W. J. BAKER.

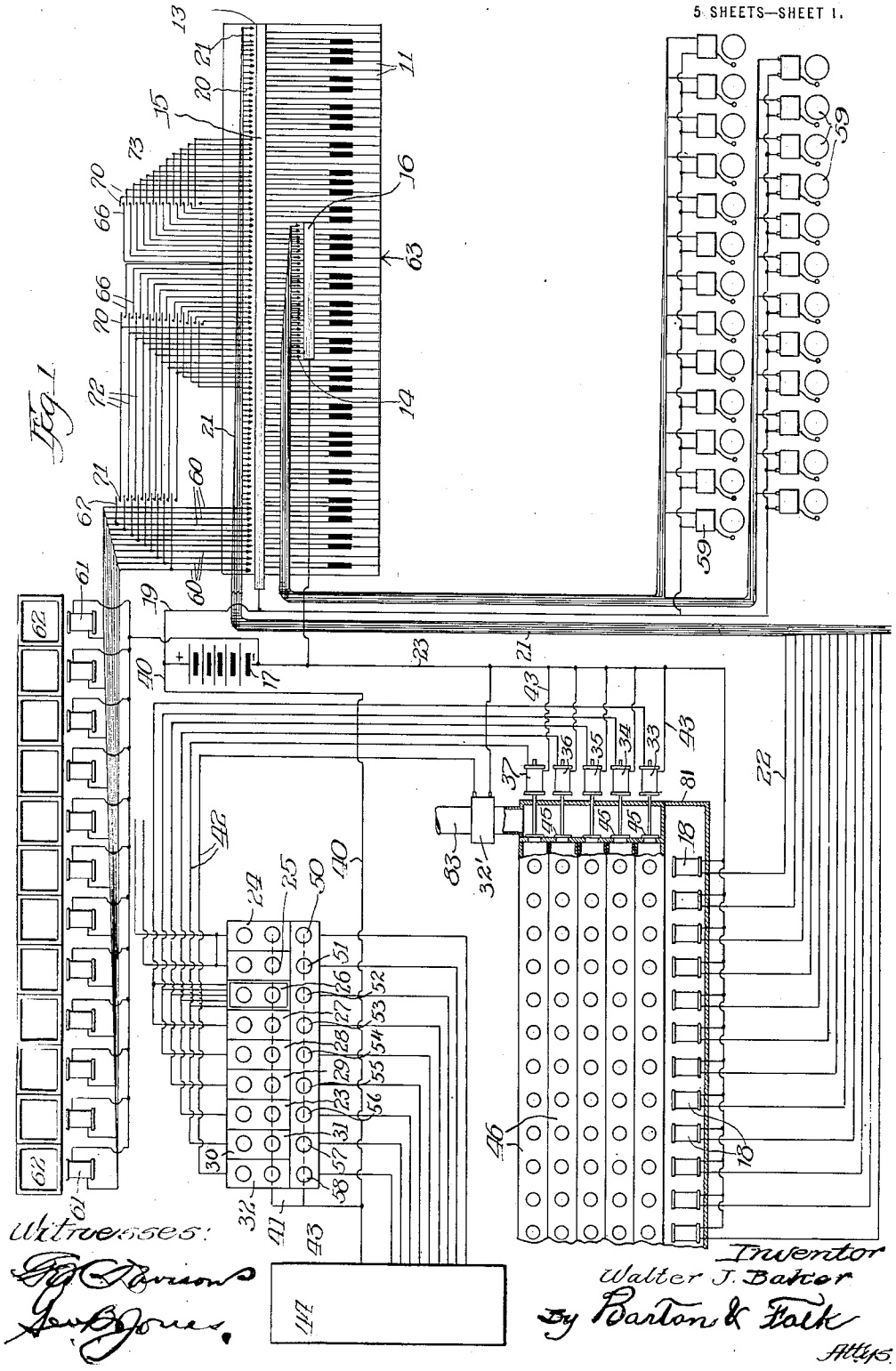
ELECTRICALLY OPERATED PIPE ORGAN.

APPLICATION FILED FEB. 20, 1915.

1,232,176.

Patented July 3, 1917.

5 SHEETS—SHEET 1.



Witnesses:

Inventor

Walter J. Baker

By Barton & Falk

Attys.

