

F. F. STAUFFER.
AUTOMATIC PIANO.
APPLICATION FILED MAY 31, 1910.

1,000,561.

Patented Aug. 15, 1911.

4 SHEETS—SHEET 1.

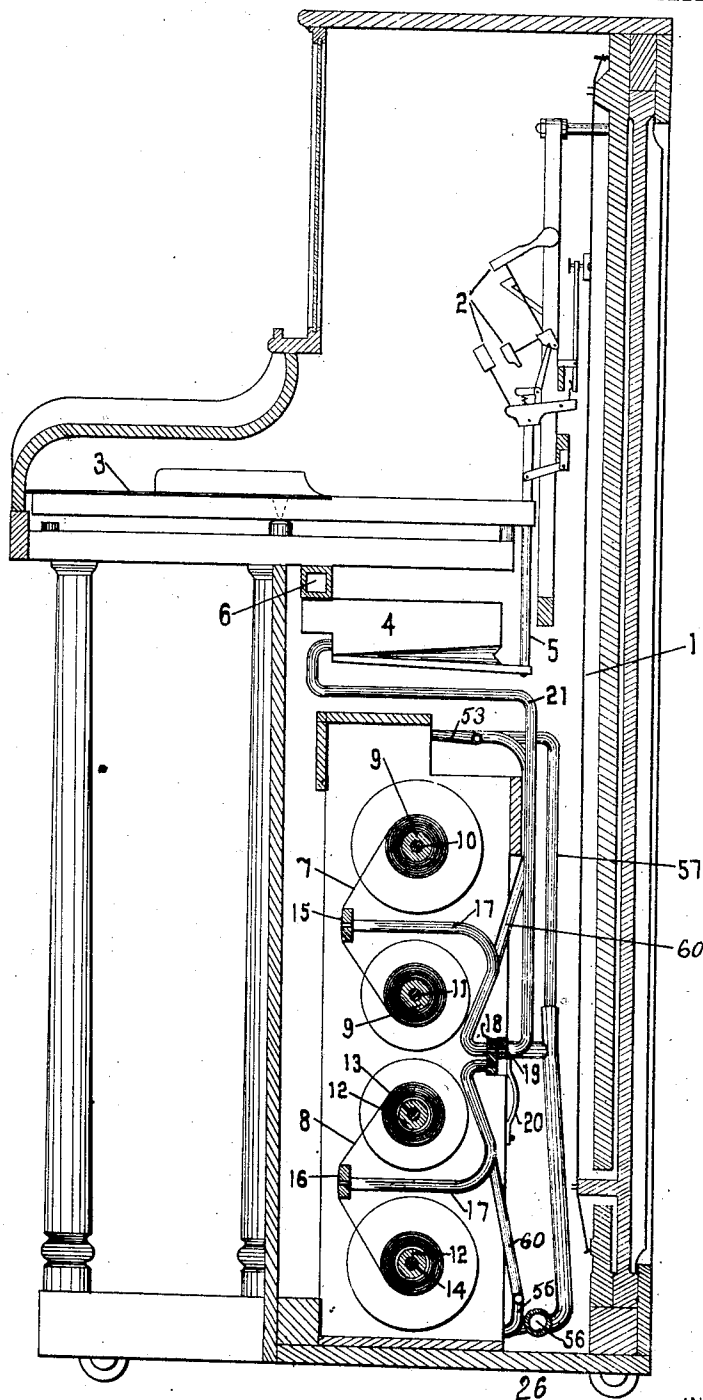


FIG. 1.

