

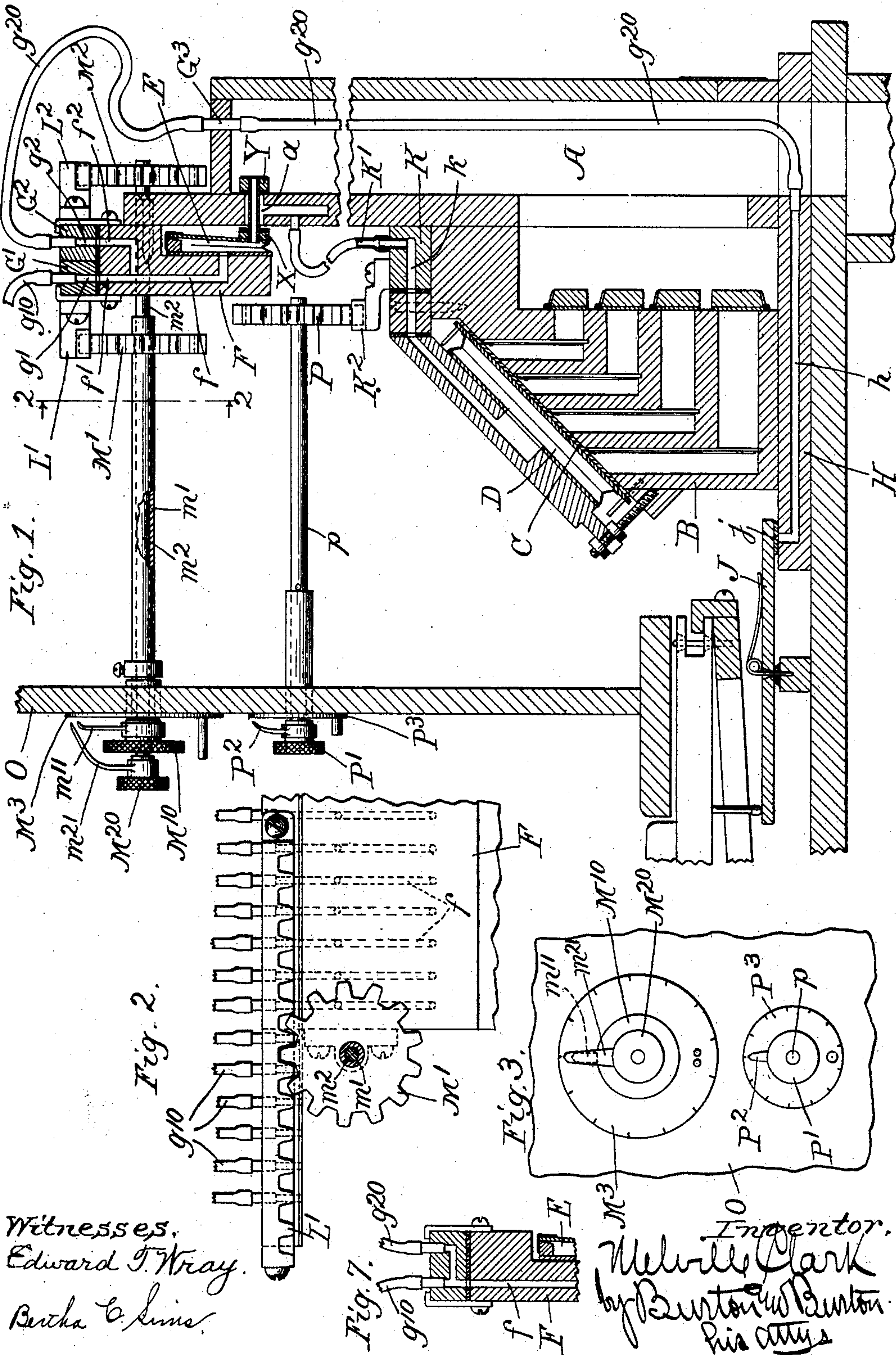
M. CLARK.

