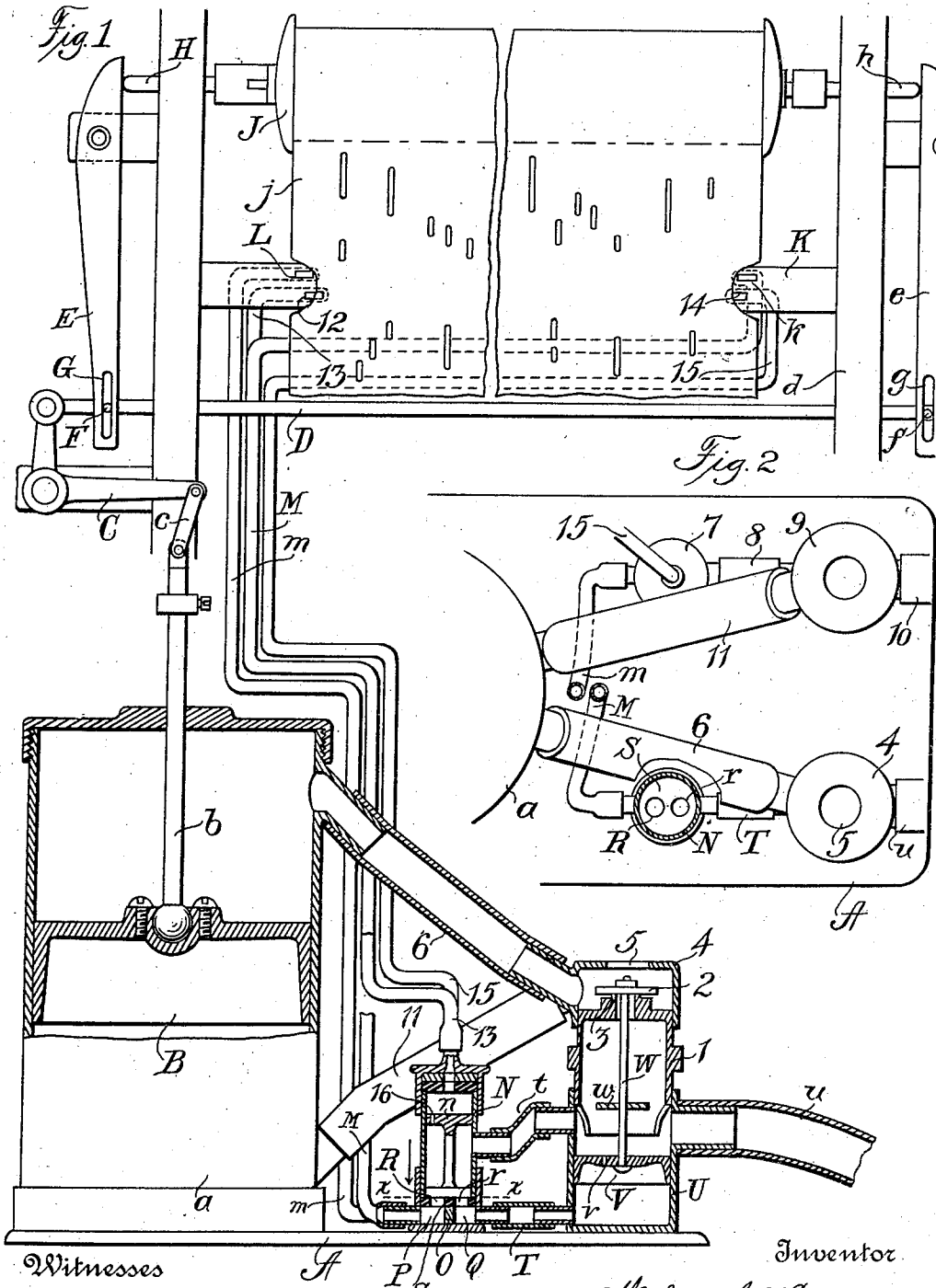


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 ROLL SHIFTER FOR PLAYER PIANOS.
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ROLL-SHIFTER FOR PLAYER-PIANOS.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WALTER A. KRUCK, a citizen of the United States, residing at Camden, in the county of Camden and State of New Jersey, have invented certain new and useful Improvements in Roll-Shifters for Player-Pianos, of which the following is a specification.

