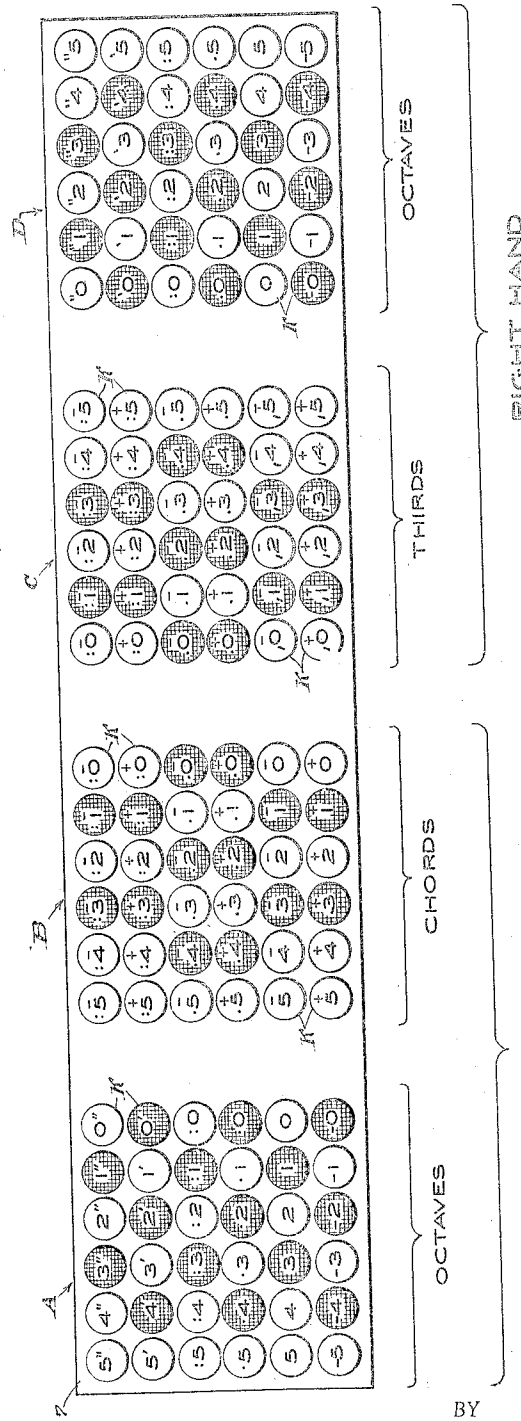


FIG. 1

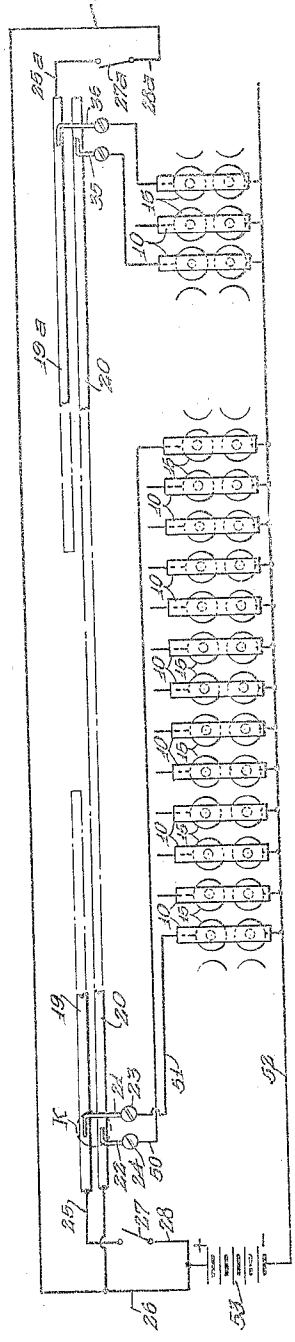


FIG. 1-A

INVENTOR.
Saturnino Tofe Bonilla

BY Mocco Blum
ATTORNEYS.

