No. 696,090. Patented Mar. 25, 1902.

T. P. BROWN.

WINDING MECHANISM.

(Application filed June 8, 1901.)

(No Model.)

Fig. 1.

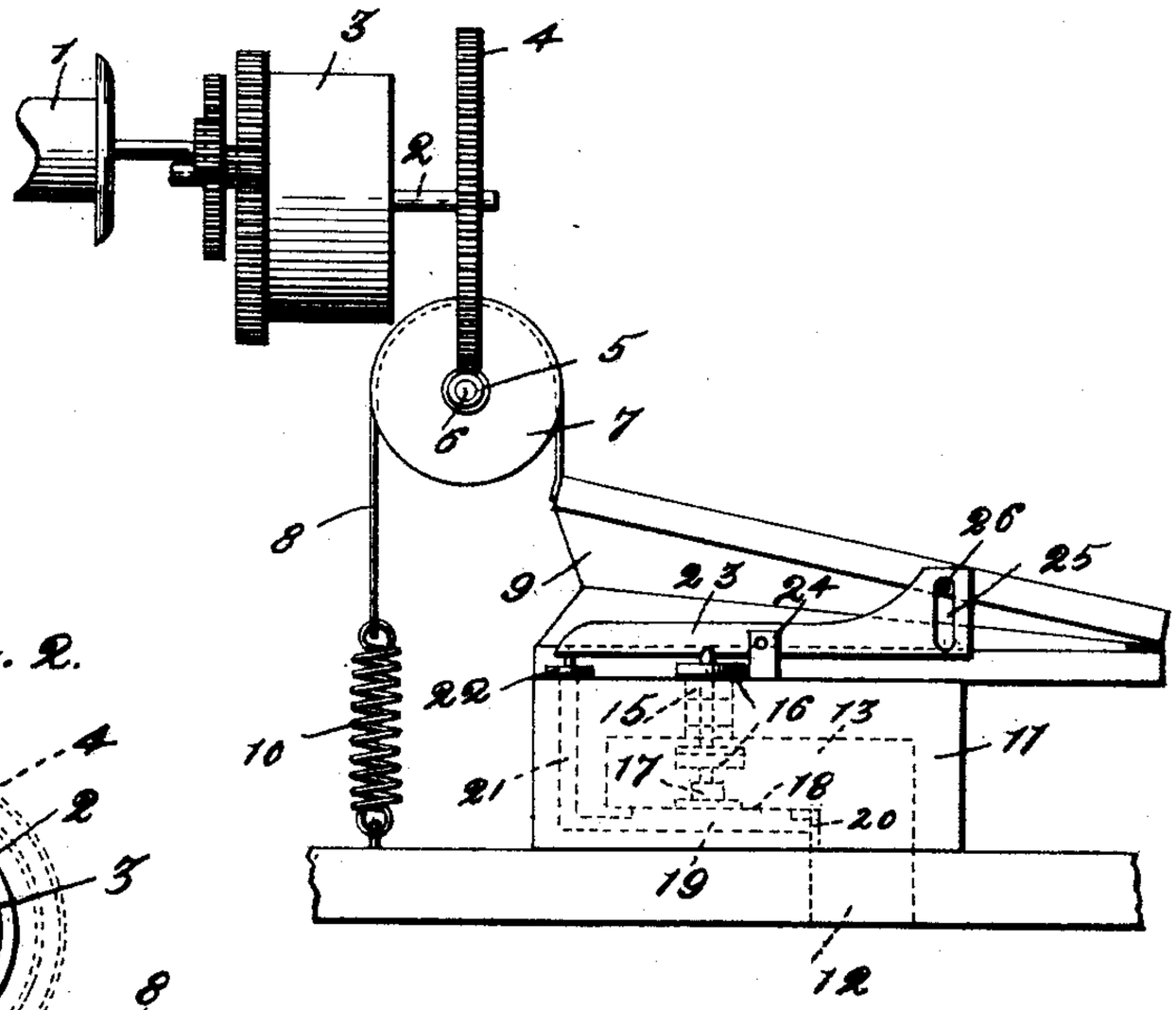
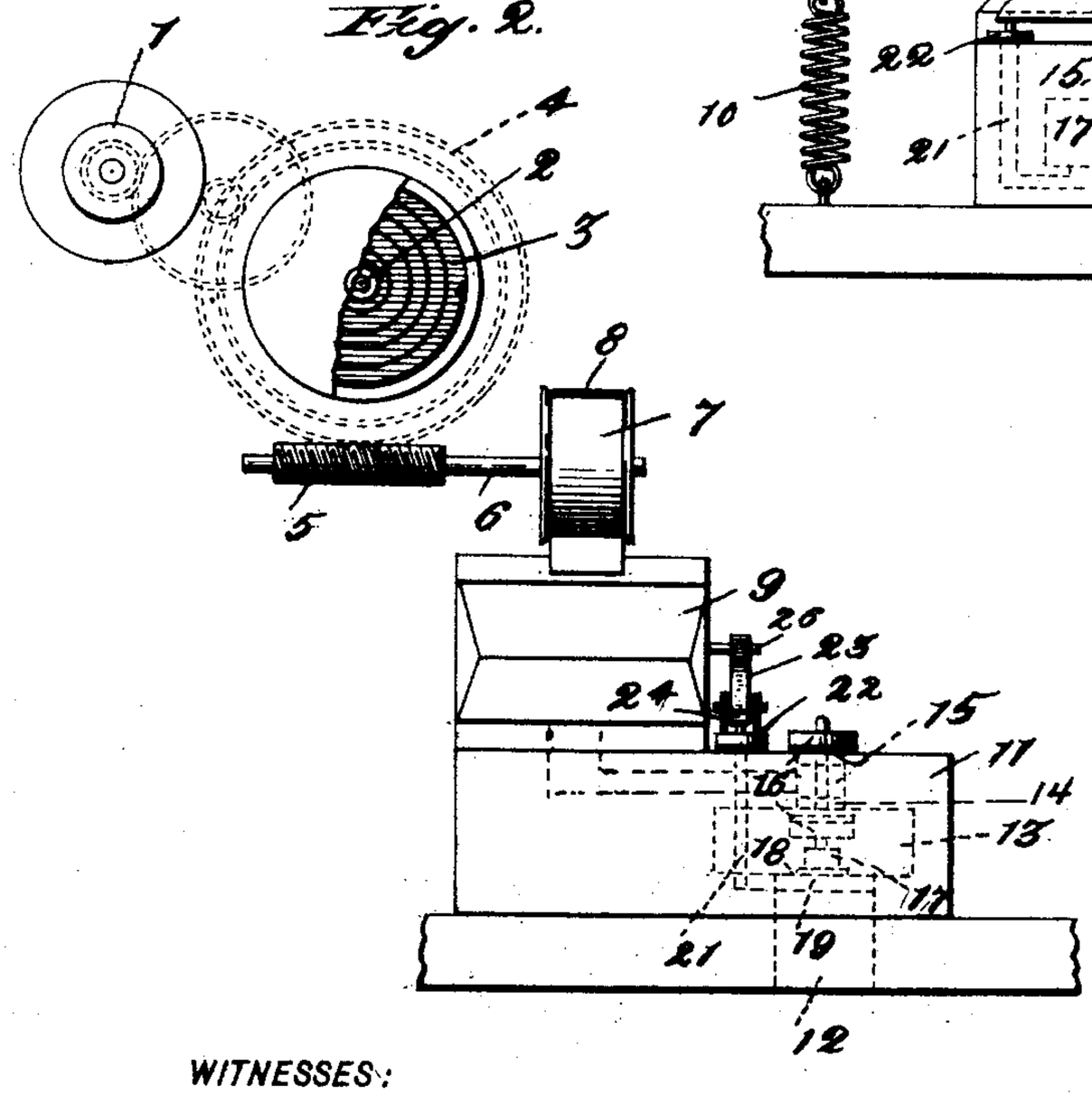


