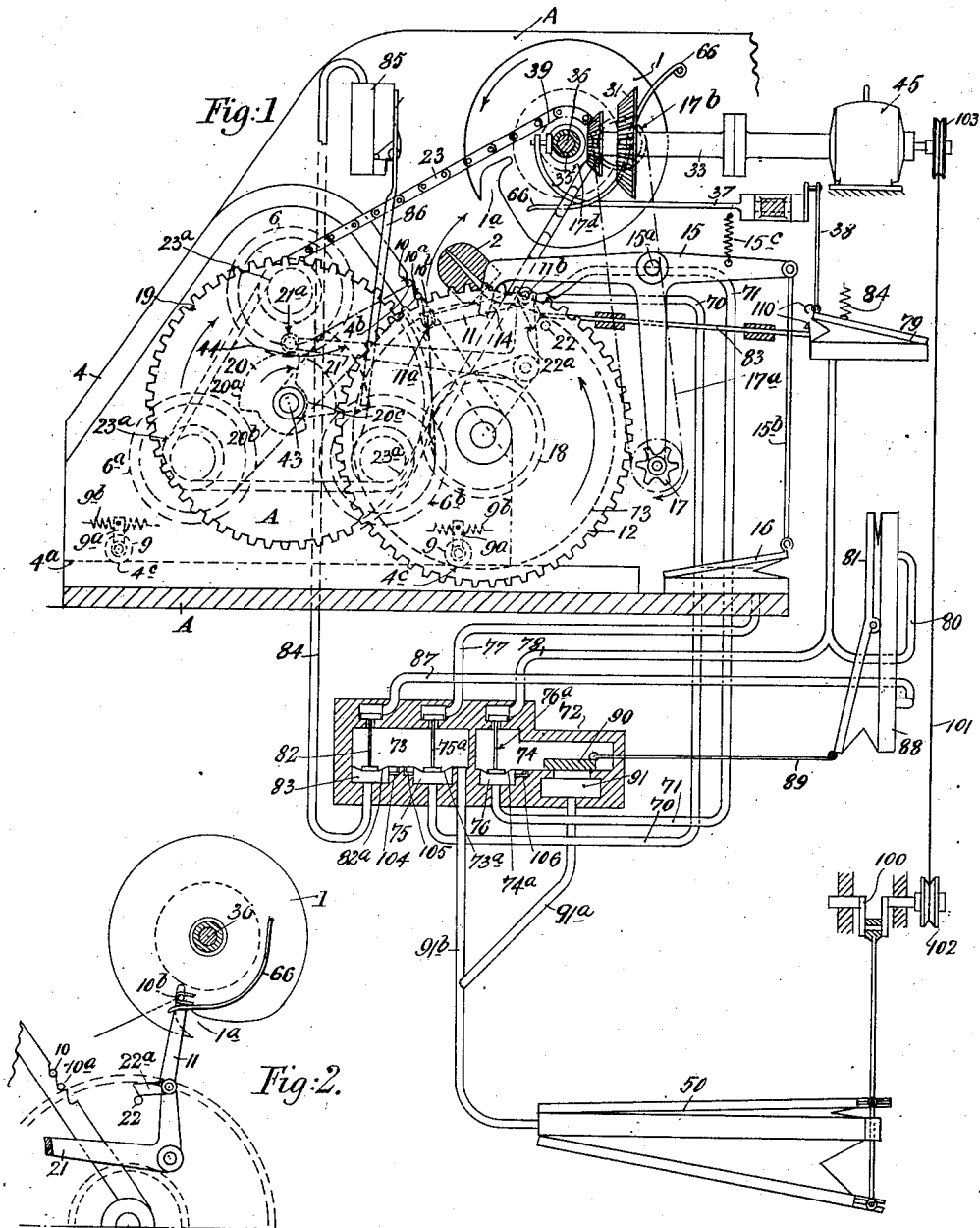


A. ZOLLINGER.
MUSICAL INSTRUMENT.
APPLICATION FILED MAY 26, 1911.

1,047,871.

