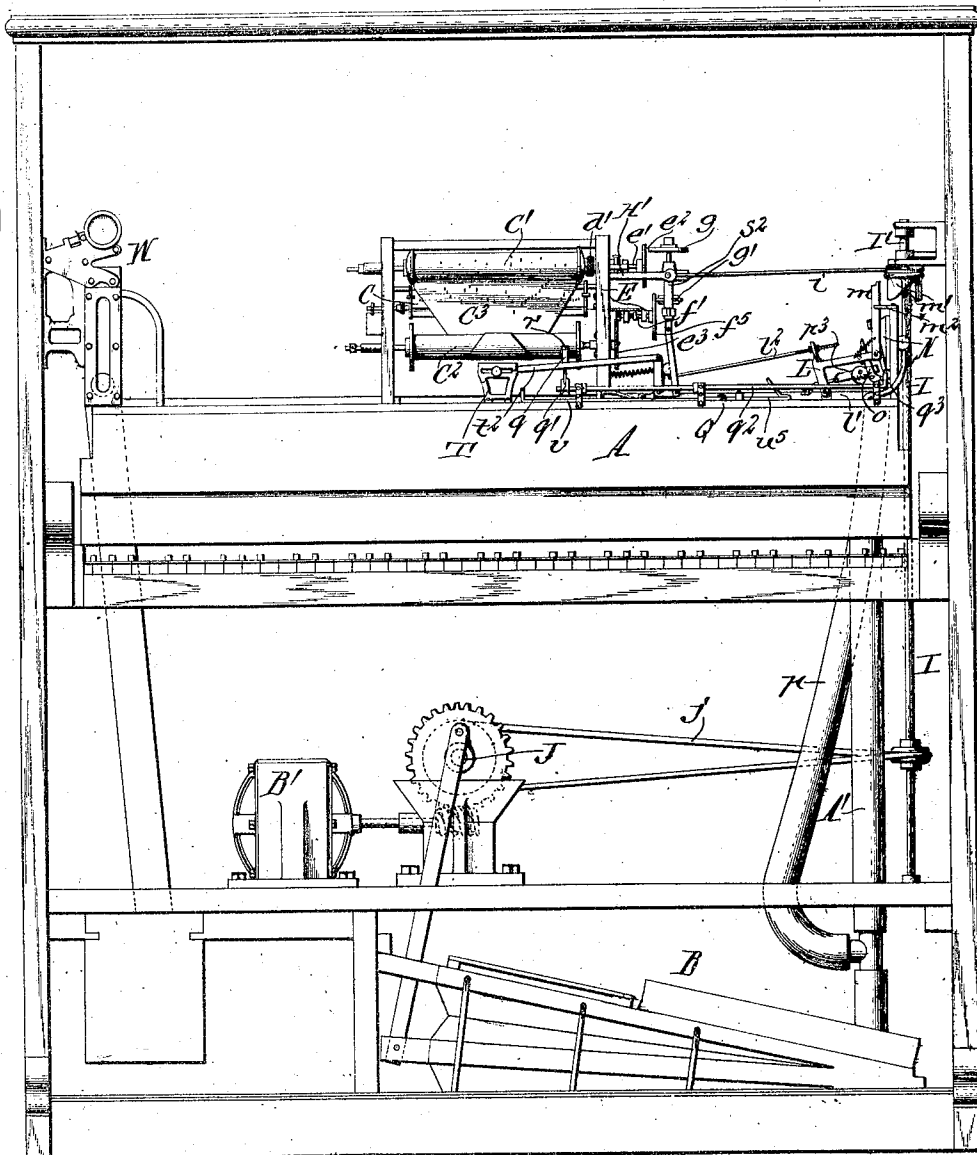


1,043,056.

3 SHEETS—SHEET 1.

Fig. 1.



