

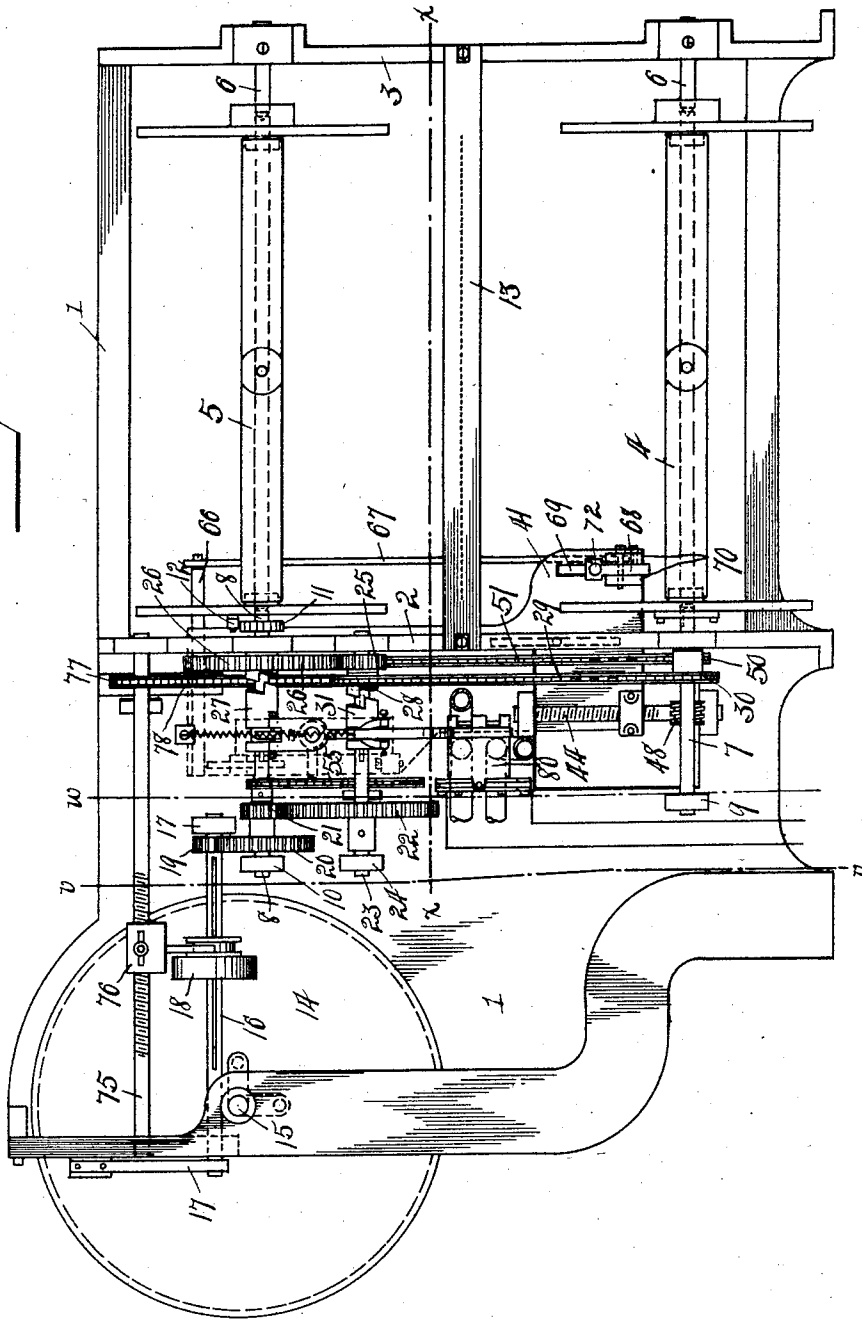
P. J. DREHER.
SHEET WINDING MECHANISM.
APPLICATION FILED MAR. 1, 1913.

1,072,411.

Patented Sept. 2, 1913.

5 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:
C. H. Biles,
D. C. Walter

