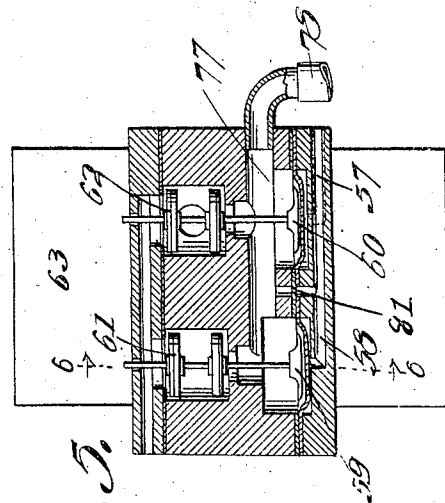
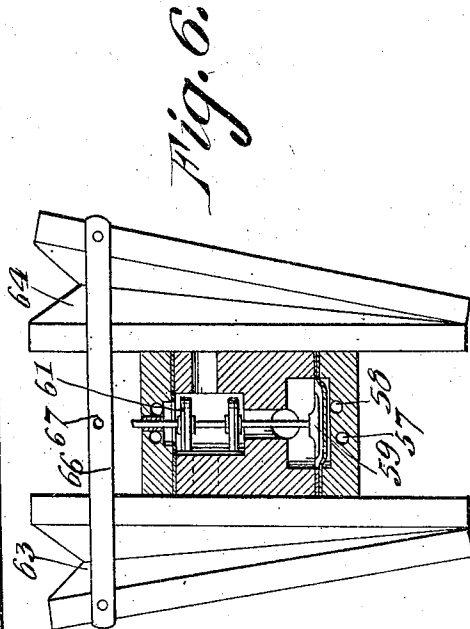
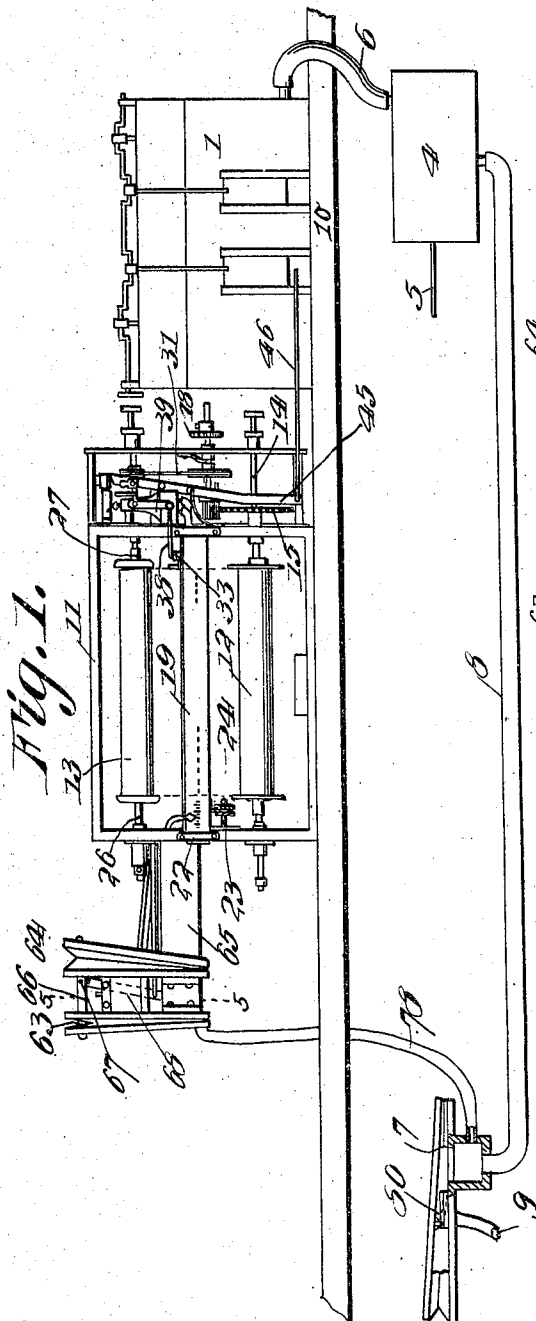


G. P. BRAND.
TRACKING DEVICE.
APPLICATION FILED MAY 10, 1910.

1,051,073.