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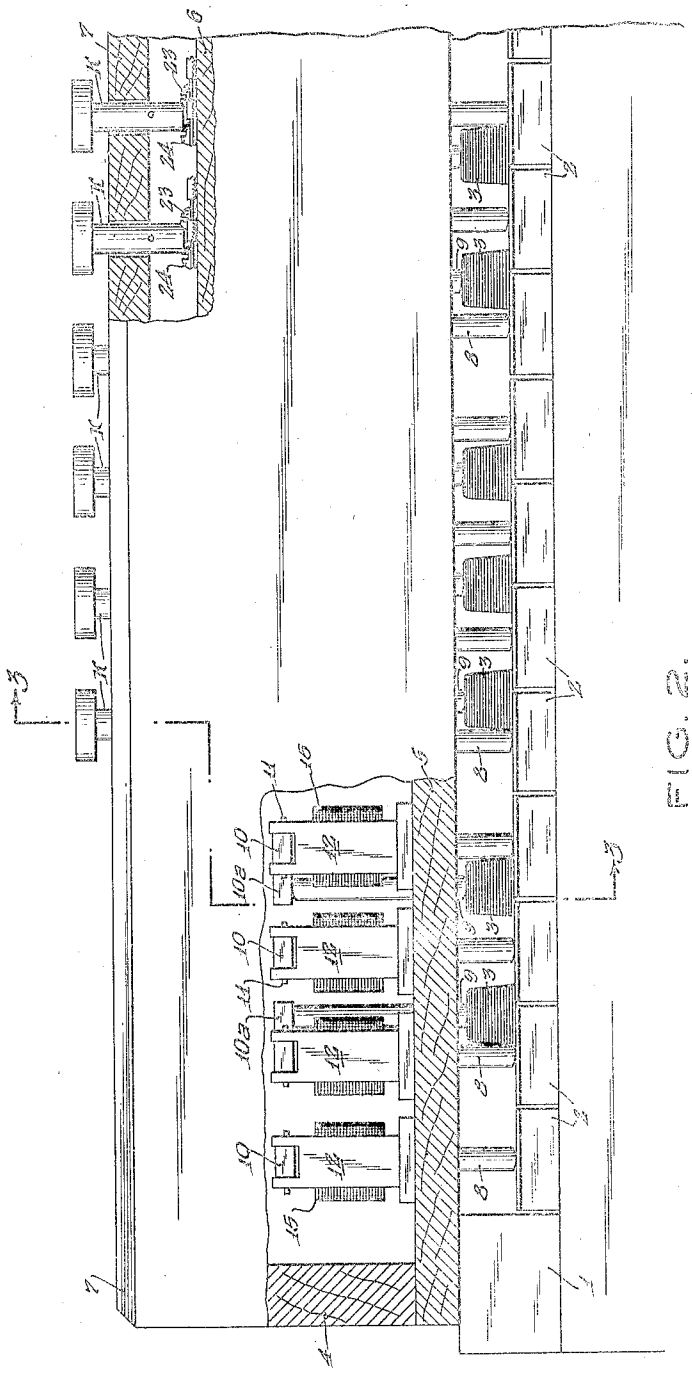


FIG. 2.

INVENTOR.
Saturnino Tofe Bonilla

BY
Marc & Blum
ATTORNEYS

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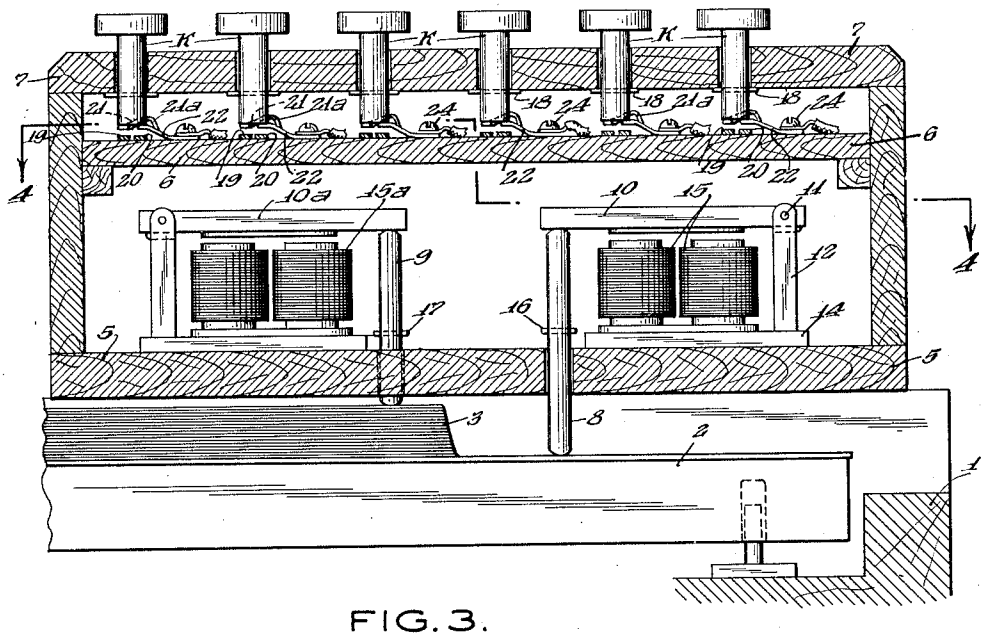


FIG. 3.