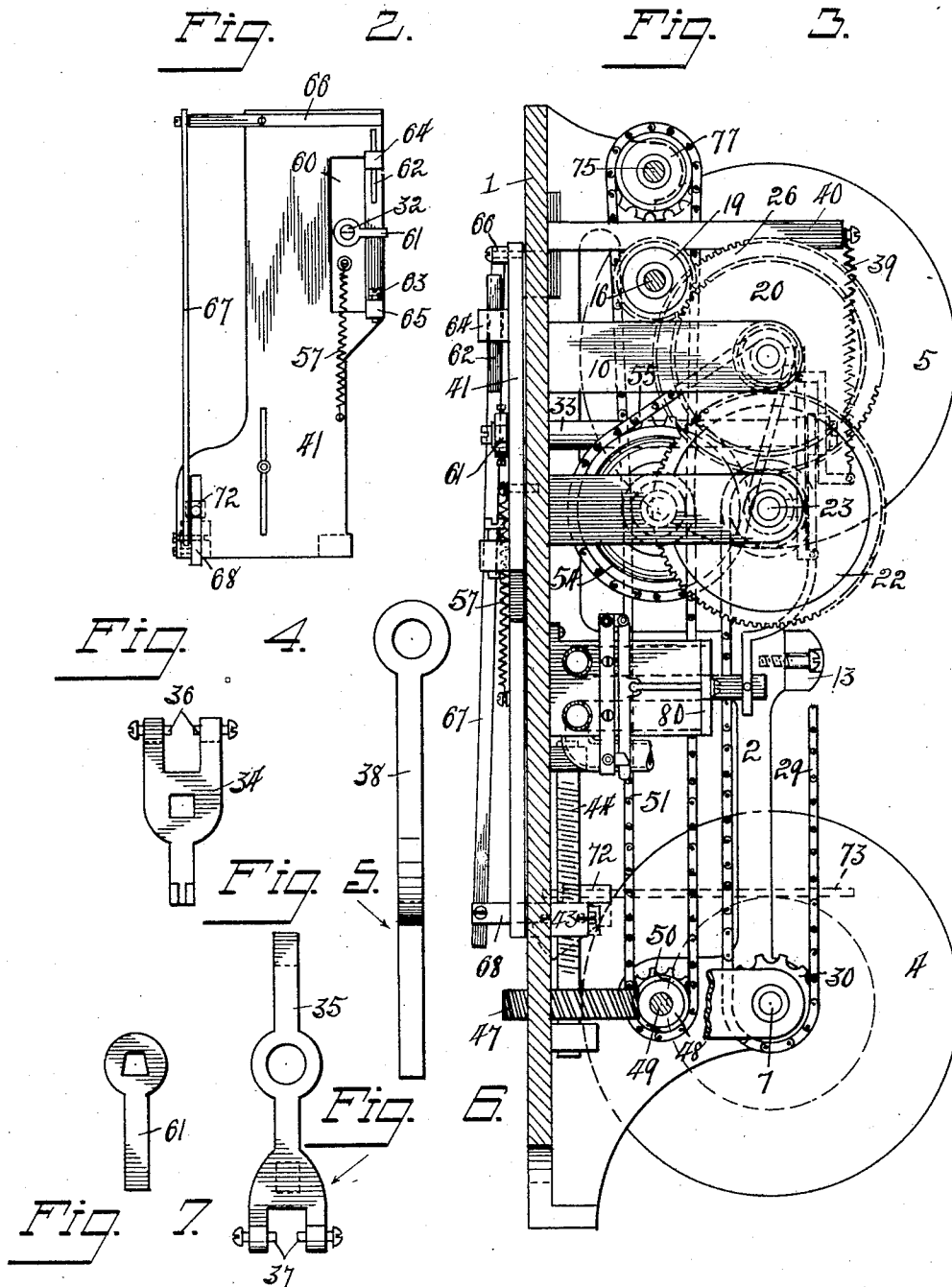
INVENTOR.
Phillip Jacob Dreher,
By Owen & Owen,
His attys.

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5 SHEETS—SHEET 2.



WITNESSES:

E. H. Mills.
D. C. Walter

INVENTOR.

Phillip Jacob Dreher.
By Brown & Brown.
Attorneys.

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5 SHEETS—SHEET 3.

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Fig. 8.

