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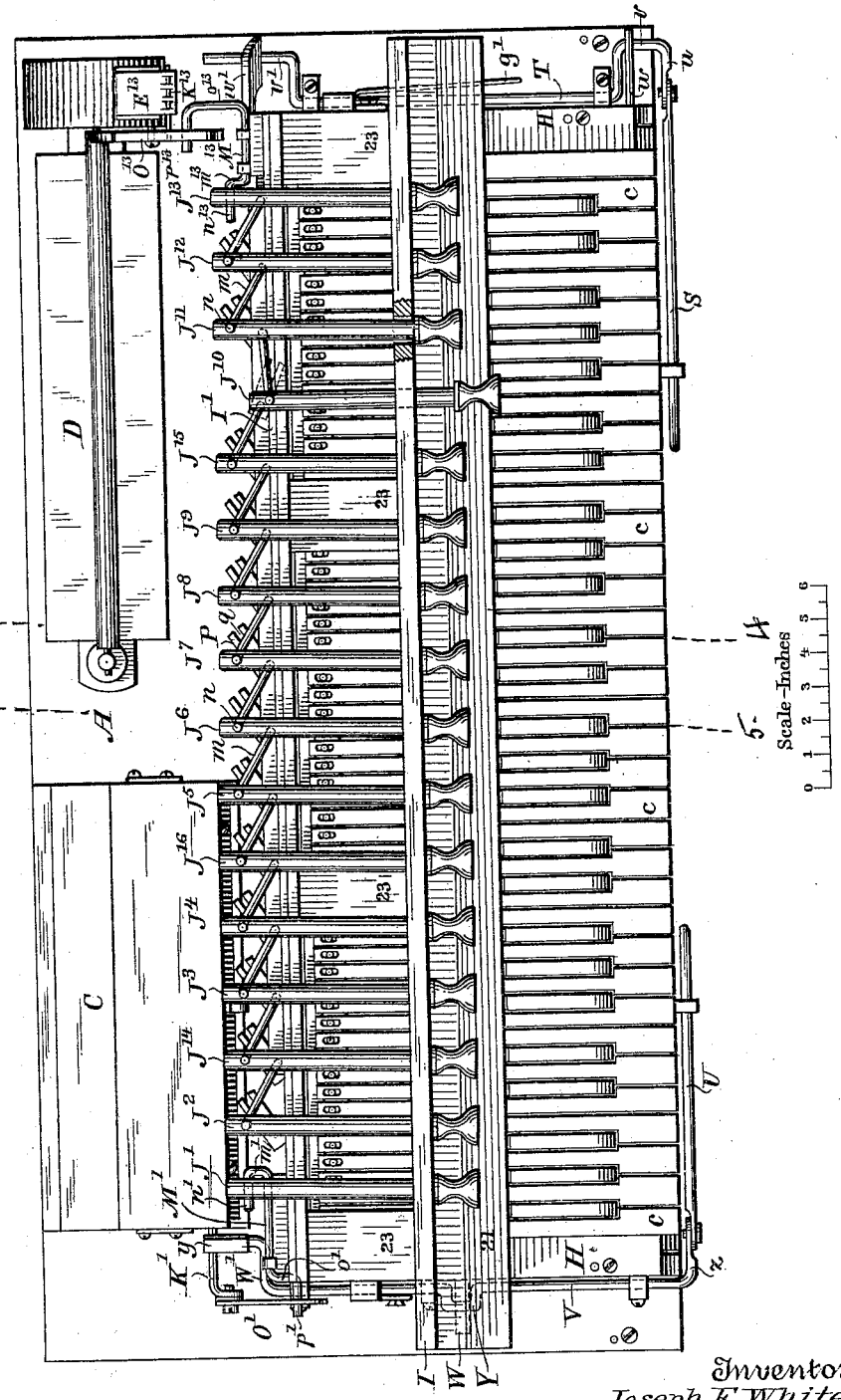
6 Sheets—Sheet 1.

J. F. WHITE.

REED ORGAN.

No. 554,757. Patented Feb. 18, 1896.

Fig. 1.



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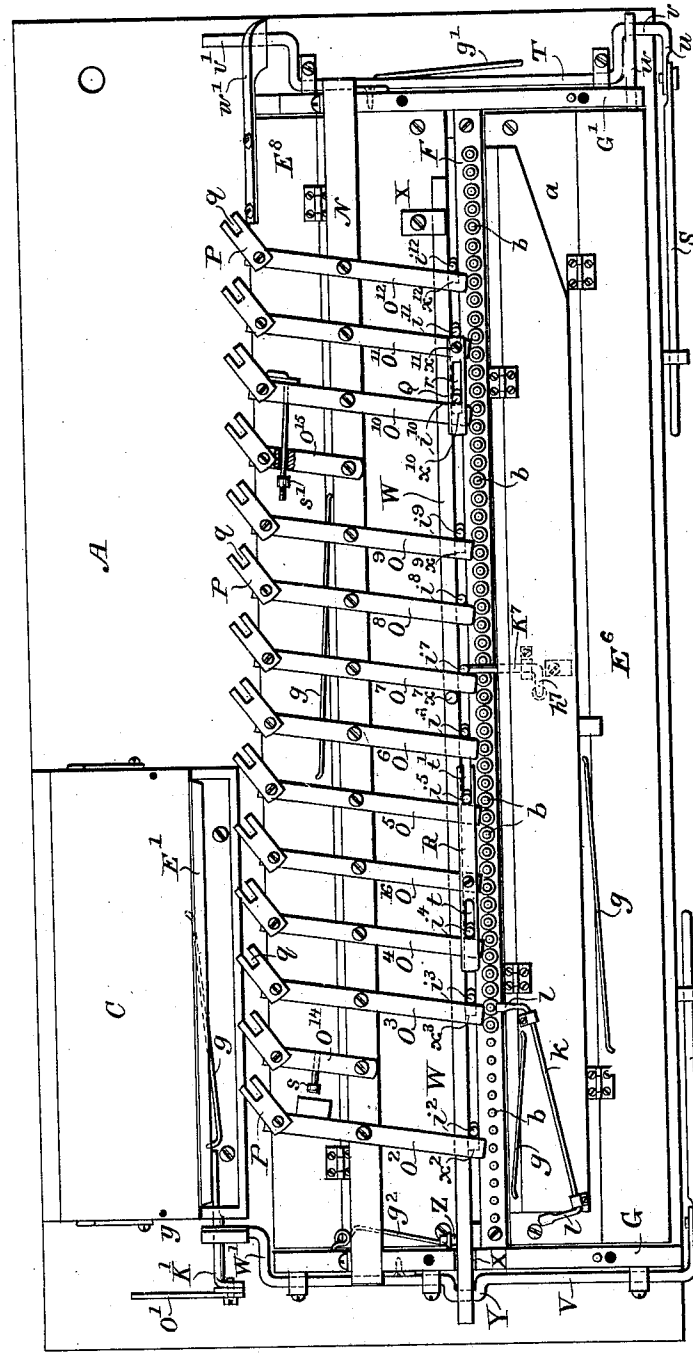

Fig. 2.