This invention relates to roll shifters for player pianos.

More particularly, it belongs to that class of contrivances constructed and arranged to be operated by atmospheric pressure and controlled by the movement of the note sheet, whereby the displacement of the note sheet with reference to the tracker-board in either direction may be rectified by a suitable sidewise movement of the note sheet brought about by an endwise movement of the roll carrying it.

The object of this invention is the production of a roll shifter comprising devices formed of metal, and without using the customary bellows for the purpose of imparting movement to the elements concerned.

Another object of this invention consists in the special construction and arrangement of parts actuated by atmospheric pressure and controlled by the note sheet, adapted to effect a reciprocating movement for any desired purpose in connection with a player piano.

The construction and arrangement of the parts of this invention are illustrated in the accompanying drawings, of which—

Figure 1 represents a front view of a portion of the frame of a player piano mechanism, and shows the note sheet in part, and the roll carrying it, with this invention applied thereto. Various parts concerned are shown in vertical section to aid the explanation. Fig. 2 is a top plan view of the spool valve casing and main valve casing, with a part of the cylinder containing the operating piston.

Throughout the drawings and description, the same letter or numeral is employed to refer to the same part.

On the base plate A, is erected the power cylinder *a*, within which is a piston B hav-

ing a rod *b* connected with a bell-crank lever C by the link *c*. The bell-crank is pivotally connected with rod D, and the rod is movably connected with levers E and *e*, by means of pins F and *f* projecting from rod D and engaging slots G and *g* in the levers. The levers have their free ends arranged against the ends of the spindles H and *h* by which the roll J is supported, and the roll carries a note sheet *j*, that passes over a tracker-board K. The two end orifices of the tracker-board marked *k* and L are connected with certain valvular devices, of which there are two sets. A description of the construction and operation of one set of those devices will explain the whole, as both sets are exactly alike in every way.

The tracker orifice *k* is connected by tube M with the casing N on base plate A. Within the casing is a spool valve *n* arranged to work freely up and down in the casing. The casing N is usually made with two removable end caps as illustrated, and, in the lower end cap is placed a disk O having two cavities P and Q, and these cavities register with orifices R and *r* in the rubber disk S, that is placed upon disk O and acts as a cushion for the spool valve *n*. It may be noted here that the orifice *k* in the tracker-board is connected by tube M with the cavity P of disk O that is located in the bottom of casing N of the spool valve. The cavity Q of disk O is connected by tube T, and casing N by tube *t*, with the main valve casing U. It will be observed that the tube T opens below the piston V in casing U, and that the tube *t* opens into that casing above the piston. The piston V has a rod W attached to it, and the rod passes upwardly through a guide plate *w* fixed transversely within the coupling 1. At the upper end of rod W is a valve 2 that has a seat 3 on the top of coupling 1. A cap 4 covers the valve and the top of the coupling, and cap 4 is provided with a central opening 5 through which the outside air may enter. Cap 4 of the main valve casing is connected by tube 6 with the cylinder *a* above the piston B as shown.

The casings N and U and their contents

comprise one set of valvular devices. The other set, identical in size and structure, includes spool valve casing 7, best shown in Fig. 2, and there is also set forth one of the tubes marked 8 connecting the casing 7 with the main valve casing 9. The top of casing 9 is connected by tube 11 with the working cylinder *a* below the piston B.

It will be noted in Fig. 1, that the note sheet *j* when in proper position covers the end orifices *k* and *L* of the trackerboard, and, the note sheet covers likewise the additional orifice 12 located near orifice *L* and connected with tube 13, and the additional orifice 14 located near orifice *k* and connected with tube 15. The additional orifices are placed, as illustrated, by the side of the orifices *k* and *L* but a little toward the middle of the trackerboard.