Patented Dec. 17, 1912.

3 SHEETS—SHEET 1.

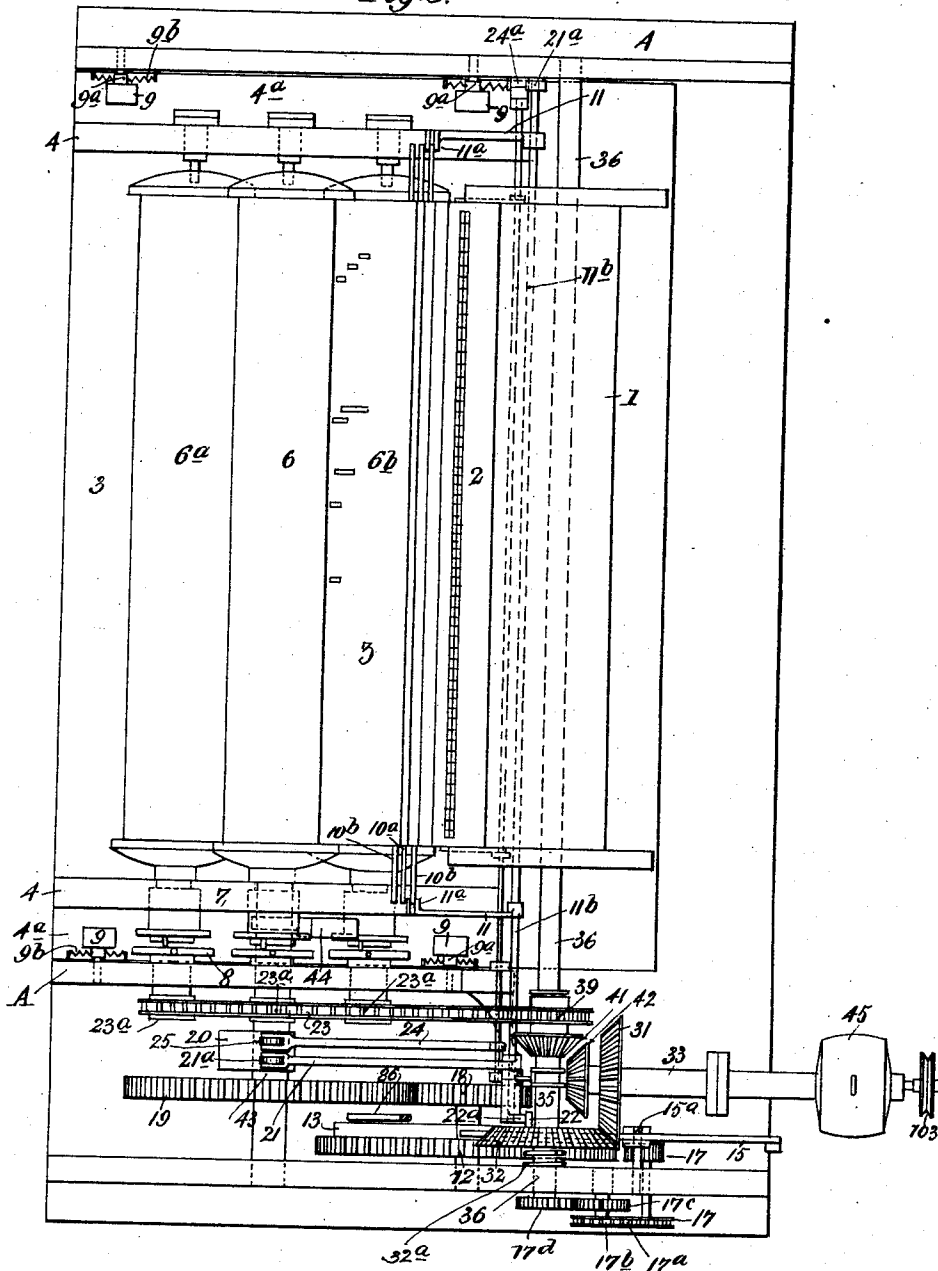


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3 SHEETS—SHEET 2.