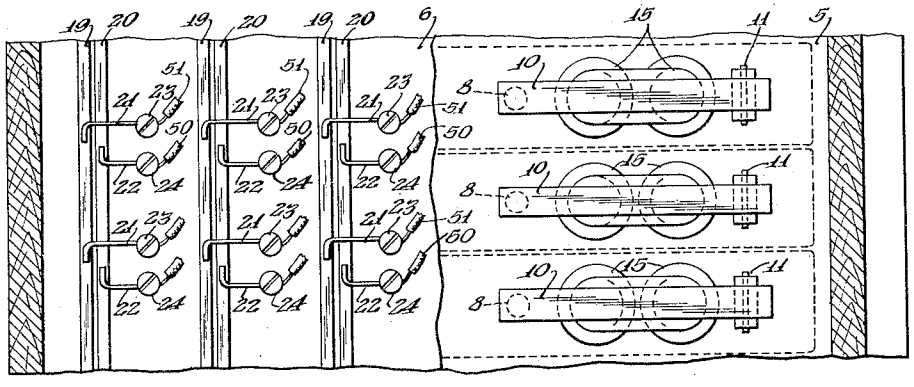


FIG. 4.

INVENTOR.
Saturnino Tofe Bonilla
BY
Mocic & Blum
ATTORNEYS

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ELECTRICAL PLAYER ATTACHMENT FOR PIANOS AND SIMILAR KEYBOARD INSTRUMENTS

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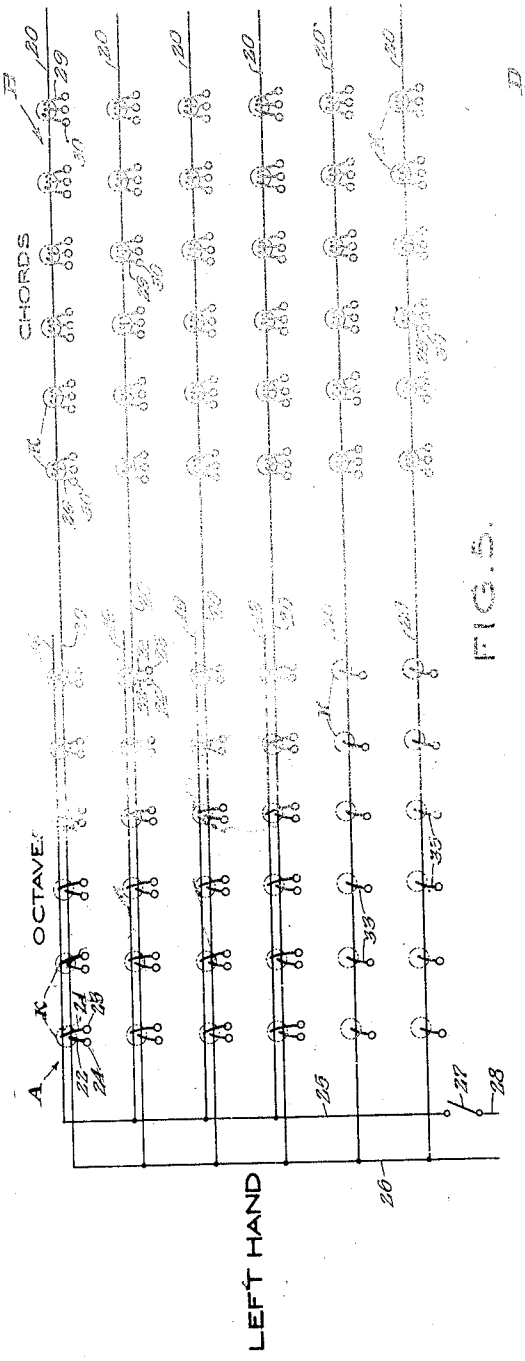


FIG. 5.