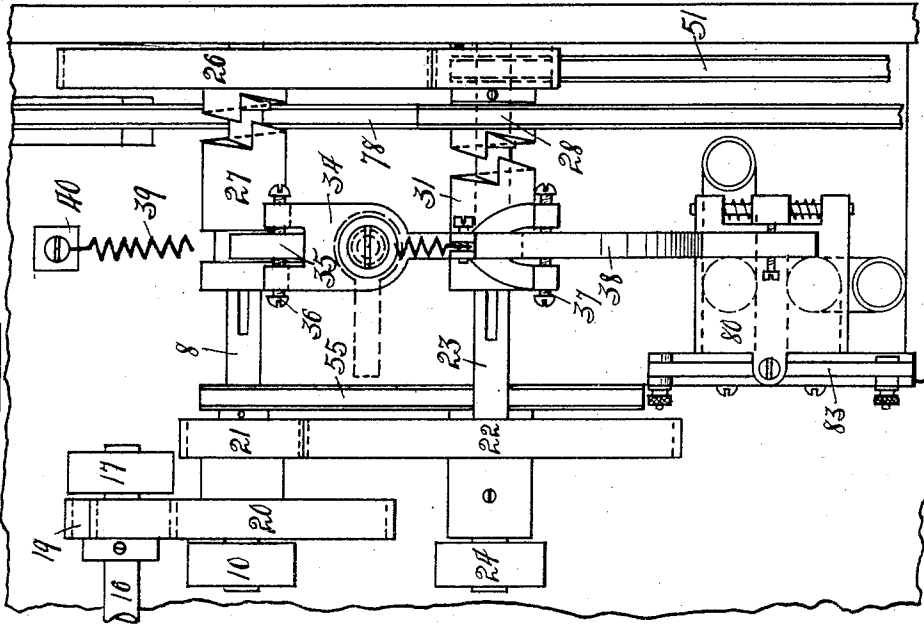
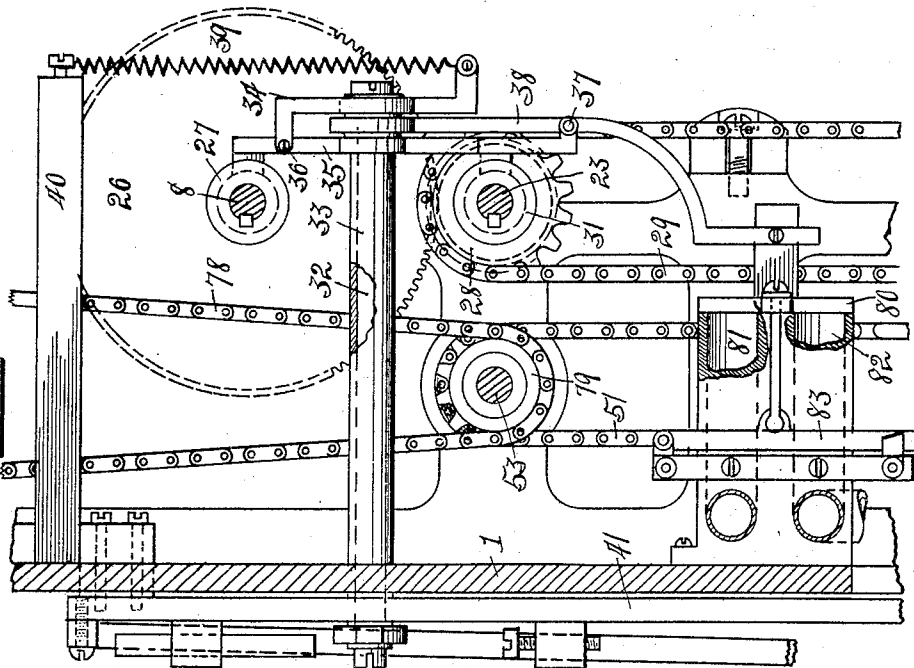


Fig. 9.



WITNESSES:

C. H. Miles.
D. C. Walter

INVENTOR.

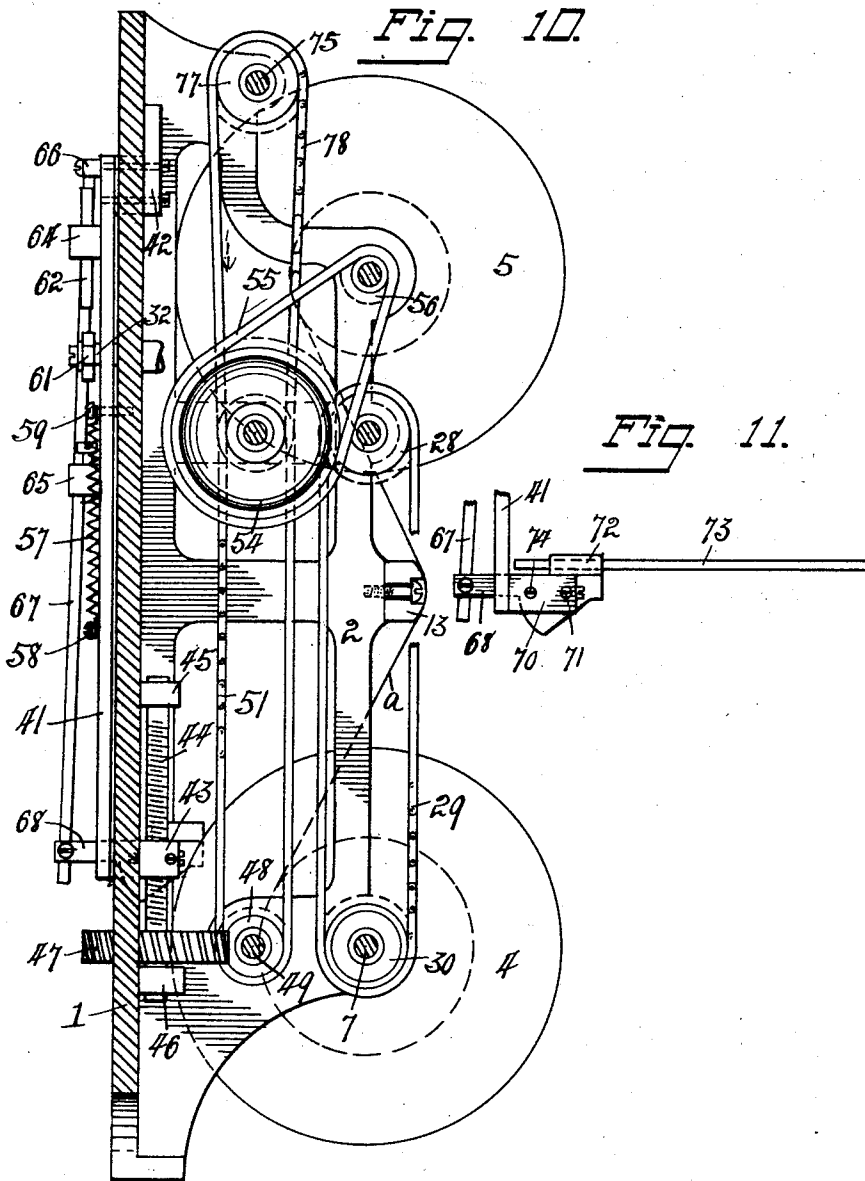
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His attys.

