

No. 715,264.

Patented Dec. 9, 1902.

D. H. HAYWOOD.  
MUSICAL INSTRUMENT.  
(Application filed Feb. 4, 1902.)

(No Model.)

2 Sheets—Sheet 1.

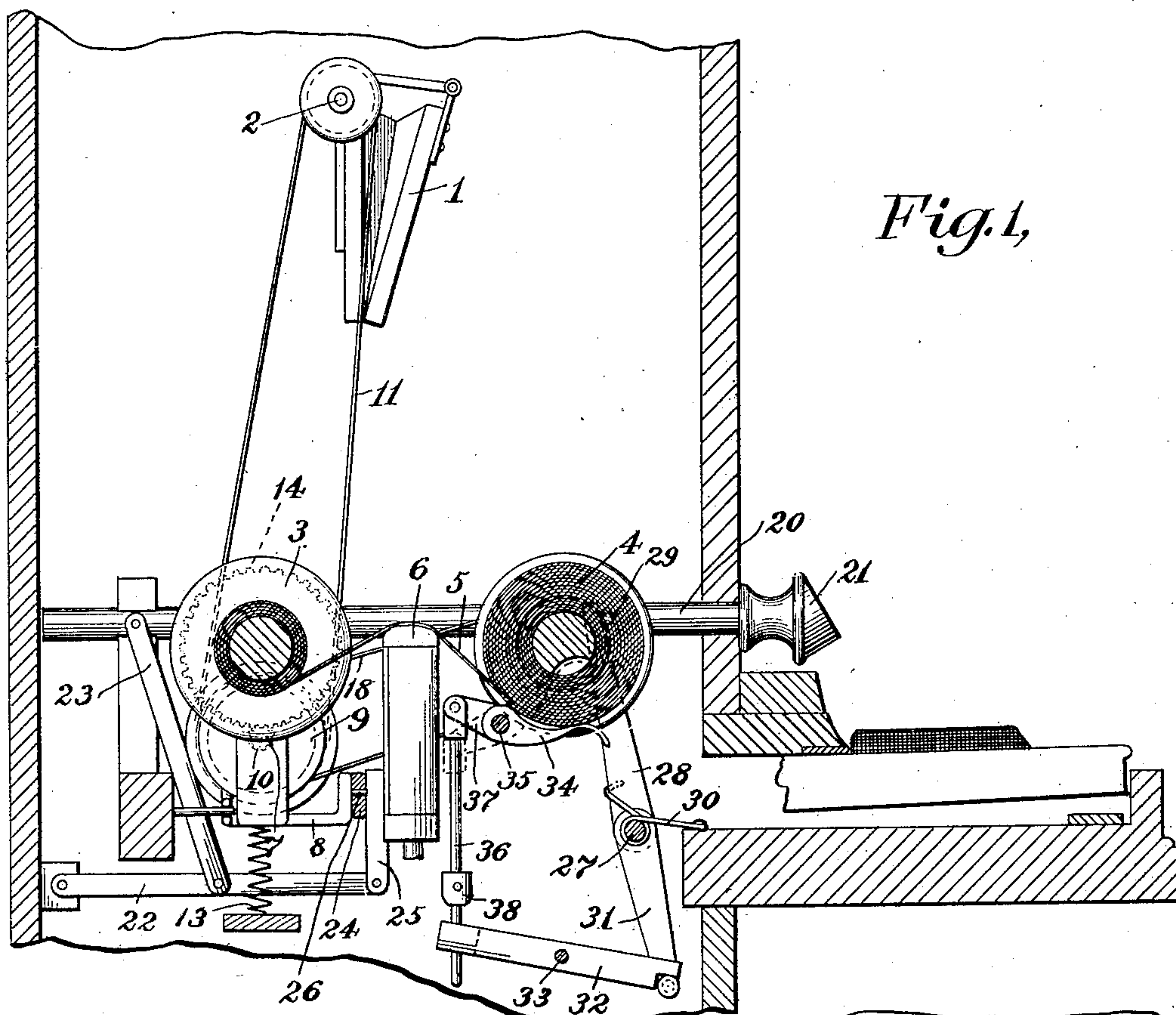


Fig. 1,

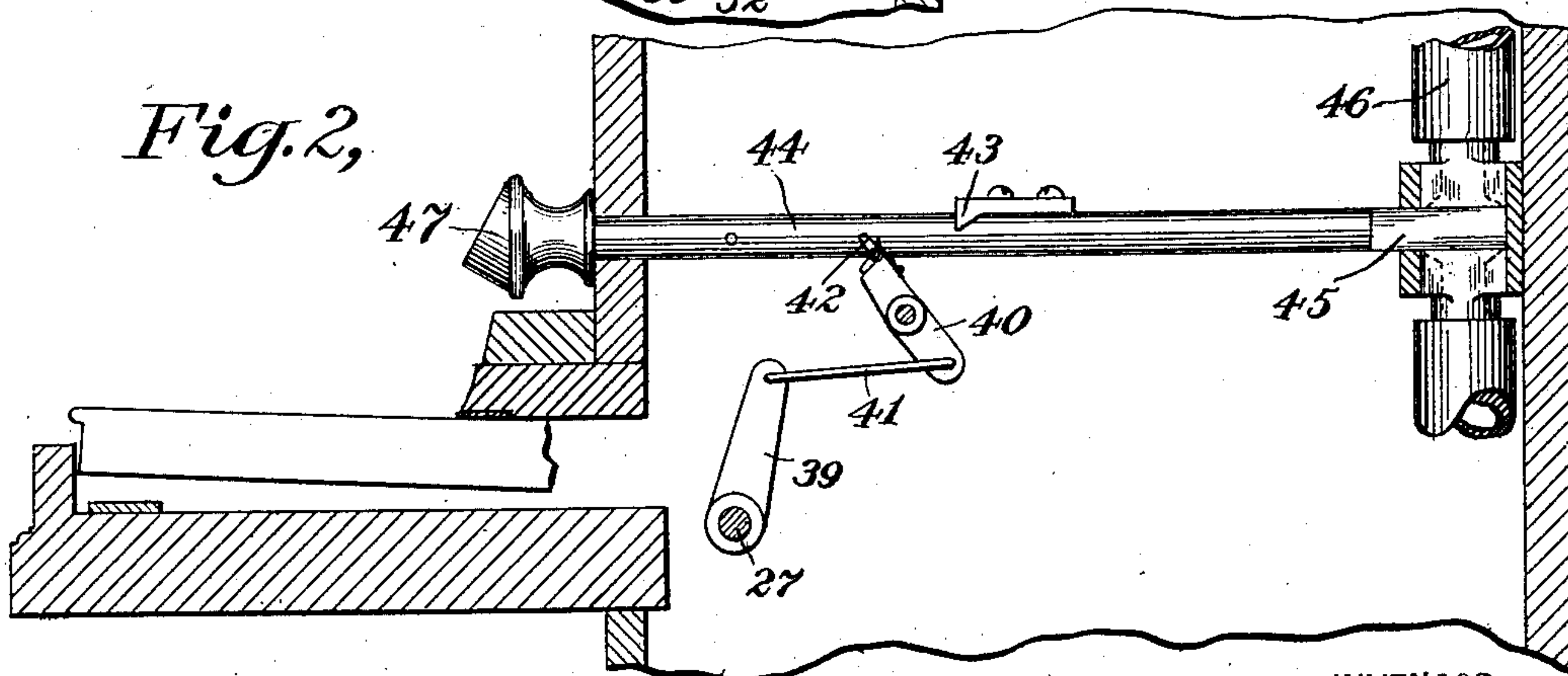


Fig. 2,

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INVENTOR