W. J. BAKER.

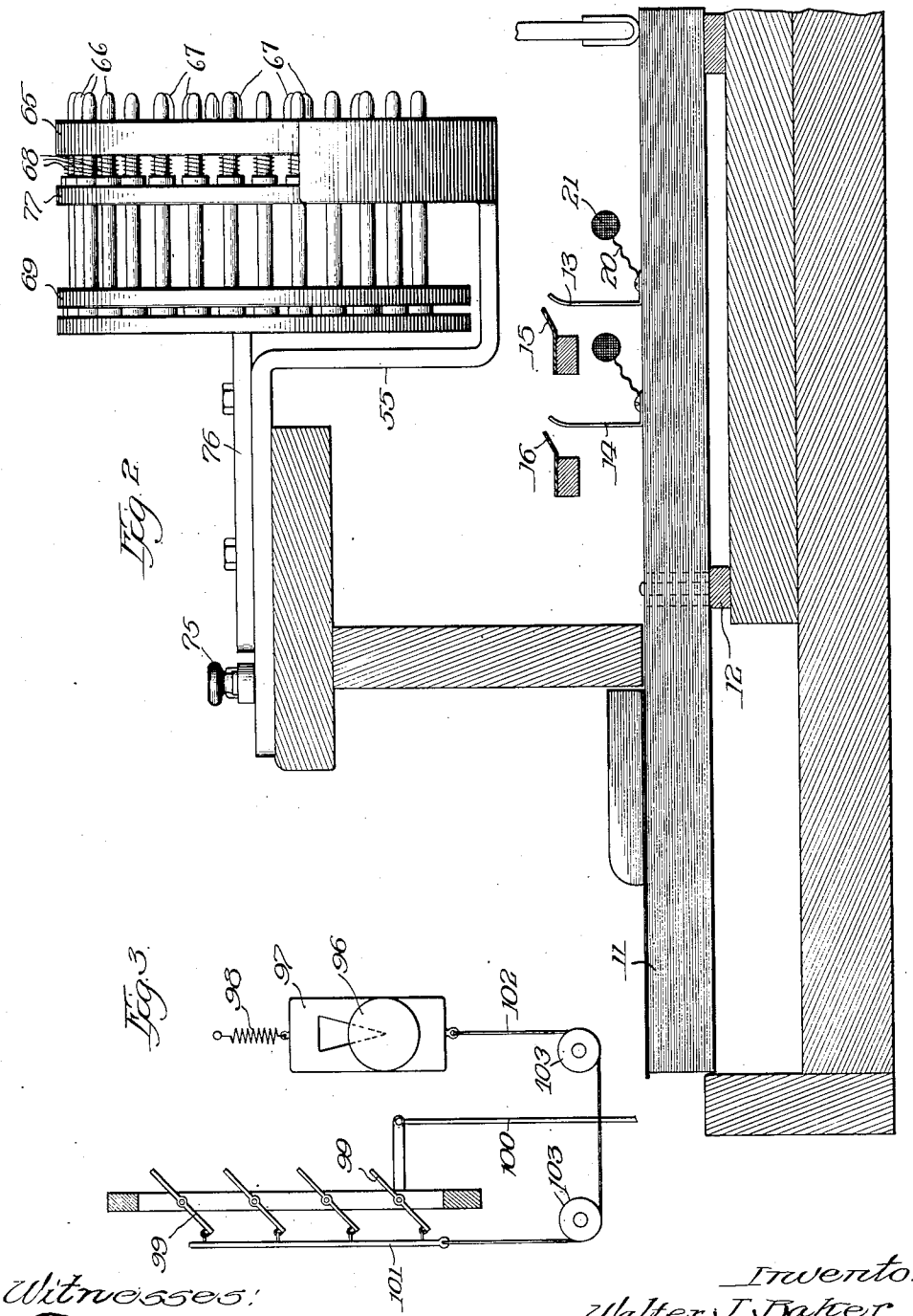
ELECTRICALLY OPERATED PIPE ORGAN.

APPLICATION FILED FEB. 20, 1915.

1,232,176.

Patented July 3, 1917

5 SHEETS—SHEET 2.



Witnesses:

Inventor

Walter J. Baker

By Barton & Folk

Attys.

W. J. BAKER.

ELECTRICALLY OPERATED PIPE ORGAN.

APPLICATION FILED FEB. 20, 1915.

1,232,176.

Patented July 3, 1917.