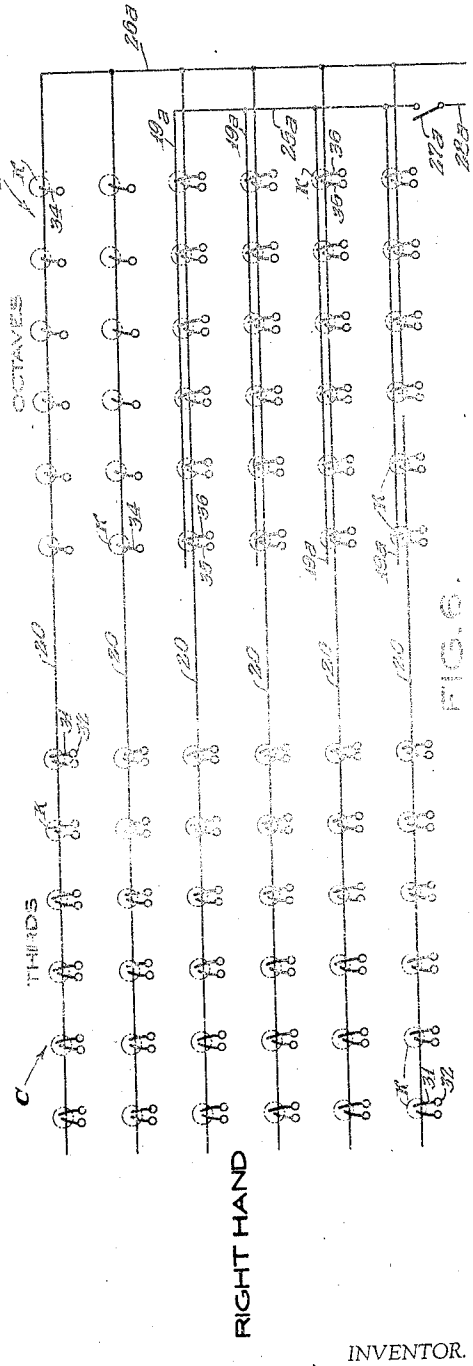


FIG. 6.

INVENTOR.
Saturnino Sofe Bonilla

BY Morse & Blum
ATTORNEYS

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ELECTRICAL PLAYER ATTACHMENT FOR PIANOS AND SIMILAR KEYBOARD INSTRUMENTS

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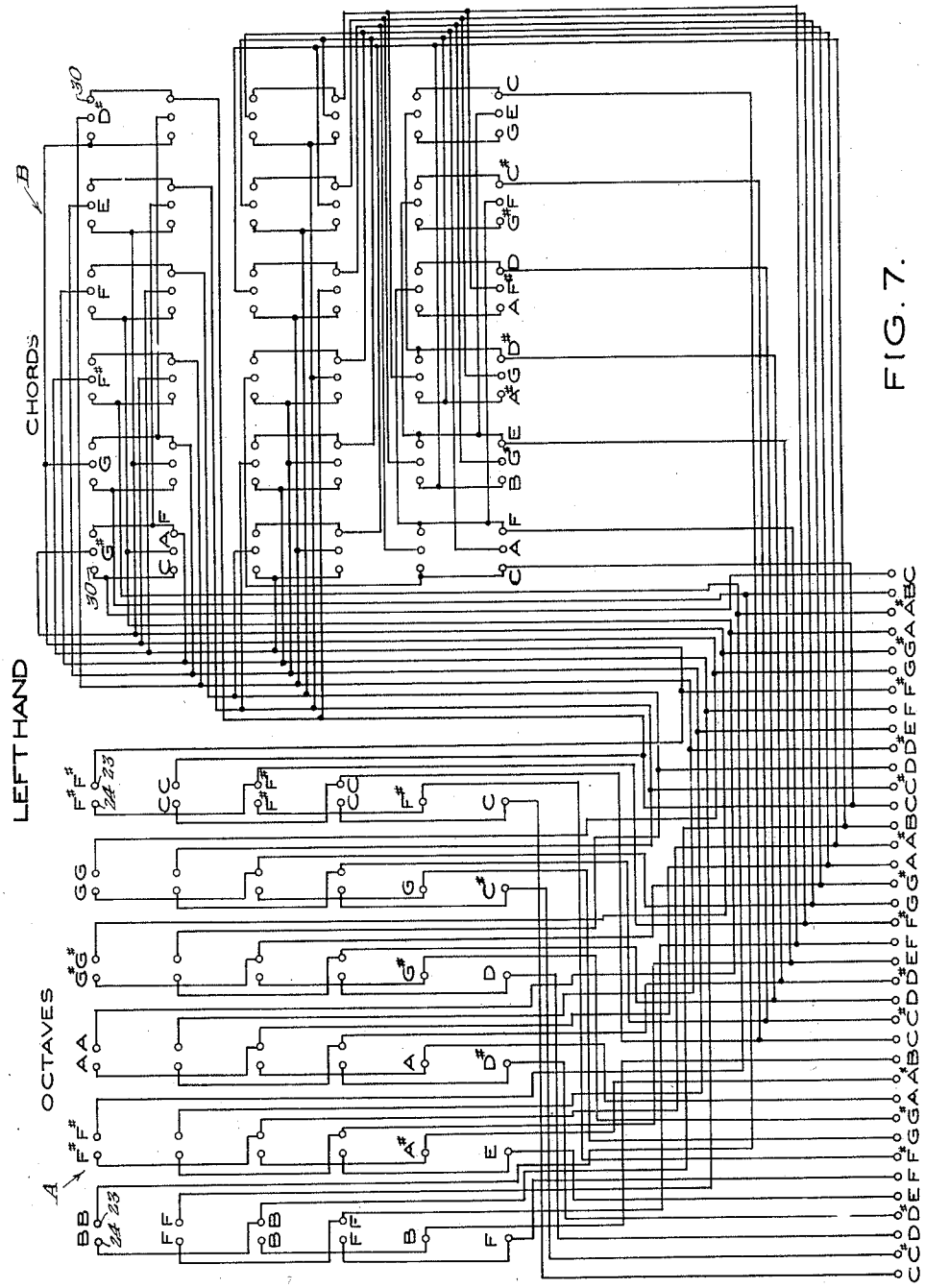


FIG. 7.