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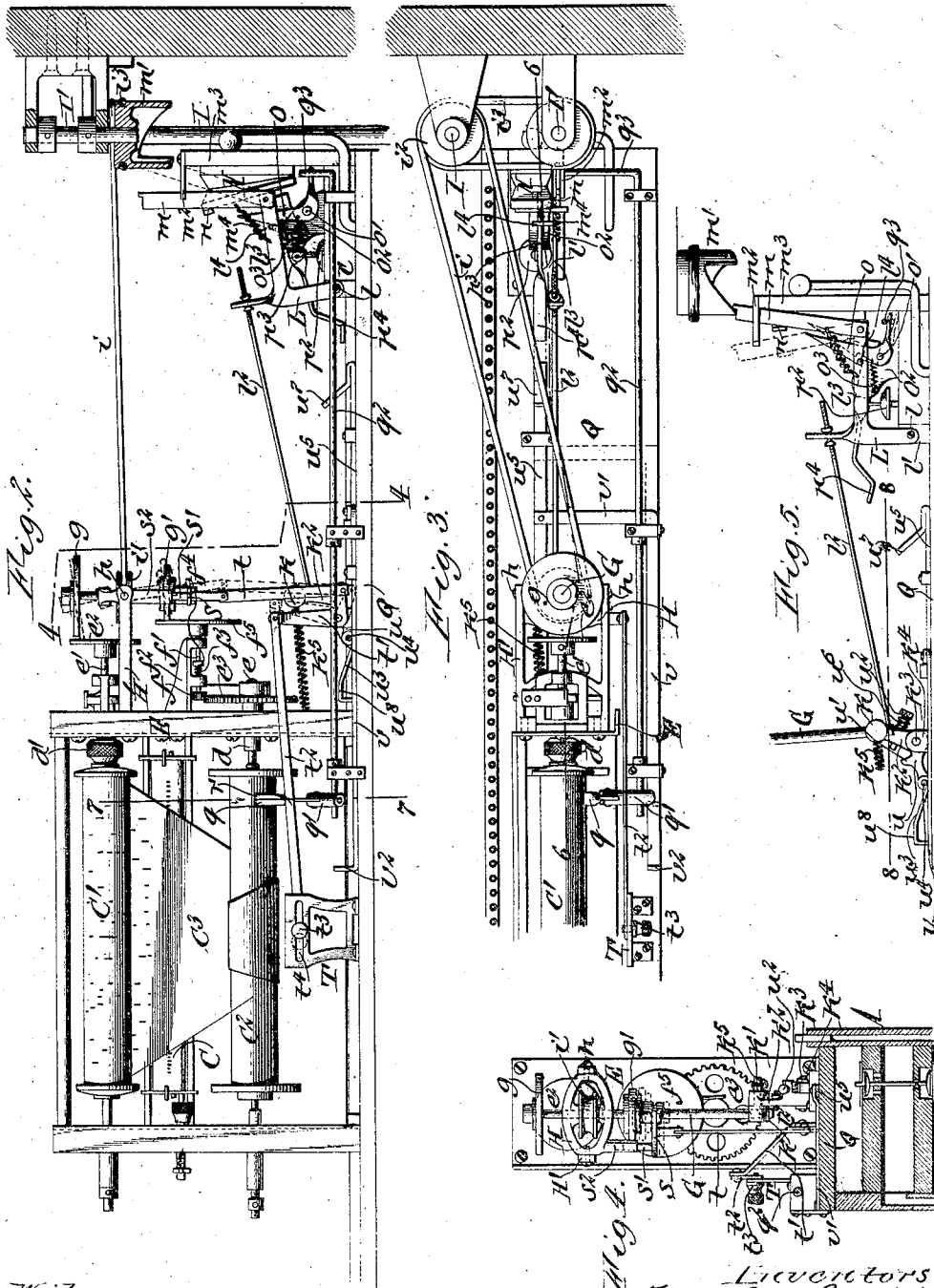
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AUTOMATIC MUSICAL INSTRUMENT.
APPLICATION FILED MAY 6, 1910.

1,043,056.

Patented Oct. 29, 1912.