Fig. 3.



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3 SHEETS-SHEET 3.

Fig. 4.

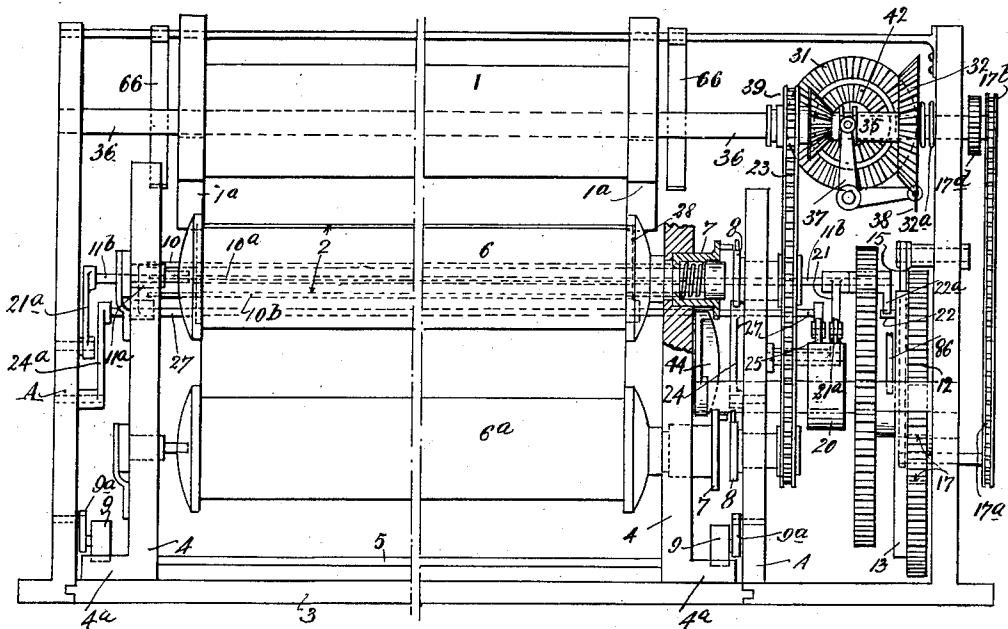


Fig. 6.

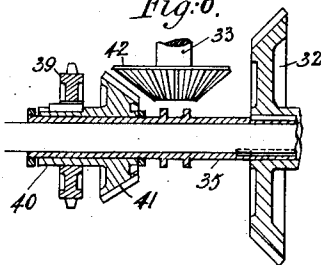
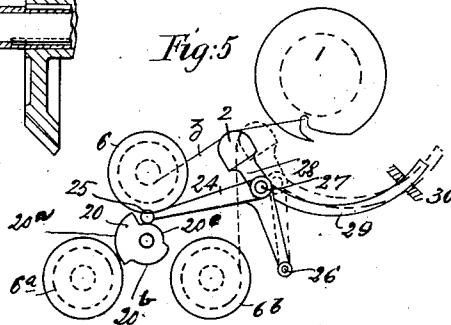


Fig. 5.



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UNITED STATES PATENT OFFICE.

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MUSICAL INSTRUMENT.

1,047,871.

Specification of Letters Patent.

Patented Dec. 17, 1912.

Application filed May 26, 1911. Serial No. 629,748.

To all whom it may concern:

Be it known that I, ADALBERT ZOLLINGER, a subject of the Grand Duke of Baden, residing at Leipzig-Eutritzsch, in Germany, have invented certain new and useful Improvements in Musical Instruments, of which the following is a specification.