TRANSPOSING DEVICE FOR MUSICAL INSTRUMENTS.

(Application filed July 14, 1898. Renewed Feb. 14, 1901.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses.
Edward T. Wray.
Bertha C. Sims.

Inventor.
Melville Clark
by Burton W. Burton.
His atty.

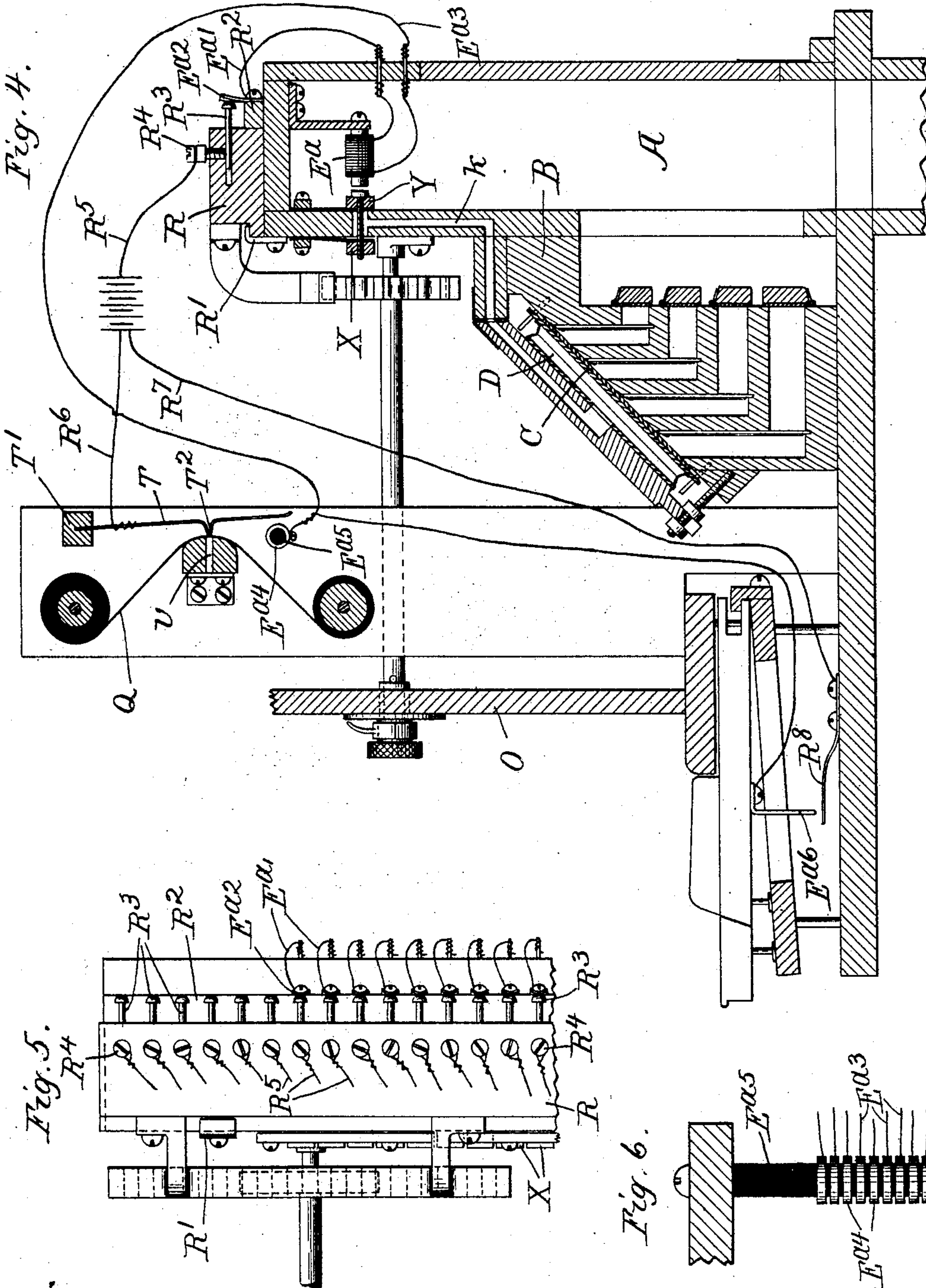
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Witnesses.