5 SHEETS—SHEET 3.

Fig. 4

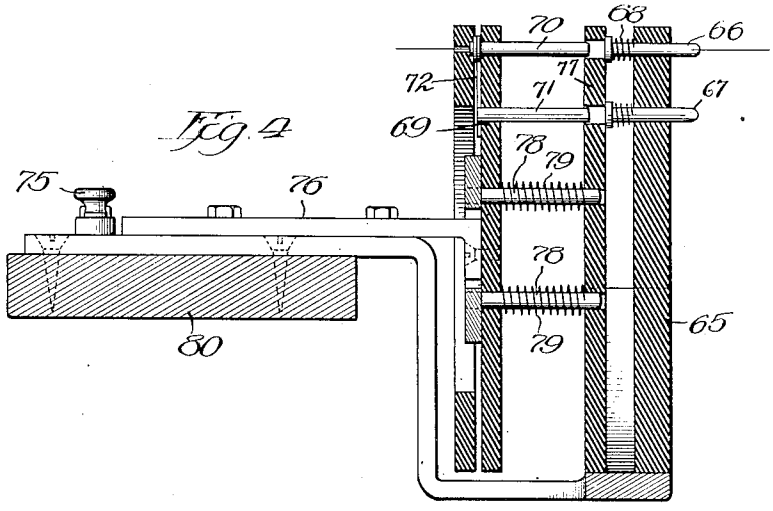


Fig. 5.

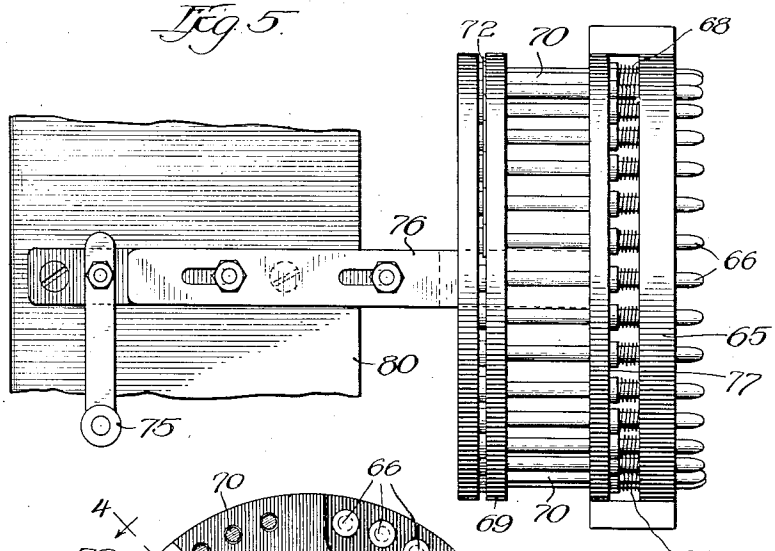
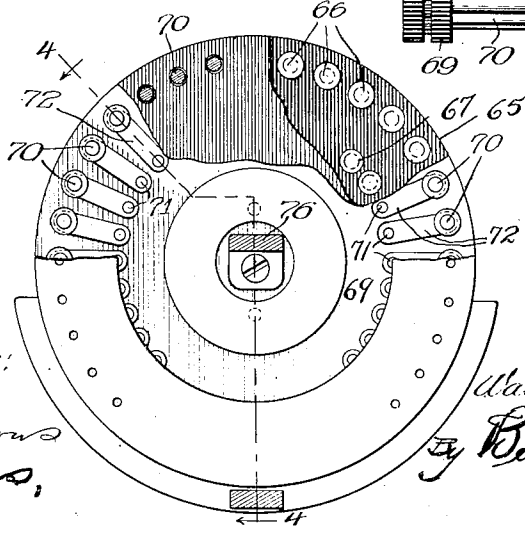


Fig. 6.



Witnesses:

Inventor

Walter J. Baker

By Barton & Folk

Attys.

W. J. BAKER.

ELECTRICALLY OPERATED PIPE ORGAN.

APPLICATION FILED FEB. 20, 1915.

1,232,176.

Patented July 3, 1917.