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*Chapin Haywood & Co.*  
ATTORNEYS

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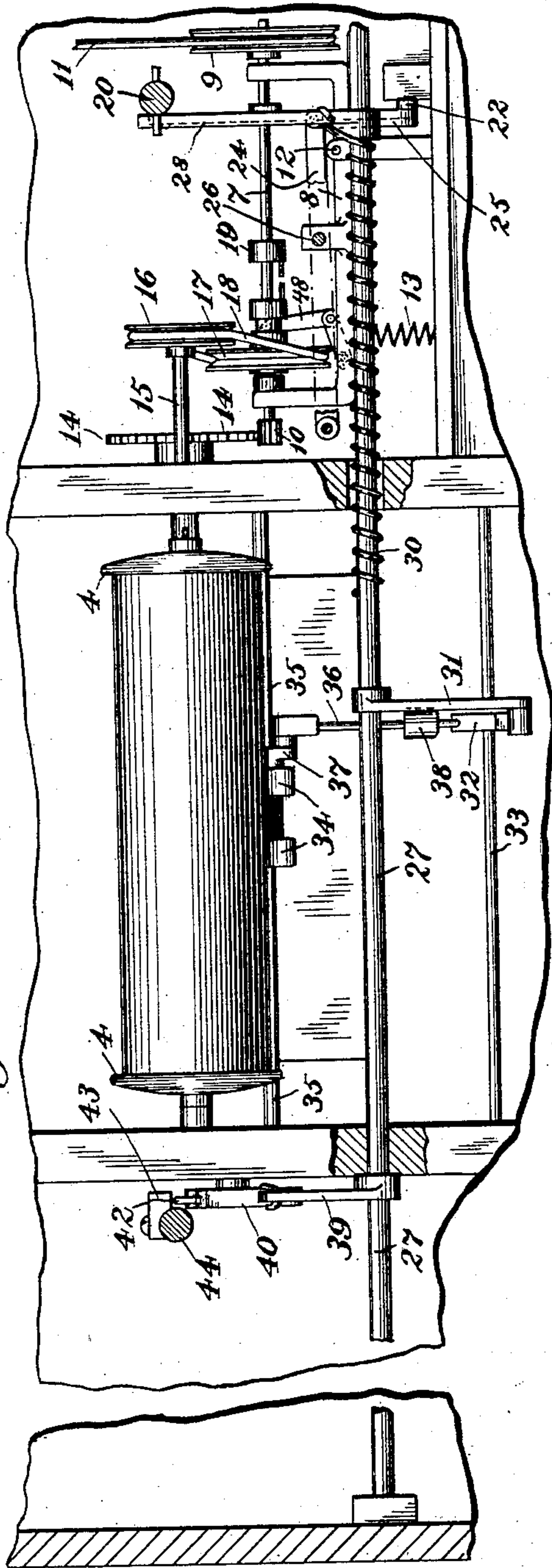
D. H. HAYWOOD.  
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2 Sheets—Sheet 2.

