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F. L. YOUNG

REPRODUCING PIANO

Filed July 1, 1922

2 Sheets-Sheet 1

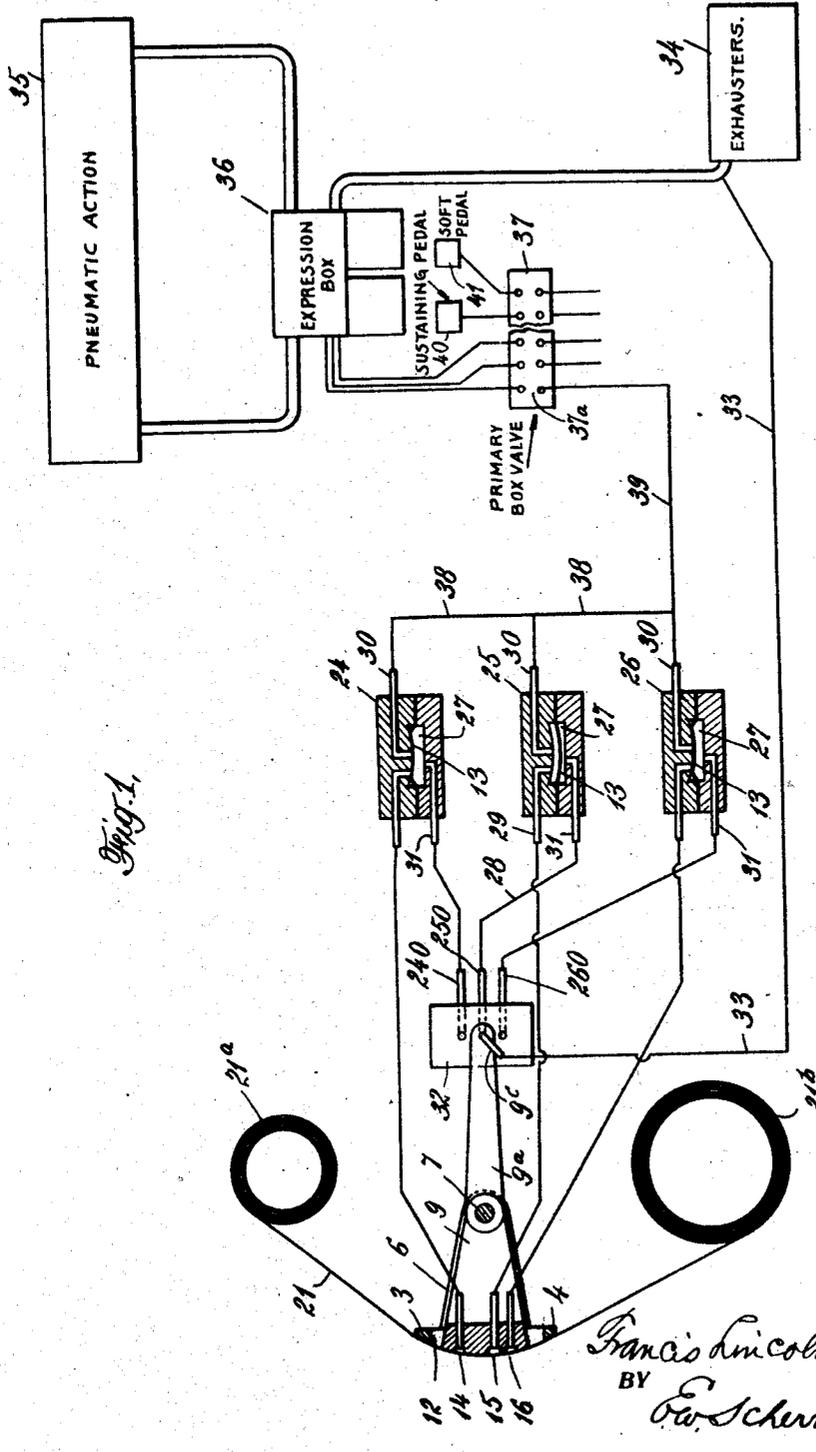


Fig. 1.