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5 SHEETS—SHEET 4.



WITNESSES:

E. H. Mills.
D. C. Walter

INVENTOR.

Phillip Jacob Dreher,
By Owen & Owen,
His attys.

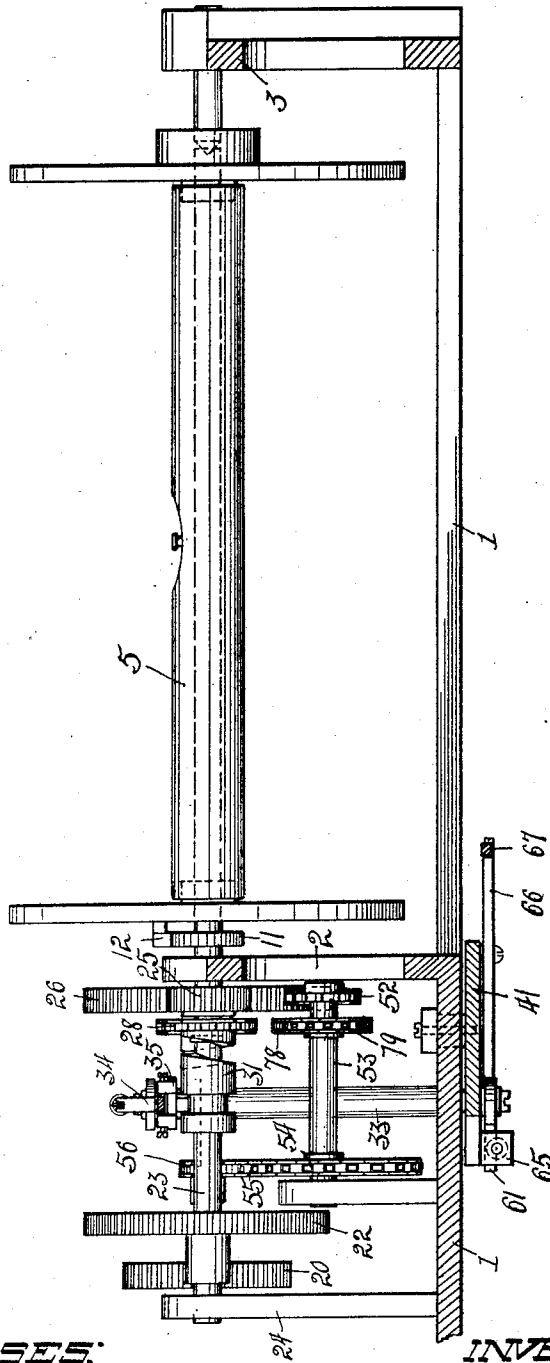
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Patented Sept. 2, 1913.

5 SHEETS—SHEET 5.

Fig. 12.



WITNESSES:

est. Hills.
S. C. Walter

INVENTOR.

Phillip Jacob Dreher,
By Owen & Owen,
His attys.

UNITED STATES PATENT OFFICE.

PHILLIP JACOB DREHER, OF TOLEDO, OHIO.

SHEET-WINDING MECHANISM.

1,072,411.

Specification of Letters Patent.

Patented Sept. 2, 1913.

Application filed March 1, 1913. Serial No. 751,485.

To all whom it may concern:

Be it known that I, PHILLIP JACOB DREHER, a citizen of the United States, and a resident of Toledo, in the county of Lucas and State of Ohio, have invented a certain new and useful Sheet-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, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

My invention relates to pneumatically operated musical and other instruments and machines of the perforated sheet or apron controlled type, and has particular reference to improvements on the machine described and claimed in my copending application Serial No. 686,481, filed March 27, 1912.

The primary object of my invention is to simplify and cheapen the cost of construction and maintenance of the machine covered by my said prior application, and to improve the working thereof whereby to enhance its practicability and commercial value.

The invention is fully described in the following specification, and while, in its broader aspect, it is capable of embodiment in numerous forms, a preferred embodiment thereof is illustrated in the accompanying drawings, in which,—

Figure 1 is an elevation of a mechanism embodying the invention. Fig. 2 is an inner or rear side view of the movable control plate and associated parts. Fig. 3 is an enlarged section on the line *v, v* in Fig. 1 with a part broken away. Figs. 4, 5, 6 and 7 are enlarged details of different levers and parts shown in Figs. 8 and 9. Fig. 8 is an enlarged section on a portion of the line *w, w* in Fig. 1. Fig. 9 is an enlarged plan of the clutch mechanism and the associated parts. Fig. 10 is an enlarged section on the lines *w, w* in Fig. 1 with parts broken away to show the gearing. Fig. 11 is a detail of the means for adjusting the mechanism to suit the size of the perforated sheet roll being acted on, and Fig. 12 is an enlarged cross-section on the line *x, x* in Fig. 1.