The object of this invention is to provide improved means for changing the music sheets in mechanical musical instruments, and the invention comprises means whereby the sheets on a plurality of music sheet rollers, are successively brought into engagement with the playing mechanism, and then rewound upon the rollers.

The invention also comprises means whereby the tracker bar over which the sheets travel is automatically adjusted to coact with the sheets drawn from the several rollers.

An embodiment of the invention is illustrated in the accompanying drawing, in which:—

Figure 1 is a side view of the apparatus, partly in section. Fig. 2 shows part of the mechanism in a different position. Fig. 3 is a plan view. Fig. 4 is an end elevation partly in section. Fig. 5 is a side-view showing the device for adjusting the tracker bar. Fig. 6 is a sectional view of a detail of the actuating mechanism.

In the drawing, 1 represents a take-up roller, which is mounted at the upper part of a frame A, and upon which each of the music sheets *z* is wound in turn after traveling over the tracker bar 2. The music sheets are perforated record sheets of the well known kind. The take-up roller 1, which is conveniently in the form of a spool as is usual in this type of apparatus, has in each of its headed ends a tapering slot or recess 1^a, enabling it to be engaged with a cross-bar attached to the forward end of the music sheet to be wound on the roller.

The cross-bars are designated 10, 10^a, 10^b, respectively, and project laterally from the sheets in the usual manner. A removable bed-plate 3 is adapted to be slid into the frame A, and supports two lateral walls 4 connected by cross-bars 5. The walls 4 have bearings for three feed rollers, 6, 6^a, 6^b. The rollers 6, 6^a, 6^b, may be of any of the usual constructions and are removably held in place as is customary, so that they may be exchanged at will. For each of the rollers

there is provided a clutch, 7, 8, the member 7 being on the gudgeon of the roller, and the member 8 being mounted in part of the frame A; these clutches serve for coupling the rollers with driving mechanism to be described hereinafter.

Rollers 9 are carried by levers 9^a pivoted to the frame A and the levers 9^a are normally held in vertical position by springs 9^b. The rollers 9 are located in the paths of flanges 4^a at the bases of the walls 4 so that during the sliding in of the plate 3, with said walls, the rollers ride on the said flanges and then engage with notches 4^c in said flanges, for the purpose of holding the bed-plate in position in the frame. The walls 4 are provided, on their inclined edges facing the roller 1, with notches 4^b, as shown more particularly in Fig. 1, there being three such notches on each wall 4. These notches are adapted for normally supporting the attaching bars 10, 10^a, 10^b of the music sheets. The mechanism for transferring these bars to the receiving recesses 1^a of the take-up roller comprises a pair of selecting arms 11 fixed to a spindle 11^b which extends across the frame and is mounted in bearings in levers 21, 21^a the latter being mounted near the sides of the frame. Each of the arms 11 has at its free end a channeled lateral projection 11^a and the projections 11^a constitute seats arranged so that each time the arms are swung upward the said seats will pick up one of the attaching bars 10, 10^a, 10^b, and transfer the same to the recesses 1^a in the headed ends of the take-up roller. The spindle 11^b has a pendent arm 22^a, by means of which it is actuated at intervals, as will be described hereinafter.

A toothed wheel 12 mounted in the frame A, outside one of the walls 4, has fixed to it a disk 13 provided with a notch 14 for engagement with a tooth on one of the approximately horizontal arms of a T-shaped lever 15 pivoted to the frame at 15^a, the other approximately horizontal arm of the said lever being connected by a rod 15^b to a pneumatic 16, so that the collapse of the pneumatic causes the lever to rock about its pivot against the action of a spring 15^c. The pendent arm of the lever 15 carries a small pinion 17, which is driven by means of a chain 17^a, actuated by means of a sprocket wheel 17^b and gears 17^c, 17^d, the