Edward J. Wray.
 Bertha C. Lewis.

Inventor:
 Melville Clark
 by Burton W. Burton
 his attorney.

UNITED STATES PATENT OFFICE.

MELVILLE CLARK, OF CHICAGO, ILLINOIS.

TRANSPOSING DEVICE FOR MUSICAL INSTRUMENTS.

SPECIFICATION forming part of Letters Patent No. 709,963, dated September 30, 1902.

Application filed July 14, 1898. Renewed February 14, 1901. Serial No. 47,353. (No model.)

To all whom it may concern:

Be it known that I, MELVILLE CLARK, a citizen of the United States, residing at Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Transposing Devices for Pneumatic and Electric Instruments, which are fully set forth in the following specification, reference being had to the accompanying drawings, forming a part thereof.

In the drawings, Figure 1 is a fore-and-aft section of a portion of a pneumatically-operated reed-organ having my improved transposing devices, portion of the keyboard, case, and automatic playing devices being broken away or omitted. Fig. 2 is a detail section at the line 2 2 on Fig. 1. Fig. 3 is a detail front elevation of the stops for controlling the transposing device. Fig. 4 is a fore-and-aft section through a reed-organ having pneumatically-operating devices controlled by electrical connections, manual and self-playing devices, and having my improved transposing devices embodied in it. Fig. 5 is a detail plan of a portion of the transposing-board and adjacent parts of the structure shown in Fig. 4. Fig. 6 is a detail plan view of the contact-bar associated with the self-playing devices of the same structure. Fig. 7 is a detail section of a slightly-modified form of primary duct-board and transposing-slide.

I have shown my improvement applied to organs of the general character which have been shown in my former patents, in which the reed-valves are operated by motor-pneumatics. In Fig. 1 I have shown an organ in which the motor-pneumatics are controlled by primary pneumatics, as in my former patents, and in Fig. 5 I have shown electromagnets substituted for the primary pneumatics. In both forms of instruments the device which controls the motor-pneumatics, whether it be a primary pneumatic or an electromagnet, is subject to control by automatic playing devices, as a perforated music-sheet or by the keys of the manual, two independent systems of connection being provided for that purpose.

I will first describe my invention as applied to an organ which is pneumatically operated and whose reed-valve-operating pneumatics

are pneumatically controlled, this being the form of organ shown in Figs. 1, 2, and 3.

A is the wind-chest; B, the reed-block, having a plurality of reed-chambers.

C is the reed-valve; D, the motor-pneumatic which actuates it and of which said reed-valve is the fluctuating wall.

E is the primary pneumatic, which controls the action of the motor-pneumatic D.

F is a primary-pneumatic duct-board, being a board on which the primary pneumatics are mounted and which has the air-ducts leading to the primary pneumatics, respectively. For the purpose of permitting the control of the primary pneumatic either by the keys of the manual or by self-playing devices, such as perforated music-sheets operating from a tracker-range, the duct f in the duct-board which leads to the primary pneumatic E is branched and has two mouths at the upper edge of the duct-board, (indicated by f' and f^2 , respectively.) The former is intended for connection with the tracker-range and the latter for connection with the manual-action.