INVENTOR.
Saturnino Tofe Bonilla
BY
Mocker Blum
ATTORNEYS

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ELECTRICAL PLAYER ATTACHMENT FOR PIANOS AND SIMILAR KEYBOARD INSTRUMENTS

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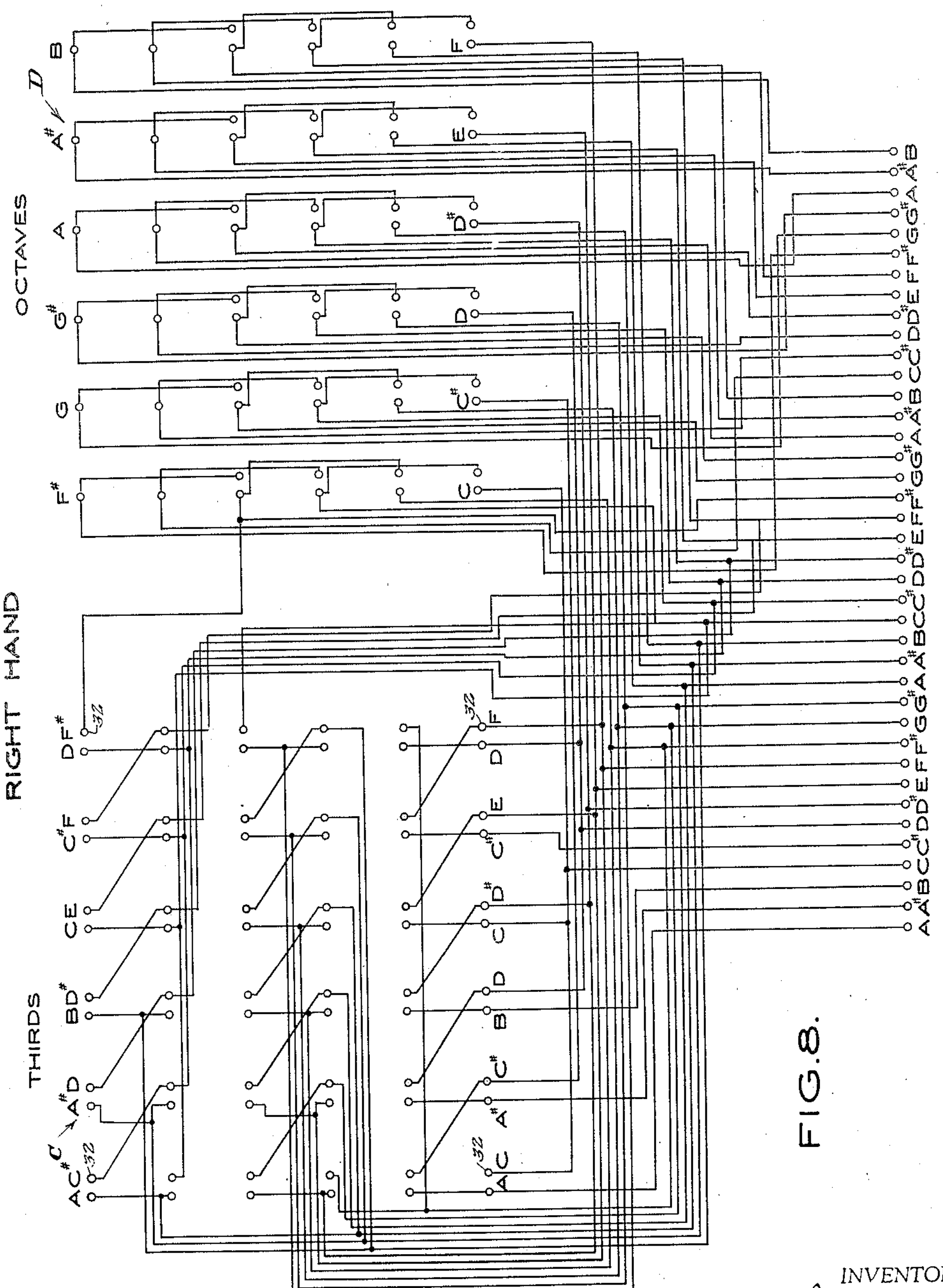


FIG. 8.

INVENTOR.