Patented Jan. 21, 1913.

4 SHEETS—SHEET 1.



Witnesses
m. a. Bond.
R. R. Bond.

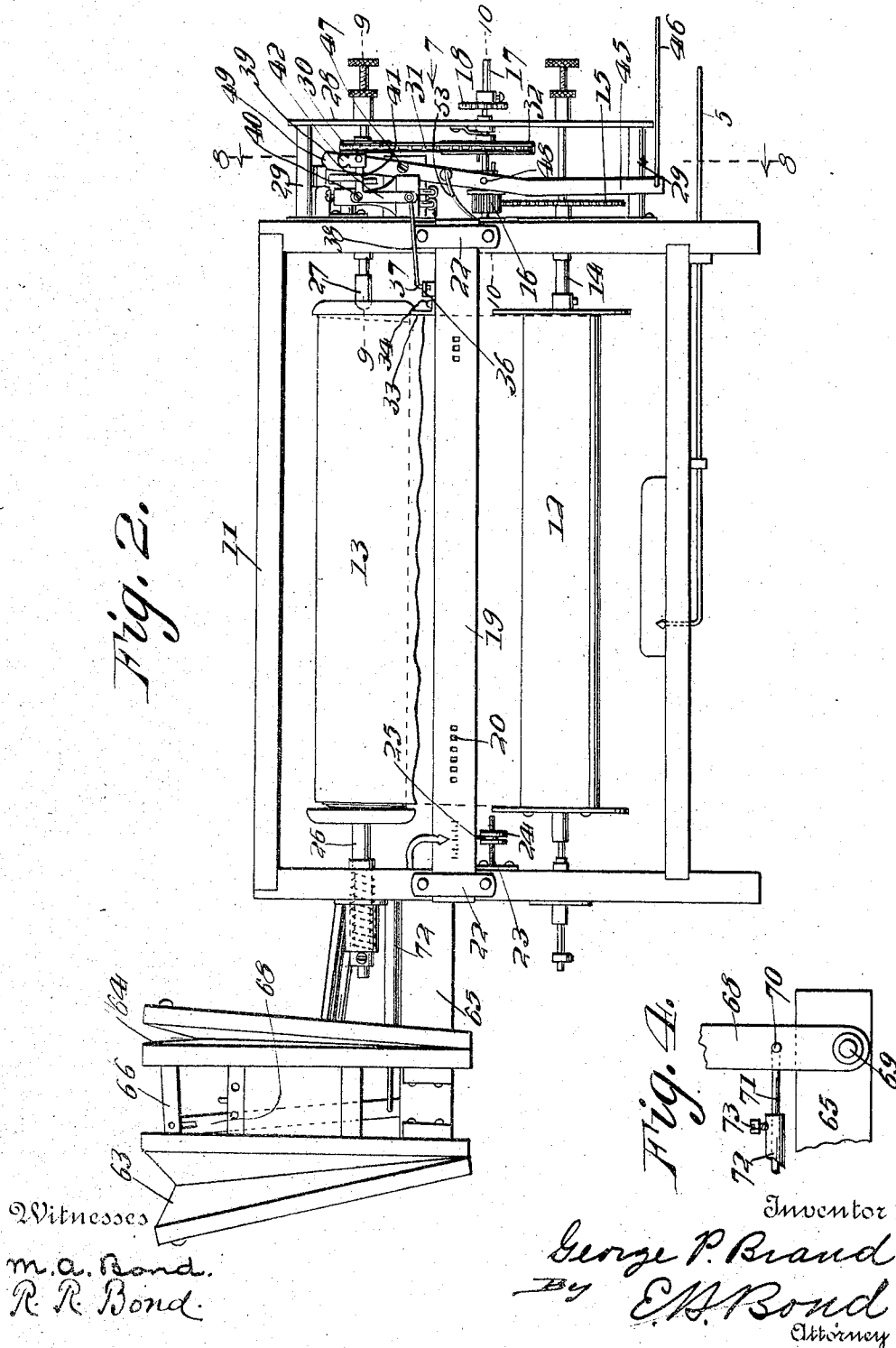
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4 SHEETS-SHEET 2.