G' is a slide-bar seated on the upper edge of the pneumatic duct-board, extending over the entire row of mouths f' , and having apertures g' corresponding to said mouths and adapted to register with them, respectively. g^{10} , &c., represent flexible tubes connected into the apertures g' and designed to extend to the tracker-range. G^2 is a similar slide-bar extending over the row of mouths f^2 , having apertures g^2 corresponding to the apertures f^2 , respectively, and adapted to register therewith.

g^{20} represents flexible tubes extending from the apertures g^2 , respectively, to the valve-board H, which is provided with ducts h , into which the tubes g^{20} , respectively, are connected, said ducts h terminating at the upper face of the board H in the rear of the manual, where their mouths, respectively, are controlled by the valves j on the ends of the levers J, which are operated by the manual-keys, respectively, in a manner which requires no further explanation. As a matter of convenience the tubes g^{20} extend in part of their course through the wind-chest, the rear edge of the reed-board H extending into the wind-chest to receive connection with said

tubes. For the purpose of affording facility for thus extending the tubes through the wind-chest I provide the nipples G^3 , extending through the upper edge of the wind-chest and having the two sections of the tube g^{20} connected to their oppositely-protruding ends, respectively. The length of the tubes g^{20} extending outside of the wind-chest between the nipples G^3 and the connection with the sliding bar G^2 is sufficient to accommodate the entire sliding movement of said bar, as hereinafter explained.

The bars G' and G^2 in addition to extending over the entire row of mouths f' and f^2 , respectively, have a sufficient extent beyond the extreme apertures g' and g^2 , which are adapted to register with the extreme apertures f' and f^2 , respectively, to permit longitudinal movement corresponding to a space occupied by seven of said mouths and ducts or any less number, according to the range of transposition desired, so that the said bars may be shifted in either direction to that extent without uncovering any of the mouths of the ducts f' and f^2 . At the intermediate or normal position of the bars G' and G^2 the tubes leading to their ducts are in communication, respectively, with the ducts h , controlled by the manual-keys, and with the apertures of the tracker-range, which correspond to the reeds whose action is controlled by the primary pneumatics, whose ducts f' are in communication with said ducts of the slide-bars, so that the player operating the manual according to any written score will produce the music in the key in which it is written, and the perforated sheet traveling over the tracker-range will in like manner produce the music in the key in which the sheet is cut. If, however, it is desired to produce the music in a different key from that in which it is written or cut, it will be seen that by moving the slide-bar G' when the music is being produced automatically by the music-sheet or the slide-bar G^2 when it is being produced by manipulating the manual so as to change the registration of the ducts of the bars with the ducts of the pneumatic duct-board the music will be produced in a key as many half-tones higher or lower than that in which it is written or cut as the steps through which the bar is shifted to the right or left, meaning by "step" the distance from one mouth to the next adjacent. It will be understood that the ducts in the duct-board and the corresponding duct in the slide-bars are equally spaced through the entire series, so that a movement of one step cuts off the existing registration and when it is completed establishes a new registration throughout the entire series except as to as many ducts at each end as the movement of the bars includes, that number of ducts at one end of the duct-board and a like number of ducts at the opposite end of the slide-bar being by such movement carried beyond the extreme ducts with which they might respectively register

and being so left without registration. In order to adjust the transposing-bars G' and G^2 as described, they may be provided with racks L' and L^2 , respectively, which are engaged, respectively, by pinions M' and M^2 , the latter on a shaft m^2 , journaled on the end of the duct-board, as seen in Fig. 2, and having another bearing on the panel O at the front of the case, and the former on a sleeve-shaft m' , which is mounted on the shaft m^2 and also extends through the board O , being, in fact, the bearing in said board for the shaft m^2 . Said shafts m' and m^2 at the forward ends have heads or thumb-knobs M^{10} and M^{20} , respectively, provided with index-fingers m^{11} and m^{21} , and a dial-plate M^3 is mounted on the board O , spaced to correspond with the transposing movement of the slide-bar, one space on the dial indicating one half-tone transposition by the slide-bar. The pinions are engaged with their respective racks at such positions that the index-fingers point to the upper mark on the dial when the transposing-bars are normally adjusted with respect to the duct-board—that is, so that the music be produced as played or cut—and by setting the index-finger to the right or left the key in which the music is produced will be raised or lowered as many semitones as the points on the dial passed over in such adjustment. Ordinarily, of course, the transposing-bars G' and G^2 will be adjusted similarly, so that the music produced from a written score by manipulating the manual or produced by the action of the perforated sheet over the tracker-range will be in the same key. For all such ordinary cases, therefore, the two index-fingers will be adjusted simultaneously and set at the same point on the dial. In rare instances, however, the music-score may be written in one key and the music-sheet perforated in a different key, and then in case transposition is desired to a still different key or in case it is desired to transpose, for example, from the key in which the perforated sheet is cut to the key in which the score is written the two transposing-bars will be differently adjusted or one will be adjusted without change of the other. Obviously if it is not considered desirable to make provision for such a rare occurrence as that the written score and the perforated sheet should be in different keys and required different transposition the two bars G' and G^2 might be integral or rigidly united, so as to operate as one, in which case one rack, one pinion, and its shaft and index-finger might be omitted, or the branching of the duct from the primary pneumatic instead of occurring in the pneumatic-block F might be made to occur in the transposing-bar, so that while having connections by means of flexible tubes both to the tracker-range and to the valve-seat controlled by the manual-keys it would have only one set of ducts to register with the corresponding set of ducts in the primary-pneumatic duct-board. Such modification is