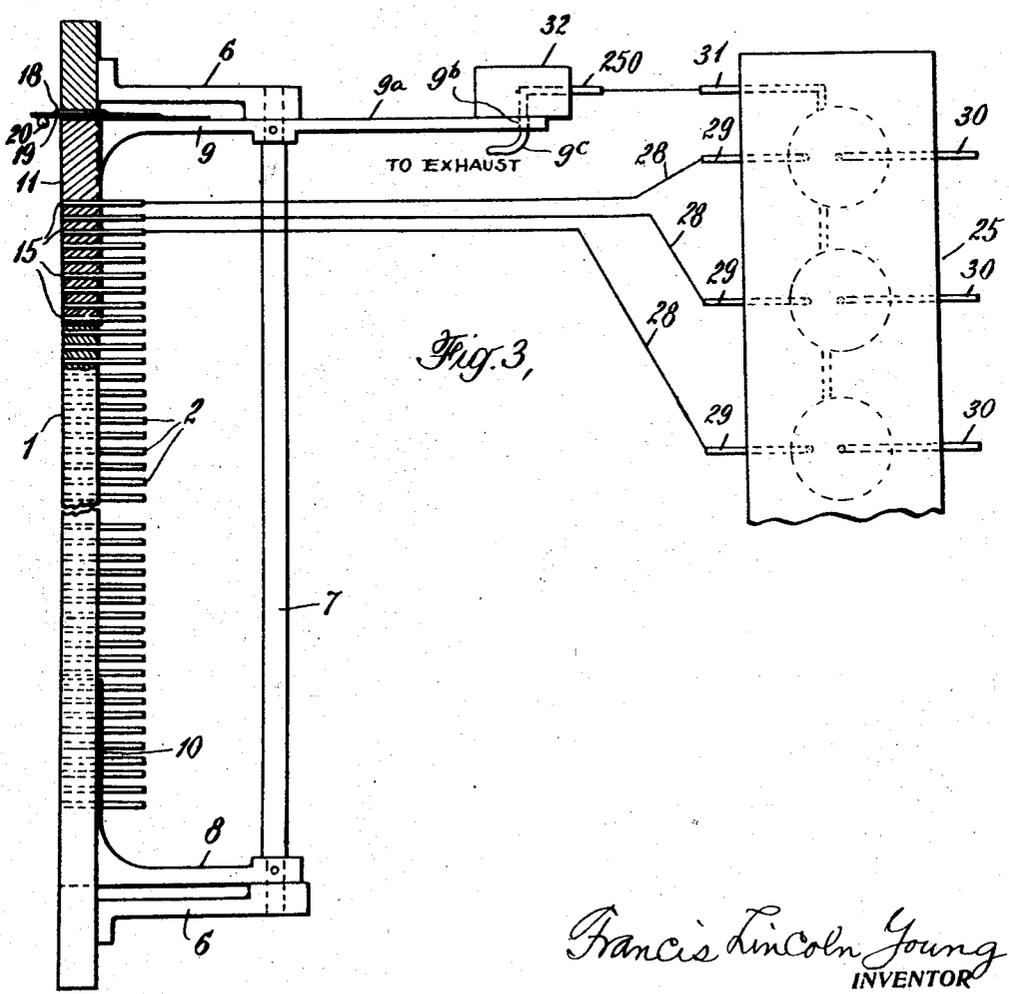
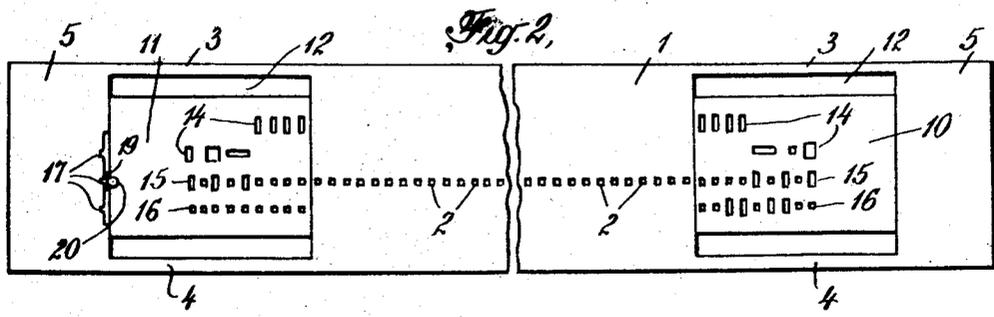
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2 Sheets-Sheet 2



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# UNITED STATES PATENT OFFICE.

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## REPRODUCING PIANO.

Application filed July 1, 1922. Serial No. 572,225.

*To all whom it may concern:*

Be it known that I, FRANCIS LINCOLN YOUNG, a citizen of the United States, and resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Reproducing Pianos, of which the following is a specification.