3 SHEETS—SHEET 2.



Witnesses:
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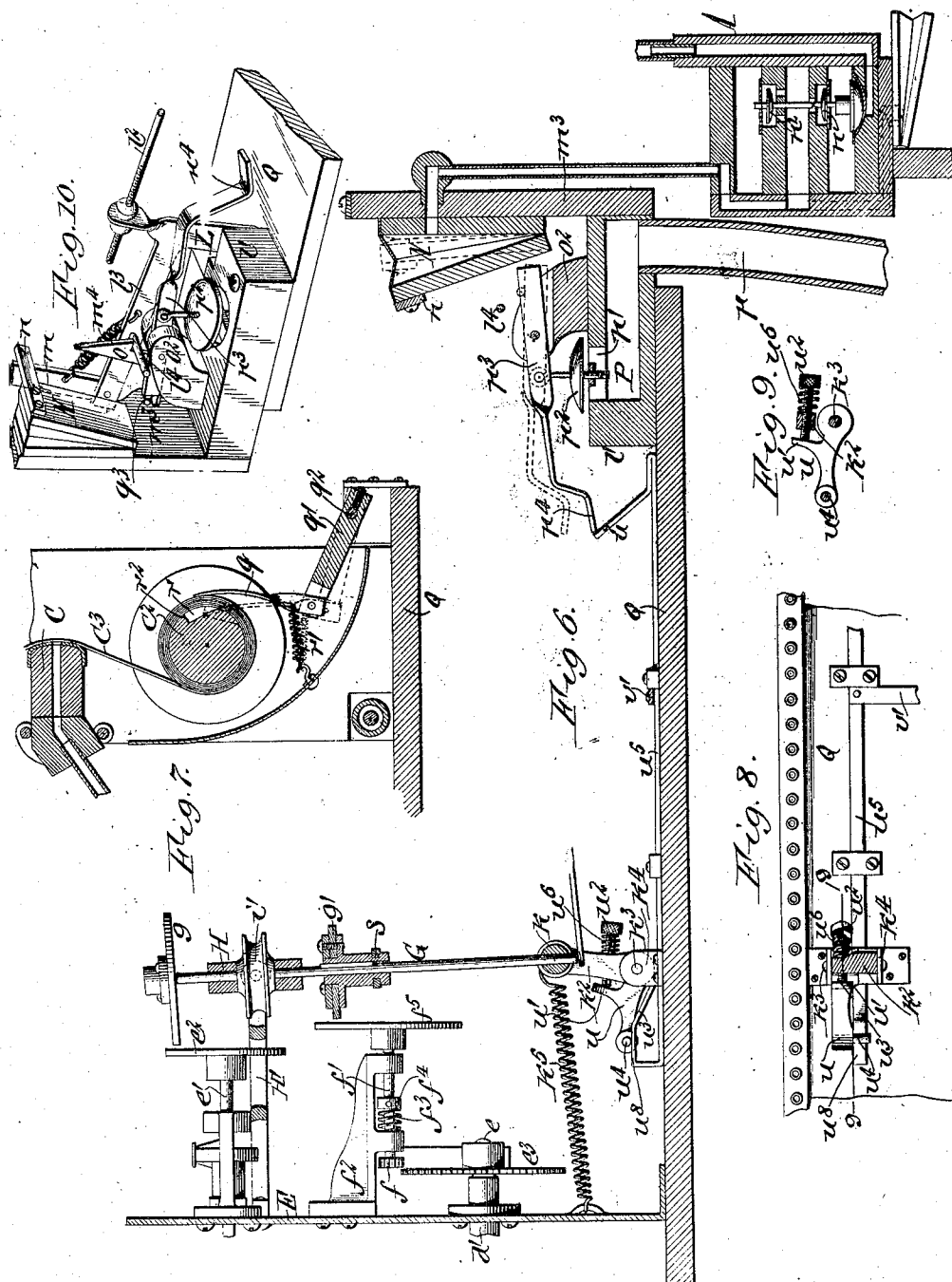
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

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AUTOMATIC MUSICAL INSTRUMENT.

1,043,056.

Specification of Letters Patent.

Patented Oct. 29, 1912.

Application filed May 6, 1910. Serial No. 559,822.

To all whom it may concern:

Be it known that we, FRANK L. McCORMICK and AUGUST DE KLEIST, citizens of the United States, and residents of North Tonawanda, in the county of Niagara and State of New York, have invented a new and useful Improvement in Automatic Musical Instruments, of which the following is a specification.

This invention relates to automatic musical instruments having a pneumatic action and automatic rewinding means for the music sheet which controls said action, the invention having more particular reference to electrically driven instruments of this class in which the motor-circuit is closed by a coin which is detained in a chute or hopper for a sufficient time to cause the instrument to play one or more pieces, at the end of which period the coin is automatically released to break the motor-circuit and stop the instrument.

One of the objects of the invention is the provision of a mechanical driving and rewind mechanism for the music sheet which is positive and reliable in action and which can be easily repaired by ordinary mechanics.

Other objects are to improve the mechanism for rendering the pneumatic action inoperative during the rewinding of the music sheet, and to provide the instrument with convenient means for throwing the music and take-up rolls out of gear with the driving mechanism without disturbing the latter, so that the music rolls can be changed without the necessity of stopping said mechanism.