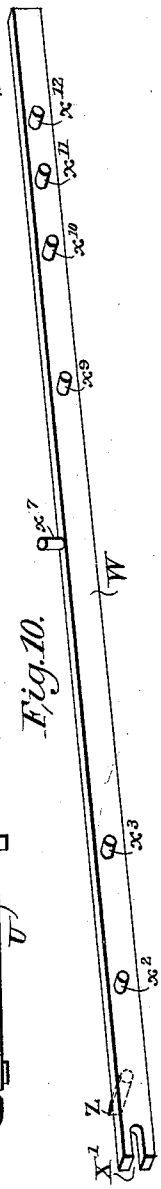

Fig. 10.

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(No Model.) 6 Sheets—Sheet 3.

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Fig. 3

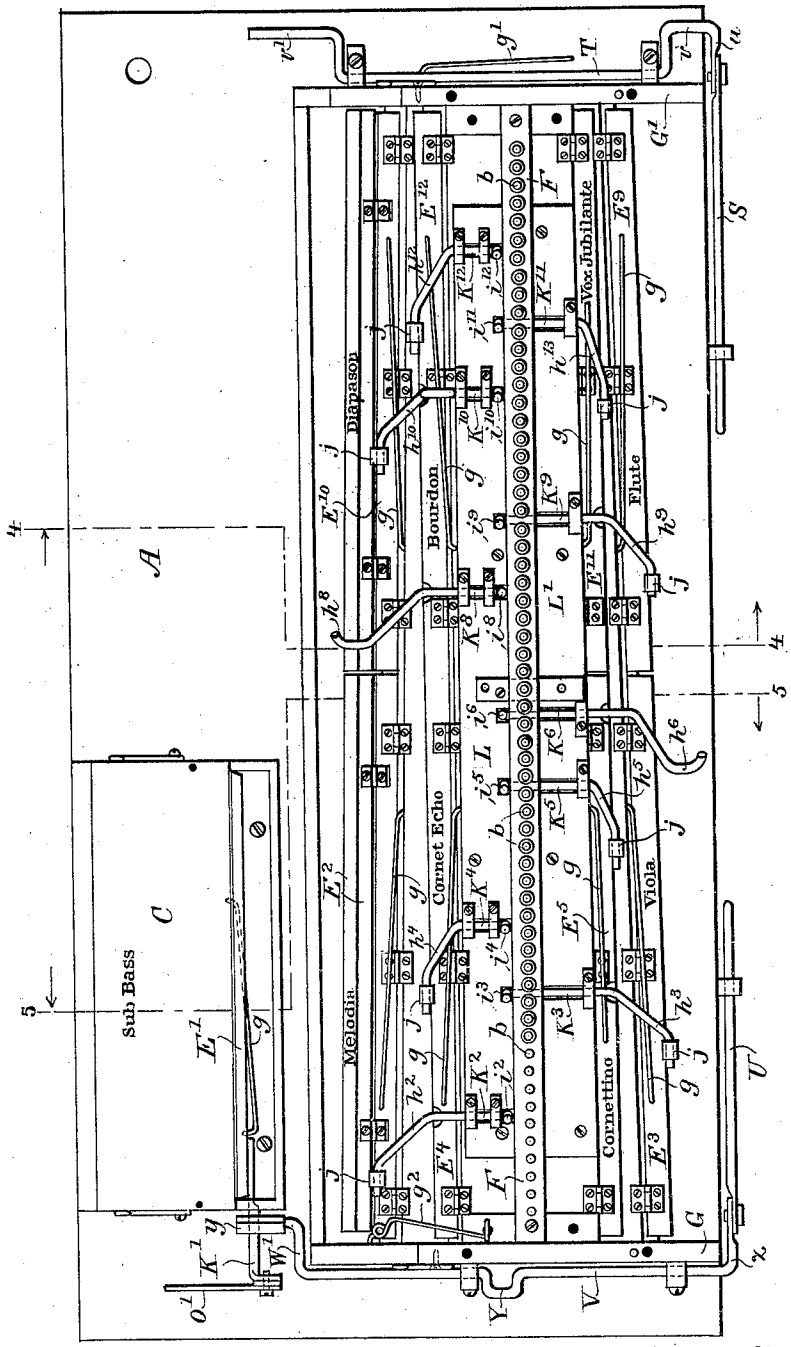

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Fig. 4.