My present invention relates to improvements in reproducing pianos and more particularly to improved means for adapting the instrument to play interchangeably with various makes of music-sheets having different kinds and arrangements of expression controlling perforations.

The drawings illustrate one of the preferred embodiments my invention is adapted to take. In them, Fig. 1 is a vertical section partly in elevation through the tracker mechanism, etc., within my invention, said figure also showing in vertical section the cut-off valve boxes used in connection with the foregoing, and further showing diagrammatically the more important operative parts of a reproducing piano including a diagrammatic showing of the pneumatic connections between the related parts of all of the foregoing; Fig. 2 is a face view of the main and supplemental trackers of Fig. 1,—in other words, a view of same as looked at from the left hand side of said Fig. 1, the middle portion of the main tracker bar being broken away to save room in the drawing; and Fig. 3 is a top plan view of part of the devices shown in Fig. 1 including the main and supplemental trackers and related parts and one of the cut-off valve boxes, only one of the supplemental trackers 10 being shown as aforesaid in top plan view, the other, namely supplemental tracker 11, being shown in horizontal section taken through its row of expression controlling ducts 15 in Fig. 1.

Describing now my invention as illustrated by the particular embodiment thereof in the drawings, 1 is the main tracker bar with its note-playing ducts 2. Projecting longitudinally from each end of said main tracker bar are integral spaced apart extensions 3 and 4 connected at their ends by the transverse piece 5.

On the back of each piece 5 is secured a bracket 6, there being aligned bearings in said brackets which receive the ends of a

rock shaft 7 located behind the tracker bar. Mounted on and rigidly secured to this rock shaft are the brackets 8 and 9, the forward ends of which respectively support the supplemental tracker sections 10 and 11 within the rectangular openings 12 at the ends of the main tracker bar 1, the said rock shaft permitting said supplemental sections 10 and 11 to be adjusted transversely relatively to the tracker 1 to bring at will any of the rows 14, 15 or 16 of expression ducts in said supplemental sections into proper playing position relatively to the note-ducts of the tracker 1.

The tracker 1 and the sections 10 and 11 are all transversely crowned on their active or music-sheet contacting face (compare Fig. 1), the crowning being on substantially the arc of a circle described about the longitudinal axis of the rock shaft 7 so that the music-sheet will make proper contact with the ducts of the main tracker and of the supplemental sections in spite of transverse adjustments given to the latter. Fig. 1 shows a music-sheet 21 in playing position on the tracker, the part 21<sup>a</sup> of said sheet being supposed to be on a music-spool, and the part 21<sup>b</sup> being supposed to be wound on the usual take-up spool.

Row 15 is shown in proper playing position. The other rows 14 and 16 are supposed to be out of play, row 14 being one notch above playing position and row 16 being one notch below playing position. The notches referred to are the notches 17 formed in the side of one of the end pieces 5, best shown in Fig. 2. These are severally adapted to be releasably engaged by rib 18 on the back of a leaf spring member 19 located in a space provided for the purpose between the piece 5 and the adjacent supplemental tracker section 11, the inner end of said member 19 being fixed to the bracket 9 (Fig. 3), and its outer end being provided with an operating knob 20. Thus, means is provided constituting a handle for the operator to use in simultaneously adjusting the sections 10 and 11 to bring the desired row of expression controlling ducts into play and to lock same in position against unintentional displacement.

The broken row of ducts 14 shown in the drawings correspond and are adapted to play with expression perforations of the so-

called "Duo Art" music-rolls. The other rows 15 and 16 may be assumed to correspond and be adapted to play the expression perforations of two other kinds or makes of reproducing piano music-rolls, so that the aforesaid tracker bar construction is capable of playing said three different kinds of reproducing piano music-rolls.

Whichever of the rows of expression ducts 14, 15 or 16 is selected to be operative, the other rows are automatically rendered inoperative so that the ducts of said latter rows will not be affected by the passage of music-sheet perforations over them. The means for accomplishing this will now be described, that shown being one convenient form of said means.

24, 25 and 26 are cut-off valve boxes, one for each row of expression ducts 14, 15 and 16. Fig. 1 shows these boxes in vertical cross section, and Fig. 3 shows part of one of them, namely, part of box 25, in plan view. All of the boxes are of the same construction so that the description of one suffices for all.