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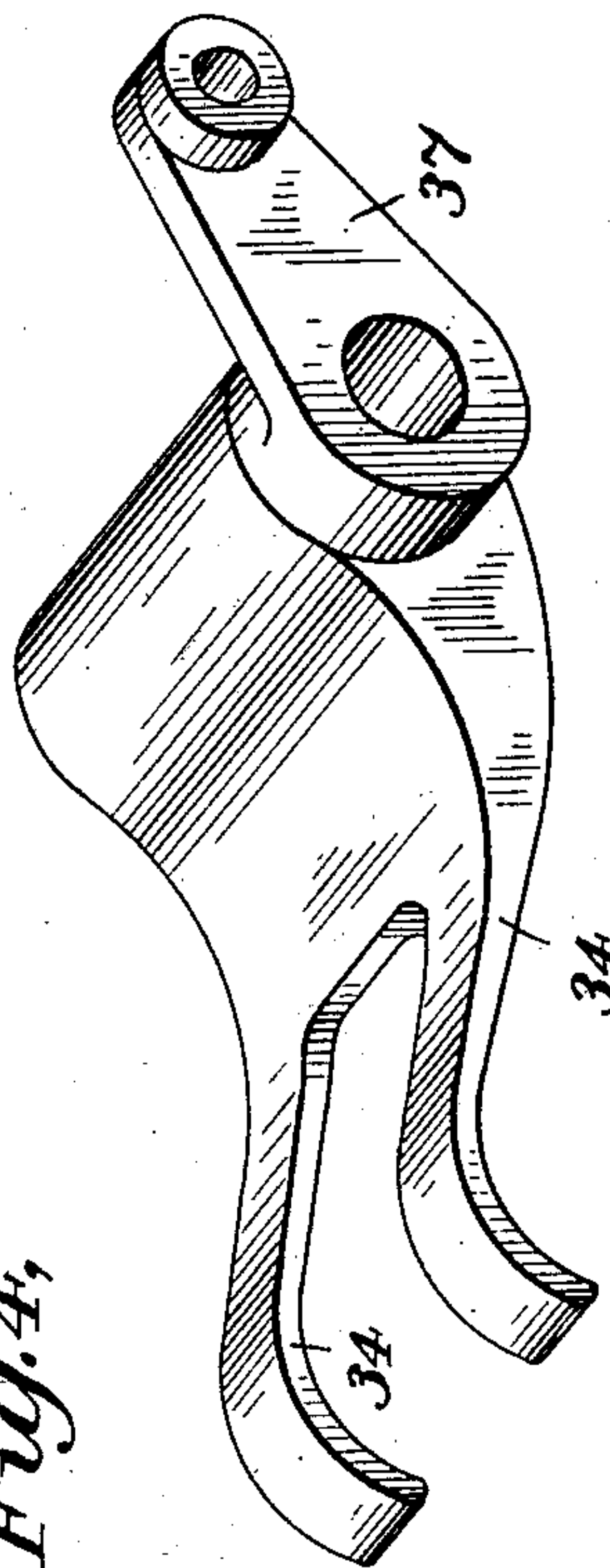
Fig. 3,



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Fig. 4,



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# UNITED STATES PATENT OFFICE.

DANIEL HOWARD HAYWOOD, OF NEW YORK, N. Y.

## MUSICAL INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 715,264, dated December 9, 1902.

Application filed February 4, 1902. Serial No. 92,546. (No model.)