Fig. 2.



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WINDING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 696,090, dated March 25, 1902.

Application filed June 8, 1901. Serial No. 63,784. (No model.)

To all whom it may concern:

Be it known that I, THEODORE PARKER BROWN, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Winding Mechanism; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to mechanical piano-players, and particularly to that type known as "pneumatic" players, which are characterized by a series of pneumatically-operated key-striking instrumentalities which are controlled by means of a music-sheet having note-perforations therein representing the notes of the musical score.

The specific object of the present invention is the improvement of the devices which are used to wind the spring-motors ordinarily used to drive the take-up roller on which the music-sheet is wound during the operation of the player and which causes the sheet to run over the tracker, the mechanism which forms the subject-matter of the present case being of such a character that the motor is kept wound up to its full power during the operation of the player, so that a uniform tension will be exerted on the music-sheet and a smooth and even running of said sheet is insured, which will, it is clear, produce a musical composition in perfect time and prevent lagging on account of slowing down of the motor as the spring driving the motor weakens in unwinding, as is the case with some of the spring driving-motors now in use.

In the drawings herewith, in Figure 1 a conventional type of spring-motor is shown with my invention applied thereto to illustrate the invention. Fig. 2 is view of the winding instrumentalities looking from the left of Fig. 1.

Referring to the drawings by numerals, like parts being denoted by like numbers in the several views, 1 indicates a spool for the sheet of music of the usual type, which may be mounted in any suitable bearings in the player case or frame, the sheet passing over the ordinary tracker and bringing the other coöperating parts of the player into action, as is customary in this class of instruments. Said spool is geared, belted, or otherwise operatively connected by suitable driving connections with the shaft 2 of a spring-motor 3, which may be of any suitable or desired type, the shaft 2 of said motor 3 being provided with a worm gear-wheel 4. Said worm gear-wheel 4 is engaged by a worm 5, carried by a shaft 6, which may be termed the "motor-winding" shaft. The said shaft 6 is provided with a pulley 7 at its other end, over which passes a strap 8, which is secured at one end to the loose or working flap of a power-pneumatic 9 and at the other end to a spring 10 of sufficient strength to keep the parts normally in the position shown in the drawings, with the pneumatic 9 distended, said spring 10 being secured at its other end to a fixed part of the player frame or casing, as shown. The said pneumatic 9 is mounted upon a puppet-valve box 11, the vacuum-chamber of which is in communication with the main exhaust-bellows or wind-trunk by means of the passage 12, and said pneumatic 9 communicates with the puppet-valve chamber 13 in the box 11 by means of a port 14, while another port 15 gives an open-air connection. The said ports 14 and 15 are controlled by means of a double puppet-valve 16, (see Figs. 1 and 2,) said valve having a stem 17, which rests at its lower end upon a diaphragm 18, which separates a diaphragm pocket or pouch 19 of ordinary construction from the puppet-valve chamber 13, said diaphragm-pocket 19 and the vacuum-chamber 13 being in communication with each other through the small port 20, which is customarily used to preserve the atmospheric balance in the two chambers. A passage 21 leads from the said diaphragm-pocket 19 to the open air, the opening of the said passage or duct 21 being controlled by means of tilting valve 22, which is actuated and preferably carried by an arm or lever 23, pivoted in suitable uprights 24 on the box 11, said arm 23 being provided at its rear end with a slot 25, which is engaged by a pin 26 on the loose or working flap of the pneumatic 9.

The operation of the mechanism described is as follows: The main exhaust-bellows being operated by the pedal mechanism, chamber 13 and the connected diaphragm-pocket

19 will be exhausted and the pneumatic 9, which stands normally in the distented position shown, will be collapsed by reason of the exhaust through port 14. As the pneumatic 9 collapses its working flap will pull the strap 8 and turn the pulley 7, the pull of spring 10 giving sufficient friction to insure turning of the pulley, and the shaft 6 will be rotated. The rotation of shaft 6 will through the worm 5 and worm-wheel 4 turn the motor-shaft and wind up the spring of the motor 3. During the collapsing of the pneumatic 9 the pin 26 on the working flap thereof will descend in the slot 25 until the pneumatic has completely collapsed, when the pin 26, striking the lower end of the slot, will operate the lever 23, which in turn will tilt the valve 22 and break the vacuum in the diaphragm-pocket 19. The diaphragm 18 will immediately rise, lifting the double puppet-valve 16, closing the port 14 and opening the open-air port 15, whereupon the pneumatic 9 will distend itself quickly and the spring 10 will draw the strap 8 back to its normal position ready for the next collapse of the pneumatic.