5 SHEETS—SHEET 4.

Fig 7

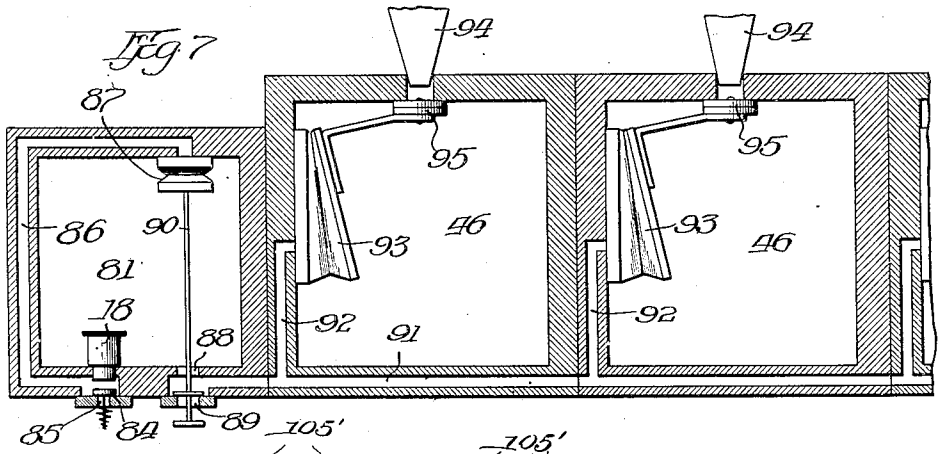
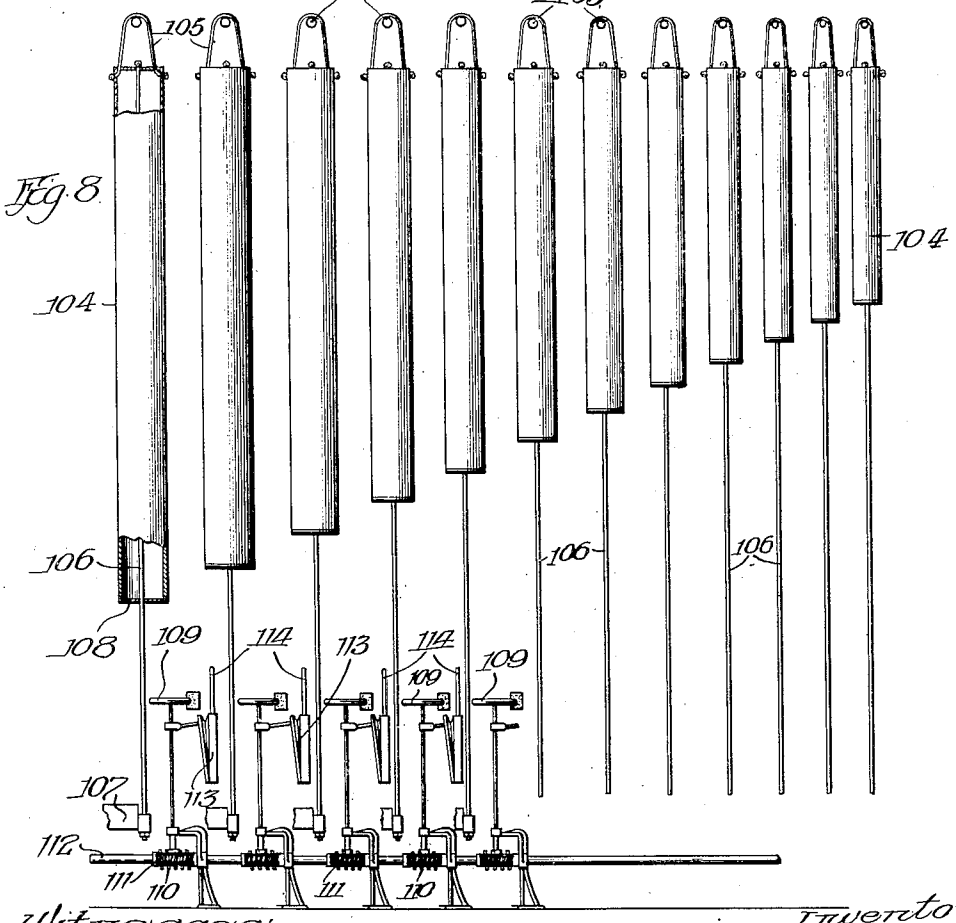


Fig 8



Witnesses:

Fes. Davison.

Jer. Bowes.

Inventor

Walter J. Baker

By Barton & Folk.

Attys.

W. J. BAKER.

ELECTRICALLY OPERATED PIPE ORGAN.

APPLICATION FILED FEB. 20, 1915.

1,232,176.

Patented July 3, 1917.

5 SHEETS—SHEET 5.

Fig 9.