*To all whom it may concern:*

Be it known that I, DANIEL HOWARD HAYWOOD, a citizen of the United States of America, and a resident of New York city, in the county and State of New York, have invented certain new and useful Improvements in Musical Instruments, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to automatically-operated musical instruments controlled by a traveling music-sheet.

My invention comprises mechanism automatically operated at a predetermined point in the movement of the music-sheet for stopping the forward movement of the said sheet either by stopping the movement of the sheet entirely or by reversing the winding mechanism, whereby the sheet may be rewound upon the spool from which it has been unwound.

The object of my invention is, primarily, to prevent the music-sheet from being unwound too far, and thus be liable to be torn from its supporting-roller, and, secondarily, to so construct the automatic means that such means will not interfere with the usual manual operation of the reciprocating bars or so-called "stops."

A further object of my invention is to so construct the mechanism that the manually-operated bar controlling the reversing device will always be forced toward the position in which the winding is reversed, or, in other words, to the reroll position, at such times as there is no music-sheet in the instrument. This for the reason that in this class of instrument the same bar which operates the reversing device at the same time closes the air-ducts in the tracker-board or otherwise renders the tone-sounding devices inoperative, so as to prevent the sounding of tones during the rewinding of the music-sheet, and it is desirable to so close the air-ducts or otherwise render the tone-sounding devices inoperative at all times that there is no music-sheet in position in the instrument.

My invention further consists in certain details of construction and combination of parts, as will be pointed out in detail in the following description, and further advantages will also appear hereinafter.

I will now proceed to describe a mechanism embodying my invention and will then point out the novel features in claims.

In the drawings, Figure 1 is a view in vertical transverse section of such portion of a musical instrument as is necessary for the illustration of my invention and in which an automatic device embodying my invention is incorporated. Fig. 2 is similar section on the same plane, but looking in the opposite direction. Fig. 3 is a front elevation, partially in vertical section, of the same; and Fig. 4 is a detail view of a tripping-finger employed.

I have illustrated my invention in connection with an automatic wind instrument and one in which air is used as a motive fluid for the sheet-winding mechanism. It will of course be understood that I do not confine myself to such style of instrument, as my device is equally applicable to other styles of instruments and instruments employing other motive power.

Referring to the drawings, particularly by reference characters employed to designate certain parts and particularly at first to Figs. 1 and 3, a motor will be seen, as designated by the reference character 1, which motor is connected to and adapted to rotate a drive-shaft 2. A take-up roller 3 is mounted in suitable bearings, and a music-sheet roller or spool 4 is also shown as suitably mounted in the instrument and as delivering its music-sheet 5 to the take-up roller 3. The music-sheet 5 may be the ordinary form of perforated music-sheet and passes over the usual tracker-board 6, having therein the passages or ducts leading to the various tone-sounding devices. An intermediate shaft 7 is mounted upon a swinging frame 8, and a band-wheel 9 is secured to one end of the shaft and a pinion 10 to the other. A cord 11, passing around the band-wheel 9, also passes around the band-wheel on the drive-shaft 2 and forms a driving connection between the two shafts. The swinging frame 8 is mounted to swing on pivots 12 and is retained in its normal upper position, as shown in the drawings, by a spring 13. In such position the pinion 10 is in operative engagement with a spur-gear 14, mounted upon the take-up-roller shaft. With the parts in their normal



positions, as shown, movement of the motor will operate the take-up roller through the pinion 10 and spur-gear 14 in a direction to wind up the music-sheet 5 upon the take-up roller 3 while unwinding it from the sheet-roller or spool 4. The shaft 15 of the spool or sheet-roller 4 has rigidly secured thereto a pulley 16, while a pulley 17 is loosely mounted upon the intermediate shaft 7. A flexible and preferably elastic band 18 passes around the two pulleys 16 and 17. When the shaft 7 is operating as just described and the sheet is being unwound from the spool or roller 4, said roller will be caused to rotate in an opposite direction to the direction of the shaft 7, and hence the pulley 17 will be rotated upon the shaft 7 in a direction opposite to the direction of the said shaft. The tension of the band 18 and the friction of the pulley 17 upon the shaft 7 will cause a slight drag upon the spool or roller 4 and will prevent overrunning of the roller, due to momentum, while the sheet is being unwound. A bell-crank lever 48 is pivotally mounted upon the swinging frame 8, and one arm thereof is loosely connected at its end with the band-wheel 17 by a pin which engages a circumferential groove in the hub of the said wheel, and the other arm has a loose connection with a pin secured to a stationary portion of the casing of the instrument. To rewind the sheet upon the roller or spool 4, the swinging frame 8 is swung upon its pivots 12, so as to disengage the pinion 10 from the spur-gear 14, and simultaneously the loose pulley 17, by the action of the bell-crank lever 48, is caused to engage with a clutch member 19, rigidly secured to the shaft 7 and is hence rotated thereby. The action of the shaft 7 will then be to rapidly rotate the spool roller-shaft 15 to reroll the music-sheet upon such spool or roller. The swinging frame is caused to move downwardly, as just described, to bear against the tension of the spring 13 to effect the reversing action by means of a manually-operated reciprocating bar 20. This bar passes through and in front of the instrument-casing and is provided with a knob or handle 21, forming a so-called "organ-stop." In this class of instrument it is known as the "reroll-stop." The bar 20 is mounted to reciprocate in ways and is connected to a lever 22 by means of a toggle-link 23. The lever 22 is connected to one end of another lever 24 by means of a link 25, and the said lever 24 is pivoted at its other end to a stationary portion of the frame. Intermediate of its ends it is pivotally connected to a lug upon the swinging frame 8 at a point 26. When the reroll-stop is pulled outwardly, the toggle-link 23 is straightened out, so as to depress the lever 22 and through the link connection 25 to depress the lever 24, and thereby to depress the swinging frame 8. When the stop has been so pulled out, the mechanism will remain in the position to