Referring to the drawings, 1 designates a stationary frame part, which, in the present instance, is disposed in vertical or upright position, and has spaced vertical webs or

walls 2 and 3 projecting forward therefrom to form bearings for the shafts and parts hereinafter referred to. Spools 4 and 5, from one to the other of which a perforated sheet *a* (see Fig. 10) is adapted to wind and vice versa, are mounted for rotary movements between the webs 2 and 3 in vertically spaced relation and have their ends socketed at one end to axially fit over the ends of stationary stub shafts 6 and at their opposite ends to respectively receive and be supported by the adjacent ends of the shafts 7 and 8. The shaft 7 is mounted in the web 2 near the lower portion thereof and in a suitable bearing standard 9, and is keyed or otherwise suitably attached to the end of the spool 4 to impart rotation thereto when driven. The shaft 8 is journaled in the upper end portion of the web 2 and in a standard 10 and carries a ratchet-wheel 11 adjacent to the inner end of the spool 5 with which a pawl 12 on the adjacent flange of said spool is adapted to engage, as hereinafter described. The sheet *a*, in passing from one roll to the other, travels over a tracker 13, which extends, in the present instance, from one to the other of the webs 2—3, being carried thereby, and has air inlet passages therein, which are uncovered by registering perforations in the music sheet as it passes thereover, as is well understood in the art.

The apparatus may be driven from a motor or other suitable source of power (not shown), which may be connected by a belt to the disk-pulley 14 on a shaft 15, that is suitably journaled in the frame 1. A shaft 16 is journaled in suitable bearings 17, 17 and extends transversely of the shaft 15 at one side of the disk-pulley 14 and has a friction-wheel 18 feathered thereto for peripheral contact with a side of the disk 14 and for axial shifting movements toward and away from the axis of the drive-disk 14 to permit a varying of the speed of driving of the shaft 16 from the disk 14. The shaft 16 carries a gear 19 in mesh with a gear 20 that is fixedly connected at one side to a small gear 21 and is loosely mounted therewith on the outer end portion of the shaft 8. The gear 21 meshes with a larger gear 22 that is fixed to a counter-shaft 23 mounted in a bearing standard 24 and in the web 2 in parallelism with the shaft 8. A small gear 25 on the shaft 23 meshes with and drives a larger gear 26,

which is loosely mounted on the shaft 8 adjacent to the side of the web 2 opposed to the roll 5. A clutch member 27 is fulcrumed on the shaft 8 for movement into and out of engagement with a companion clutch surface on the adjacent hub end of the gear 26, whereby rotation is communicated to the shaft 8 from the gear 26 when the clutch member 27 is in clutch engaging position. The shaft 23 carries a loose sprocket-wheel 28, which has connection through a sprocket-chain 29 with a sprocket-wheel 30 on the shaft 7, and a clutch member 31 that is feathered on the shaft 23 is movable into and out of engagement with a companion clutch member on the sprocket-wheel 28, whereby rotation may be communicated from the shaft 23 to the shaft 7 for driving the spool 4 when desired. It is thus evident that when the spool 5 is acting as a winding agent for the music roll or sheet the clutch member 31 is out of engagement with the sprocket-wheel 28 to permit the shaft 7 to turn freely with the spool 4 during the unwinding movement thereof, and the clutch member 27 on the shaft 8 is in engagement with the gear 26 to cause such shaft to be driven in a direction to communicate rotation to the winding spool 5 through the medium of the sprocket-wheel and pawl connection 11 and 12. When it is desired to rewind the music sheet or roll upon the spool 4, the clutch member 27 is released from the gear 26, and the clutch member 31 on the shaft 23 is engaged with the sprocket-wheel 28 to communicate a driving or rewinding action to the shaft 7 from the shaft 23.

Extending through the frame 1 from the rear thereof and forward therefrom between the two shafts 8 and 23 is a control shaft 32 for the shiftable clutch members 27 and 31, said shaft 32 extending through a stationary bearing part 33. A lever 34 is fixed to the outer or forward end of the shaft 32, having its shaft receiving opening preferably squared for such purpose, as shown in Fig. 4, and has one end forked, with the terminals of the furcations thereof extending rearwardly and straddling the associated end portion of a clutch-shifting lever 35, which lever is loosely mounted on the outer end portion of the shaft 32 at the inner side of the lever 34. The lever 35 is engaged at opposite sides of one end portion thereof by set-screws 36 threaded through the terminals of the forked end of the lever 34, and has its adjacent end provided with a boss for fitting into the peripherally grooved race of the clutch member 27 and its other end provided with a boss for working in a smaller race on the movable clutch member 31, as best shown in Figs. 8 and 9. The end of the shift-lever 35 adjacent to the clutch member 31

is forked and provided with set-screws 37 for embracing opposite sides of a lever 38, which lever is loosely mounted at one end upon the shaft 32 between the levers 34 and 35, and has its opposite end extended beyond the end of the shift-lever 35 to which it is attached, for the purpose hereinafter described.