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4 SHEETS—SHEET 3.

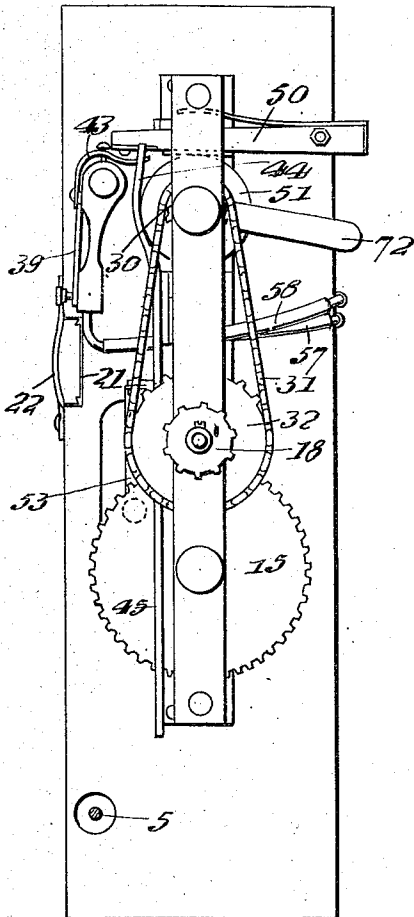


Fig. 7.

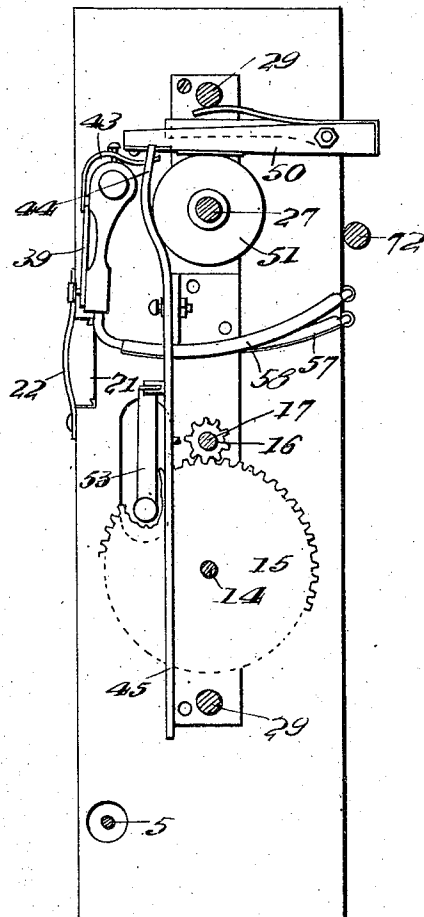


Fig. 8.

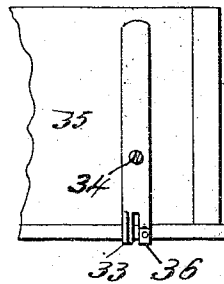


Fig. 3.

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4 SHEETS-SHEET 4.