which it has been moved by reason of the fact that at such times there will be a straight thrust through the toggle-link 23. The spring 13 will assist the parts to return to their normal positions (shown in the drawings) when the stop is pushed inwardly and the toggle-link 23 thrown out of line.

I lay no claim to any of the foregoing mechanism, as it forms the ordinary and well-known type of reversing-gear used in a well-known automatic musical instrument and was taken directly from such instrument for purposes of illustrating the invention to be now particularly described in connection therewith.

A shaft or spindle 27 is arranged in suitable bearings transversely of the instrument and carries an actuating-lever 28, which is adapted to engage one side of a pin or projection 29 upon the reciprocating bar 20. A spring 30, wound around the shaft 27, tends to normally force the lever 28 in a direction to push the reciprocating bar 20 outwardly. The shaft 27 further carries an arm 31, engaged at certain times by a latch 32. The latch 32 is pivoted at 33 and is preferably slightly overbalanced at its outer end or that end at which it engages the arm 31, so that normally when set it will hold the arm 31, shaft 27, and lever 28 in the position shown in Fig. 1 of the drawings. A tripping-finger 34 is loosely mounted upon a bearing 35, and a link 36 is secured to an arm 37, connected to or forming a part of the said finger. The link 36 and the arm 37 are preferably of a weight sufficient to slightly overbalance the weight of the finger 34, so that the tendency of the finger is upward. The link 36 carries a button or projection 38, which in its downward movement is adapted to engage the inner end of the latch 32 to trip it.

The finger 34 is normally sustained by the music-sheet when such sheet is in position in the instrument. When, however, the sheet has arrived at a predetermined point in its movement, the finger 34 will pass into an aperture therein provided and also, preferably, provided in the sheet-roller or spool in which the music-sheet is mounted and will thereby permit the link 36, with its button or projection 38, to drop sufficiently to trip the latch 32, and the lever 28, arm 31, and shaft 27, which form an actuating member for the bar 20, will be forced around by the action of the spring 30 to push the said bar 20 outwardly. By the foregoing operation the rewinding mechanism will be shifted so that the parts will be in position to automatically reroll the music-sheet upon the spool 4. If it be desired to only partially reroll the music-sheet, the reciprocating bar 20 may be pushed inwardly by hand at any desired point in the rewinding, and the actuating member will thereby be reset. The finger 34 having been automatically depressed at the first start of the rewinding, the button or projection 38 will be lifted



away from the latch 32, so that the said latch will be permitted to engage the actuating member and hold it in its position until again tripped.

5 It will be noticed that as the actuating member engages one side only of the pin or projection 29 the said reciprocating bar 20 will be entirely free of the actuating member when it is engaged by the latch 32 and may be  
10 moved backward and forward by hand, as heretofore, so that the automatic means in no way interferes with the manual reversing at any time.

When there is no music-sheet or spool in  
15 the instrument, the latch 32 will always be tripped, so that the bar 20 will always at such times be forced outwardly. This is desirable, for the reason that in this type of instrument, as heretofore explained, the reciprocating bar  
20 20 in its outward movement not only operates the reversing mechanism, but also closes the air-ducts in the tracker-board so as to prevent tones from sounding. The outward position is hence the desired position for the reroll-stop when the instrument is being manually  
25 operated from the keyboard, so that under all conditions, except during the forward movement of the music-sheet or at some time when the music-sheet is stationary, it is desirable to have the reroll-stop out, and the  
30 automatic device herein effects exactly this desired condition.