- gear wheel 17^a being fixed to the shaft 36 of the roller 1. The pinion 17 is normally held out of engagement with the toothed wheel 12, by the spring 15^c, as shown in Fig. 1. Upon collapse of the pneumatic 16, due to suction, the lever 15 will rock so that it is disengaged from the notch 14, and the pinion 17 is moved into engagement with the wheel 12 and rotates the latter.
- Fixed to the shaft of the toothed wheel 12 there is a toothed wheel 18 meshing with a toothed wheel 19, and fixed to the shaft 43 of the latter is a cam disk 20 having three path-sections 20^a, 20^b, 20^c forming segments of cylinders of different diameters, the diameters being approximately in the proportion of 1:2:3. The lever 21 carrying one end of the spindle 11^b is a bell crank, and carries a roller 21^a which rides upon these segmental surfaces of the cam 20, so that the spindle 11^b, and the selecting arms 11 which it carries, have three normal positions, according to the position of the cam 20. In each of these three normal positions of the arms 11 the said arms are held, in relation to one of the cross-bars 10, 10^a, 10^b, so that when the said arms are swung upward they will pick up that particular cross-bar. The driving gear and cam-paths are proportioned so that the wheel 12 can complete one revolution without altering the position of the bell crank 21. The above mentioned pendent arm 22^a of the spindle 11^b is actuated by a pin 22 fixed to the disk 13, so that when the pin strikes the arm 22^a the arms 11 rise, engage one of the bars 10, 10^a, 10^b, (according to the position of the bell-crank 21), and transfer said bar to the notches 1^a of the roller 1. When the arms 11 are thus elevated, the projections 11^a slide on to curved springs 66 fixed to the frame A, and the arms are thus retained in their elevated position until disengaged, as will be described hereinafter.
- The roller 1 is rotated by means of two bevel wheels 31, 32. The bevel wheel 31 is fixed to a shaft 33 continuously driven by a motor 45. The wheel 32 is fixed to a sleeve 35 slidably engaged by a spline with the shaft 36 of the roller 1. A spring 32^a tends to keep the wheels 31, 32 engaged with each other. The slidable sleeve is engaged with a bell crank 37, to which a cord 38 is attached. The latter is attached to a pneumatic 79, so that collapse of this pneumatic causes the lever 37 to shift the sleeve 35 and disengage the wheel 32 from the wheel 31. A spring 84 tends to expand the pneumatic 79, and the latter is provided with a spring catch 110, which retains the pneumatic in its contracted state after collapse, but can be disengaged by means of a slidable rod 83, one end of which is located in the path of the arm 22^a. The sleeve 35 carries a rotatable sleeve 40 to which is fixed a bevel gear 41, and a sprocket wheel 39 is slidably engaged with the sleeve 40 by a spline. The sprocket wheel 39 is connected by a chain 23 to sprocket wheels 23^a fixed to the clutch members 8. When the sleeve 35 is moved to disengage the wheel 32 from the wheel 31 the wheel 41 engages a wheel 42 fixed to the motor shaft 33. The sprocket wheel 39 is not displaced, being held fast by the chain 23. The sleeve 40 and sprocket wheel 39 are then driven by the shaft 33, and the three clutch members 8 are driven by the wheel 39 and chain 23. On the shaft 43 of the wheels 119 is fixed a cam 44 operating the clutch members 7, so as to successively bring into engagement the three clutches of the feed rollers, these clutches being normally held out of engagement by springs. The cam 20 also supports a roller 25 mounted on an angular lever 24 pivoted at 26. This lever 24, together with a lever 24^a, at the other side of the apparatus, supports a rod 27, so that it can rock the same through an arc of a circle having its center at 26, as shown in Fig. 5. The tracker bar 2 is carried by supports 28 pivoted on the rod 27, said supports having curved tails 29 which work in guide slots in a bar 30. Accordingly, when the lever 24 is rocked by the cam 20 the tracker bar is moved, and is by this means adjusted so that the sheet to be wound upon the roller 1 lies flat upon the surface of the tracker bar. Dotted lines in Fig. 5 illustrate one of the positions to which the tracker bar is shifted in this manner, namely the position occupied by the bar during the playing of the sheet *z* unwound from the feed roller 6^b. The sheets are unwound from the rollers 6^b, 6^a, and 6 in the order in which these rollers are here enumerated.
- The tracker bar 2 forms part of a pneumatic playing mechanism of a well-known type, which does not form part of the present invention and is accordingly not shown in the drawing. In addition to the usual channels in this bar, through which air is drawn by a suction device for the purpose of sounding the notes when the orifices of the said channels are exposed by holes in the music sheet, the bar has two channels connected by flexible conduits 70, 71 to a box 72, which has compartments 73, 74, and is connected by pipes 91^a and 91^b to a bellows 50 actuated by means of a crank 100, belt 101, and pulleys 102 and 103, driven by the motor 45. In this box the said conduits terminate in chambers 75, 76 separated at the top from the compartments 73 and 74 respectively by flexible diaphragms 73^a and 74^a supporting the stems of valves 75^a and 76^a. The said valves normally closed by the action of the diaphragms, control orifices which form passages to pipes 77 and 78 respectively. The pipe 77 leads to the