In the accompanying drawings consisting of 3 sheets: Figure 1 is a front elevation of an automatic piano embodying the invention with the front wall of the case removed, the piano action and strings being omitted for clearness. Fig. 2 is a front elevation of the tracker-box and the roll-driving mechanism, on an enlarged scale. Fig. 3 is a top plan view of said mechanism. Fig. 4 is a transverse section on line 4—4, Fig. 2. Fig. 5 is a view similar to the right hand portion of Fig. 2, showing a different position of the parts. Fig. 6 is a vertical section on line 6—6, Fig. 3, on an enlarged scale, the wind chest being shown diagrammatically with reference to the other parts. Fig. 7 is an enlarged transverse section on line 7—7,

Fig. 2. Fig. 8 is a horizontal section on line 8—8, Fig. 5. Fig. 9 is a vertical section on line 9—9, Fig. 8. Fig. 10 is a perspective view of the devices for locking the flushing valve and the shifting device of the friction-gearing.

Similar letters of reference indicate corresponding parts throughout the several views.

A indicates the wind chest containing a pneumatic action of any suitable construction, and B the pump or main suction bellows operated by an electric or other suitable motor B¹. A suction trunk A¹ connects the wind chest with said bellows.

C indicates the tracker board, C¹ the music roll, C² the take-up roll and C³ the music sheet. The right hand ends of the roll-spindles are engaged with the usual clutch members or heads *d*, *d*¹ secured to the take up and rewind shafts *e*, *e*¹, respectively, which are journaled in the adjacent cheek E of the tracker-box or frame. The rewind shaft is held against endwise movement and carries a friction disk *e*² at its outer end. Mounted on the outer end of the take-up shaft *e* is a spur gear *e*³ adapted to mesh with a pinion *f* carried by a longitudinally-movable shaft *f*¹ supported by a bracket *f*² secured to the cheek E. A spring *f*³ applied to the shaft *f*¹ between its inner bearing and a collar *f*⁴ of the shaft, tends to withdraw the pinion *f* from engagement with the spur gear *e*³.

*f*⁵ indicates a friction disk secured to the outer end of the shaft *f*¹.

G indicates an upright shaft facing the friction disks *e*² and *f*⁵ and carrying friction wheels *g*, *g*¹ adapted to engage said disks respectively. The shaft G is journaled in an oscillating frame or support H pivoted by horizontal pins or trunnions *h* to the bifurcated outer end of a bracket H¹ projecting from the cheek E. The pivot-pins of this oscillating-frame are arranged cross-wise of the friction disks *e*² and *f*⁵ and located in a plane between the shafts of said disks, so that when said frame is rocked in one direction the upper friction wheel *g* engages the companion friction disk *e*² and the lower friction wheel *g*¹ clears the corresponding friction disk *f*⁵, while when said frame is rocked in the opposite direction, the position of said wheels is reversed. The

constant rotation of the shaft G in the same direction thus causes the music sheet to be taken up or rewound according as said shaft is oscillated in one or the other direction.

5 The shaft G is driven from a countershaft I by a belt *i* running around pulleys *i*¹, *i*² on said shafts. This countershaft may be driven from the motor B by any suitable means, that shown in the drawings including an intermediate horizontal shaft J connected with the motor by worm gearing and with the countershaft by a belt *j*.

10 As best shown in Figs. 4 and 6, the shaft G extends below the lower friction disk *f*^o and passes loosely through a block or swivel *k* having a horizontal stud *k*¹ by which it is journaled in the upper end of a toggle-arm *k*². The latter is pivoted upon a horizontal shaft *k*³ arranged parallel with the pivots of the oscillating frame H and mounted in fixed bearings *k*⁴.

20 *k*⁵ indicates a spring connecting the toggle-arm *k*² with the cheek E or other fixed part and tending constantly to pull said arm and the lower end of the shaft G toward said cheek, thereby normally holding the lower friction wheel *g*¹ against the disk *f*^o and the upper wheel *g* out of engagement with the friction wheel *e*² and driving the take-up roll. The spring *k*⁵ is more powerful than the spring *f*³, so as to overcome its resistance and normally shift the pinion *f* into engagement with the gear wheel *e*³, as shown in Figs. 1 and 2. When, however, 35 the position of the shaft G is reversed for rewinding the music sheet, the wheel *g*¹ recedes from the disk *f*^o and the spring *f*³ withdraws the pinion *f* from the gear wheel *e*³, as shown in Fig. 6. This reversal of the shaft G is automatically effected after the playing of the last piece on the music roll preferably by the following mechanism: L indicates a vertically-swinging shifting lever pivoted at *l* to a block *l*¹, and *l*² is a rod connecting the angular portion of said lever with the toggle arm *k*², so that when the long member *l*³ of the shifting lever is depressed, the shaft G is oscillated to the rewind-position shown by dotted lines in Fig. 2. Pivoted to said long arm is an upright trip or presser-bar *m*, the upper end of which is movable into and out of the path of a rotary cam *m*¹ secured to an upright shaft I¹ which is driven from the shaft I by a belt *i*³. The upper portion of this trip bar is arranged in a suitable guide *m*² carried by a fixed standard *m*³. A spring *m*⁴ connecting the trip-bar with the lever L tends to draw said bar out of range of the cam *m*¹. 60 while a small bellows or pneumatic N serves, when collapsed, to swing the upper end of the trip bar under the face of the cam, as shown by dotted lines in Fig. 2, and by full lines in Fig. 5, so as to be depressed thereby.