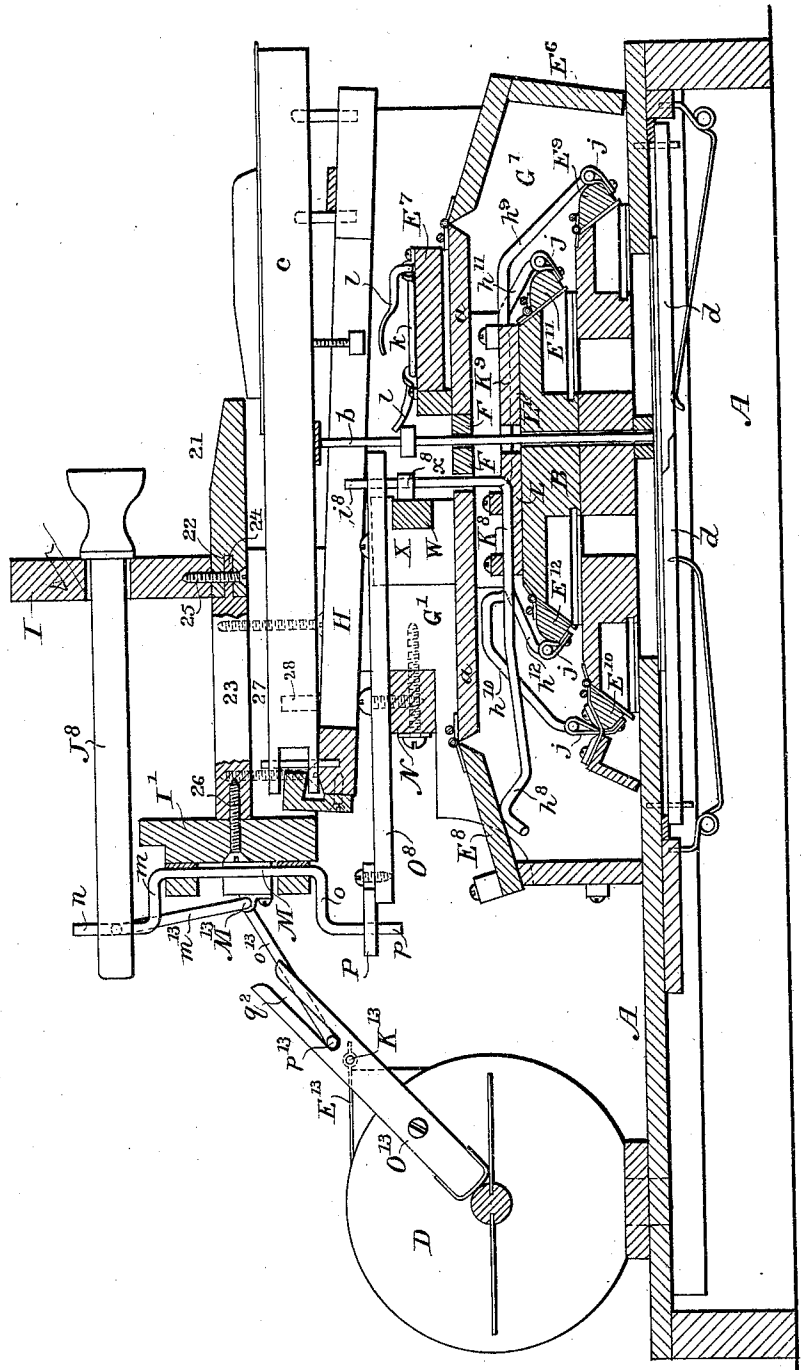

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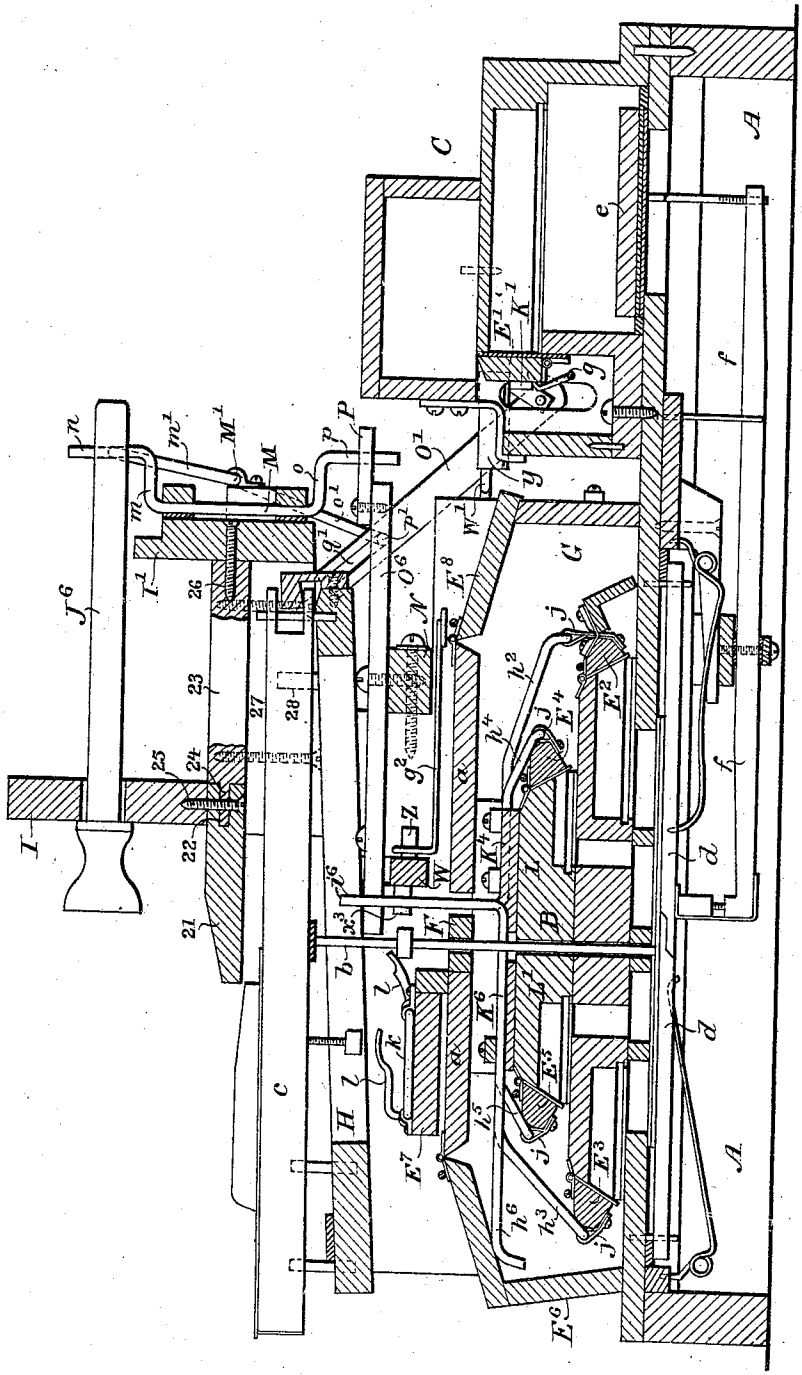
Fig. 5.



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(No Model.)

6 Sheets—Sheet 6.

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REED ORGAN.

No. 554,757.

Patented Feb. 18, 1896.

Fig. 6.

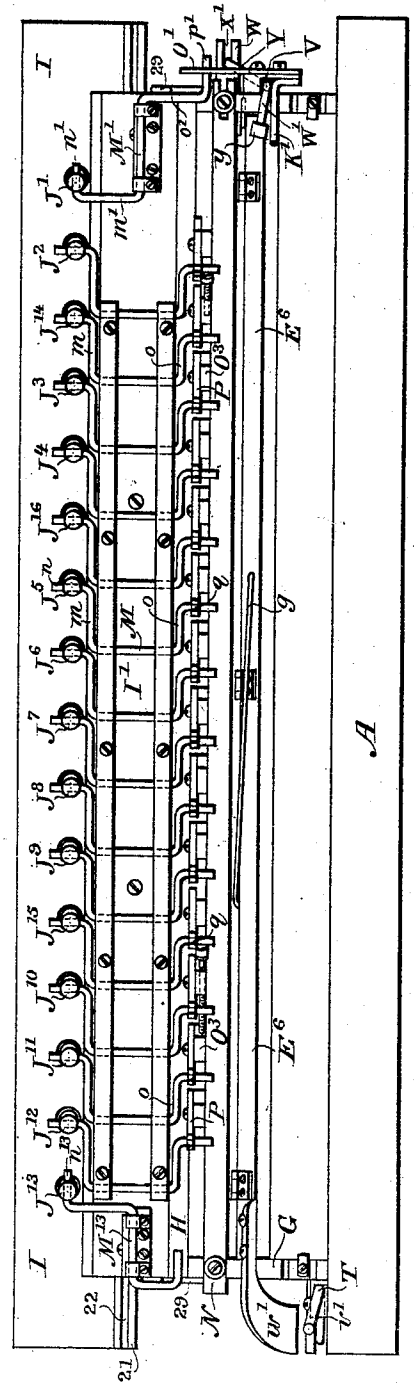


Fig. 9.

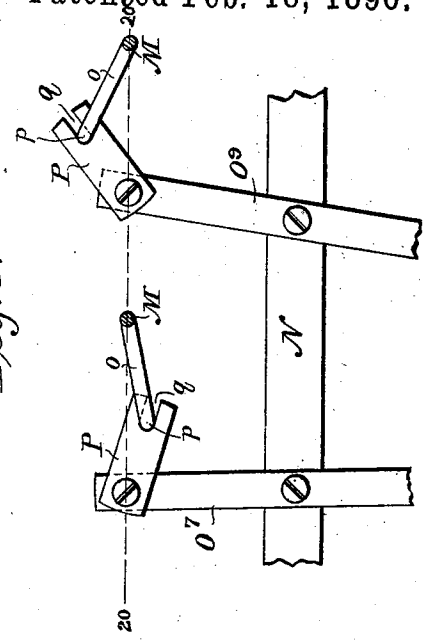


Fig. 7.