WITNESSES:

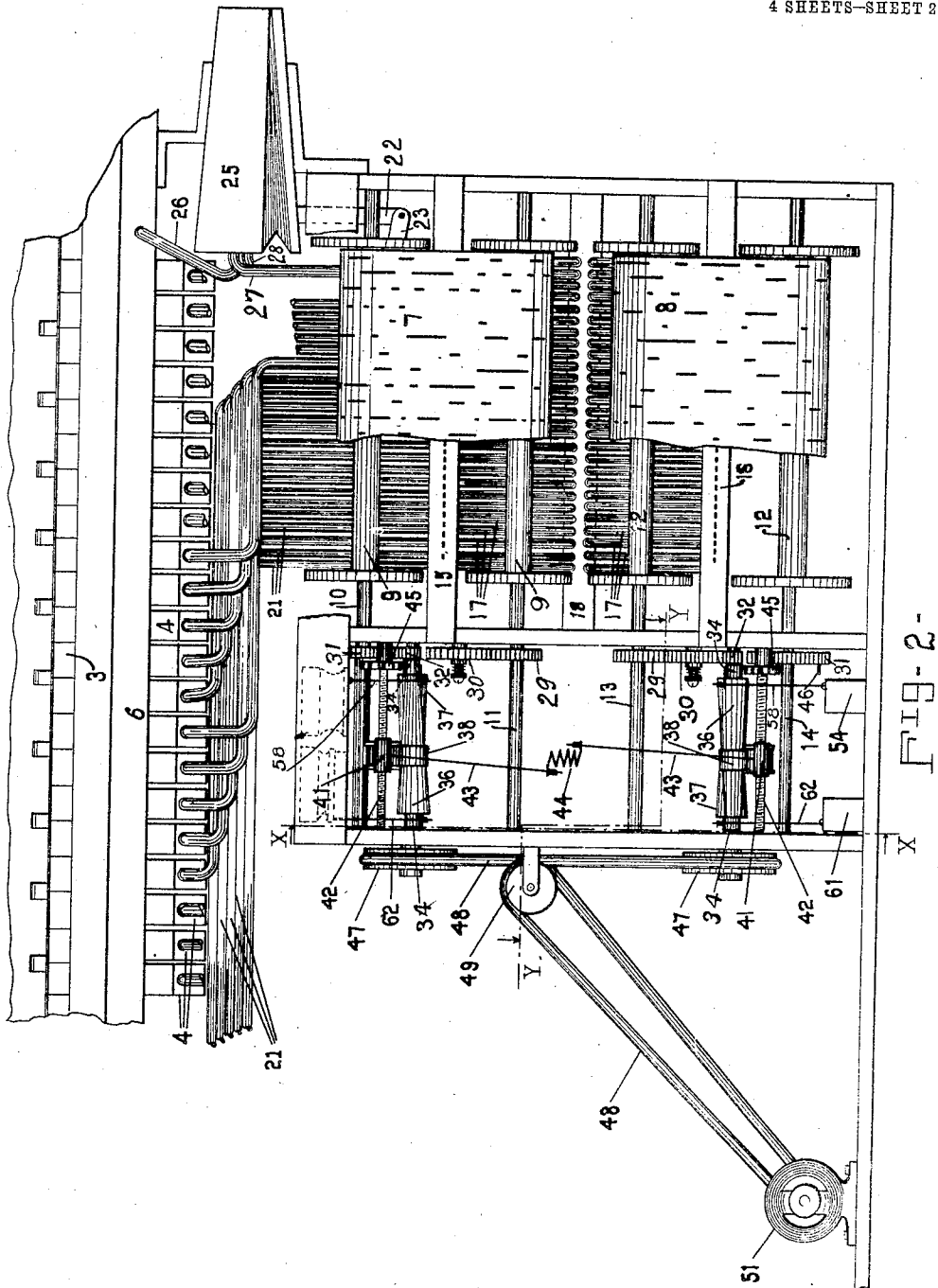
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4 SHEETS—SHEET 3.

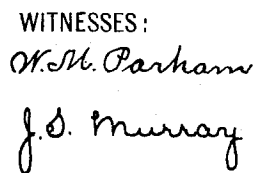


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UNITED STATES PATENT OFFICE.