65 For this purpose, the movable board of this

pneumatic has an arm *n* which bears against the rear edge of the trip-bar. The operation of this bellows is controlled by a rewind-perforation in the music sheet placed near the rear end thereof and a corresponding pair of valves *n*¹, *n*² of the usual pneumatic action, Fig. 6, the pneumatic being inflated when the rewind-perforation registers with the corresponding tracker-duct and deflated when it breaks register therewith, in a well known manner. During the rewinding operation of the music sheet, the shaft G is locked in position by an automatic pawl or catch *o* arranged to interlock with a laterally-projecting pin *l*⁴ of the elbow lever L when the latter is depressed, as shown in Figs. 5 and 10. This catch is pivoted at *o*¹ to a lug *o*² of the block *l*¹ and is constantly urged toward the pin *l*⁴ by a spring *o*³.

In order to flush the wind chest and silence the instrument during the rewinding of the music sheet, a branch tube *p* connects the suction trunk A¹ with a flushing chamber P in the block *l*¹, as shown in Fig. 6. A port *p*¹ connects this chamber with the outer atmosphere, this port being controlled by a normally-closed valve *p*² carried by a vertically-swinging lever *p*³ fulcrumed on the lug *o*². As shown in Figs. 3, 6 and 10, the locking pin *l*⁴ extends over the rear arm of the valve-lever *p*³ at a suitable height to depress said arm simultaneously with the depression of the shifting lever L, thereby lifting the front arm of the valve-lever, opening the valve *p*² and flushing the wind chest. 100

At the end of the rewinding operation, the locking catch *o* is automatically disengaged from the locking pin *l*⁴ by the action of a finger *q* which coöperates with the take-up roll. This finger is pivoted at its lower end to a vertically-movable rock-arm *q*¹ secured to a horizontal rock shaft *q*², which is arranged parallel with the take-up roll and on the front side thereof. This shaft is supported in bearings mounted on a base board Q and provided at its right hand end with a trip arm *q*³ which overlaps the tail of the locking catch, as shown in Figs. 2 and 10. As seen in Fig. 7, the finger *q* bears against the convolutions of the music sheet opposite a transverse groove or recess *r* in the periphery of the take-up roll, the finger being constantly drawn toward said roll by a spring *q*⁴. This recess has an abrupt rear end *r*², referring to the direction of travel of the take-up roll during the rewinding of the music sheet. So long as the recess remains covered by the music sheet during the rewinding operation, the finger is held in the retracted position shown by full lines in Fig. 7, allowing the locking catch *o* to remain in engagement with the locking pin *l*⁴. As soon, however, as the recess is uncovered by the complete unwinding of the music sheet, the finger is 130

drawn into the recess and its upper end is brought into the path of the abrupt end of the recess, as shown by dotted lines in Fig. 7, thereby depressing the finger and causing it to rock the shaft g^2 in the proper direction to trip the locking catch and release the flushing valve and the shifting lever L.

In order to permit the speed of the take-up roll to be changed to suit different tempos, the lower friction wheel g^1 is preferably splined on the shaft G, as shown in Fig. 6, so that it can be shifted toward and from the center of the companion disk f^5 . In the construction shown in the drawings, the annularly-grooved hub of the wheel g^1 is embraced by a horizontal fork s having at its outer end a vertical stem s^1 which is guided in a tube s^2 carried by the oscillating-frame H, as best shown in Fig. 4. Extending downwardly from said fork is a rod t connected at its lower end to one arm of a bell crank lever t^1 whose other arm is connected with the adjacent end of a horizontal shifting bar t^2 . The latter is provided at its opposite end with a clamping screw t^3 which passes through the horizontal slot t^4 of a standard T mounted on the base-board Q, preferably opposite the middle of the take-up roll where the screw can be conveniently manipulated. Upon loosening this screw, the bar can be shifted to the right or left to a greater or less extent to drive the take-up roll at the desired speed.