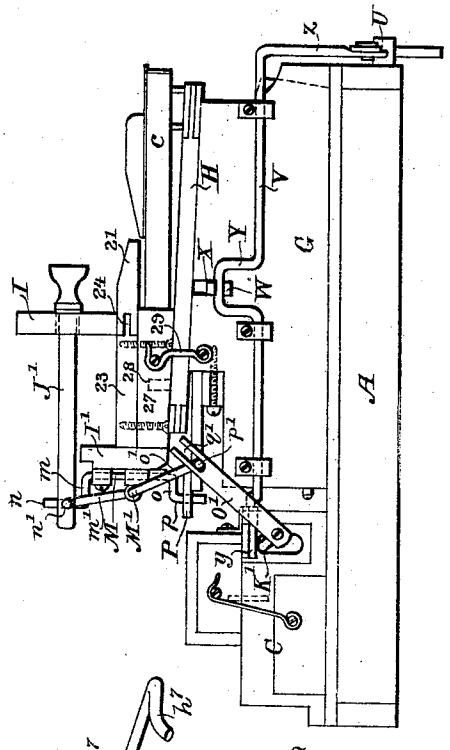
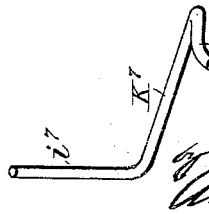


Fig. 8.



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UNITED STATES PATENT OFFICE.

JOSEPH F. WHITE, OF BRATTLEBOROUGH, VERMONT, ASSIGNOR TO THE ESTEY ORGAN COMPANY, OF SAME PLACE.

REED-ORGAN.

SPECIFICATION forming part of Letters Patent No. 554,757, dated February 18, 1896.

Application filed April 23, 1894. Serial No. 508,648. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH F. WHITE, of Brattleborough, in the county of Windham and State of Vermont, have invented certain new and useful Improvements in Reed-Organs, of which the following is a specification.

The present invention consists in an improved construction of the stop-action of a reed-organ; and the object of the invention is to furnish an action simple and economical in construction, perfect and certain in operation, easily and rapidly put together and taken apart, so that an inexpert person can take it apart for access to the reeds, reed-valves and mutes without injuring the instrument, and which will not get out of order, if any moderate care is exercised.

In order that the principle and mode of operation of the invention may be understood, it will be illustrated and described as applied to a single-manual organ having several sets of reeds and stop mechanism therefor of an existing type of the well-known Estey organs.

The essential parts of the organ, with the improvements applied thereto, are illustrated in the accompanying drawings, wherein—

Figure 1 is a plan view of the organ-action. Fig. 2 is a plan view of the same with the name-board and key-frame removed. Fig. 3 is a plan view of the same with the forte-swells and all parts above the same removed. In Figs. 2 and 3 also the swell-chamber of the sub-bass and the tremolo are removed. Fig. 4 is a vertical cross-section in a plane indicated by the line 4 4 in Fig. 1. Fig. 5 is a vertical cross-section in a plane indicated by the line 5 5 in Fig. 1. Fig. 6 is a rear view of the action with the sub-bass and tremolo removed. Fig. 7 is an end view, looking at the bass end. Fig. 8 is a detail view of the octave-coupler controller. Fig. 9 is a diagram illustrating the locking action of the mute-operators. Fig. 10 is a perspective view of the grand-organ bar. Figs. 1, 2, 3, 6, 7 and 10 are drawn to a standard scale, indicated on Sheet 1. Figs. 4, 5, 8 and 9 are drawn to a scale twice the standard scale.

The particular organ which has been selected for illlustration and description contains the following well-known characteristics, with which the improvements are conjoined.

A is the horizontally-arranged wind-chest, with which all of the reed sets communicate. Immediately above the wind-chest is the socket or reed-cell board B, the sub-bass C, and the tremolo or vox humana D. The socket or reed-cell board contains four full sets of reeds, the reeds in each set being divided into independent bass and treble sections, and there are eight principal mutes controlling the eight sections of these four sets of reeds. These eight mutes, (see Fig. 3,) with their names, as designated in the Estey organs, are as follows: E^2 is the melodia; E^3, the viola; E^4, the cornet echo; E^5, the cornettino; E^9, the flute; E^{10}, the diapason; E^{11}, the vox jubilante, and E^{12} the bourdon. The sub-bass likewise has a mute E′, and the vox humana a mute E^{13}. Covering the four rear mutes E^2 E^4 E^{10} E^{12} is the rear or melodia forte-swell E^8, while above and covering the four front mutes is the front or flute forte-swell E^6. (See Fig. 2.)

Immediately above and carried by and hinged to the fixed hinge-plate *a* for the front swell is the octave-coupler E^7. Between the two swells is the longitudinal guide-rail F for the vertically and longitudinally movable tracker-pins *b*, intermediate between the manual-keys *c* above and the reed-valves *d* below.

At opposite ends of the socket or reed-cell board B, the eight principal mutes and the swells are the fixed vertical inclosing and supporting end plates G G′. Above the forte-swells and resting upon the end plates or supports G G′ is the key-frame H, carrying the manual-keys *c*.

Immediately above and supported upon and by the rear of the key-frame is the frame of the name-board I. Supported and guided by the name-board I of the name-frame (see Fig. 1) are sixteen horizontally and longitudinally sliding stops J′ to J^{16}, which project in front of the name-board, where they have manipulating-knobs. Thirteen of these stops, J′ to J^{13}, inclusive, correspond and cooperate with the eight principal mutes, two swells, octave-coupler, sub-bass mute and vox-humana mute E′ to E^{13}, inclusive, respectively.

At this point it is stated that in the following description when the word "mute" alone is employed it is used to designate generically one of the eight principal mutes, one of the two swells, or the octave-coupler, all of these eleven parts being included for the purposes of this specification as mutes. Where a particular mute is referred to, it will be referred to as a principal mute, a swell, a coupler, a sub-bass mute, or a vox-humana mute, as the case may be.

In addition to the stops just named there are two modulating or piano stops, the dolce-stop J^{14} and the dulciana J^{15}, and a combination-stop, the harp æolienne J^{16}. There are also two knee-stops (not shown) below the wind-chest A, a knee-swell which controls the two swells E^6 E^8 simultaneously, and a grand organ which controls all of the principal mutes, (except the cornet echo and the cornettino,) the sub-bass mute, and the octave-coupler simultaneously. The main reed-valves *d* are located within the wind-chest immediately beneath the air egress or eduction ducts from the reed-cells, and are operated directly from the tracker-pins. (See Figs. 4 and 5.) The sub-bass reed-valves *e* are operated by jacks *f*, which are operated by the appropriate valves *d*. The tremolo mechanism D is the well-known vox-humana mechanism of the Estey organs.

All of the foregoing parts are old and well known and such as are in extensive use in one type or class of the Estey organs.