FLOYD F. STAUFFER, OF DALLAS, TEXAS, ASSIGNOR OF ONE-HALF TO WILLIAM J. GLYNN, OF DALLAS, TEXAS.

AUTOMATIC PIANO.

1,000,561.

Specification of Letters Patent. Patented Aug. 15, 1911.

Application filed May 31, 1910. Serial No. 564,153.

To all whom it may concern:

Be it known that I, FLOYD F. STAUFFER, a citizen of the United States, residing at Dallas, in the county of Dallas and State of Texas, have invented certain new and useful Improvements in Automatic Pianos, of which the following is a specification.

My invention relates to new and useful improvements in automatic pianos, and has for its object the production of an increased playing capacity, and the reduction of the playing mechanism to a more compact form, means also being provided to regulate the velocity of operation so that the time of the music will be constant. The last named means is more particularly described and claimed in the applicant's co-pending application filed May 31st, 1910 under Serial Number 564,154.

In the modern automatic piano it has been the practice to mount a perforated traveling controller sheet upon a pair of reels, said controller sheet acting in conjunction with an apertured tracker-board connected by air conduits with pneumatics which operate the piano action. In such cases, the controller sheet is adapted to be wound slowly from one reel to the other, while playing and to be rapidly rewound when the controller sheet has reached its limit of travel. Such an apparatus is objectionable, owing to the wear and strain upon the controller sheet and other parts during the rapid rewinding, also there must be an interruption in the music while this rewinding takes place. Other previous forms of automatic pianos have employed an endless controller sheet. This has eliminated the necessity of rewinding, and the delay incident thereto, but the length of such a sheet, and consequently the playing capacity of the piano must be limited since the sheet cannot be compactly wound upon rollers. The capacity of the first described sheets which are adapted to rewind is also limited since a long controller sheet cannot be used without a large variation taking place in the velocity of travel of said sheet as it winds from one reel upon the other.

The present invention proposes to avoid these objectionable features by providing two separate controller sheets, one of which will be rewound while the other is unwinding.

The invention also provides automatic

mechanism for regulating the velocity of travel of each controller sheet and for reversing the direction of travel of the two controller sheets when they have finished winding or re-winding.

The invention has for its object finally to provide a device of the character above described which will be simple and efficient, and comparatively easy to construct and one which will not be likely to get out of working order.

With these and various other objects in view, my invention has relation to certain novel features of construction and operation an example of which is described in the following specification and illustrated in the accompanying drawings, wherein:

Figure 1 is a transverse vertical sectional elevation of a piano showing the herein described apparatus installed therewithin. Fig. 2 is a front view of the operating mechanism of the piano consisting of the two controller sheets, the means for rotating the same and regulating their velocity, and the connections from the tracker-boards to the pneumatics. Fig. 3 is a rear view of the same apparatus. Fig. 4 is a side elevation of the frame in which the reels with their driving gears and pulleys are mounted showing the manner of the driving of the reels from an electric motor. Fig. 5 is a transverse vertical sectional view taken on the line $x-x$ of Fig. 2. Fig. 6 is a horizontal sectional view taken of the line $y-y$ of Fig. 2 showing the mechanism by which the velocity of the reels is gradually varied to compensate for the change in velocity of the traveling controller sheet.

Referring now more particularly to the drawings wherein like numerals of reference designate similar parts in all the figures, the numeral 1 denotes the piano wires and 2 the various parts composing the piano action or striking mechanism.

A set of piano keys adapted to operate the piano action in the usual manner by manual displacement is denoted by the numeral 3, and a set of pneumatics adapted to accomplish the same purpose through automatic means is denoted by the numeral 4. The pneumatics are connected with the action by vertical rods 5 and each of them has interior connection with an air exhaust duct 6.

The parts above described are old in the

art, but are specified and shown in order to make clear their connection with the novel apparatus hereinafter described.