The shift-lever 35 and associated parts are shown in Figs. 1 and 9 as being in neutral position, and it will be apparent that upon a shifting of the lever in one direction, the clutch member 27 will be moved into engagement with the cooperating clutch surface of the gear 26 to effect a driving of the shaft 8 and a consequent driving of the sheet winding roll or spool 5, upon which the perforated sheet *a* winds during an operation of the mechanism. Should the lever 35 be shifted in the opposite direction, the clutch member 31 will be moved into engagement with the clutch surface on the sprocket-wheel 28 to effect a driving of the shaft 7 and attached spool or roll 4 for sheet rewinding purposes.

A coiled contraction spring 39 is attached at one end to the outwardly turned end of the lever 34, which end is opposed to that attached to the lever 35, and the spring has its opposite end fixed to a post or frame part 40 projecting forward from the frame 1. It will be noted, by reference to Figs. 1 and 9, that the line of pull of the spring 39 is in longitudinal alinement with the levers 34, 35 and 38 when such levers are in the neutral position shown in said figures so that upon a shifting of said levers in one or the other direction from neutral position, the spring will act to continue the shifting movement of the levers to throw one or the other of the clutch members 27, 31 into engagement with its companion and to yieldingly maintain such engagement.

Mounted at the rear of the frame 1 for vertical reciprocatory movements relative thereto is a plate or shifting member 41, which has guide parts 42 and 43 working forward through registering slots or guideways in the frame 1. The guide part 43, in the present instance, has a vertically disposed threaded opening therein in which a worm-shaft 44 is threaded, said shaft being journaled in upright position in bearing members 45 and 46 at the front side of the frame part 1. The shaft 44 carries a gear 47 in mesh with a worm-gear 48 on a shaft 49 that is mounted at the rear of the shaft 7 in parallelism therewith. A sprocket-wheel 50 on the shaft 49 has connection through a chain 51 with a sprocket-wheel 52, which is carried by a shaft 53 that is mounted in suitable bearings beneath the shaft 23, (see Fig. 12) and the shaft 53 carries a large sprocket-wheel 54, which is connected by a chain 55 to a sprocket-wheel

56 that is fixed to the shaft 8. The rotation which is thus communicated to the shaft 44 from the shaft 8 causes a lowering movement of the plate 41 against the influence of a coiled contraction spring 57, which is anchored at its lower end to the plate 41, as at 58, (Fig. 10) and at its other end to a screw or other suitable anchoring part 59, which projects from the frame part 1 through the slot or opening 60 in the plate 41. The spring 57 assists means hereinafter referred to in returning the plate 41 to its raised position after being lowered by the driving action of the shaft 8 during a winding of the music sheet on the spool 5.

The rear end of the shaft 32 works through the opening 60 in the plate 41 and has a finger 61 projecting laterally therefrom in the path of movement of the co-acting control parts 62 and 63 on the plate 41. The parts 62 and 63 are disposed at opposite sides of the finger 61, the former being reciprocally carried by a boss 64 on the plate 41 and the latter, in the present instance, comprising a screw which is threaded into a boss 65 on said plate. When the plate has been lowered a predetermined distance the control part 62 will coact with the finger 61 and rock such finger and its shaft 32 to effect an oscillation of the levers 34, 35 and 38 and a consequent shifting of the clutch members 27 and 31 to release the clutch member 27 from clutch engagement with the gear 26 and to throw the clutch member 31 into clutch engagement with the sprocket-wheel 28 whereby to stop the winding action of the spool 5 and to communicate a rewinding action to the spool 4. When the plate 41 has reached a predetermined point in its return or upward movement the control part 63 engages the finger 61 and rocks it and the shaft 32 in reversed direction to that above described so as to shift the clutch 31 from engagement with its companion and to shift the clutch member 27 into engagement with its companion to again effect a driving of the spool 5 to wind the music sheet thereon.

It is evident that the clutch shifting mechanism must be adjustable to suit the length of the music sheet or initial size of the music sheet roll, and this is accomplished as follows: Fulcrumed to the upper end portion of the plate 41 and extending transversely thereof is a lever 66, which has one end positioned to act as a stop for limiting the upward movement of the control part 62, and has its other end connected by a rod 67 to the rear end of a lever 68, which works through a slot 69 in the plate 41 (see Figs. 1 and 2) and is fulcrumed in parts 70 extending forward from the plate 41 at opposite sides of the slot 69, as best shown in Fig. 11, the fulcrum point of the lever 68 being indicated therein at 71. The forward