The mutes.—Excluding now from immediate consideration the sub-bass, vox humana, knee-swell and grand organ, which have special relations to the other parts, the improved stop-action comprises three fundamental sections: first, the section which includes the primary means or controllers for immediately operating the eight principal mutes and the two forte-swells; second, the section which includes the operating instrumentalities or operators which have an immediate and permanent relation with the name-board and which receive movement directly from the stops of the name-frame, and, third, an intermediate section between the name-frame and the principal mutes and swells, having transmitters for transmitting to the controllers of the mutes and swells the movements derived from the operators moved by the stops. In addition to these fundamental relations a transmitter of the intermediate section imparts motion to the octave-coupler controller from its appropriate stop. The intermediate section includes transmitters for effecting the combination controlled by the combination-stop and for producing the piano effects controlled by the dulciana and dolce stops, and the appropriate stops of the name-frame have special relations with the sub-bass and vox humana which do not interfere with its fundamental characteristic.

The fundamental characteristic of the name-board section is that its operators have no permanent or intimate connection with any of the parts controlled thereby, since they have merely the relation of juxtaposition or free contact with the transmitters moved by and co-operating with them. It is likewise characteristic of the intermediate section that none of its transmitters are permanently or intimately connected with the moved parts or controllers of the mute-section, the co-operative relation being that of juxtaposition, propinquity, or free contact. As the result of these fundamental characteristics the name-board frame with its accessories and the frame of the intermediate or transmitter section with its accessories can be disconnected from the remainder of the action and removed at will readily and without difficulty, and extreme simplicity of construction is attainable.

In describing the stop-action specifically the mute-section will be described first, reference being had particularly to Fig. 3. Each of the eight principal mutes is hinged to the socket-board B, normally closing the air-ducts to the several reeds controlled thereby, and is held closed by a torsional spring *g* in the usual manner. The swells E^6 E^8 (see Fig. 2) are provided with similar or equivalent springs. Co-operating respectively with the eight principal mutes E^2 E^3 E^4 E^5 E^9 E^{10} E^{11} E^{12} are eight corresponding principal-mute-controlling cross rock-shafts K^2 K^3 K^4 K^5 K^9 K^{10} K^{11} K^{12}, each of which extends horizontally above and at right angles to the length of the principal mutes and is suitably journaled in fixed bearing-plates L L', mounted upon the socket-board B. These several mute-controlling rock-shafts have at their outer ends downwardly-inclining operating lifting crank-arms h^2 h^3 h^4 h^5 h^9 h^{10} h^{11} h^{12}, respectively, which are flexibly, by preference, connected with the respective principal mutes. The flexible connection in each instance consists, by preference, of a loop *j*, preferably of leather, secured to the free edge of the principal mutes, through which loop extends the free end of the corresponding operating crank-arm. The several principal-mute-controlling rock-shafts have also at their inner ends, immediately in the rear of the tracker-pin guide-rail F, upwardly-extending operated crank-arms i^2 i^3 i^4 i^5 i^9 i^{10} i^{11} i^{12}, respectively, which co-operate with the intermediate transmitters of the intermediate section, as will hereinafter appear.

K^6 and K^8 are swell-controlling rock-shafts for the swells E^6 E^8, respectively, and are provided respectively with operated and operating crank-arms h^6 i^6 and h^8 i^8, and are similar to the principal-mute rock-shafts except in two respects. These two respects, due to the circumstance that the swells E^6 E^8 are above the shafts K^6 K^8, are, first, that the lifting crank-arms h^6 h^8 incline upwardly, and, second, that their free ends simply bear upon the under sides of their respective swells, there being no loop connection, as shown in Figs. 4 and 5. The swells and principal

mutes are elevated to admit air to the reeds by the action of the lifting and operating crank-arms of their respective controllers when their corresponding stops are pulled out, and when the stops are pushed in the swells and principal mutes are restored to their normal closed position by their closing and restoring springs.

The controller for the octave-coupler E^7 is shown in Fig. 2. It consists of a rock-shaft K^7, having operating crank-arm h^7 and operated crank-arm i^7, and is similar in all substantial respects to the front-swell controller K^6, except that the rock-shaft K^7 is journaled in suitable bearings upon and on top of the plate a and above the tracker-pin guide-rail F. The operating and lifting crank-arm h^7 extends beneath the octave-coupler to elevate the same into operative position, and the octave-coupler is restored to its normal inoperative lower position by the torsional spring g with which it is furnished. Only one octave-reaching rock-shaft k with its cranks l is shown upon the coupler-frame, for the sake of indicating its purpose. The controller K^7 is shown in detail in Fig. 8.

The eight principal mutes, the two swells, and the octave-coupler thus are shown to have corresponding controllers, each of which is composed of a double-cranked rock-shaft, and which have between them eleven upwardly-extending operated crank-arms i^2 to i^{12}, inclusive.

Referring now to Figs. 1 and 6, the name-board section will be described. The eleven stops J^2 to J^{12}, inclusive, are connected directly with operating instrumentalities or operators which are exactly alike and for which the description of one will suffice. This operator consists of a vertically-extending double-cranked rock-shaft M, which is journaled by suitable bearings on the rear side of the rear rail I′ of the name-board frame. Each shaft M has an upper horizontal crank-arm m, having at its free end a vertical finger n, which extends upwardly through an aperture in the corresponding stop and constitutes a rear support therefor, and each shaft likewise has at its lower end a horizontal crank-arm o, (extending in the same direction as the arm m,) having at its free end a downwardly-projecting vertical finger p. As each stop is moved in and out its corresponding rock-shaft M is oscillated, thus swinging the lower finger p through an arc of a circle.

The intermediate section is shown in Fig. 2. Its frame consists of a longitudinal bar N, which is fastened at opposite ends to the end supports G G′. This bar carries eleven jacks O^2 to O^{12}, inclusive, corresponding with the eleven stops J^2 to J^{12}, inclusive, and the eleven crank-arms i^2 to i^{12}, inclusive, of the eleven mute-controllers. Each of these jacks is a horizontal lever pivoted at its middle upon the bar N. The front ends of these eleven jacks lie alongside of the eleven crank-arms i^2 to i^{12}, respectively, the latter being in the paths of movement of the jacks when the jacks are swung on their pivots. At its rear end each of these jacks carries a horizontal swinging link P, which is pivoted to the jack and has at its outer end an open-mouthed elongated slot q. Each of the slots q is entered and occupied by one of the fingers p of one of the operators M, said finger abutting against the inner closed wall of the slot.

When the entire action is in operative condition, each link P normally occupies a position approximately at right angles to its jack but inclining rearwardly. When, however, any one of the stops J^2 to J^{12} (say the stop J^2) is pulled out, its corresponding operator M is rotated, the corresponding link P is swung inwardly on its pivot and at the same time swings the rear end of the corresponding jack O^2 to the left. (See Fig. 2.) Thus the front end of the jack is swung to the right, and in doing so it abuts against the upwardly-extending operating crank-arm i^2, thereby oscillating the controller K^2 and opening the mute E^2. When the stop is pushed inward, the spring g of the mute restores all of the parts to their normal positions. The spring of the mute always keeps the inner wall of each slot q in contact with its finger p. To maintain each mute, swell or octave-coupler in its open position against the action of its spring when the corresponding stop is pulled out, the extent of movement of each stop is such that when each link P is swung forwardly it passes the dead-center line, (see the dotted line 20 20 in Fig. 9,) which intersects the axis of the corresponding operator M and the pivot between the link and its jack. The swinging movement of the jack which effects the opening of its corresponding principal mute, swell or octave-coupler is due to the circumstance that each finger p swings through the arc of a circle and that said finger abuts against the inner wall of the corresponding slot q. Each jack with its link thus constitutes the transmitter between one of the operators connected with a stop and one of the controllers connected with a mute. In each case, it will be noted, the transmitter has free contact with the operator and controller—that is to say, there is no permanent or fixed connection between them.