In the lower portion of the piano casing there are mounted two traveling controller sheets 7 and 8, one above the other. The upper controller sheet 7 is mounted upon a pair of reels 9 fast upon shafts 10 and 11 respectively. The lower sheet is mounted upon a pair of reels 12 fast upon shafts 13 and 14 respectively. These controller sheets are of the usual perforated construction and they are adapted to act in conjunction with apertured tracker boards 15 and 16 respectively. From the apertures of these tracker-boards there extend a plurality of flexible air conduits 17 which communicate with two parallel rows of apertures in a bar 18. A bar 19 provided with a single row of apertures is adapted to be vertically adjusted upon the bar 18, the apertures of said bar being adapted to communicate with either row of apertures in the bar 18 according to the position of adjustment of the bar 19. In order to hold the bar 19 firmly against the bar 18 so that air tight communication may be established between the apertures of the two bars, a pair of springs 20 are made to bear against the bar 19 at each extremity thereof.

From each of the apertures of the bar 19 a flexible air conduit 21 extends to one of the pneumatics 4, having interior communication with the same. The vertical adjustment of the bar 19 is accomplished through means of a pneumatic adapted to be alternately operated from the two controller sheets in the following manner. An arm 22 extending vertically from the center of the last named bar has its upper extremity pivotally secured to one extremity of a pivoted lever 23, the other extremity of which is connected by a link 24 with the adjustable center plate of a double pneumatic 25 whose upper and lower plates are stationary. Said pneumatic communicates through a tube 26 with the air exhaust duct 6. An air conduit 27 extending from said pneumatic to the lower tracker-board 16 is adapted in conjunction with said tracker-board and the controller sheet 8 to actuate the lower half of the double pneumatic 25. Another air conduit 28 extends from said pneumatic to the tracker-board 15 and acts in conjunction with the same and with the controller sheet 7 to actuate the upper half of the pneumatic 25. Perforations are provided in the controller sheets at the end of the music thereupon which perforations are adapted to cross the apertures in the tracker-boards with which apertures the tubes 27 and 28 communicate, thus permitting air to be drawn into one of said tubes and producing a displacement of one-half of the double pneumatic 25. This results in a

vertical adjustment of the bar 19 thus cutting off communication of the pneumatics 4 with one of the tracker-boards and placing them in communication with the other.

Upon the shafts 11 and 13 are mounted gears 29 each of which meshes with an idler gear 30. Upon each of the shafts 10 and 14 are mounted gears 31. Between each of the gears 29 and 31 a pinion 32 is mounted upon a shaft 33. The shafts 33 are each rotatably mounted in frames 34 pivoted upon shafts 35. Means hereinafter described are provided by which the frames 34 may be made to undergo a slight pivotal motion about the shafts 35 sufficient to throw the gears 32 into mesh with either the gears 30 or the gears 31. In the former case the lower drum 9 will drive the upper one, and the upper drum 12 will drive the lower one, and in the latter case, the upper drum 9 will drive the lower one, and the lower drum 12 drive the upper one. The shaft 33 carries a cone pulley 36 and the shaft 35 carries a cone pulley 37 oppositely positioned to the cone pulley 36. A belt 38 is mounted upon each pair of pulleys 36 and 37 and is adapted to undergo gradual transverse displacement upon the same. To accomplish this displacement, flanged pulleys 39 are made to engage the belts 38, the lower pulley being mounted upon the underside of the lower belt 38 and the upper pulley on the upper side of the upper belt 38. These pulleys are mounted in brackets 40 extending integrally from collars 41 threaded upon feed screws 42. In order to hold the pulleys 39 firmly in contact with their respective belts 38 the upper and lower frames 34 are connected by rods 43, between the extremities of which rods a coiled spring 44 is interposed. A downward tension is thus exerted upon the upper frame 34 and an upward tension upon the lower frame 34, causing the pulleys 39 to press firmly against their respective belts. Upon each of the feed screws 42 a star wheel 45 is rigidly mounted. Each of these star wheels is adapted to be engaged by a pin 46 upon the adjacent gear 31. It is thus apparent that once during each revolution of the gears 31 the pins 46 actuate the star wheels 45 and the feed screws 42 through a partial revolution causing the parts 38, 39, 40 and 41 to undergo a slight transverse motion. The cone pulleys 37 are each driven by sheaves 47. Rotation is imparted to the sheaves through an endless cord 48 passing over pulleys 49 and driven by a pulley 50 upon a motor shaft 51. As previously explained one of the controller sheets 7 and 8 is adapted to be rewinding and inactive as regards its function for producing music, which the other sheet is unwinding and acting in conjunction with the pneumatics, etc., to operate the piano action.