shown in Fig. 7. With the same effect as the last-described structure—that is, the effect that only one transposing-bar and one stop to actuate it would be required, transposition being made simultaneously and similarly for the manual and for the tracker-range—the transposing-bar may be located between the primary pneumatic and the motor-pneumatic—that is, so as to shift the connections of the ducts which constitute the communication between the primary pneumatics and the motor-pneumatics which they respectively control. Such a device may be employed in the same instrument with the structure first above described, consisting of two independently-actuated transposing-bars for the tracker-range and manual-actions, respectively, and in Fig. 1 I have illustrated such a device between the primary and motor pneumatics. For this purpose K is the transposing-bar, having ducts k connected by flexible tubes K' with the ports a , which are controlled by the valves X and Y, actuated by the primary pneumatics in a manner and for purposes which are familiar. The transposing-bar K has a rack K^2 secured to it and engaged by a pinion P on a shaft p , which extends through the panel-board O and has an operating-knob P' and index-finger P^2 , operating over the dial P^3 , subdivided in the same manner and for the same purpose as the dial M^3 . When an organ is provided with all three transposing-bars G' , G^2 , and K, the stop which actuates the last mentioned may be employed generally, and the other two not be used only when it is, for any reason, desirable to transpose differently for the self-playing devices, and for the manual-action. Whichever devices are not used should be set at the normal position—that is, with the index-finger at the top of the dial.

When the action is controlled by electrical devices, as in the structures illustrated in Figs. 4, 5, and 6, the transposing-bar evidently should carry the conducting-wires instead of the conducting pneumatic tubes and should have contact-buttons whose contact should be shifted instead of duct-openings whose registration with other duct-openings is shifted. I will describe the structure represented in Figs. 4, 5, and 6 in so far as necessary to make the transposing device understood. The valves X and Y, controlling the duct k , which leads to the motor-pneumatic, are actuated by an electromagnet E^a instead of a primary pneumatic, as in the other structure. The wire $E^{a'}$ from one end of the coil about the magnet extends to the contact-piece E^{a2} , mounted on the upper end of the wind-chest, and the wire E^{a3} from the other end of the coil extends to the contact-piece E^{a4} , mounted on an insulating-rod E^{a5} , which extends parallel to the tracker-range and near thereto, while a branch from the same wire E^{a3} extends to a contact E^{a6} on the manual-key. R is the transposing bar or board in this structure. It is mounted upon the top of the