From the foregoing it will be seen that the mechanism described is quite automatic in its action, starting and continuing its operation so long as the main bellows are being operated, and that it will keep the motor-spring constantly wound to the desired position. It will be understood, of course, that this winding-pneumatic which I have described above is made of a size sufficient to wind the motor-spring, but not large enough to strain or overwind it, so that danger of breaking the parts is avoided, the winding of the motor-spring being effected only when it is run down to the point where the power of the winding-pneumatic will overcome its resistance.

The spring 10 is made of a resistance or pulling power less than that of the opening-spring of the main bellows, so that the collapsing of the pneumatic 9 is insured when sufficient power is exerted through the pedal mechanism to collapse the main bellows, and the winding mechanism will therefore begin its operation immediately the player is started.

I do not wish to be understood as limiting my invention to the details of construction shown, and include as of my invention all equivalent constructions and devices that may be combined to carry out my invention. For example, instead of the pulley and strap shown and described a gear-and-ratchet mechanism might be used, and as this may be properly called a "true equivalent" of the device shown I consider such a construction to be within the range of my invention. Furthermore, while I have shown and described a spring-motor for moving the music-sheet I do not wish to be thought to limit my invention to the particular motor described and shown, for it will be clear that a weight-motor might be used and the winding means described utilized to draw up the weight instead of rewinding the spring, as in the present case. It will be apparent, also, that in lieu of the spring which I have shown as holding one end of the friction-strap that passes over the winding-shaft pulley a weight might be used with the same effect.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In an automatic piano-player and in combination, a spring-motor for moving the music-sheet, means for winding the motor-spring, a power-pneumatic in communication with and operable from a source of air-supply, and connections between the working flap of said power-pneumatic and said winding means whereby the latter is actuated by the movement of said working flap.

2. In an automatic piano-player and in combination, a spring-motor for moving the music-sheet, a power-pneumatic in communication with and operable from the main bellows, and connections between the working flap of said power-pneumatic and said winding means; whereby said winding means is actuated by the downward movement of said working flap as the power-pneumatic is collapsed.

3. In an automatic piano-player and in combination, a spring-motor for moving the music-sheet, a winding-shaft connected with the motor-shaft, a power-pneumatic in communication with and operable from the main bellows, and connections between the working flap of said power-pneumatic and said winding-shaft; whereby said winding-shaft is actuated at each collapse of said pneumatic.

4. In an automatic piano-player and in combination, a spring-motor for moving the music-sheet, a winding-shaft connected with said motor-shaft, a pulley on said winding-shaft, a power-pneumatic, and a strap connection between the working flap of said power-pneumatic and said pulley; whereby intermittent, rotary movements are imparted to said pulley and winding-shaft at each collapse of said pneumatic.

5. In an automatic piano-player and in combination, a spring-motor for moving the music-sheet, a worm gear-wheel on the motor-shaft, a winding-shaft, a worm on the said winding-shaft engaging the worm gear-wheel on the motor-shaft, a pulley on said winding-shaft, a strap running over said pulley, a power-pneumatic with which said strap is connected at one end so as to impart a rotary movement to said pulley and winding-shaft when the pneumatic is collapsed, and means for returning the strap to its normal position.

6. In an automatic piano-player and in combination, a spring-motor for moving the music-sheet, means for winding the motor-spring, a power-pneumatic to actuate said winding means as it collapses, said power-pneumatic being in communication with the main bellows and operable therefrom, and means for breaking the vacuum in said power-pneu-

matic to allow it to distend at regular intervals, whereby a regular, intermittent movement is imparted to said winding means by said power-pneumatic.

7. In an automatic piano-player and in combination, a spring-motor for moving the music-sheet, means for winding the motor-spring, a power-pneumatic to actuate said winding means as it collapses, said power-pneumatic being in communication with the main bellows and operable therefrom, and automatic means for breaking the vacuum in said power-pneumatic to allow it to distend at regular intervals, whereby a regular, intermittent movement is imparted to said winding means by said power-pneumatic.

8. In an automatic piano-player and in combination, a spring-motor for moving the music-sheet, means for winding the motor-spring, a power-pneumatic to actuate said winding means as it collapses, said power-pneumatic being in communication with the main bellows and operable therefrom, and automatic means operated by the said power-pneumatic to break the vacuum in said power-pneumatic and allow it to distend at regular intervals, whereby a regular, intermittent movement is imparted to said winding means by said power-pneumatic.