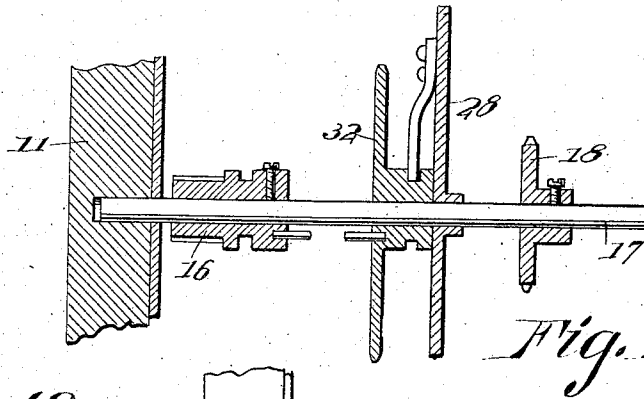
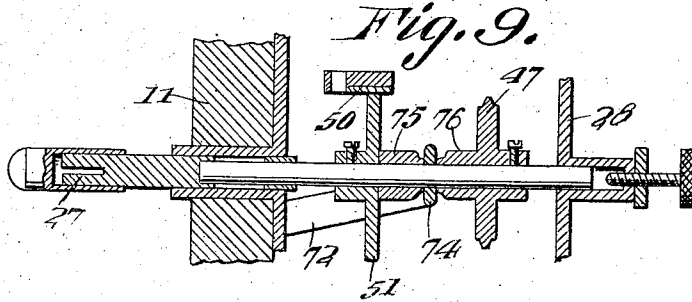
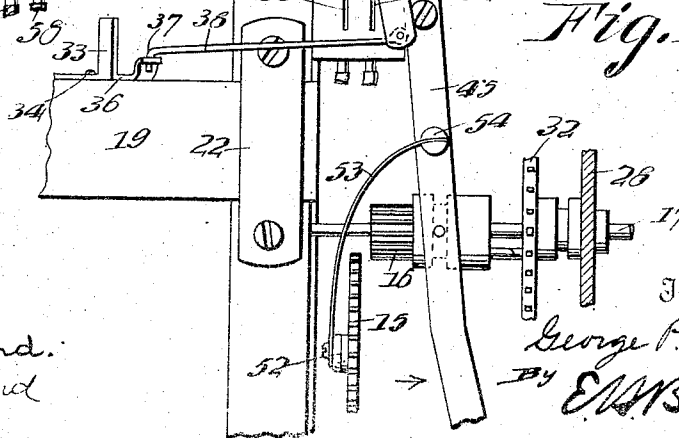
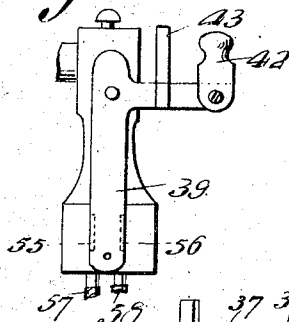


Fig. 12.



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UNITED STATES PATENT OFFICE.

GEORGE P. BRAND, OF NEW YORK, N. Y.

TRACKING DEVICE.

1,051,073.

Specification of Letters Patent.

Patented Jan. 21, 1913.

Application filed May 10, 1910. Serial No. 560,411.

To all whom it may concern:

Be it known that I, GEORGE P. BRAND, a citizen of the United States of America, and resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Tracking Devices, of which the following is a specification.

This invention relates to certain new and useful improvements in tracking devices or means for assuring alinement of the perforations in a music sheet and the ducts of a tracker bar in a self-playing musical instrument.

It is a well-known fact that in the operation of piano players and similar devices, much trouble has been experienced on account of the music sheet not passing over the tracker bar properly, that is, so that the perforations in the music sheet will properly aline with their respective ducts in the tracker bar. This, as is also well-known, is occasioned from several causes:—the shrinking and swelling of the paper, the uneven winding of the sheet on the spools, unevenness in width at the opposite edges of the sheet, and numerous other causes which will be well-known to those familiar with this art.

Various means have heretofore been devised for overcoming this objection. I am aware that it has been proposed to meet this requirement by means of guides engageable with one or both edges of the music sheet. It has also been proposed to obviate this objection by means for automatically shifting the rollers or spools in the direction of their length. Again, it has been proposed to move the tracker bar automatically in order to bring about the proper alinement. In such devices, however, it has been the practice to shift the sheet with relation to the tracker bar or the tracker bar transversely with relation to the direction of the movement of the sheet. No provision is made for maintaining perfect alinement of the music sheet. So far as I am aware, however, I am the first to provide means whereby the desired result is accomplished by maintaining perfect alinement of the music sheet regardless of the varying widths thereof, insuring the constant parallel feeding of the music sheet across the tracker bar and on the take-up roll, sensitive automatic means being provided for at-

taining this end. I do not move the tracker bar with relation to the music sheet, nor the sheet with relation to the tracker bar, the relative positions of these two parts being once obtained, the same is at all times maintained by automatic adjustment of the music spool, such adjustment being accomplished by means of an edge guide movable to actuate a valve and most sensitive in its movement, the said valve controlling a plurality of ports, which ports, in turn, govern a plurality of pneumatics which regulate the movement of the said music spool. I provide for the adjustment of the tracker bar in order to bring the ducts thereof in perfect alinement with the perforations of the music sheet, as well as for transposing.