It is desirable to provide means for manually throwing the music and take-up rolls out of gear with the automatic driving and rewind mechanism, so that the music sheet may be moved over the tracker by hand, in tuning the instrument with the use of such a sheet, and so that the music rolls can, if desired, be changed while the motor remains in operation. For this purpose we prefer to employ the devices shown in the drawings which are constructed as follows: u indicates an arm mounted loosely on the shaft k^3 beside the toggle-arm k^2 and facing the cheek E. The arm u is provided on its upper side with a lug u^1 adapted to bear against the front end of a set screw u^2 carried by the toggle-arm, as shown in Figs. 6, 8 and 9, so that when the arm u is raised it swings the arm k^2 and the lower portion of the shaft G toward the right, thus withdrawing the lower friction wheel g^1 from the disk f^5 and allowing the spring f^3 to shift the pinion f out of gear with the spur wheel e^3 . The arm u is raised by a cam or incline u^3 engaging with a laterally-projecting pin u^4 of said arm and carried by a slide u^5 movable lengthwise of the arm. This slide is guided on the base board Q and is in turn actuated by a second slide v arranged on said board in front of the slide u^5 and rigidly connected with the latter by a transverse arm v^1 . The slide v has a thumb

piece v^2 for actuating it. Upon shifting the front slide v to the right the cam u^3 of the rear slide raises the arm u , as before described, the cam being of such a height that the shaft G is rocked far enough to allow the gear pinion f to clear the wheel e^3 , but not so far as to move the upper friction wheel g into contact with the companion disk e^2 , as shown in Fig. 6. In this position of the parts, the music and take-up rolls can be turned by hand independently of the driving and rewind mechanism, for tuning purposes, and the music roll can be replaced by another without stopping the motor. By providing an adjustable abutment u^2 for the lug of the arm u , the angle of the latter relative to the toggle-arm k^2 can be readily regulated to give the shaft G the required throw to move both the friction wheels g, g^1 out of gear with the companion disks, as above described. A spiral spring u^6 is preferably applied to this screw between its knurled head and the arm k^2 to frictionally hold it from turning.

To enable the instrument to be silenced while changing the music roll and yet allow the pump-motor to continue in operation, the cam-slide u^5 is provided with a second cam or incline u^7 arranged to engage under a forward extension p^4 of the flush-valve lever p^3 , when said slide is shifted to its full extent, as shown in Fig. 6, thereby opening the flushing valve p^2 . The valve-opening cam u^7 is so arranged with relation to said extension that it stops short thereof under a partial or half-stroke of the slide and engages the same only when the slide receives its full stroke. By this arrangement, the flushing valve can be left closed, in tuning the instrument with the use of the music sheet, and can be opened in changing the music roll. As shown, the cam u^3 has a dwell or horizontal portion u^8 , of sufficient length to keep the arm u elevated in both the half-stroke and full-stroke positions of the cam-slide.

In practice, the motor-circuit may be closed by any suitable means. This may be accomplished by depositing a coin in a chute or coin-controlled switch W of any approved kind, preferably constructed to release the coin after the instrument has played a piece of music, or a predetermined number of pieces in a well known manner. This mechanism is not fully shown in the drawings as it forms no part of our present invention.

The operation of the instrument is as follows: In the normal position of the parts, the flushing valve p^2 is closed, the take-up roll C^2 is in gear, and the music roll C^1 out of gear with the frictional driving mechanism, as shown in Figs. 1 and 2, and the trip bar m clears the rotary cam m^1 . The cam-slide u^5 is shifted to its initial position, so as not to interfere with the automatic ac-

tion of the parts. Upon closing the motor circuit, the cam shaft I^1 is constantly rotated and the oscillating shaft G is continuously rotated in one direction, driving the take-up roll in the proper direction to wind the music sheet thereon. When the sheet has been fully wound upon the take-up roll, the rewind perforation of the sheet comes into register with the corresponding tracker-duct, collapsing the pneumatic N and swinging the trip bar m under the constantly-rotating cam m^1 , which depresses said bar, thereby oscillating the shaft G to the position shown by dotted lines in Fig. 2 and causing the sheet to be rewound upon the music roll. In order to rewind the sheet rapidly, the upper friction disk is comparatively large, as shown. Simultaneously with the reversal of the oscillating shaft G , the flushing valve p^2 is opened by the pin l^4 of the depressed shifting lever L , the latter and the valve being locked in this position during the rewinding operation by the automatic catch o . The moment that the sheet is fully unwound from the take-up roll, the finger q enters the uncovered recess r of said roll, withdrawing the catch o , allowing the flushing valve to close and at the same time permitting the driving gearing to return to its normal position under the action of the spring k^5 , as shown in Figs. 1 and 2.