Saturnino Tofe Bonilla

BY Mock & Blum

ATTORNEYS

Patented July 29, 1941 2,250,522

UNITED STATES PATENT OFFICE

2,250,522

ELECTRICAL PLAYER ATTACHMENT FOR PIANOS AND SIMILAR KEYBOARD INSTRUMENTS

Saturnino Tofé Bonilla, New York, N. Y.

Application April 19, 1941, Serial No. 389,282

3 Claims. (Cl. 84—423)

My invention relates to a new and improved electrical player attachment for pianos and similar keyboard instruments.

One of the objects of the invention is to provide a simple attachment which can be applied to the keyboard of any existing piano or the like, whereby the notes of the piano can be played individually, and whereby suitable chords can also be played by actuating suitable individual keys of the attachment.

Another object of the invention is to provide an attachment which will render the playing of the piano more easy to inexperienced persons.

Another object of the invention is to provide an improved attachment whereby octaves can be played by actuating suitable individual keys of the attachment.

Other objects of the invention will be stated in the annexed description and drawings, which illustrate a preferred embodiment thereof.

Fig. 1 is a top plan view of the keyboard of the improved attachment, showing the keys which are respectively actuated by the left hand and by the right hand of the player. These keys are arranged in sets or groups, said groups being respectively designated as A, B, C and D. Groups A and B are played by the left hand, and groups C and D are played by the right hand. The keys of group A, with the exception of the keys in the two front rows of group A, can play octaves. The keys in the two front rows of group A play single notes. The keys of group D, with the exception of the keys in the two rear rows of group D, can also play octaves. The keys in the two rear rows of group D play single notes.

Fig. 1—A is a detail view of certain parts of the circuit.

Fig. 2 is a front elevation of the attachment, taken at the group A. Part of the representation of the attachment is broken away in Fig. 2, in order to show certain interior parts.

Fig. 3 is a sectional view on the line 3—3 of Fig. 2.

Fig. 4 is a sectional view on the line 4—4 of Fig. 3.

Fig. 5 is a diagrammatic view of the contacts for the groups A and B.

Fig. 6 is a view corresponding to Fig. 5, of the contacts for groups C and D.

Figs. 7 and 8 are respectively circuit diagrams of the groups of keys A and B, and C and D.

Fig. 2 diagrammatically shows the keys of a piano or the like. This piano has a frame or casing 1, and it is provided with a conventional keyboard which consists of the white keys 2 and the black keys 3. The attachment is provided with a casing which has vertical walls 4, and a horizontal bottom wall 5. The casing is also provided with an intermediate horizontal partition wall 6, which is located between the bottom wall 5 of said casing and the horizontal top wall 7.

The bottom wall 5 of the attachment rests upon the frame member of the piano.

The bottom or base wall 5 of the attachment is provided with a series of perforations through which suitable vertically movable plungers or rods extend. Each of these plungers overlies a respective white key or respective black key, so that when a plunger is depressed, it actuates the respective white key or black key of the piano. The plungers 8 actuate the white keys 2 and the plungers 9 actuate the black keys 3. These plungers 8 and 9 are located slidably in suitable guide perforations of the bottom wall 5 of the attachment.

The respective plungers 8 and 9 are actuated by respective identical electrical units. As shown in Fig. 3, the respective plungers 8 and 9 rest freely upon the respective keys 2 and 3. These keys 2 and 3 have the usual springs for holding them in their normal horizontal positions. The weights of the respective plungers 8 and 9 are insufficient to depress the respective keys 2 and 2 below their normal horizontal positions.

The plunger 8 is actuated downwardly by an armature 10, when said armature 10 is moved downwardly by respective electromagnetic means. The armature 10 is pivoted at 11 to a standard 12 which is connected to a magnet-base 14, which is suitably fixed to the bottom wall 5 of the attachment. Each armature 10 is associated with a pair of coils 15, which have respective cores, so that when said coils 15 are energized from a source of electric current, the armature 10 is turned downwardly to depress the respective plunger 8, and thus actuate and depress the respective white key 2. The electromagnetic means for actuating the respective plungers 9 are identical with the electromagnetic means for actuating the respective plungers 8. The armature 10a therefore corresponds to the armature 10, and the coils 15a correspond to the coils 15. Each pair of coils 15 or 15a is connected in series, and one end of a coil of each pair is connected in any conventional manner, as for example, by a wire 52, to one side of a source of electric current 53. This is represented conventionally as a battery.

The plungers 8 and 9 are made of hard but resilient rubber or of other suitable insulating material which can slide easily in the respective

guide perforations of the bottom wall 5. The plungers 8 and 9 are respectively provided with stop pins 16 and 17, which limit their downward movement.