If desired, the actuating device may be employed to stop the winding mechanism altogether, and for this purpose I have shown an  
35 arm 39, secured to the shaft or spindle 27, (see more particularly Fig. 2,) and a rocking lever 40, connected to said arm 39 by a link 41. The rocking lever 40 carries a spring-pawl 42 at its upper end, and the said pawl  
40 is adapted to operatively engage with a stud or projection 43 upon a reciprocating bar 44 during a movement of the said rocking lever 40 in one direction only. The reciprocating  
45 bar 44 is adapted to stop or start the winding mechanism, and for this purpose may carry a valve 45, which controls the passage of fluid through a connection 46 leading to the motor 1. The reciprocating bar 44 extends  
50 through the front of the casing and is provided at its outer end with a knob or button 47 and constitutes what is known in an instrument of this type as the "motor-stop." It will be noticed that when at the limits of  
55 its movement in either direction the pawl 42 of the rocking lever 40 is in such a position as to be clear of the stud or projection 43, so that the bar 44 may be operated by hand in either direction. If the bar 44 be moved partially or entirely outward, the rocking lever  
60 40 will engage the stud or projection 43 thereon to move the said bar inwardly whenever the latch 32 is tripped; but immediately the bar has been so moved inward it is again  
65 free to be manually operated, because the rocking lever 40 will in its final movement

have passed out of operative engagement therewith. If the bar 44 happens to be in an intermediate position when the rocking lever  
70 40 is being reset, the lever will pass by the stud or projection 43 freely, owing to the action of the pawl 42. By my device I may then, if desired, entirely stop the winding of the music-sheet at a predetermined point in the movement thereof, or I may by dispensing  
75 with the mechanism for actuating the motor-stop automatically operate the rewinding mechanism only, so that if motive power be continuously supplied the music-sheet will be automatically rerolled. In either case my  
80 device in no way interferes with the manual operation of the instrument.

When the sheet is entirely rewound or at any time during the rewinding, further movement of the winding mechanism may be arrested  
85 by manual operation of the bar 44, or the bar 20 may be manually operated against the resistance of the spring 30 to reset the device and again permit forward movement of the winding mechanism. 90

I do not desire, of course, to be limited only to the precise details of construction or combination of parts as herein set forth, as the same may obviously be varied within wide limits without departing from the spirit and  
95 scope of my invention.

What I claim is—

1. In an automatic musical instrument, the combination with a music-sheet-winding reversing mechanism and a manually-operated  
100 reciprocating bar for controlling same, of an actuating member adapted to engage said bar to move same in one direction only, means whereby power may be stored in said member, and tripping mechanism for said actuating member. 105

2. In an automatic musical instrument, the combination with a music-sheet-winding reversing mechanism and a manually-operated  
110 reciprocating bar for controlling same, of an actuating member adapted to engage said bar to move same in one direction only, means whereby power may be stored in said member, and automatic tripping mechanism for said actuating member. 115

3. In an automatic musical instrument, the combination with a music-sheet-winding reversing mechanism and a manually-operated  
120 reciprocating bar for controlling same, of an actuating member adapted to engage said bar to move same in one direction only, means whereby power may be manually stored in said member, and tripping mechanism for said actuating member.

4. In an automatic musical instrument, the  
125 combination with a music-sheet-winding reversing mechanism and a manually-operated reciprocating bar for controlling same, of an actuating member adapted to engage said bar to move same in one direction only, means  
130 whereby power may be stored in said member, and tripping mechanism, arranged to op-



erate at a predetermined point in the movement of a traveling music-sheet, for tripping said actuating member.

5. In an automatic musical instrument, the combination with a music-sheet-winding reversing mechanism and a manually-operated reciprocating bar for controlling same, of a spring-pressed actuating member adapted to engage said bar to move same in one direction only, and tripping mechanism for said actuating member.

6. In an automatic musical instrument, the combination with a music-sheet-winding reversing mechanism, and a manually-operated reciprocating bar for controlling same, of an actuating member adapted to engage said bar to move same in one direction only, means whereby power may be stored in said member upon the manual operation of the said reversing-bar in the other direction, and tripping mechanism for said actuating member.

7. In an automatic musical instrument, the combination with a music-sheet-winding reversing mechanism, and a manually-operated reciprocating bar for controlling same, of an actuating member adapted to engage said bar to move same in one direction only, a spring for said member, means whereby power may be stored in said spring upon the manual operation of the said reversing-bar in the other direction, and tripping mechanism for said actuating member.

8. In an automatic musical instrument, the combination with a music-sheet-winding reversing mechanism and a manually-operated reciprocating bar for controlling same, of a spring-pressed actuating member adapted to engage said bar to move same in one direction only, a latch for said actuating member, and a tripping device for said latch.