To explain the operation, let it be assumed that from any cause the note sheet *j* during its progress over the trackerboard is drawn to one side uncovering, in whole or in part, the orifice *k*. Air now passes by way of tube M into spool valve casing below the valve, which it lifts, allowing air to pass through cavity P, openings R and *r* in the cushion disk at the bottom of that casing, and by connecting tube T into main valve casing U below piston V. The piston is raised, and valve 2 closes opening 5 at the top, enabling the suction tube *u* to take the air from the working cylinder *a* above piston B. Atmospheric pressure below piston B moves that piston upwardly, operating bell crank C, and rod D toward the left and again covering orifice *k*. Let it be further assumed that the note sheet *j* is so narrow that a part of each of the orifices *k* and *L* are always uncovered. Such a condition of things will result in holding up main valve 2 and its duplicate in the casing 9, and equal suction will be effected both above and below piston B in working cylinder *a*. Now, if the note sheet becomes displaced toward the right, considering Fig. 1, sufficiently to uncover any part of additional orifice 12, air passes by tube 13 into the top of casing N as illustrated, and there is then air pressure both above and below spool valve *n*, which drops of its own weight, closing orifices R and *r* at the bottom of casing N. No more air can then enter by way of connection T beneath main valve piston V, and by way of duct *v* the air beneath that piston is quickly exhausted. The outside air on main valve 2 seats that valve and air enters working cylinder *a* above piston B which is moved downwardly, operating bell crank C and rod D, moving roll J and note sheet *j* to the left and recovering additional orifice 12. The reason for placing the additional orifices

somewhat more toward the middle of the trackerboard will now become apparent. The object is to provide for the automatic adjustment of unusually narrow note sheets.

It will be understood, that when both additional orifices 12 and 14 are covered by the note sheet, the tubes 13 and 15 are exhausted, owing to the fact that the top of each spool valve has a duct such as duct 16 through the upper disk of spool valve *n* shown in Fig. 1. The air is drawn out between the ends of the spool valve through the tube *t* into the casing U of the main valve, and the interior of casing N above the spool valve is normally, therefore, a partial vacuum, which condition permits air entering below the spool valve to raise that valve as already explained.

It has been stated herein that both sets of the valvular devices are identical in construction and operation, and, further, when the orifice *k* or the orifice *L* is opened, the sets of valvular devices operate independently of each other. But, when either of the additional orifices 12 or 14 is opened as set forth in this specification, while the sets of valvular devices still act independently, it is not exactly in the same order as before. That is to say, for example, when orifice *L* is uncovered, air by way of tube *m* actuates the parts in casings 7 and 9, best shown in Fig. 2. The uncovering of additional orifice 12, however, located at the same end of the trackerboard with the orifice *L*, causes the operation of devices in casings N and U. Having now described this invention, and explained the mode of its operation, what I claim is:—

1. The combination with a pair of casings having valves movable freely up and down therein, each valve having a head at either end connected together and an air space between them, the said casings having upper and lower openings controlled by said valves, of a trackerboard having end orifices connected with the lower openings of the casings and additional orifices connected with the upper openings, the said end and additional orifices at the same end of the trackerboard being connected with different casings, a suction tube having connections with said casings between the heads of the valves therein, and means constructed to permit the passage of air from above the upper heads of the valves in the casings into said suction tube connections.

2. The combination with a pair of casings having spool valves movable freely up and down therein, the said casings having upper and lower openings controlled by said valves, of a trackerboard having end orifices connected with the lower openings of the

casings and additional orifices connected
with the upper openings, the said end and
additional orifices at the same end of the
trackerboard being connected with different
5 casings, and a suction tube having connec-
tions with said casings between the heads of
the spool valves, the upper head of each
spool valve having an air duct constructed
to permit air to pass from above the upper

head of the valve into said suction tube con- 10
nections.

In testimony whereof I affix my signature
in presence of two witnesses.

WALTER A. KRUCK.

Witnesses:

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