Various changes may obviously be made within the scope of the appended claims, and we do not therefore wish to be limited to the particular construction herein shown and described.

We claim as our invention:

1. In an instrument of the character described, the combination of take-up and music rolls, driving and rewind wheels for alternately rotating said rolls, an oscillating shaft carrying wheels arranged to engage with said driving and rewind wheels, respectively, a constantly-actuated member, and means for oscillating said shaft including a part movable into and out of the path of said member.

2. In an instrument of the character described, the combination of take-up and music rolls, driving and rewind wheels for alternately rotating said rolls, an oscillating shaft carrying wheels arranged to engage with said driving and rewind wheels, respectively, a constantly actuated member, and means for oscillating said shaft including a part movable into and out of the path of said member and a pneumatic for moving said part into the path of said member.

3. In an instrument of the character described, the combination of take-up and music rolls, driving and rewind wheels for alternately rotating said rolls, an oscillating shaft carrying wheels arranged to engage with said driving and rewind wheels, respectively, a constantly-actuated member, a

shifting lever connected with said shaft, and a trip-bar acting upon said lever and movable into and out of the path of said member.

4. In an instrument of the character described, the combination of take-up and music rolls, driving and rewind wheels for alternately rotating said rolls, an oscillating shaft carrying wheels arranged to engage with said driving and rewind wheels, respectively, a shifting lever connected with said shaft, a rotary cam, a trip-bar attached to said lever and movable into and out of the path of said cam, a spring tending to withdraw the trip-bar from the cam, and a pneumatic for moving said bar into the path of the cam.

5. In an instrument of the character described, the combination of take-up and music rolls, driving and rewind wheels for alternately rotating said rolls, and oscillating shaft carrying wheels arranged to engage with said driving and rewind wheels, respectively, shifting means for the oscillating shaft, means for locking said shifting means, and releasing means for said locking means controlled by the take-up roll.

6. In an instrument of the character described, the combination of take-up and music rolls, driving and rewind wheels for alternately rotating said rolls, an oscillating shaft carrying wheels arranged to engage with said driving and rewind wheels, respectively, a shifting lever for said shaft, a locking catch for said lever, and a releasing device operating on said catch and controlled by the take-up roll.

7. In an instrument of the character described, the combination of take-up and music rolls, said take-up roll having a peripheral recess, driving and rewind wheels for alternately rotating said rolls, an oscillating shaft carrying wheels arranged to engage with said driving and rewind wheels, respectively, shifting means for said shaft, means for locking said shifting means, and a rock-shaft arranged parallel with the take-up roll and having a releasing arm acting on said locking means and a finger arranged to enter said recess when the music sheet is unwound therefrom.

8. In an instrument of the character described, the combination of a wind chest having a flushing valve, music and take-up rolls, driving mechanism including shiftable members for alternately rotating said rolls in opposite directions, a lever carrying the flushing valve, a shifting-lever arranged adjacent to said valve-lever and having a part arranged to engage therewith to open said valve, means for actuating said shifting lever, and a connection between the shifting lever and the shiftable members of the driving mechanism.

9. In an instrument of the character described, the combination of a wind chest hav-

ing a flushing valve, music and take-up rolls, driving mechanism including shiftable members for alternately rotating said rolls in opposite directions, a lever carrying the flushing valve, a shifting-lever arranged adjacent to said valve-lever and having a projection arranged to engage therewith to open said valve, a connection between the shifting lever and the shiftable members of the driving mechanism, and an automatic lock arranged to engage said projection.

10. In an instrument of the character described, the combination of a wind chest having a flushing valve, music and take-up rolls, driving mechanism including shiftable members for alternately rotating said rolls in opposite directions, a lever carrying the flushing valve, a shifting-lever arranged adjacent to said valve-lever and having a pin arranged to engage therewith to open said valve, means for connecting the shifting lever with said shiftable members, an automatic catch arranged to interlock with said pin, and releasing means for said catch controlled by the take-up roll.