9. In an automatic musical instrument, the combination with a music-sheet-winding reversing mechanism and a manually-operated reciprocating bar for controlling same, of a spring-pressed actuating member adapted to engage said bar to move same in one direction only, a latch for said actuating member, and an overbalanced tripping device for said latch, adapted to be sustained in an inoperative position by the music-sheet.

10. In an automatic musical instrument, the combination with a music-sheet-winding reversing mechanism and a manually-operated reciprocating bar for controlling same, said bar carrying a stud or projection, a spring-actuated lever adapted to engage one side of said stud or projection, a latch for said lever, and an overbalanced tripping-bar for tripping said latch, adapted to operate at a predetermined point in the movement of the music-sheet.

11. In an automatic musical instrument, the combination with a music-sheet-winding mechanism and a manually-operated reciprocating stopping and starting bar therefor, of automatic actuating means engaging said bar to actuate same at a predetermined point in

the movement of a traveling music-sheet, upon movement of said means in one direction, and failing to engage said bar upon movement in the other direction.

12. In an automatic musical instrument, the combination with a music-sheet-winding mechanism and a manually-operated reciprocating stopping and starting bar therefor, of automatic actuating means engaging said bar to actuate same at a predetermined point in the movement of a traveling music-sheet, upon movement of said means in a direction to move said bar to stop said winding mechanism, and failing to engage said bar upon movement in the other direction.

13. In an automatic musical instrument, the combination with a music-sheet-winding mechanism, and a manually-operated reciprocating stopping and starting bar therefor, of automatic means for actuating the said bar at a predetermined point in the movement of the music-sheet, said means being out of operative engagement with said bar when at the limit of its movement in either direction, and being in position to operatively engage said bar only when moving between such limits, whereby the said bar is free to be manually operated at other times.

14. In an automatic musical instrument, the combination with a music-sheet-winding mechanism, and a manually-operated reciprocating stopping and starting bar therefor, of automatic means for actuating the said bar at a predetermined point in the movement of the music-sheet, said means being out of operative engagement with said bar when at the limit of its movement in either direction, and being in position to operatively engage said bar only when moving between such limits, and in one direction of its movement only, whereby the said bar is free to be manually operated at all other times.

15. In an automatic musical instrument, the combination with a music-sheet-winding mechanism, and a manually-operated reciprocating stopping and starting bar therefor, of automatic means for actuating the said bar to stop said winding mechanism at a predetermined point in the movement of the music-sheet, said means being out of operative engagement with said bar when at the limit of its movement in either direction, and being in position to operatively engage said bar only when moving between such limits, whereby the said bar is free to be manually operated at other times.

16. In an automatic musical instrument, the combination with a music-sheet-winding mechanism, and a manually-operated reciprocating stopping and starting bar therefor, of an actuating member therefor, means whereby power may be stored in said member, and tripping mechanism for said actuating member.

17. In an automatic musical instrument, the combination with a music-sheet-winding mechanism, and a manually-operated reciprocating stopping and starting bar therefor, of automatic actuating means engaging said bar to actuate same at a predetermined point in



rocating stopping and starting bar therefor, of an actuating member therefor, means whereby power may be manually stored in said member, and tripping mechanism for said actuating member.

18. In an automatic musical instrument, the combination with a music-sheet-winding mechanism, and a manually-operated reciprocating stopping and starting bar therefor, of an actuating member therefor adapted to engage said bar to move same in one direction only, means whereby power may be stored in said member to move same in such direction, and tripping mechanism for said member.

19. In an automatic musical instrument, the combination with a music-sheet-winding mechanism, and a manually-operated reciprocating stopping and starting bar therefor, of an actuating member therefor adapted to engage said bar to move same in one direction only, means whereby said member may be manually operated in the opposite direction, and whereby power may be stored therein at such time to move same in the other direction, and tripping mechanism for said member.

20. In an automatic musical instrument, the combination with a music-sheet-winding mechanism including an air-motor, of a valve, a manually-operated reciprocating bar for operating said valve, automatic actuating means engaging said bar to actuate same at a predetermined point in the movement of a traveling music-sheet, upon movement of said means in one direction, and failing to engage said bar upon movement in the other direction.

21. In an automatic musical instrument, the combination with a music-sheet-winding mechanism including an air-motor, of a valve, a manually-operated reciprocating bar for operating said valve, automatic actuating means engaging said bar to actuate same at a predetermined point in the movement of a traveling music-sheet, upon movement of said means in a direction to move said bar to stop said winding mechanism, and failing to engage said bar upon movement in the other direction.