Each box contains as many enclosed circular chambers 27 as there are expression ducts in the row 14, 15 or 16 to which the given box relates. For instance, box 25 will have nine of such chambers 27 (only three, however, being shown in Fig. 3 for the sake of simplicity) severally connected to the nine ducts of the row 15 by tubes 28.

Every chamber 27 is divided into an upper and lower part by a diaphragm or pouch 13. Every tube 28 connects with a duct 29 which opens into the upper pouch chamber. Leading from every upper chamber is another duct 30. When the pouch 13 is up, it is adapted to close the mouths of said ducts 29 and 30.

31 is a duct which connects with all of the lower pouch chambers in the given cut-off box.

240, 250 and 260 are three ports on the face of the block 32 being the mouths of three ducts in said block whose other ends are severally tube-connected, as best shown in Fig. 1, to the ducts 31 of the boxes 24, 25 and 26 respectively.

9<sup>a</sup> is a rearward extension from the bracket 9, said extension carrying the port 9<sup>b</sup> being one end of an elbow tube 9<sup>c</sup> whose other end is connected by a tube 33 to the suction or exhaust device 34, said port 9<sup>b</sup> being adapted to be carried by said extension 9<sup>a</sup> into communication with one at a time of the ports 240, 250 and 260, the others remaining open to the atmosphere.

It will be understood that the ducts 29 and 30 and the tubes 28 are kept normally on suction by reason of their connection with the exhauster 34 through intervening pneumatic connections in the same manner that the tracker tubes connected with the

note-playing ducts of the tracker bar of the ordinary player piano are kept normally on suction.

Further, it will be understood that whenever there is suction in the lower pouch chambers, the pneumatic pressure on both sides of the pouches 13 is equalized and the pouches drop and do not cut off communication between the ducts 29 and 30. This is the condition which happens to be shown in box 25 (Fig. 1) due to the exhausting port 9<sup>b</sup> being in communication with the port 250 which in turn is connected, as previously described, with all of the lower pouch chambers in the box 25. This results in the ducts 29 and 30 in said box 25 being put into communication without any obstruction by the pouches 13,—which in turn results in making operative the related row 15 of expression controlling ducts.

Similarly, if the row 14 or the row 16 of expression controlling ducts is brought into proper playing position relatively to the note ducts in the main tracker, the mere act of making this adjustment will result in rendering said row of ducts 14 or 16 operative to function with the expression perforations of the given music-sheet because said adjustment will bring the exhaust port 9<sup>b</sup> into communication respectively with the port 240 or the port 260, and will release the pouches of the box 24 or the box 26 respectively, depending upon which row of ducts 14 or 16 has been adjusted into playing position.

Vice versa, the rows of expression controlling ducts which are not in playing position are thereby automatically rendered inoperative. This is the case with rows 14 and 16 in Fig. 1, and results from the fact that the ports 240 and 260 are open to the atmosphere and, therefore, all of the pouches 13 in the related cut-off boxes 24 and 26 are pressed against the mouths of the ducts 29 and 30 and have cut off communication between said ducts and therefore have rendered inoperative said related rows 14 and 16 of expression controlling ducts.

Referring now to the rest of the apparatus shown in Fig. 1, yet to be described, this may take so many forms that I have shown them only diagrammatically. Thus, 35 represents any usual pneumatic action for actuating the hammer mechanism of the piano.

36 is any usual or preferred form of expression box operatively connected with said pneumatic action for controlling the striking force of the individual pneumatic actions on the related hammer mechanisms, said expression box being itself controlled from the expression perforations in a suitable music-sheet co-acting with one of the rows 14, 15 or 16 of expression ducts, whichever row is in operative position and is adapted to play said music-sheet.

The exhauster 34 is operatively connected to the pneumatic action through the expression box 35 as shown.

37 is any well known form of valve box operatively connecting the cut-out boxes 24, 25 and 26 with the expression box 36 and with soft and sustaining pedal operating means 41 and 42, etc., usual to these instruments. Although there are three of these cut-out boxes, there need be only one valve box 37, because, as already explained, only one of said cut-out boxes is operative at one time to operatively connect the given active row 14, 15 or 16 of expression controlling ducts with the expression box 36, and the pneumatic action. Therefore, in practice, one duct 30 of the cut-out box 24 is connected by a tube 38 with one duct 30 of box 25, and these in turn are connected to one duct 30 of box 26, all three of said ducts 30 being then operatively connected by tube 39 with one of the valve mechanisms 37<sup>a</sup> in the valve box 37.