The shanks of the keys K of the attachment are mounted slidably in suitable guide perforations which are provided in the top wall 7 of the casing of the attachment. The shank of each key K is provided with a stop pin 18, which limits the upward movement of the respective shank, relative to the top wall 7. The keys K are made of any suitable insulating material. Each of the octave-playing keys of the four rear rows of group A is associated with a pair of buss-bars 19 and 20. Said buss-bars 19 and 20 are mounted upon the intermediate partition 6 of the casing of the attachment. Said partition 6 is made of insulating material, so that the buss-bars 19 and 20 are insulated from each other. Each octave-playing key K of the aforesaid group A is associated with a pair of spring wires 21 and 22, which are respectively fixed to the partition 6 by means of terminal screws 23 and 24. Each pair of coils 15 or 15*a* comprises a single electromagnetic device, one terminal of which is connected to one side of the source of electric current. The other terminal of each electromagnetic device is connected to one of said terminal screws. These spring wires 21 and 22 have the bent construction which is illustrated in Fig. 4. The tips of each pair of spring wires 21 and 22 normally abut the bottom wall of the shank of the respective octave-playing key K, and the resilience of said spring wires 21 and 22 normally holds the respective octave-playing key K in the normal elevated position which is shown in Fig. 3. Said wires are upwardly arched and each said wire has an L-shape in plan view.

When the wire 21 is depressed by the respective octave-playing key K, the free end or tip of said wire 21 will contact with the respective buss-bar 19, but not with the respective buss-bar 20, due to the upwardly arched shape of said wire 21. Each wire 22 is sufficiently short so that when its tip is depressed by the shank of the respective octave-playing key K, said tip will contact only with the respective buss-bar 20 and not with the respective buss-bar 19. The bottom wall of the shank of each said octave-playing key K is of sufficient area to overlie the tips of the respective associated resilient wires 21 and 22, so that when a respective key K is depressed, the respective associated wires 21 and 22 will respectively contact with the buss-bars 19 and 20.

As shown in Fig. 5, the buss-bars 19 are confined to the four rear rows of group A.

The buss-bars 20 extend under the four groups of keys, so that said buss-bars 20 are used to play chords and thirds, in the intermediate groups B and C, and also to play octaves and single notes, by means of the keys of group D.

At the left-hand side of the attachment, the buss-bars 19 are connected to a first common buss-bar or conductor 25 which is fixed to the partition 6, and all the buss-bars 20 are connected to a second common buss-bar or conductor 26, which is also fixed to said partition 6. The conductor 25 can be connected through the manually-operated switch 27, to a conductor 28. The conductors 26 and 28 are connected to the other side of said source of current, so that the circuit of an electro-magnetic device is closed when the respective contact spring touches the respective buss-bar, if said buss-bar is connected to the other side of said source of current. This source of current may be direct current or it may be alternating current. If alternating current is used, the power line can include a rectifier for supplying direct current, or else the electromagnets can be of the well-known type which exert a constant electromagnetic force, even though their coils are energized by alternating current.

The keys K in the group B, which are used for producing chords, are identical with those previously described, save that each respective key of group B cooperates with three spring wires 29, which are connected to respective terminal screws 30. Each said group of three contact springs 29 is associated with a single respective buss-bar 20. Each screw 30 is connected to a terminal of a respective electromagnetic device, so that three notes are played by actuating a key of group B.

In order to play the thirds by means of the keys of group C, spring contact wires 31 are arranged in pairs, each said spring wire having its base connected to the partition 6, by means of a terminal screw 32. The tips of each pair of spring wires 31 contacts a respective buss-bar 20 when said tips are depressed by a respective key K. Each terminal screw 32 is connected to one terminal of a respective electromagnetic device, so that two notes are played by depressing a key of group C.

The keys of the two front rows of group A, which play single notes, are respectively associated with single contact springs 33. When the tips of any said spring 33 is depressed by the shank of the respective key K, said tip contacts with the respective buss-bar 20, thus energizing a single electromagnetic device, and playing a single note.

The keys K of the two rear rows of group D, which play single notes, are associated with respective single contact springs 34, whose tips are depressed to contact with the respective buss-bar 20. Each terminal screw of springs 34 is connected to one side of a single electromagnetic device.

At the right-hand side of the attachment, the buss-bars 20 are connected to a third common conductor or buss-bar 26*a*, and the buss-bars 19*a* of group D are connected to a fourth common conductor or buss-bar 25*a*. The conductor 25*a* can be connected by manually-operated switch 27*a*, to conductor 28*a*.

The bottom of Fig. 7 corresponds to thirty-seven successive keys of the piano keyboard, which are played by the left hand of the operator, by means of the attachment. The bottom of Fig. 8 diagrammatically shows thirty-seven keys on the right-hand side of the regular keyboard, which are played by the right hand of the player, by using the attachment.

However, it will be noted that in the use of the improved attachment, the left hand goes from right to left in going from lower notes to higher notes. The right hand of the player goes from left to right on the improved attachment, in going from lower notes to higher notes.