wind-chest and guided in longitudinal movement between the retaining-clips $R' R'$ at the forward side and the bar R^2 at the rear side, said bar R^2 serving also to hold the contact-piece E^{a2} . The transposing-bar R has contact-pins R^3 , corresponding to the contact-pieces E^{a2} , respectively, and binding-screws R^4 , which hold the contact-pins in place and receive also the circuit-wire R^5 , which runs to one pole of the battery. From the other pole of the battery the circuit-wires R^6 run to tracing-fingers T T, &c., mounted in an insulating-bar T' , which extends parallel to the tracker-range and music-rollers, said tracing-fingers having protruding bends T^2 , which bear with slight pressure upon the perforated sheet Q as it passes over the tracker-range into a recess v in the tracker-range when the apertures in the paper pass over said aperture v . The movement of any finger caused by the intrusion of its bend T^2 through the paper brings the free end of the finger against the contact E^{a4} on the rod E^{a5} and closes the circuit corresponding to such finger and energizes the electromagnet which operates the valves to control the motor-pneumatic which actuates the reed-valves corresponding to said finger. From the same pole in the battery from which the wires R^6 extend wires R^7 of a duplicate set extend to contact-pieces R^8 , mounted, respectively, in position to be impinged upon by the contact-pins E^{a6} on the manual-keys, so that the depression of any manual-key closing the circuit through the contact-pieces E^{a6} and R^8 will cause the proper electromagnet to be energized to produce the action of the motor-pneumatic to open the reed-valve corresponding to the key depressed. It will be seen that shifting the transposing-bar R so as to change the registration or contact of the pins R^3 and contact-pieces E^{a2} will make a corresponding change in the reed-valve which is operated by the depression of any given key or the movement of any given finger T, thus transposing or changing the key in which the music will be produced precisely as by the shifting of the transposing-bars G' and G^2 in the pneumatic structure.

I claim—

1. In a pneumatically-operated musical instrument, in combination with the pneumatics which control the sounding devices respectively, ducts leading from such pneumatics respectively, and ports to which said ducts lead; suitable means for controlling such ports and thereby controlling said ducts individually, thereby selecting the sounding device which is to be brought into action, said ducts all being disjoined or severed at a line transverse to their extent, abutting or adjusting bars having or supporting respectively the two disjoined portions of the ducts, such portions extending respectively to the pneumatics on the one hand and to the controlled ports on the other hand, one of said bars being movable and constructed and arranged

to carry in its movement without severance thereof that portion of said ducts which is contained or supported by it, and means for moving such bar to shift the registration or
5 connection of such ducts across the line of severance.

2. In an instrument having sounding devices, and motor devices and their connections for causing the sounding devices respectively to speak; pneumatics for controlling
10 the motor devices; ducts from said pneumatics; valves controlling said ducts, and mechanical connections from the manual-keys for operating said valves respectively, said
15 ducts each comprising two parts which terminate respectively in adjacent boards or bars, one of said parts extending to the pneumatic and the other part extending to the valve, one of said boards or bars being mov-
20 able on the other carrying the terminals thereon without severance thereof from the parts of the ducts to which they respectively pertain to shift the registration of the terminal mouths of said ducts at the plane of contact,
25 and suitable means for moving said movable board or bar at will.

3. In an instrument having sounding devices, and motor devices and their connections for causing the sounding devices to
30 speak; pneumatics for controlling the motor devices, and ducts from said pneumatics to the tracker-range, said ducts each comprising two parts which terminate respectively in adjacent boards or bars, one of said boards or
35 bars being movable on the other carrying the terminals thereon without severance thereof from the parts of the ducts to which they respectively pertain to shift the registration of the terminal mouths of said ducts at the plane
40 of contact, and suitable means for moving said movable board or bar at will.

4. In an instrument having sounding devices, motor-pneumatics, and connections by which they cause the sound devices to speak;
45 primary pneumatics, and valves by which they respectively control the motor-pneumatics; ducts leading from the primary pneumatics respectively, and ports to which said ducts lead and suitable means for controlling
50 such ports and thereby controlling said ducts individually, and thereby selecting the sounding devices to be brought into action; said ducts being all disjoined or severed at a line transverse to their extent; abutting or ad-
55 justing bars having or supporting respectively the two disjoined portions of the ducts, such portions extending respectively to the primary pneumatics on the one hand and to the controlled ports on the other; one of said
60 bars being movable, and constructed and arranged to carry in its movement, without severance thereof, the portion of said ducts contained or supported by it; and means for moving such bar to shift the registration or
65 connection of such ducts across the line of severance.