A mechanism has been provided to automatically throw the driving gears of the rewinding spools out of mesh when the controller sheet thereupon has been rewound, and further mechanisms have been provided to cause this same sheet to begin unwinding producing music as soon as the other sheet has finished playing, this latter mechanism also serving to produce a reversal of the direction of rotation of the drums of the sheet that has been unwinding or producing music. In order to interrupt the travel of either controller sheet when it has completed rewinding, a perforation is provided in each controller sheet at the beginning of the music perforations thereupon. Each of said perforations at the beginning of the music on the controller sheets is adapted to cross an aperture in the tracker-board of said sheet, which aperture is connected by an air conduit with a pneumatic adapted to throw one of the gears 32 out of mesh with the gears which it drives. The pneumatic which operates for this purpose in conjunction with the upper controller sheet is designated by the numeral 52 and is connected with the tracker-board of said controller sheet by an air conduit 53. A pneumatic 54 is adapted to perform the same function for the lower controller sheet and is connected with the tracker-board of said sheet by an air conduit 55. In order to produce the necessary suction within these pneumatics, an air conduit 56 is extended from the air duct 6 and is connected with each of the pneumatics 52 and 54 by air conduits 57. Each of the pneumatics 52 and 54 is connected by a rod 58 with one of the frames 34. Owing to the tension in the spring 44 which causes the upper pulley 39 to act downward and the lower pulley 39 to act upward, the frames 34 are normally deflected toward each other causing the pinions 32 to mesh with the gears 30, but when either of the sheets 7 or 8 have finished rewinding, one of the pneumatics will be compressed by the means above described sufficiently to throw the corresponding gear 32 out of mesh with the gear 30, but not sufficiently to throw it into mesh with the gear 31. Rotation will thus cease to be communicated to said sheet which will remain stationary until the other sheet has finished unwinding or producing music.

A mechanism has already been described by which a pneumatic 25 is actuated when either sheet finishes unwinding, which mechanism causes the shifting of a bar 19. At one extremity of this bar is an aperture 58^a which has connection through an air conduit 59, and said aperture in the bar 19 is adapted to communicate with either of the two apertures in the bar 18, according to the position of the vertical adjustment of said bar 19. From each of the apertures in

the bar 18 an air conduit 60 extends to a pneumatic 61, one of these pneumatics being positioned adjacent to the pneumatic 52 and the other adjacent to the pneumatic 54. Each of the pneumatics 61 is connected by a rod 62 with one of the frames 34. Thus, when either of the controller sheets finishes unwinding causing the operation of the pneumatic 25 and the shifting of the bar 19, a compression of one of the pneumatics 61 results and an expansion of the other pneumatic 61. The controller sheet which was stationary is thus started unwinding and the direction of travel of the sheet which was unwinding is reversed, causing it to begin rewinding.

It is obvious that various changes may be made in the form and proportion of the parts and details of construction of the above described device without departing from the spirit or sacrificing the advantages of the same and I, therefore, reserve the right to make such changes and alterations in said device as fairly come within the scope of the following claims.