end of the lever 68 is provided with a socket portion 72 into which the rear end of a gage-rod 73 may be inserted. This gage-rod is intended to project at its forward end portion over the spool 4 and is swingingly adjustable with the lever 68 to enable it to be placed in contact with the periphery of a music sheet roll on the spool 4, as indicated by dotted lines in Fig. 3. A moving of the lever 68 a sufficient distance to enable the rod 73, when projecting therefrom, to have contact with the periphery of a music sheet roll on the spool 4 and before its free end has been attached to and wound upon the spool 5, will properly adjust the stop-lever 66 to coöperate with the control part 62 to move the control finger 61 and associated parts to effect a shifting of the clutch members 27 and 31 to stop the winding action of the direct winding spool 5 when the music roll has been wound thereon, except for the end portion thereof which is attached to the spool 5. When the control mechanism for the clutch shifting parts has been properly adjusted to suit the size of the music roll being used, such mechanism is secured in adjusted position by a tightening of the screw 74 (see Fig. 11) against the lever 68, said screw being carried by one of the lever carrying parts 70. The rod 73 is then removed from engagement with the lever 68.

The means provided for controlling the speed of driving of the spool driving part to compensate for the gradually increasing diameter of the music sheet roll as it winds upon the spool 5 during a playing of the instrument, whereby the music sheet will be caused to travel at uniformed speed over the tracker 13, will now be described. Suitably mounted on the frame part 1 above the shaft 16 in parallelism therewith is a worm-shaft 75 having an axially shiftable part 76 threaded thereon and in engagement with the friction-wheel 18 to axially move such wheel upon a turning of the shaft 75. A sprocket-wheel 77 is carried by the shaft 75 and has connection through a chain 78 with a sprocket-wheel 79 on the shaft 53, to communicate rotation from such shaft to the shaft 75. The connection between the shaft 53 and friction-wheel 18 is such that when the shaft 8 is being turned in a direction to communicate sheet winding movements to the spool 5 the friction-wheel 18 will be gradually moved inward relative to the disk-pulley 14 to gradually slacken the speed of driving of the winding spool 5 as the increasing diameter of the sheet-roll on the spool 5 may require to maintain constant the speed of travel of the music roll over the tracker during a playing of the instrument. When the music roll is being rewound from the spool 5 onto the spool 4, the spool 5 is then driven by the unwinding action of the music sheet and communicates rotation to

the shaft 8 through the pawl 12 and sprocket-wheel 11 in a direction reverse to the rotation of said shaft when acting to drive the spool 5. The driving of the shaft 8 in this reverse direction communicates a reverse driving action to the worm 44 to impart an upward movement to the control plate 41. Very little strain is exerted on the music sheet during this rewinding action, as the spring 57 and the tendency of the friction-wheel 18 to move outward by centrifugal action assist in returning the plate 41 to its raised position. When the plate 41 is raised sufficiently for the control part 63 to engage the finger 61 and rock it and the shaft 32, the clutch parts will be shifted to stop the rewinding of the music sheet roll upon the spool 4 and to again wind the same on the spool 5.

The lever 38, which has its rocking movements controlled by the rocking movements of the clutch-shifting lever 35, has its free end attached to a door or gate 80 to move such door on its hinge to open the blower and suction conduits 81 and 82 to the atmosphere when the lever 38 is moved in one direction, or during the period of engagement of the clutch 31 with its companion, thus rendering the blower and suction parts of the apparatus inoperative during a rewinding operation of the music sheet. The battery energized circuit, which is customarily provided in instruments of this class for effecting an electrical operation of the bells, anvil and other playing parts, has a knife-switch 83 in circuit therewith, the movable member of which is connected to the gate 10 in a manner to cause an opening of the switch when said gate is thrown to its open position. These features of the apparatus are the same as in my earlier application Serial No. 686,481, and for a more complete description of the same reference is made to such application.

The operation of my invention is as follows: A perforated sheet roll is placed on the lower spool 4, and before passing the free end of the music sheet over the tracker 13 and attaching it to the winding spool 5, the operator inserts the gage-rod 73 into the socket portion 72 of the lever member 68 and, after loosening the set-screw 74, moves the lever laterally into contact with the periphery of the music roll. The placing of the rod 73 in contact with the music roll in this manner rocks the lever 68 on its pivot and properly adjusts the stop lever 66 to co-operate with the stop part 62 to act upon the rock finger 61 and move the clutch parts to stop a winding of the music sheet upon the spool at a predetermined point in such winding movement. It is thus evident that the control means for the clutch mechanism can be easily and quickly adjusted to suit any size of music sheet roll so that the