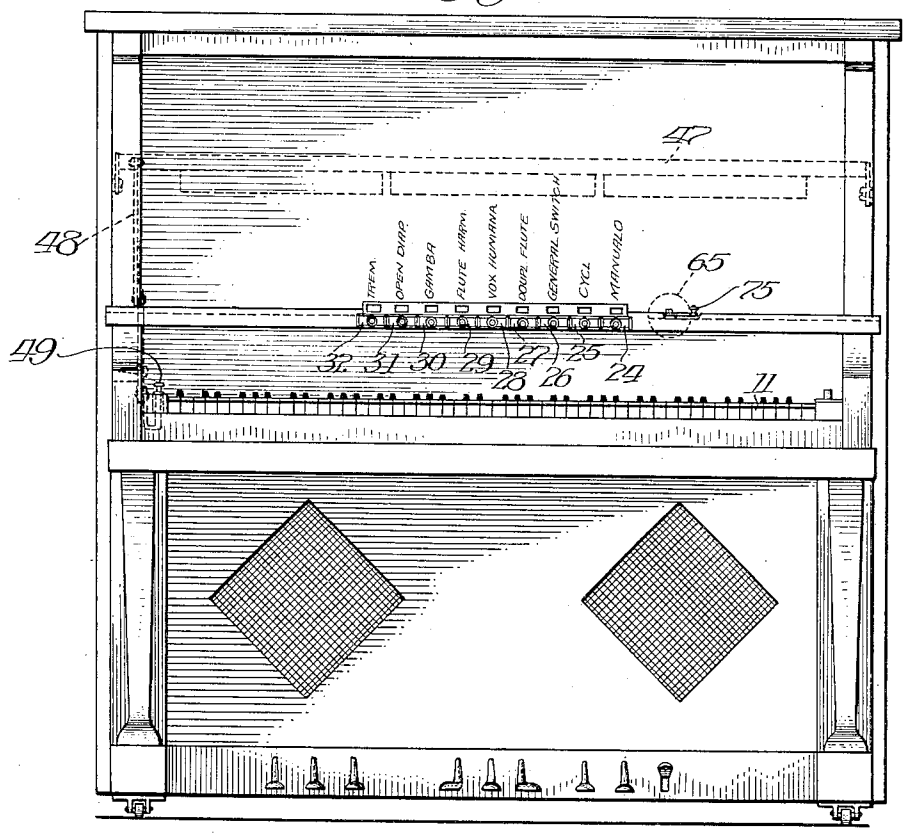
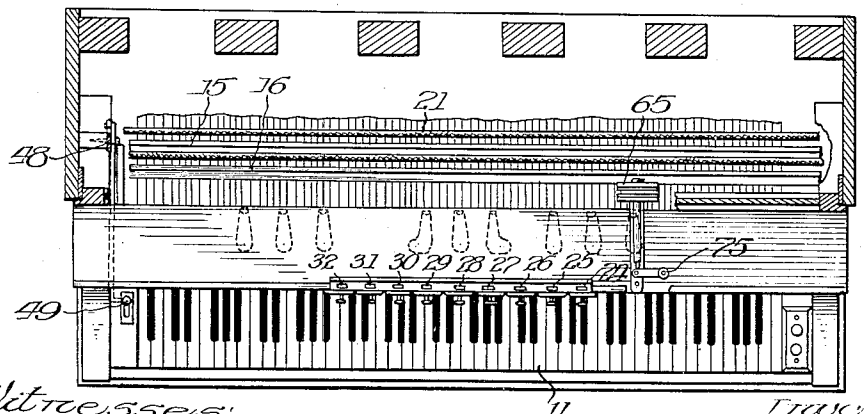


Fig 10.



Witnesses:
Geo. E. Davison.
Frances L. Pound.

Inventor
Walter J. Baker
By George Bayard Jones
Atty.

UNITED STATES PATENT OFFICE.

WALTER J. BAKER, OF CHICAGO, ILLINOIS, ASSIGNOR TO HARMO-ELECTRIC COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

ELECTRICALLY-OPERATED PIPE-ORGAN.

1,232,176. Specification of Letters Patent. Patented July 3, 1917.

Application filed February 20, 1915. Serial No. 9,748.

To all whom it may concern:

Be it known that I, WALTER J. BAKER, 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 Electrically-Operated Pipe-Organs, of which the following is a full, clear, concise, and exact description.

My invention relates to pipe organs and more particularly to improvements in means for controlling the organ from a single keyboard.

The objects of the invention are

To provide means permitting the organ to be played as to any or all of its stops from a piano keyboard.

To provide an improved coupler for playing octaves.

To provide a piano keyboard with attachments permitting it to be used as a substitute for the several keyboards or manuals of an organ.

To provide a piano with attachments permitting it to be played either in the usual way as a piano or in conjunction with an organ played from its keyboard or permitting the playing of the organ alone without the piano; and

To provide various improved circuit arrangements and structural improvements which will be apparent from a consideration of the embodiment of the invention illustrated in the drawings and hereinafter described.

Referring to the drawings,

Figure 1 is a diagrammatic showing of a portion of the organ and the circuit connections with the keyboard;

Fig. 2 is a sectional elevation through the keyboard;

Fig. 3 is a diagrammatic showing of a whistle operated in conjunction with the swell;

Fig. 4 is a sectional elevation of the electric coupler on the line 4—4, Fig. 6.