9. In an automatic piano-player and in combination, a spring-motor for moving the music-sheet, a winding-shaft for the motor-spring geared to the motor-shaft, a friction-pulley on said winding-shaft, a friction-strap running over said pulley and spring-held at one end, a power-pneumatic to the working flap of which the other end of said strap is secured, and means for causing an automatic, alternating collapse and distention of said power-pneumatic, whereby a regular, intermittent rotation is imparted to said winding-shaft.

10. In an automatic piano-player and in combination, a spring-motor for moving the music-sheet, a winding-shaft for the motor-spring geared to the motor-shaft, a friction-pulley on said winding-shaft, a friction-strap running over said friction-pulley and spring-held at one end, a power-pneumatic to the working flap of which the other end of said strap is secured, a vacuum-chamber with which said pneumatic is in communication, a puppet-valve controlling the port between said chamber and said pneumatic, an open-air port, pneumatically-operated means to move said puppet-valve, and an automatically-operated valve to control the action of said pneumatically-operated means.

11. In an automatic piano-player and in combination, a spring-motor for moving the music-sheet, a winding-shaft for the motor-spring geared to the motor-shaft, a friction-pulley on said winding-shaft, a friction-strap running over said pulley and spring-held at one end, a power-pneumatic to the working flap of which the other end of said strap is secured, a vacuum-chamber having a port entering said power-pneumatic and an open-air port, a double puppet-valve controlling said ports, a flexible diaphragm to actuate said puppet-valve, a diaphragm-pocket having an open-air port, a valve controlling said port, and means for opening and closing said valve.

12. In an automatic piano-player and in combination, a spring-motor for moving the music-sheet, a winding-shaft for the motor-spring geared to the motor-shaft, a friction-pulley on said winding-shaft, a friction-strap running over said friction-pulley and spring-held at one end, a power-pneumatic to the working flap of which the other end of said strap is secured, a vacuum-chamber having a port entering said power-pneumatic and an open-air port, a double puppet-valve controlling said ports, a flexible diaphragm to actuate said puppet-valve, a diaphragm-pocket having an open-air port, a valve controlling said port, and automatic means for opening and closing said valve.

13. In an automatic piano-player and in combination, a spring-motor for moving the music-sheet, a winding-shaft for the motor-spring geared to the motor-shaft, a friction-pulley on said winding-shaft, a friction-strap running over said friction-pulley and spring-held at one end, a power-pneumatic to the working flap of which the other end of said strap is secured, a vacuum-chamber having a port entering said power-pneumatic and an open-air port, a double puppet-valve controlling said ports, a flexible diaphragm to actuate said puppet-valve, a diaphragm-pocket having an open-air port, and automatic means operated by said power-pneumatic for opening and closing said valve.

14. In an automatic piano-player and in combination, a spring-motor for moving the music-sheet, a winding-shaft for the motor-spring geared to the motor-shaft, a friction-pulley on said winding-shaft, a friction-strap running over said friction-pulley and spring-held at one end, a power-pneumatic to the working flap of which the other end of said strap is secured, a vacuum-chamber having a port entering said power-pneumatic and an open-air port, a double puppet-valve controlling said ports, a flexible diaphragm to actuate said puppet-valve, a diaphragm-pocket having an open-air port, a valve controlling said port, a lever operatively connected at one end with said valve, and connections between the said lever and the working flap of said power-pneumatic to operate said lever and open and close said valve as the pneumatic collapses and distends.

15. In an automatic piano-player and in combination, a spring-motor for moving the music-sheet, a winding-shaft for the motor-spring geared to the motor-shaft, a friction-pulley on said winding-shaft, a friction-strap running over said friction-pulley and spring-held at one end, a power-pneumatic to the working flap of which the other end of said strap is secured, a vacuum-chamber having

a port entering said power-pneumatic and an open-air port, a double puppet-valve controlling said ports, a flexible diaphragm to actuate said puppet-valve, a diaphragm-pocket having an open-air port, a valve controlling said port, a lever operatively connected at one end with said valve, and a slot-and-pin connection between said lever and the working flap of said power-pneumatic to operate said lever when the said working flap approaches the limit of its movements in collapsing and distending to open and close said valve.

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

THEODORE PARKER BROWN.

Witnesses:
RUFUS B. DODGE, Jr.,
FRANK W. KING.