11. In an instrument of the character described, the combination of take-up and music rolls, automatic driving mechanism including shiftable members for alternately rotating said rolls in opposite directions, automatic shifting means for said members, and manual means independent of said automatic shifting means for throwing the driving mechanism out of gear with both of said rolls.

12. In an instrument of the character described, the combination of take-up and music rolls, driving and rewind wheels for alternately rotating said rolls, an oscillating shaft carrying wheels arranged to engage with said driving and rewind wheels, respectively, means for automatically oscillating said shaft, and means for manually oscillating said shaft including a shifting arm cooperating with said shaft and a cam arranged to engage said shifting arm.

13. In an instrument of the character described, the combination of take-up and music rolls, driving and rewind wheels for alternately rotating said rolls, an oscillating shaft carrying wheels arranged to engage with said driving and rewind wheels, respectively, means for automatically oscillating said shaft, and means for manually oscillating said shaft including a shifting arm cooperating with said shaft and a slide carrying a cam arranged to engage said shifting arm.

14. In an instrument of the character described, the combination of take-up and music rolls, driving and rewind wheels for alternately rotating said rolls, an oscillating shaft carrying wheels arranged to engage with said driving and rewind wheels, respectively, a toggle-arm connected to the

lower end of said shaft, and means for manually oscillating said shaft including a shifting arm pivoted adjacent to said toggle-arm and adapted to engage the same.

15. In an instrument of the character described, the combination of take-up and music rolls, driving and rewind wheels for alternately rotating said rolls, an oscillating shaft carrying wheels arranged to engage with said driving and rewind wheels, respectively, a toggle-arm connected to the lower end of said shaft and carrying a set screw, and means for manually oscillating said shaft including a shifting arm pivoted adjacent to said toggle-arm and arranged to engage said set screw.

16. In an instrument of the character described, the combination of take-up and music rolls, driving and rewind wheels for alternately rotating said rolls, an oscillating shaft carrying wheels arranged to engage with said driving and rewind wheels, respectively, a toggle-arm connected to the lower end of said shaft and carrying a set screw, and means for manually oscillating said shaft including a shifting arm pivoted adjacent to said toggle-arm and arranged to engage said set screw, and a slide having a cam cooperating with said shifting arm.

17. In an instrument of the character described, the combination of take-up and music rolls, automatic driving mechanism including shiftable members for alternately rotating said rolls in opposite directions, automatic shifting means for said members, a wind chest having a flushing-valve, means for automatically opening said valve, and manual means independent of said automatic shifting and valve opening means for opening the flushing valve and throwing the driving mechanism out of gear with both of said rolls.

18. In an instrument of the character described, the combination of take-up and music rolls, automatic driving mechanism including shiftable members for alternately rotating said rolls in opposite directions, automatic shifting means for said members, a wind-chest having a flushing-valve, means for automatically opening said valve, and independent manual means for throwing the driving mechanism out of gear with both of said rolls and opening the flushing valve, said manual means being constructed to act on the driving mechanism alone in one position thereof and on both the driving mechanism and the flushing valve in another position thereof.

19. In an instrument of the character described, the combination of take-up and music rolls, driving and rewind wheels for alternately rotating said rolls, an oscillating shaft carrying wheels arranged to engage with said driving and rewind wheels, respectively, a toggle-arm connected to the

lower end of said shaft, a shifting arm pivoted adjacent to said toggle-arm and adapted to engage the same, a wind chest having a flushing valve, and a manual slide having 5 cams cooperating respectively with said shifting arm and the flushing valve.

20. In an instrument of the character described, the combination of take-up and music rolls, driving and rewind wheels for 10 alternately rotating said rolls, an oscillating shaft carrying wheels arranged to engage with said driving and rewind wheels, respectively, a toggle-arm connected to the lower end of said shaft, a shifting arm pivoted adjacent to said toggle-arm and co- 15 operating therewith, a wind chest having a

flushing valve, a lever carrying said valve, and a manual slide having cams cooperating with said shifting arm and said valve-lever, respectively, the cam-slide being constructed 20 to engage said shifting lever and clear the valve-lever by a partial stroke of the slide and to engage both of said members by a full stroke of the slide.

Witness our hands this 3d day of May, 25 1910.

FRANK L. McCORMICK.
AUGUST DE KLEIST.

Witnesses:

NORMAN O. FISH,
W. H. WENDELL.