While in the present instance the invention will be described as herein illustrated as used in connection with a piano player, it is evident that in many of its respects it is in no wise applicable alone to such devices, but will be found equally as serviceable in other arts, such, for instance, as paper perforating machines, weaving machines, and other devices of such a nature as to employ a perforated sheet. The pneumatics which actuate the music spool are operated under low tension. The mechanism herein illustrated compensates for unevenness of the sheet on the music spool and saves the edge of the paper from running side to side on the flanges of the take-up spool, and thus prevents injury to such edges of the paper. On the rewind, the music spool is held centrally in a fixed position so that the paper is wound even and smooth thereon as it is taken from the take-up spool.

Other objects and advantages of the invention will hereinafter appear and the novel features thereof will be particularly pointed out in the appended claims.

The invention is clearly illustrated in the accompanying drawings, which, with the numerals of reference marked thereon, form a part of this specification, and in which I have shown one practical embodiment of the invention, but it is to be understood that the same is capable of embodiment in other forms, and is subject to changes, variations, and modifications in details, proportions of parts, etc., without departing from the spirit of the invention or sacrificing any of its advantages. I, therefore, do not wish to restrict myself to the particular construc-

tion hereinafter described, as it is evident that various instrumentalities employed may be modified and various other changes made, and, I, therefore, reserve the right to avail myself of such modifications as come properly within the scope of the protection prayed.

In the accompanying drawings, Figure 1 is an elevation of sufficient of the mechanism of a piano player to illustrate the construction and application of my present improvements. Fig. 2 is a similar view on an enlarged scale showing the parts embodying my present invention in a different position. Fig. 3 is a detail partly in section and partly in top plan, showing the manner of mounting the edge guide. Fig. 4 is a detail with portions broken away looking at the rear of the pneumatics, showing the connection of the rod which actuates the music spool. Fig. 5 is a vertical section on the line 5—5 of Fig. 1. Fig. 6 is a section on the line 6—6 of Fig. 5. Fig. 7 is an enlarged end view looking in the direction of the arrow 7 in Fig. 2. Fig. 8 is a vertical section on the line 8—8 of Fig. 2. Fig. 9 is an enlarged sectional detail on the line 9—9 of Fig. 2. Fig. 10 is an enlarged sectional detail on the line 10—10 of Fig. 2. Fig. 11 is a front elevation of the edge guide and attached parts seen at the right of Fig. 2, on an enlarged scale. Fig. 12 is a detail showing the edge guide and valve in a different position from what they are seen in Fig. 11, namely their normal position.

Like numerals of reference indicate like parts throughout the several views.

In carrying out the invention the essential features thereof will, of course, be adapted to the style of machine in which they are to be employed. In the present instance, I have shown the application of the present invention to an automatic piano player otherwise of known construction. The parts of such player, aside from those with which the present invention is closely associated, have not been illustrated as the same are believed to be unnecessary. The motor, the re-wind mechanism, the bellows and such other parts as are common to all music players may be all of any of the well-known or approved forms of construction.

Of the parts shown, 1 designates the motor, which with the usual connections, controls the wind and re-wind of the music sheet, these parts being of the usual or well-known construction and operating in the usual manner.

4 is a gate box of usual construction for controlling the tempo, 5 being the tempo rod. 6 is the connection between this gate box and the motor. 7 is the governor, also of known construction, or it may be of any approved form, it being connected to the gate box 4 by means of suitable connection

8. 9 is a connection from the said governor 7 and designed to lead to the exhaust mechanism, not shown but of usual construction and mode of operation.

10 is a portion of the frame supporting the motor and other parts now to be described.

11 is the music box or frame constructed to support the music spool, the tracker bar and other parts, the same being mounted upon the portion 10 of the frame in any of the well-known or approved ways and designed for the purpose for which such boxes are generally employed.

12 is the take-up roll and 13 the music spool upon which the music sheet is to be wound and unwound in the usual manner.

The take-up roll may be of any of the well-known forms of construction mounted on its shaft 14 in any well-known way. 15 is a gear wheel on said shaft 14 meshing with the pinion 16 on the shaft 17 operated in the usual manner by connection with the motor through the medium of the sprocket 18.