Fig. 5 is a top plan view thereof;

Fig. 6 is an end elevation thereof partly broken away;

Fig. 7 is a section through the wind chests; and

Fig. 8 is an elevation of a special attachment in imitation of chimes.

Fig. 9 is an elevation of a piano.

Fig. 10 is a plan view thereof partly in section, with certain parts removed for the sake of clearness.

Before proceeding to a detailed description of the circuits, electromagnets and mechanism actuated thereby, the general operation may be understood by stating that an ordinary piano may be equipped with contacts whereby each key may be used to close a circuit to play the corresponding notes of an organ in whichever one or more of the various stops the operator may select. The stops are selected by depressing ordinary push-button electric switches. An electric coupling device is provided whereby if any note higher than a certain predetermined note is played, the note an octave higher is also played simultaneously. Playing any note lower than the arbitrary dividing point on the keyboard results in playing simultaneously notes one and two octaves lower. In addition to the usual stops of the organ, a number of auxiliary musical effects are provided for and may be rendered available by the depression of additional push-button switches. For example, a series of bells, various whistles and other special features may be provided, all actuated from the piano keyboard in such manner as not to materially affect the touch, that is the lightness of operation of the keys of the latter.

Referring to Figs. 2, 9 and 10, it will be seen that the ordinary piano keys 11, which are pivotally supported at 12, are provided with one or more thin, light resilient metal contacts 13, 14. All the keys illustrated are provided with contacts 13 as shown in Fig. 1, whereas a smaller number, preferably only twenty-five are provided with the second contacts 14. The keys representing the highest and lowest octaves may be left in their normal condition if desired. When any key is depressed the resilient contact 13 thereof engages a contact bar 15 which runs the length of the keyboard. A similar shorter contact bar 16 is engaged by the contacts 14 of such keys as are provided with said contacts.

The contact bar 15 is connected with one of the terminals of a battery 17 or other suitable source of current. The actuation of any key closes a circuit from the battery

through one of the corresponding electromagnets 18, each of which corresponds to a note of the chromatic scale. The circuit may be traced from battery 17, through conductor 19 to contact bar 15, thence to the contacts 13 and through the flexible conductors 20 to the cable 21, parallel conductors 22, to the electromagnets 18, returning through the common return conductor 23 to the battery. Through suitable mechanism hereinafter described, the energization of any magnet 18 permits all notes of the same pitch to be played throughout the various stops, provided the performer has previously actuated the switch corresponding to one or more stops which he desires to have played. For example, the depression of the middle A key on the piano keyboard energizes one of the magnets 18 and permits all of the A pneumatics to admit air to the pipes of the same pitch such as the flute, voxhumana or other stops.

The stop controlling switches are numbered 24, 25, 26, 27, 28, 29, 30 and 31 in the diagram. They are preferably two button snap switches. An additional switch 32 is provided for controlling the tremolo 32'. These switches are arranged in a bank, as shown in the drawing, and mounted in any convenient location, preferably just over the piano keyboard. Said switches control circuits from the battery 17, which are in parallel to the key-controlled circuits, and each includes one of the electromagnets 33, 34, 35, 36, 37, etc., (the number being capable of indefinite extension). The circuit may be traced from battery 17, through conductor 40, to the common conductor 41, thence through one or more of the switches 24 to 32, inclusive, in parallel, to the conductors 42 which lead to the electromagnets 33 to 37, inclusive, returning from the individual magnets through parallel conductors 43 to the common return conductor 23 and thence to the battery 17. Said return conductor also connects with other electrically operated devices 44, hereinafter described. When the switch 27 is actuated, for example, the corresponding electromagnet 33 is energized, thereby opening the corresponding valve 45 and admitting air to the stop chamber 46 of the lowest stop shown on the diagram. As a result, whatever keys are played on the piano, the corresponding notes in said stop are played on the organ. If more than one switch is actuated, so as to throw in several stops, each key struck on the piano keyboard will cause as many notes of the same pitch but a different quality or timbre to be played, as switches have been actuated. With this arrangement it is possible to play all the stops simultaneously by actuating all of the stop switches. To save excessive manipulation, however, I provide the separate switch 26, which, when actuated, throws in all of the stops. This saves the operator from actuating a large number of switches. In this connection it is to be understood, of course, that the number of switches and the number of stops illustrated in the diagram are comparatively small to avoid undue complications in the drawing. The system may be extended indefinitely by simply duplicating the connections illustrated so that an organ of maximum size may be played in the manner indicated. It is to be understood that the piano is simply played in the usual way provided none of the switches 24, 25, 26, etc., are closed. In other words, the circuits of said stop chamber valves remain open so that the organ is not played. If it is desired to play the organ to the exclusion of the piano a muting bar 47 of well known form is simply pressed against the strings by suitable connections 48, 49, (Figs. 9 and 10) whereby only the organ is heard.