There is a peculiarity about the vox-jubilante stop J^{11} in the construction shown requiring special mention. The corresponding jack O^{11} (see Fig. 2) carries at its inner or forward end a coupling-link Q pivoted thereto, which extends to the left and has an aperture r which is entered and occupied by the upper end of the adjacent operating-arm i^{10} of the diapason-mute E^{10}. Consequently when the vox-jubilante stop is operated both the vox-jubilante reeds and the diapason-reeds are simultaneously brought into action, so that the vox-jubilante stop is virtually a combination-stop. No means are shown for operating the vox-jubilante mute independently. In order that the diapason-mute E^{10}

may be operated independently, the aperture r is elongated in the direction of the opening movement of the crank-arm i^{10}.

The two piano-stops, dolce J^{14} and dulciana J^{15}, and the combination stop-harp æolienne J^{16} have special relations and connections. The dolce-stop does not operate an independent mute, but its purpose is to partially open the melodia-mute, (which controls the fundamental melodia bass-reeds,) so that a soft or piano tone is thereby obtained. The operator M of the dolce-stop J^{14} accordingly co-operates with a link P, carried by a jack O^{14}, which is similar to the other jacks O^2 to O^{12}, except that it does not extend forward of the bar N. (See Fig. 2.) This jack has a "lost-motion" connection with the melodia-jack O^2, so that only a portion of its motion is operative to move said jack O^2. This lost-motion connection comprises an adjustable mover s attached by a screw-shank to the jack O^{14}, which is adapted to abut against the jack O^2 or a stop thereon. When both jacks O^2 O^{14} are in their normal mute-closing positions, there is an open space between the mover s and the jack O^2. Consequently when the jack O^{14} is moved by the dolce-stop J^{14} its movement has no effect upon the melodia-mute until the said space has been passed over, and thereafter the jack O^{14} swings the jack O^2. Consequently the action of the dolce-stop is simply to partly open the melodia-mute. In an almost similar manner the dulciana-stop J^{15} acts to partially open the diapason-mute E^{10}, (which controls the fundamental diapason treble-reeds,) so as to produce a soft or piano tone. The operator M of the dulciana-stop J^{15} co-operates with a link P on the corresponding jack O^{15}, which does not extend forward of the bar N and which has a lost-motion connection with the diapason-jack O^{10}, consisting of an adjustable mover s', attached to the jack O^{10} by a screw-shank and adapted to be encountered by the jack O^{15} after the said jack has moved across an open space. In this case, however, the shank of the mover s' extends loosely through a through-aperture in the jack O^{15}, so that the mover s' acts to pull the jack O^{10}, whereas the mover s acts to push the jack O^2. Otherwise the operation of the dulciana-stop is identical with that of the dolce-stop.

The purpose of the harp-æolienne stop J^{16} is to simultaneously operate the cornet-echo mute E^4 and the cornettino-mute E^5 without interfering with their independent operation by their appropriate stops J^4 and J^5. Accordingly the operator M of the stop J^{16} co-operates with a link P on a jack O^{16}, located between the jacks O^4 O^5, corresponding to the cornet-echo and cornettino mutes, respectively. The jack O^{16} carries on its inner end a double coupling-link R, pivoted at its middle to said jack and having near its opposite ends two elongated apertures or slots $t t'$, which are entered and occupied, respectively, by the crank-arms i^4 and i^5 of the cornet-echo and cornettino mute controllers. Consequently when the harp-æolienne stop is pulled out the cornet-echo and cornettino reeds are brought simultaneously into action. The elongation of the slots t t' permits the jacks O^4 and O^5 to operate independently of each other.

The sub-bass and vox humana.—The sub-bass mute E′ has an outwardly-extending rigid operating crank-arm or controller K′ eccentrically located with reference to the mute-hinge, and pivoted to the outer end of this arm is a jack, link, or transmitter O′ pivoted at its lower end to said arm and having at its upper end an open elongated slot q'. Co-operating with this jack O′ is a horizontal double-cranked rock-shaft or operator M′ journaled upon the rear rail I′ of the name-frame. This shaft has at its upper end a vertical crank-arm m' having a horizontal finger n' passing through an aperture on the rear end of the sub-bass stop J′, and at its lower end a vertical crank-arm o' having a horizontal finger p' which enters and occupies the slot q' bearing against the lower inner wall thereof. By moving the stop J′ outwardly the sub-bass mute E′ is opened, and when the stop is moved inwardly the mute is closed by a torsional or equivalent spring g. The stop in opening and closing carries the jack, link, or transmitter O′ past the dead-center line intersecting the axis of the operator M′ and the pivot between the jack and the controller K′, so that the mute E′ is securely maintained both open and shut.

The vox-humana mute E^{13} (which in the construction shown is a flexible piece of leather secured along one edge to the vox-humana casing) is connected at its free edge to an arm or controller K^{13} upon a jack or transmitter O^{13}, which is pivoted near its lower and outer end to the vox-humana casing, and which has at its inner and upper end an open slot q^2. Co-operating with this jack O^{13} is a horizontal double-cranked rock-shaft or operator M^{13} journaled upon the rear of the rear rail I′ of the name-frame. Said rock-shaft has a vertically-extending crank-arm m^{13}, having a horizontal finger n^{13} entering an aperture in the rear end of the stop J^{13}, and an outwardly-extending downwardly-inclining crank-arm o^{13} having a horizontal finger p^{13} which enters and is located in the open slot q^2. By moving the stop J^{13} out and in the jack O^{13} is swung back and forth on its pivot, thus opening and closing the mute E^{13}.

The knee-swell.—The object of the knee-swell is to simultaneously open and close both swells E^6 E^8. It contains no novelty, and hence will be briefly described. The knee-stop (not shown) acts to move longitudinally a rod S, which is pivotally connected to a crank-arm u on a rock-shaft T having two lifting-cranks v v' arranged respectively beneath tappet-arms w w', carried respectively by the two swells E^6 E^8. Moving the rod S to the right opens both swells. The shaft T

is restored to its normal position both by the restoring-springs g of the swells and by a special torsional spring g'.

The grand organ.—The object of the grand organ is to bring into operation either the full power of the organ or so much thereof as may produce the maximum desired effect. The grand-organ mechanism, as illustrated, opens simultaneously all of the eight principal mutes (except the cornettino and cornet echo) and the sub-bass mute, and it also brings the octave-coupler into action. It does not operate the swells nor produce the vox-humana and harp-æolienne effects. The primary operating mechanism of the grand organ consists of a longitudinally-sliding rod U, which is operated by a knee-stop (not shown) in the usual manner, and a horizontally-disposed rock-shaft V connected therewith by a crank-arm z. This rock-shaft V is journaled (see Fig. 7) upon the bass end support G. Upon its extreme rear end the shaft V carries a horizontally and inwardly extending depressor y located immediately above the controller K′ of the sub-bass mute.