above mentioned pneumatic 16 and the pipe 78 leads to the above mentioned pneumatic 79, and also has a branch 80 leading to a pneumatic 81. The compartment 73 also contains a valve 82 supported by a flexible diaphragm 82^a over a chamber 83 which is connected by a pipe 84 to an air valve 85. Narrow ducts 104 and 105 connect the compartment 73 to the chambers 83 and 75 respectively, and a similar duct 106 connects the chamber 76 to the compartment 74. The said ducts are so proportioned, that when equal degrees of vacuum exist above and below the diaphragms, and air is admitted below the diaphragms, through the pipes 70, 71 and 84 respectively the air admitted produces sufficient difference of pressure to cause the diaphragms to rise and open the valves 75^a, 76^a and 82 respectively. The valve 85 is normally closed by a spring but has a pendent arm 86 extending into the path of the pin 22 on the disk 13. The valve 82 controls a pipe 87 leading to a pneumatic 88 the movable member of which is fixed to the movable member of the pneumatic 81 so that the contraction of either of these pneumatics causes the other to expand, and vice versa. The movable member of the pneumatic 88 is connected by a rod 89 to a valve 90 controlling an orifice between the compartment 74, and a compartment 91 connected by the pipe 91^a to the bellows 50.

The action of the apparatus will now be described. Prior to starting the motor the bars 10, 10^a, 10^b, at the forward ends of the music sheets are all engaged with the notches 4^b, and the lever 15 is engaged with the notch 14, so that the pinion 17 is out of mesh, as shown in Fig. 1. On starting the motor 45 the take-up roller 1 is revolved in the direction indicated by the arrows in Fig. 1, and the bellows 50 is actuated and exhausts air from the compartments 73 and 91. The valve 90 is at this stage closed so that no vacuum is produced in the compartment 74. The valve 85 is also closed, so that no air is admitted under the diaphragm 82^a. The pipe 70 being open to the atmosphere, through the tracker bar, air is admitted to the chamber 75, whereby the valve 75^a is opened, and enables the bellows to exhaust the pneumatic 16, which collapses, rocks the lever 15 out of engagement with the notch 14, and throws the pinion 17 into mesh with the wheel 12, so that the latter rotates. The pin 22 strikes the arm 22^a, whereby the arms 11 are swung upward into engagement with the springy supports 66. The arms 11 carry the bar 10^b upward, so that the ends of this bar enter the recesses 1^a in the flanges of the take-up roller, and these flanges then remove the bar from the said arms and the roller 1 begins to wind the sheet off the roller 6^b. The bar 10^b slides to the inner end of the recesses 1^a, so