winding of the music sheet upon the spool 5 will be stopped at a predetermined point. The clutch mechanism is then moved by hand from the neutral position shown in Figs. 1 and 9 to throw the clutch member 27 into engagement with the clutch surface on the gear 26 to effect a driving of the shaft 8 from said gear. The driving of the shaft in the direction in which it is impelled by the gear 26 causes the ratchet-wheel 11 on such shaft to act against the pawl 12 to impart a sheet winding movement to the spool 5. The driving of the shaft 8 in spool driving direction communicates rotation to the worm 44 in a direction to effect a lowering of the plate 41 and attached parts. When a predetermined length of the sheet has been wound upon the spool 5, the plate 41 will have lowered a sufficient distance for the control part 62 to engage the finger 61 on the clutch mechanism shaft 32 and rock such shaft to effect a shifting of the clutch member 27 from engagement with the gear 26 and a shifting of the clutch member 31 into engagement with the clutch surface on the sprocket-wheel 28, thus stopping the winding of the music sheet upon the spool 5 and imparting rotation to the spool 4 in a direction to rewind the music sheet thereon. When a predetermined portion of the music sheet has been rewound upon the spool 4 the plate 41, under the influence of the spring 57 and the reverse turning action of the worm 44, will have raised a sufficient distance for the control part 63 to strike and move the finger 61 to effect a reversing action of the clutch mechanism to disconnect the rewinding parts and connect the sheet winding parts to again wind the music sheet upon the spool 5 from the spool 4. The reverse driving action of the worm 44, during the rewinding operation is caused by the music sheet turning the spool 5 so that the pawl 12 then acts on the ratchet-wheel 11 to communicate reverse rotation to the shaft 8 from that which is communicated thereto by the gear 26 when in clutch engagement therewith. During a winding of the music sheet upon the spool 5 the worm shaft 75 is slowly driven in a direction to communicate a slow inward movement to the friction-wheel 18 relative to the drive-disk 14, whereby the speed of driving of the sheet winding parts is gradually decreased to compensate for the gradually increasing diameter of the music roll on the spool 5, thus maintaining the movement of the music sheet over the tracker 13 practically constant during a playing operation. The driving of the spool 5 from the shaft 8 through the medium of the ratchet-wheel 11 and pawl 12 is found in practice to be quite an important feature as the connecting of the spool with the drive parts in this manner enables the spool to be turned relative there-

to without effecting the adjustment of the control parts of the driving mechanism when desired to turn the spool for the purpose of taking up slack in the music sheet.

5 I wish it understood that my invention is not limited to any specific construction or arrangement of the parts except in so far as such limitations are specified in the claims.

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

1. In combination, a sheet-winding roll, mechanism for driving said roll, a clutch mechanism for controlling the driving action of said roll, said clutch mechanism having means which is automatically operable to disconnect said roll and driving mechanism at a predetermined point in a sheet-winding action, said means having a removable gage member for coacting with a sheet roll to adjust said control means prior to a winding of the music roll on said sheet-winding roll.

2. In combination, a pair of spools from one to the other of which a roll of sheet material is adapted to wind, drive means for one of said rolls, a clutch mechanism operable to throw said means into and out of driving engagement with the associated roll, and control means for said clutch mechanism comprising a reciprocally movable member having adjustable parts for coacting with a part of said mechanism to shift the same at predetermined points in the movements of said member, a lever movable to change the adjustment of one of said member parts to vary the point of shifting of said mechanism relative to the movements of said member, a second lever pivotally carried by said member and having connection with said first lever to communicate rocking movements from one to the other, means for securing the second lever in adjusted position, and a part removably carried by said second lever and adapted to be moved into contact with the periphery of a music roll carried by one of said spools and when so moved to communicate an adjusting movement to said first lever to change the adjustment of the coacting part of said member to effect a shifting of the clutch mechanism at a predetermined point in the winding action of the music roll.

3. In an apparatus of the class described, a spool for carrying a music roll, mechanism operable to effect an unwinding of a music sheet from such roll, and a clutch mechanism automatically operable to stop the action of said unwinding mechanism

when a predetermined length of the music roll has been unwound from said spool, said control mechanism having means adjustable to adjust the point of stopping of said driving mechanism relative to the unwinding action of a music sheet and said means having a control lever for movement into contact with the periphery of a music sheet roll to change the adjustment of said means, the part of said lever which is intended to have contact with the music sheet roll being removable when the roll is being unwound, and means for securing said lever in adjusted position.

4. In combination, a sheet-winding spool, mechanism for driving said spool, a clutch mechanism automatically shiftable to disconnect said spool and driving mechanism at a predetermined point in a sheet-winding action, said clutch mechanism having a reciprocally movable control part, a worm having threaded engagement with said control part for communicating reciprocatory movements thereto when the worm is rotated, and means for communicating rotation to said worm from the driving mechanism.

5. In combination, a sheet-winding spool, mechanism for driving said spool, clutch mechanism automatically operable to stop the spool driving action of said mechanism at a predetermined point in the winding of a sheet on the spool, said clutch mechanism having a reciprocally movable control part, a worm having connection with said control part for adapting it when rotated to communicate movements to such part, a shaft driven by said driving mechanism, means for changing the speed of the driving mechanism to compensate for the increasing diameter of a sheet roll winding on said spool, said means having connection with and being driven by said shaft, and means connecting said shaft and worm for communicating rotation from one to the other thereof.

6. In an apparatus of the class described, a spool, a driving mechanism having a shaft in ratchet-wheel and pawl connection with said spool, and mechanism automatically operable to disconnect said shaft and driving mechanism at a predetermined point in the winding of a sheet roll on said spool.

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

PHILLIP JACOB DREHER.

Witnesses:

S. T. KLOTZ,

F. E. AUL.