All of the principal mutes and the octave-coupler, which are affected by the grand-organ stop, are operated by a single instrumentality, consisting of a single grand-organ operating-bar W, (see Fig. 2,) which is shown in detail in Fig. 10. This bar extends horizontally in the same plane as the transmitter-bar N, immediately behind the operating crank-arms i^2 to i^{12}, and immediately below the inner ends of the jacks O^2 to O^{12}. It is adapted to slide longitudinally and horizontally in suitable guides X X. The grand-organ bar W extends at its bass end beyond the end support G, and it has at its extreme bass end an open horizontal slot X′, which is entered and occupied by a crank Y of the grand-organ rock-shaft V. The bar W is moved to the right by the crank Y and to the left by a spring g^2 bearing against a stud Z on the bar W. The bar W carries a plurality of operating-studs x^2, x^3, x^9, x^{10}, x^{11}, and x^{12}, all of which extend horizontally and forwardly immediately at the left of the crank-arms i^2, i^3, i^9, i^{10}, i^{11}, and i^{12}, respectively. Consequently when the bar W is moved to the right the said studs encounter said crank-arms and open the corresponding mutes. The bar W also carries a stud x^7, which extends vertically immediately at the left of the front end of the jack O^7, so that when the bar is moved to the right it moves said jack, and said jack moves the arm i^7 of the octave-coupler. The stud x^7 might be located the same as the other studs, except that owing to the shortness of the arm i^7 it is desirable to place the stud x^7 so as to encounter the jack O^7, since greater leverage is thereby attained.

To operate the grand organ the rod U is moved to the left by the usual knee-stop, (not shown,) which rocks the shaft V, thereby depressing the depressor y, thus opening the sub-bass mute, and moving the crank Y inward, whereby the bar W is moved to the right and the mutes controlled by it are opened and the octave-coupler is rendered operative. On removing the pressure from the grand-organ knee-stop, the several parts are moved to their normal inoperative positions by the springs.

The name-frame.—The name-frame has a novel construction. The front longitudinal rail 21 thereof extends flatwise horizontally, and has a groove 22 extending along the middle of its rear edge. Secured to the front rail 21 are four horizontal flat cross-rails 23 arranged at equal intervals, each having a tenon 24 entering the groove 22. The cross-rails are in addition united to the front rail by glue and by screws 25, which extend upwardly from the bottom of the rail 21 through the tenons 24 into the vertically-arranged name-board I, thereby also holding the latter in position. The vertically-arranged rear rail I′ is screwed directly to the rear ends of the cross rails or blocks 23 by screws 26. At each end there is screwed to each end block 23 a supporting-foot 27, which, when the name-frame is in position, rests upon the end rails of the key-frame and holds the name-frame out of the way of the manual-keys. The name-frame, as usual, is held in position on the key-frame by steady-pins 28 and hooks 29.

The advantages which result from the described improvements are many, and consist, principally, in the resulting economy of manufacturing, facility in taking apart for cleaning and repairing, and certainty and quickness in operation when the organ is being played.

Perhaps the most prominent merits and advantages of the improvements lie in the resulting economy in making. All of the operators M′ to M^{16} and the controllers K^2 to K^{12} are made of wire bent to the proper shape. With the exception of the operators M′ and M^{13} and their stops all the operators and their stops are just alike, which obviously results in economy in making and assembling. Likewise, all of the transmitting-jacks O^2 to O^{12} are exactly alike, except the slight additions to the jacks O^2 and O^{10}, and all of the links O′ are just alike. Hence but comparatively few separate pieces have to be manufactured and kept in stock.

In building the organs with the improvements all of the parts constituting the name-frame and carried thereby are assembled together at one place; the transmitting-section of the action with the transmitting-jacks are assembled together at another place, and the bearing-plates L L′ with the mute-controllers are assembled together at still another place. These three sections of the action are made separately and in quantity, and when one set is brought together the parts of the set are quickly and easily assembled together to make the finished organ. The putting of the action upon the organ is one of the final steps of organ-building, the case, bellows, wind-chest,

wind-conductors, and reed sets having been previously combined.

Owing to the present improvements the several parts of the action are added to the otherwise completed organ very quickly, since there is no fastening together of the several moving parts of the different stop-actions. This is a matter of great importance, since a great saving of factory-room is thus effected. In the old laborious method large floor-space was necessary for the final assembling operations, which is greatly reduced by the present improvements.

The ease and quickness of assembling the several parts of the new action is largely due to the fact that, as far as the principal mutes, the swells, the octave-coupler, and the combination effects are concerned, all of the operator-shafts extend vertically and all of the transmitters extend horizontally, while there is free contact relation between them furnished by the open-slotted links.

The grand-organ bar is readily put in place without interference with other parts of the action, and the connections between the sub-bass, the vox humana and the stops are simply and conveniently made.

The improved construction of the name-frame makes a firm, solid, strong and efficient name-frame, (having these qualities in a degree exceeding that of the ordinary name-frame,) which enables small and otherwise worthless pieces of material to be employed, thus effecting economy in making.

It will be noted that the present improvements involve no change in the relative locations of the reed sets, the wind-chest, the key-frame and the name-frame, and do not add to the height, width, or length of the action.

Other features of merit and advantage in making and assembling will readily suggest themselves to the expert organ-builder.

The same reasons which show the convenience in making are equally applicable when considering the taking apart of the organ for cleaning, tuning, or repairing.

Numerous modifications can be made in the construction without departing from the principle and mode of operation of the invention.

The improvements have been described and illustrated in connection with a somewhat elaborate single-manual organ. To apply the improvements to a simpler organ having fewer reed sets simply involves omitting a portion of the parts. To extend the improvements to a single-mannal organ having a larger number of stops simply involves the addition of other exactly similar parts.

To apply the improvements to a two-manual organ simply requires a duplication of the same stop-action, with such modifications and omissions as will be well understood by the expert organ-builder.

In the illustrated grand-organ bar all of the studs except one are shown extending horizontally, the exception being the stud x^7, which bears against the corresponding transmitter. All of the studs can be so located, with the advantage that silencing-felts can be more readily applied. The stud Z of the grand-organ bar might be omitted and the spring g^2 arranged to act upon the free end of the grand-organ bar. These are a few examples of permissible modifications.

In the accompanying drawings it has been considered unnecessary in all instances to illustrate the felts which are used between moving contacting parts or the cloth coverings for joints to prevent air-leakage, since to illustrate all of such details would tend to confuse the drawings, and their application and use are well known.

I claim as my invention—

1. A horizontally-sliding stop, an operator consisting of a vertically-extending double-cranked rock-shaft, one of said cranks being connected with said stop, a swinging mute, and a controller for said mute, said controller consisting of a double-cranked horizontally-extending rock-shaft, one of said cranks being connected by a flexible connection with said mute, in combination with a transmitter between said operator and controller, said transmitter comprising a centrally-pivoted horizontally-extending lever or jack, one end of which is in the path of one of the cranks of said controller so that it abuts against the same, and said transmitter having at its other end a horizontally-swinging open-slot link which is entered and occupied by one of the crank-arms of said operator, substantially as set forth.