5. In an instrument having sounding de-

vices and motor devices and their connections for causing the sounding devices respectively
70 to speak, pneumatics for controlling the sounding devices; ducts from the pneumatics, and valves for controlling said ducts; mechanical connections from the manual-keys for operating the valves respectively, the
75 ducts each comprising two parts, one part extending to the pneumatics and the other part extending to the valve-seats, said parts terminating respectively in adjacent boards or bars, one of said boards or bars being movable
80 on the other to shift the registration of the terminal mouths of said ducts at the plane of contact of the bars, the portions of said ducts pertaining to said movable bar being flexible tubes to permit such movement of
85 the bar; and suitable means for moving the bar at will.

6. In an instrument having sounding devices and motor devices and their connections for causing the sounding devices to
90 speak; pneumatics for controlling the motor devices, a tracker-range and ducts thereto from said pneumatics, said ducts each comprising two parts which terminate respectively in adjacent boards or bars, one of said
95 boards or bars being movable on the other to shift the registration of the terminal mouths of said ducts at the plane of contact of the boards or bars; the portions of said ducts pertaining to said movable bar comprising
100 tubes which are flexible to permit the movement of the bar without rupture or disconnection of the ducts, and suitable means for moving such movable board or bar at will.

7. In a pneumatically-operated musical instrument, in combination with the pneumatics
105 which control the sounding devices respectively, ducts from said pneumatics respectively each provided with two branches; slides which respectively have apertures corresponding to said branches, and flexible tubes
110 connected to said apertures, those thus connected to the apertures of one of said slides being arranged to afford communication with a tracker-range and adapted to be controlled
115 by a perforated music-sheet thereat, and those connected to the other slide being arranged to afford communication with a valve-board and adapted to be controlled by the manual-keys respectively.

8. In a pneumatically-operated musical instrument, in combination with the pneumatics
120 which control the sounding devices respectively, ducts from said pneumatics respectively each provided with two branches; slides which respectively have apertures corresponding to said branches, and flexible
125 tubes connected to said apertures, those thus connected to the apertures of one of said slides being arranged to afford communication with a tracker-range and adapted to be
130 controlled by a perforated music-sheet thereat, and those connected to the other slide being arranged to afford communication with a valve-board and adapted to be controlled by

the manual-keys respectively; mechanical devices for moving the slides respectively, and a graduated plate and index-finger to indicate the steps of such movement.

5 9. In a pneumatically-operated musical instrument, in combination with the pneumatics which control the sounding devices respectively, ducts from said pneumatics respectively, each provided with two branches; 10 slides which respectively have apertures corresponding to said branches, and flexible tubes connected to said apertures, those thus connected to the apertures of one of said slides being arranged to afford communication with a tracker-range and adapted to be 15 controlled by a perforated music-sheet thereat, and those connected to the other slide being arranged to afford communication with a valve-board and adapted to be controlled by 20 the manual-keys respectively; said slides being provided with rack-bars; pinions engaging said rack-bars, respectively, having their shafts conaxial, one of said shafts being a sleeve on the other; index-fingers on said

shafts, and a graduated dial-plate over which 25 both said index-fingers move as the shafts are rotated.

10. In a musical instrument, in combination with the sounding devices, motor-pneumatics for causing the sounding devices to 30 speak, and primary pneumatics to control the motor-pneumatics; ducts controlled by the primary pneumatics and leading to the motor-pneumatics and each comprising a flexible tube, a slide into which all said flexi- 35 ble tubes are connected; the apertures through said slide being adapted to register at the slide-seat with the continuations of the ducts respectively; and means for moving the slide in its seat to shift the registration of said ducts. 40

In testimony whereof I have hereunto set my hand, in the presence of two witnesses, at Chicago, Illinois, this 11th day of July, 1898.

MELVILLE CLARK.

Witnesses:

CHAS. S. BURTON,
JEAN ELLIOTT.