22. In an automatic musical instrument, the combination with a music-sheet-winding mechanism including a power-motor, and a reciprocating power-controlling bar therefor, of automatic means for actuating the said bar to cut off the supply of motive power at a predetermined point in the movement of the music-sheet, said means being out of operative engagement with said bar when at the limit of its movement in either direction, and being in position to operatively engage said bar only when moving between such limits, whereby the said bar is free to be manually operated at other times.

23. In an automatic musical instrument, the combination with a music-sheet-winding mechanism including a power-motor, and a manually-operated reciprocating power-controlling bar therefor, of a rocking lever located out of the path of movement of the said

bar when said rocking lever is at the limit of its movement in either direction, but in a position to operatively engage said bar when moving between such limits, whereby the said bar is free to be independently operated at other times.

24. In an automatic musical instrument, the combination with a music-sheet-winding mechanism including a power-motor, and a manually-operated reciprocating power-controlling bar therefor, of a rocking lever located out of the path of movement of the said bar when said rocking lever is at the limit of its movement in either direction, but in a position to operatively engage said bar when moving between such limits, whereby the said bar is free to be independently operated at other times, the engaging portion of said rocking lever having an independent movement, whereby such operative engagement is during a movement in one direction only.

25. In an automatic musical instrument, the combination with a music-sheet-winding mechanism including a power-motor, and a manually-operated reciprocating power-controlling bar therefor, of a rocking lever located out of the path of movement of the said bar when said rocking lever is at the limit of its movement in either direction, but in a position to operatively engage said bar when moving between such limits, whereby the said bar is free to be independently operated at other times, said rocking lever spring-actuated in one direction, and a latch for holding said lever against the tension of the spring.

26. In an automatic musical instrument, the combination with a music-sheet-winding mechanism including a power-motor, and a manually-operated reciprocating power-controlling bar therefor, of a rocking lever located out of the path of movement of the said bar when said rocking lever is at the limit of its movement in either direction, but in a position to operatively engage said bar when moving between such limits, whereby the said bar is free to be independently operated at other times, said rocking lever spring-actuated in one direction, a latch for holding said lever against the tension of the spring, and automatic tripping mechanism for said latch.

27. In an automatic musical instrument, the combination with a music-sheet-winding mechanism, and a reversing mechanism therefor, of a manually-operated reciprocating stopping and starting bar for said sheet-winding mechanism, a manually-operated reciprocating bar for controlling said reversing mechanism, and automatic means for simultaneously operating both said bars at a predetermined point in the movement of a music-sheet.

28. In an automatic musical instrument, the combination with a music-sheet-winding mechanism, and a reversing mechanism therefor, of a manually-operated reciprocating stopping and starting bar for said sheet-winding mechanism, a manually-operated reciprocating



ing bar for controlling said reversing mechanism, and automatic means for simultaneously moving said bars in opposite directions at a predetermined point in the movement of  
5 a music-sheet.

29. In an automatic musical instrument, the combination with a music-sheet-winding mechanism, and a reversing mechanism therefor, of a manually-operated reciprocating stop-  
10 ping and starting bar for said sheet-winding mechanism, a manually-operated reciprocating bar for controlling said reversing mechanism, actuating means for simultaneously  
15 operating both said bars, yielding means pressing in one direction upon said actuating means, a latch for holding said actuating means against the pressure of said yielding means, and tripping mechanism for said latch.

30. In an automatic musical instrument,  
20 the combination with a music-sheet-winding mechanism, and a reversing mechanism therefor, of a manually-operated reciprocating stop- ping and starting bar for said sheet-winding  
25 mechanism, a manually-operated reciprocating bar for controlling said reversing mechanism, spring-pressed actuating means for simultaneously operating both said bars, a latch for said actuating means, and a trip-  
30 ping device for tripping said latch at a pre- determined point in the movement of a music-sheet.

31. In an automatic musical instrument, the combination with a music-sheet-winding mechanism, and a reversing mechanism there-  
35 for, of a manually-operated reciprocating stop- ping and starting bar for said sheet-winding mechanism, a manually-operated reciprocating bar for controlling said reversing mechanism, spring-pressed actuating means for  
40 simultaneously operating both said bars, a latch for said actuating means, and an over- balanced tripping device for tripping said latch, adapted to be sustained in an inoperative position by a music-sheet.

32. In an automatic musical instrument,  
45 the combination with a music-sheet-winding mechanism, and a reversing mechanism therefor, of a manually-operated reciprocating stop- ping and starting bar for said sheet-winding  
50 mechanism, a manually-operated reciprocating bar for controlling said reversing mechanism, spring-pressed actuating means for simultaneously operating both said bars, a latch for said actuating means, having yield-  
55 ing pressure thereon to cause the same to normally engage said actuating means, and an automatic tripping device for tripping said latch.

DANIEL HOWARD HAYWOOD.

Witnesses:

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M. M. CONOVER.