2. A swinging mute, a controller therefor consisting of a rock-shaft extending horizontally at right angles to the mute, said rock-shaft having a horizontally-extending crank-arm and a vertically-extending crank-arm, and a flexible connection between said horizontal crank-arm and said mute, in combination with a transmitter consisting of a horizontally-swinging lever or jack which lies in the path of said vertical crank-arm and abuts against the same to control the mute, substantially as set forth.

3. A horizontally-sliding stop, and an operator consisting of a vertically-extending rock-shaft having two horizontally-extending crank-arms at opposite ends, the upper of said crank-arms having an upwardly-extending finger which is connected with said stop, and the lower of said cranks having a downwardly-extending finger, in combination with a transmitter consisting of a horizontal pivoted swinging lever or jack extending in the same general direction as said stop, and a horizontally-swinging open-slotted link pivoted to said lever or jack, into which open slot said downwardly-extending finger enters, substantially as set forth.

4. A horizontally-extending wind-chest, a horizontally-extending socket or reed-cell board upon said wind-chest containing a plurality of sets of reeds, reed-valves within said wind-chest beneath said socket-board, end

supports at the opposite ends of said socket-board upon said wind-chest, a plurality of horizontally-extending swinging principal mutes pivoted to said socket-board, a horizontal tracker-pin guide-rail above said socket-board, horizontal hinge-plates on either side of said guide-rail, front and rear swells hinged to said hinge-plates above said principal mutes, the key-frame supported by said end supports above the swells, the manual-keys on said key-frame, and the tracker-pins extending from said keys through said guide-rail to said reed-valves, in combination with an action consisting of three fundamental parts or sections, as follows: (1) a mute-controlling section, comprising two bearing-plates mounted upon the socket-board on opposite sides of the tracker-pins, and a plurality of mute-controllers mounted thereupon, each consisting of a horizontal rock-shaft extending crosswise of the mutes and having at its outer end a horizontal crank-arm which co-operates with one of the principal mutes or one of the forte-swells and at its inner end a vertical crank-arm located immediately behind and extending upwardly above the swell hinge-plates, (2) a name-frame mounted above and upon the key-frame, a plurality of horizontally-sliding stops carried by said name-frame, and a plurality of operators each consisting of a vertical rock-shaft journaled to the rear part of the name-frame and located beneath the stops, each rock-shaft having an upper crank-arm connected with one of said stops and a lower crank-arm, and (3) a transmitting-section, comprising a horizontal transmitter-bar located below the key-frame and above the rear swell, and a plurality of transmitters extending horizontally from said operators to said controllers, each transmitter consisting of a lever or jack centrally pivoted upon said bar with its front end located alongside and in the path of one of said vertical crank-arms of one of the mute-controllers and an open-slotted link pivoted to the rear end of said lever or jack the slot of which is occupied by the lower crank-arm of one of said operators, substantially as set forth.

5. As an independently constructed and mounted section of an organ-action, a transmitting frame or bar, and a plurality of horizontally extending and swinging levers or jacks the principal of which are centrally pivoted to said frame or bar, each of which has pivoted to it at one end an open-slotted link, substantially as set forth.

6. Two mute-controllers, in combination with a transmitter abutting directly against one of said controllers to operate the same, and a slotted coupling-link pivoted to said transmitter, the other of said controllers being operated by said coupling-link, substantially as set forth.

7. Two mute-controllers, each having an operated arm, in combination with a transmitter abutting directly against the operated arm of one of said controllers to operate the same, a slotted coupling-link pivoted to said transmitter in the slot of which the operated arm of the second controller is located, and an independent transmitter abutting against the operated arm of said second controller to independently operate the same, substantially as set forth.

8. Two mute-controllers, in combination with a transmitter located therebetween, and a double coupling-link centrally pivoted upon said transmitter and having slots at its opposite ends which co-operate with said controllers respectively, substantially as set forth.

9. Two mute-controllers each having an operated arm, a transmitter located therebetween, and a double coupling-link centrally pivoted upon said transmitter and having slots at its opposite ends which are entered and occupied by said operated arms respectively, and two independent transmitters abutting against said operated arms respectively for independently operating the same, substantially as set forth.

10. A mute, a mute-controller therefor, and a main transmitter immediately operating the same, in combination with a piano-transmitter connected with said main transmitter by a lost-motion device, whereby said mute is only partially opened, substantially as set forth.

11. A mute, a mute-controller therefor having an operated arm, a swinging transmitting main lever or jack abutting against said arm to fully open said mute, and a stop and stop connection for operating said main lever or jack, in combination with a swinging transmitting piano lever or jack, a lost-motion connection between said main and piano levers or jacks, whereby said mute is only partially opened, and a stop and stop connection for said piano lever or jack, substantially as set forth.

12. The combination of two transmitters for operating the same mute, and a mover adjustably connected with one of said transmitters and arranged in the path of the other of said transmitters, substantially as set forth.

13. A mute, a spring normally closing the same, a controller for opening said mute against the action of said spring, a swinging pivoted transmitting lever or jack co-operating with said controller, and a link pivoted to said lever or jack, in combination with a stop, an operator consisting of a rocking shaft operated by said stop, said rocking shaft having a crank-arm connected with said link, the extent of movement of said crank-arm in operating said mute being sufficient to carry the point of connection between said crank and link past a line intersecting the axis of said rock-shaft and the pivot between said link and lever or jack, substantially as set forth.

14. A plurality of mutes, and controllers therefor each having an operated arm, in combination with a longitudinally-sliding grand-organ bar co-operating simultaneously with a plurality of said operated arms, substantially as set forth.

15. A plurality of mutes, and controllers therefor each having an operated arm, said several operated arms being in line with each other and all moving in the same direction to open their respective mutes, in combination with a longitudinally-sliding grand-organ bar having a plurality of studs which co-operate with said operated arms, substantially as set forth.

16. A plurality of mutes, and controllers therefor, each having an operated arm, said several operated arms being in line with each other and all moving in the same direction to open their respective mutes, in combination with a longitudinally-sliding grand-organ bar having a plurality of projecting studs extending across the paths of said operated arms respectively and abutting against the same to open the mutes, substantially as set forth.

17. A reed-cell or socket board, reed-valves, manual-keys, tracker-pins between said keys and valves, mutes, and controllers for said mutes each having a vertical operated arm located behind said tracker-pins, the several operated arms being in line with each other and all moving in the same direction to open their respective mutes, in combination with a horizontal longitudinally-sliding grand-organ bar extending lengthwise of the key-frame and located below the key-frame and in the rear of said tracker-pins, said grand-organ bar having a plurality of studs co-operating with the respective operated arms of said mute-controllers, substantially as set forth.

18. A longitudinally-sliding grand-organ bar, in combination with a rock-shaft having a crank for operating said grand-organ bar, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JOSEPH F. WHITE.

Witnesses:
WALTER H. CHILDS,
JACOB GRAY ESTEY.