In the same way, other ducts 30 respectively from the boxes 24, 25 and 26, will or may be inter-connected in sets of three, and in turn connected to the respective valve mechanisms in box 37 adjacent said valve mechanism 37<sup>a</sup>.

Although I have shown and described the rows 14, 15 and 16 of expression controlling ducts as operating through one and the same expression box 36, it will be obvious that I could make them operate through three different kinds or constructions of expression boxes, the latter method having the advantage that expression boxes could be chosen respectively adapted to render with the best possible effect the expression perforations of the different kinds of music-rolls, but said duplication of expression boxes will, of course, have the disadvantage of adding that much more mechanism to the piano with corresponding increase in its cost and its complication. Also, there may be a special valve box 37 for each expression box 36.

It is possible that other changes and modifications may be made in the illustrative embodiment of my improvements which will, nevertheless, still be within the scope and spirit of my invention and within the scope and spirit of the annexed claims, and as such are intended to be covered thereby; also that certain features may be used without others.

I have happened to illustrate an embodiment of my invention adapted to play three kinds of music-rolls but, of course, the invention is adapted to be embodied to play two or any greater number of kinds of rolls by correspondingly reducing or increasing the number of rows of expression controlling ducts and the cut-off boxes and connections, etc.

What I claim is:

1. Means for adapting a reproducing piano to play interchangeably with music-sheets having different kinds and arrangements of expression controlling perforations, said means comprising a main tracker bar having note playing ducts; a supplemental section having plural rows of expression controlling ducts, the said rows being respectively adapted to co-act with the expression controlling perforations of said different kinds of music-sheets; said supplemental section being supported for transverse adjustment at the end of the main tracker bar to permit any of its rows of expression ducts to be brought into proper playing position relatively to the note ducts in the main tracker bar.

2. Means for adapting a reproducing piano to play interchangeably with music-sheets having different kinds and arrangements of expression controlling perforations, said means comprising a main tracker bar having note playing ducts; a supplemental section having plural rows of expression controlling ducts, the said rows being respectively adapted to co-act with the expression controlling perforations of said different kinds of music-sheets; said supplemental section being supported for transverse adjustment at the end of the main tracker bar to permit any of its rows of expression ducts to be brought into proper playing position relatively to the note ducts in the main tracker bar; and means which automatically renders inoperative all expression ducts except the particular row which has been brought into said proper playing position.

3. Means for adapting a reproducing piano to play interchangeably with music-sheets having different kinds and arrangements of expression controlling perforations, said means comprising a main tracker bar having note playing ducts; a supplemental section having plural rows of expression controlling ducts; the said rows being respectively adapted to co-act with the expression controlling perforations of said different kinds of music-sheets; said supplemental section being supported for transverse adjustment at the end of the main tracker bar to permit any of its rows of expression ducts to be brought into proper playing position relatively to the note ducts in the main tracker bar, there being one of said adjustable supplemental sections at each end of the main tracker, said sections being structurally united so that the transverse adjustment of the one section carries with it the other.

4. Means for adapting a reproducing piano to play interchangeably with music-sheets having different kinds and arrangements of expression controlling perfora-

tions, said means comprising a main tracker bar having note playing ducts; a supplemental section having plural rows of expression controlling ducts, the said rows being respectively adapted to co-act with the expression controlling perforations of said different kinds of music-sheets; said supplemental section being supported for transverse adjustment at the end of the main tracker bar to permit any of its rows of expression ducts to be brought into proper playing position relatively to the note ducts in the main tracker bar; note-sounding means operatively connected with said ducts in the main tracker; and expression controlling means operatively connected with the rows of ducts in the supplemental section.

5. Means for adapting a reproducing piano to play interchangeably with music-sheets having different kinds and arrangements of expression controlling perforations, said means comprising a main tracker bar having note playing ducts; a supple-

mental section having plural rows of expression controlling ducts, the said rows being respectively adapted to co-act with the expression controlling perforations of said different kinds of music-sheets; said supplemental section being supported for transverse adjustment at the end of the main tracker bar to permit any of its rows of expression ducts to be brought into proper playing position relatively to the note ducts in the main tracker bar; and means adapted selectively to render inoperative all expression ducts except the particular row which has been brought into said proper playing position; note-sounding means operatively connected with said ducts in the main tracker; and expression controlling means operatively connected with the rows of ducts in the supplemental section.

Signed at New York in the county of New York and State of New York this 30th day of June A. D. 1922.

FRANCIS LINCOLN YOUNG.