Each one of the group of keys A—D consists of six rows. Each row is located one behind the other and each row has six keys. These rows are arranged in each group like the keyboard of a typewriter, so that the tips of the keys of each row are higher than in the preceding row. However, the tops of the keys in each group may be in the same plane.

Figs. 7 and 8 do not show the contact springs,

since the representation of the contact springs is unnecessary in these circuit diagrams.

The buss-bars **19** and **19***a* can be respectively disconnected from the source of current, by opening switch **27** or switch **27***a*, or by opening both said switches **27** and **27***a*. If switch **27** is opened, the keys of the last four rows of group A will play only single notes. If switch **27***a* is opened, the keys of the first four rows of group D will play only single notes.

In such case, the keys of the last four rows of group A will play the lower notes of the respective octaves, and the keys of the first four rows of group D will play the higher notes of the respective octaves.

The keys of group A and of group D, which can play either octaves or single notes, are designated as combination keys, and the other keys of said groups are designated as single keys.

In Fig. 1, the heads of the keys are represented as being marked with musical symbols, according to the system of musical notation which is shown in my U. S. Patent No. 1,883,115 dated October 18, 1932.

I have shown a preferred embodiment of my invention, but it is clear that numerous changes and omissions can be made without departing from its spirit. Likewise, the invention is not limited to the complete combination disclosed herein and it includes variable sub-combinations which can be used independently of the entire combination disclosed herein.

Whenever I refer in a claim or claims to the actuation of the keyboard on a piano, it is to be understood that I include the playing of equivalent musical instruments which are actuated by means of keys. Likewise, while the invention is disclosed in the form of an attachment whereby plungers or other actuating members move the respective conventional keys of a piano, the plungers or actuating members **8** and **9** may operate the action of the piano directly and without the use of the keys **2** and **3**.

In order to avoid limiting the invention to the use of electrically operated devices, each electro-magnet and its armature is designated generally as an operating device, which moves the respective actuating member **8** or **9**, out of the normal position to which said actuating member is biased. Each contact spring is designated as a control member which is biased to an "off" position, and which is moved to its "on" position, in which it touches the respective buss-bar, by the respective key. Each key of the four front rows of group A, for example, is an operator-actuated key which is movable to actuate a plurality of the contact springs to their "on" positions. The switch **27** or **27***a* is an operator-actuated control means which is movable independently of the members **8** and **9**, and independently of the armatures, to prevent the energizing of a selected electro-magnet by the movement of its respective contact spring to the "on" position. The invention is therefore not limited to electro-magnetic actuation or control.

As shown in Fig. 1—A, members **28** and **26***a* are connected to each other.

The buss-bars **20** are therefore permanently connected to one terminal of the source of current, and the buss-bars **19** and **19***a* can be manually connected to or disconnected from said terminal.

I claim:

1. Means for playing a piano comprising a plurality of movable actuating members which respectively play different notes, each said actuating member having a power-operated operating device which is adapted to operate the respective actuating member in order to play the respective note, each said operating device having a movable control member which is adapted to turn on the supply of power to said operating device when said control member is in the "on" position and to shut off the supply of power when said control member is in the "off" position, each said actuating member being biased to a normal position out of which said actuating member is moved by the respective operating device when the respective operating device is supplied with power, each said movable control member being biased to the "off" position, an operator-actuated key which is movable to actuate a plurality of said movable control members to their "on" positions, so that said key can play a plurality of notes, operator-actuated control means movable wholly independently of said actuating members and of said operating devices and adapted to prevent the supply of power to a selected operating device even when the respective control member is moved to the "on" position.

2. Mechanism for playing the notes of a piano comprising a series of movable members, each said member being adapted to play a note when said member is actuated, each said movable member having an electro-magnetic device which actuates the respective movable member when said electro-magnetic device is energized, one terminal of each said electro-magnetic device being connected to one side of a source of electric current, main buss-bars respectively associated with auxiliary buss-bars, the main buss-bars being connected to the other side of said source of current, the auxiliary buss-bars being connectible to said other side of said source of current by means of a switch which is movable either to the circuit-closing position of the circuit opening position, the other terminal of each said electro-magnetic device beng connected to a switch-member which is movable to contact with a buss-bar, said switch-members being biased away from said buss-bars, said switch-members being arranged in groups, each group comprising a plurality of said switch-members, the switch-members being movable to contact respectively with a main buss-bar and with an auxiliary buss-bar, each group having an operating key which is adapted to move the switch-members of the respective group into contact with the respective buss-bars.

3. Mechanism according to claim 2, in which the groups of switch-members correspond to combinations of notes selected from a class which consists of octaves and chords.

SATURNINO TOFÉ BONILLA.