Adjacent the switches 24 to 32 in Fig. 1, I provide an additional series of circuit-closers 50 to 58, inclusive, adapted to close branch circuits from the battery to any one of a number of special additional electrically operated musical devices illustrated diagrammatically at 44.

As previously stated, certain of the piano keys have two sets of contacts thereon, The contacts 14, 16 close parallel circuits from the battery 17 to a series of bells 59 of different pitch corresponding to the notes of the piano. Any number of such circuits may be provided. In the drawings I have disclosed twenty-five circuits and corresponding bells as suitable for the purpose.

When the lowest octave of the keyboard illustrated is played, special circuits through conductors 60 and magnets 61, are established permitting the actuation of the pedal base, that is, the pipes 62 of low pitch. These pedal base pipes may be played through an electric coupler, when certain of the higher notes on the keyboard are struck. The electric coupler is so arranged that when in operation any note played on the keyboard will also play a note an octave higher or lower, depending upon whether the note struck is in the upper range or lower range of the keyboard. The dividing line is arbitrarily selected at the point shown by the arrow 63 in the diagram. Any note higher than this note when played results in a second note an octave higher being played, whereas any lower note when played is accompanied by a second note an octave lower or by an additional third note two octaves lower, as in the present construction.

The coupler, in the form illustrated, consists of a fixed disk of insulating material 65 supporting two sets of contacts 66, 67; these sets are arranged in concentric rows, the outer row containing twenty-four contacts, arranged twelve on each side of the

center line, and the inner row containing eighteen contacts, nine on each side of the center line. These contacts are yieldingly mounted, as shown in Fig. 4, but otherwise are stationary contacts, each having an enlarged head with a spring 68 arranged between said head and the fixed support. A movable disk of insulating material 69 is also provided carrying contacts 70, 71, arranged in two rows corresponding to those previously described. The adjacent contacts of the inner and outer rows on the movable disk are connected by jumpers 72. With this arrangement, when the movable disk is moved toward the stationary disk, independent circuits 73 (Fig. 1) are closed to the various keyboard contacts, each circuit closed through the outer row of contacts, however, having a corresponding parallel circuit to an inner pair of contacts. The stationary contacts are all electrically connected to the individual key contacts 13. The movable contacts are each connected through a common return to the battery, for example, the contact bar 15. Each individual circuit includes one of the electromagnets 18 therefore, but arranged to correspond to an octave lower or higher than the magnet corresponding to the key. The two magnets, therefore, corresponding to the octave are in parallel with each other but in series with the battery, and the single set of circuit closing contacts 13, 15 of the piano keys. In other words, said piano keys always close at least one circuit and may close a parallel circuit provided the coupler is first actuated. This actuation is accomplished by the operator moving a handle 75, thereby sliding the bar 76, on the end of which is mounted the movable disk and associated parts. A fixed shield or disk 77 is provided, with openings which receive the ends of contacts 70, 71. Said shield serves as a guide for pins 78 surrounded by springs 77 which press the disk 79 away from the stationary disk 65. The operator is thus enabled to make yielding contact between the two sets of contact pins. The coupler is supported preferably on a cross-bar 80 mounted at a convenient height above the piano keys within easy reach of the operator.

The construction whereby the energization of magnets 18 permits more than one stop to be played, will now be described, (see Fig. 7). The wind chests 46 have already been mentioned. They are arranged side by side, an additional wind chest 81 being arranged parallel thereto and containing the magnets 18. All of the wind chests may be supplied with compressed air through the pipe 83. (Fig. 1). Each electromagnet has an armature 84 normally closing a port 85 communicating through the passage 86 with a pneumatic 87, the latter controlling double ports 88, 89, through a rod 90. These last two ports communicate through a passageway 91 and branches 92 with the interior of pneumatics 93, there being one pneumatic for each organ pipe 94. The pneumatics are normally in the position indicated in the drawing, owing to the pressure within and without each pneumatic being equalized, and if allowed to collapse, each will open a valve 95 admitting air from the wind chest 46 to the pipe 95.