that during the subsequent rotation of the roller 1 its ends clear the arms 11. During the continued rotation of the wheel 12 the pin 22 strikes the arm 86 and opens the valve 85, whereby air is admitted through pipe 84 to the chamber 83, and opens the valve 82. This causes the pneumatic 88 to collapse and open the valve 90, so that a vacuum is produced in the compartment 74. The wheel 12 rotates until the lever 15 re-engages the notch 14. At the end of its rotation it causes the cam 44 to throw into engagement the clutch 7, 8 of the roller 6^b. Meanwhile the take-up roller is drawing the music sheet across the tracker bar, and the musical instrument is being played. When the music is finished and the sheet has been nearly unwound from its feed roller, a hole in the sheet opens the pipe 71 to the atmosphere, so that air is admitted to the chamber 76 and opens the valve 76^a, with the result that the pneumatics 79 and 81 collapse. The pneumatic 79 acting through the cord 38 and lever 37, adjusts the clutch sleeve 35 so that the wheels 41 and 42 are meshed, and the wheels 31 and 32 are unmeshed, the pneumatic being held in its contracted state by the catch 110. The chain 23 is now driven, and rotates the roller 6^b so that the sheet is unwound from the take-up roller on to the roller 6^b. At the end of this unwinding operation the rod 10^b slides along the springy supports 66 and is re-engaged with the arms 11, which are then swung back by the sheet traveling to the roller 6^b. The arm 22^a strikes the rod 83, whereby the catch 110 is disengaged, and the clutch sleeve 35 returns to its original position, and meshes the wheels 31, and 32, so that the drive of the chain 23 is stopped and the motor again drives the take-up roller for winding a fresh sheet thereon. In the initial stage of each of its revolutions the wheel 12, acting through the wheels 18 and 19, adjusts the cam 20, so that for each successive sheet the bell-crank 21 adjusts the arms 11 for picking up that sheet, and the lever 24 adjusts the tracker bar for coaction with that sheet.

What I claim as my invention and desire to secure by Letters Patent of the United States is:—

1. The combination, with a mechanical musical instrument having a tracker bar and a take-up roller for music sheets, of a plurality of music sheet feed rollers, a lever arm adapted to engage music sheets on said feed rollers and move said sheets into engagement with the take-up roller, actuating mechanism for said lever arm and means for automatically adjusting said lever arm, before its actuation, so that successive actuations of said arm cause the same to successively engage the sheets on the several feed rollers.

2. The combination, with a mechanical musical instrument having a tracker bar and a take-up roller for music sheets, of a plurality of music sheet feed rollers, a lever arm adapted to engage music sheets on said feed-rollers and move said sheets into engagement with the take-up roller, actuating mechanism for said lever arm, a supporting lever to which said lever arm is pivoted, and
10 a cam device which actuates said supporting lever before each actuation of the lever arm, to adjust the latter so that successive actuations of said arm cause the same to successively engage the sheets on the several
15 feed rollers.

3. In a mechanical musical instrument the combination of a take-up roller for music sheets, a plurality of music sheet feed rollers, means actuated by the instrument for
20 successively engaging, with the take-up roller, music sheets wound upon the several feed rollers, an adjustable tracker bar, and means actuated by the instrument for ad-

justing said tracker bar to successively coact with the sheets drawn from the several feed- 25 rollers.

4. In a mechanical musical instrument the combination of a take-up roller for music sheets, a plurality of music sheet feed rollers, means actuated by the instrument for
30 successively engaging, with the take up roller, music sheets wound upon the several feed rollers, a tracker bar, a pivoted support for said tracker bar, having a curved tail-piece, a slotted guide for said tail piece, a
35 lever carrying said pivoted support, and a cam actuating said lever to adjust said support and the tracker bar, so that said tracker bar is adjusted to successively coact with the sheets drawn from the several feed rollers. 40

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

ADALBERT ZOLLINGER.

Witnesses:

HEZEN SACK,
RUDOLPH FRICKE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."