What I claim is:

1. In an automatic piano, the combination with the strings and action thereof, of two perforated traveling controller sheets, an apertured tracker-board acting in conjunction with each of said sheets, a plurality of pneumatics actuating the piano action, a set of air conduits connecting with the apertures of each tracker-board, the two sets discharging in parallel lines of adjacent apertures, an adjustable bar provided with a line of apertures adapted to be placed in alinement with either of the aforesaid lines of apertures, air conduits extending from the apertures of the last named bar to the pneumatics controlling the action, and a pneumatic adapted to produce adjustment of said bar, operated from the controller sheets.

2. In an automatic piano, the combination with the strings and action thereof of two perforated traveling controller sheets, reels upon which the extremities of said sheets are mounted, an apertured tracker-board acting in conjunction with each sheet, a plurality of pneumatics actuating the piano action, a bar provided with two parallel rows of apertures, air conduits connecting the apertures of each row with one of the tracker-boards, a shift-bar provided with a row of apertures which may be alined by adjustment of the said shift-bar with either row of apertures upon the aforesaid bar, air conduits connecting the apertures of said shift bar with the pneumatics controlling the piano action, a pneumatic by which the adjustment of the shift-bar may be accomplished, said pneumatic being operated by the controller sheets, means by which the velocity of rotation of the afore-

said reels may be gradually varied, mechanisms adapted to interrupt the rotation of the reels of each sheet, pneumatics controlling said mechanisms operated by said sheets, mechanism adapted to reverse the directions of travel of the controller sheets, and pneumatics controlling said mechanism operated from the controller sheets.

3. In an automatic piano, the combination with the strings and action thereof, of two perforated traveling controller sheets, reels upon which the extremities of said sheets are mounted, an apertured tracker board acting in conjunction with each sheet, a plurality of pneumatics actuating the piano action, a bar provided with two parallel rows of apertures, air conduits connecting the apertures of each row with one of the tracker-boards, a shift bar provided with a row of apertures which may be alined by adjustment of the shift bar with either row of apertures upon the aforesaid bar, air conduits connecting the apertures of the shift bar with the pneumatics operating the piano action, a pneumatic by which the adjustment of the shift bar is accomplished, said pneumatic being actuated by the controller sheets, mechanisms adapted to reverse the directions of travel of the controller sheets, and pneumatics controlling said mechanisms actuated from the controller sheets.

4. In an automatic piano, the combination with the strings and action thereof of two perforated traveling controller sheets, reels upon which the extremities of the sheets are mounted, an apertured tracker-board acting in conjunction with each sheet, a plurality of pneumatics actuating the piano action, a stationary bar with two parallel rows of apertures, air conduits connecting the apertures of each row with one of the tracker-boards, a shift bar provided

with a row of apertures which may be alined by adjustment of the shift bar with either row of apertures upon the stationary bar, air conduits connecting the apertures of the shift bar with the pneumatics actuating the piano action, a pneumatic by which the adjustment of the shift bar is accomplished, said pneumatics being actuated by the controller sheets, mechanisms adapted to interrupt the rotation of the reels of each sheet, and pneumatics controlling said mechanism actuated by said sheets.

5. In an automatic piano, the combination with the strings and action thereof, of a perforated traveling controller sheet, reels upon which the extremities of said sheet are mounted, means actuated by said controller sheets operating the piano action, a pivotally mounted frame, a pair of cone pulleys oppositely mounted in said frame, one of said pulleys being positioned at the pivotal axes of the frame, a belt carried by said pulleys, a feed screw mounted adjacent to said frame parallel to the axes of the pulleys, a belt shipper mounted on said feed screw acting on said belt, a mechanism communicating an intermittent rotation to the feed screw, a pinion carried by the shaft of the cone pulley mounted in the free end of the adjustable frame, two trains of gearing operating the two reels of the controller sheet respectively, and a pneumatic operated by the controller sheet by which the pivoted frame may be adjusted to throw said pinion into mesh with either train of gearing.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FLOYD F. STAUFFER.

Witnesses:

J. S. MURRAY,
B. I. THERREL.