When the magnet 18 is energized, the port 85 is opened permitting the air within the pneumatic 87 to exhaust through the passage 86 and said port. Said pneumatic thereupon collapses, raising rod 90, the valve post 88 thereupon being closed and shutting off communication between the chamber containing the magnets and the stop chambers. The port 89 is opened, thereby permitting a simultaneous exhaust of all of the pneumatics 93, if the pressure in the wind chests has previously been established by opening communication with the source of supply by means of the valves 45 (Fig. 1). It will thus be seen that one or more of the pipes 94 are played depending on whether or not the corresponding stops have previously been adjusted.

Various auxiliary musical devices may be provided. In Fig. 3 I have shown a whistle 96 supplied from a wind chest and controlled by a sliding valve 97 normally held by a spring 98 in such position as to cut off the air but shown in Fig. 3 as partly open. Said valve may be actuated by the performer by the same operation by which he opens the swell, the shutters 99 of which are shown as being operated by a link 100 manipulated by the knee of the performer, or in any other conventional manner. When the shutters 99 are turned, the connecting link 101 pulls on the cord 102, the latter running over suitable pulleys 103 and being connected to the slide valve 97.

In Fig. 8 I have illustrated a device which imitates chimes. It consists of a series of tubular depending members 104, each closed at the upper end and suspended by a cord or other flexible supporting member 105 from a suitable support 105'. A wire 106 passes through the closed end and is held by tying a knot. It is secured to a suitable support 107 at the other end. The wire passes through an opening in a mica disk 108 in the lower end of the tube. The wire and hence the tubular member is caused to vibrate by a rotating disk 109 driven through suitable worm and gear connections 110 and 111 receiving power from a common shaft 112. A musical note is thus given out by said member. The disk 109 is normally out of contact with the wire, but may be moved against the wire by the action of a pneumatic 113 which may be connected by a pipe 114 to an additional wind chest, which

may be a duplicate of the wind sheet 46, for example, and therefore controlled from the keyboard.

Various changes may be made in the circuits and structures described without departing from the scope of the invention.

What I claim is:—

1. The combination with a piano having a keyboard and a muting device, of a structurally separate and distinct pipe organ having an electro-pneumatic action, electrical connections from said keyboard to said pipe-organ to permit the latter to be played from the piano keys, and manually operable means other than the keys for rendering said electrical connections effective or ineffective at will, whereby said piano may be played alone, said pipe organ may be played from said piano keyboard simultaneously with the playing of the piano or by muting the piano strings said organ may be played alone.

2. The combination with a pipe organ having an electric action, of a piano structurally independent thereof and having the usual keyboard, circuit conductors connecting said organ and said piano, means actuated by the piano keys for closing individual circuits to the units of the organ action, a plurality of circuit-closers mounted on said piano accessible to the operator, and electrical connections therefrom to the various stops of the organ, whereby the pipes of any stop may be played from said keyboard.

3. In an electrically controlled system for combined piano and organ playing, a pipe-organ having ranks of pipes and valves therefor, a piano having a keyboard, a source of current, a plurality of circuit closers actuated by the keys of said keyboard, circuits opened and closed thereby for controlling said valves from said piano, a second set of circuits in parallel with each other and with said first circuits, but in series with said circuit closers and said source of current, means constituting an octave coupler for opening and closing said second circuits, a further set of circuits including said source of current, electromagnetic means in each circuit controlling a rank of pipes, and means mounted on said piano for opening and closing said last set of circuits to determine the rank of pipes to be played.

4. In a device of the class described, a piano having a plurality of piano keys pivotally supported near the middle, an upwardly extending light spring contact mounted on the top surface of each key and to the rear of said pivot, a cable extending transversely above the rear part of said keys and having light individual flexible conductors leading therefrom to the individual contacts, and a transverse conductor mounted above said keys and normally out of contact with said individual contacts, but adapted to be engaged thereby with a sliding contact when the forward part of said key is depressed, whereby the circuits are closed without appreciably modifying the key action, and an organ connected to said cable whereby it may be played from said piano keys.

5. The combination with a piano having a keyboard, of an electric pipe-organ and auxiliary electrical musical devices structurally distinct therefrom, two sets of circuit closers mounted in the piano and actuated simultaneously by the movement of the keys, connections from said circuit closers to said organ and devices, one of said sets controlling the speaking of the pipes of all ranks, and the other set controlling said musical devices, stop switches on said piano and connections therefrom to the stop devices of the organ to render them subject to the control of said first set.

In witness whereof, I hereunto subscribe my name this fifteenth day of February, A. D., 1915.

WALTER J. BAKER.

Witnesses:
McClellan Young,
Geo. B. Jones.