19 is the tracker with usual ducts. This is mounted for endwise movement in suitable guides 21 in the opposite ends of the box, suitable plates 22 being provided, if desired, to prevent outward displacement of said tracker bar. Endwise movement may be given this tracker bar for transposing or for the purpose of adjustment of the same to properly aline the music sheet, and this adjustment may be accomplished in any well-known way. In the present instance I have shown one convenient form which consists of the screw-threaded rod 23 affixed in any suitable manner to a fixed part of the music box and upon this rod is mounted a nut 24 provided with a peripheral slot in which is engaged a pin or projection 25 depending from the under side of the tracker bar and readily affixed thereto. It will thus be seen that movement of the nut 24 along the screw-threaded rod 23 will, by the engagement of the walls of said slot with the said fixed projection 25, move the tracker bar one way or the other according as the nut is moved.

26 is the usual spring-actuated spindle or pintle for the left hand end of the music spool tending normally to force the same to the right, yet subject to the action of the tracking device.

27 is the right hand spindle or bearing for the music spool. It is mounted for endwise movement in suitable bearings in the end of the music box and in the vertical bar or support 28 suitably attached to the outer end of the music box and sustained at a predetermined distance therefrom by suitable means as the rods or the like 29, as seen best in Fig. 2. Mounted on this spindle 27 is a sprocket wheel 30 around which passes a 100

sprocket chain 31 which, in turn, passes around the sprocket wheel 32 on the shaft 17, whereby the music spool is rotated upon the re-wind, it being understood that this is normally inactive, that is as the music sheet is being unwound from the music spool and wound on the take-up roll, it performs no function.

33 is an edge guide. It is pivotally mounted, as at 34, on the shelf or partition 35 in the music box. The edge guide portion extends vertically and bears against the edge of the music sheet, as seen in Fig. 2. The edge guide has a member 36 elevated above the plane of the guide member proper, as seen clearly in Fig. 2, and adapted to receive the bent end 37 of a link or the like 38, the other end of which is suitably connected with the valve member 39, which latter is pivotally mounted, as at 40, and has a lateral arm 41 carrying a weight 42. From said arm 41 there extends rearward a member 43, seen clearly in Figs. 7 and 8, which is in the path of and designed to be actuated by the upper end 44 of the lever 45, the lower end of which is designed to be connected with the re-wind mechanism by a rod or the like 46. This lever is pivotally mounted, as at 47, and at 48 is suitably connected with the pinion 16, so that the latter is moved out of engagement with the gear 15 as the lower end of said lever is moved to the right. As the said lower end is moved to the right, the upper end which is made preferably rounded or cam shaped, as seen at 49, in its movement not only engages the member 43, so as to actuate the valve member 39, but also engages beneath the brake 50 and lifts the same out of contact with the disk or wheel 51 on the pintle 27. At the same time, a brake pad 52 carried by the arm 53, connected at one end, as at 54, to the lever 45, is thrown into engagement with the pinion 15, as seen clearly in Fig. 11, so as to put the required tension on the take-up roll during the re-wind.

The member over which the valve member 39 moves is provided with two ports 55 and 56, seen best in Fig. 11 where they are uncovered for the re-wind. One of these ports communicates by suitable means, as a flexible tube 57, with one of the diaphragms, while the other connects by flexible tube or the like 58 with the other diaphragm, which diaphragms control the valves which control the pneumatics designed to actuate the music spool, as will soon be described. Figs. 5 and 6 illustrate the mechanism for controlling these pneumatics, by reason of the connections 57 and 58. Referring to Fig. 5, 59 is the diaphragm in communication with the tube 58 and 60 is the diaphragm in communication with the tube 57. These diaphragms control the movements of the valves 61 and 62 respec-

tively, as seen in Fig. 5, in a well-known way and further detailed description thereof does not seem necessary. These valves are those which control the pneumatics 63 and 64 mounted in any suitable manner upon the support 65, which may be supported from the music box. 66 is a bar connecting the movable boards of the two pneumatics and to this bar is connected, as at 67, the upper end of a lever 68, the lower end of which is pivotally mounted on some suitable support, as the support 65, 69 being the pivot of said lever 68. With this lever 68 near its pivot is connected, as at 70, one end of a rod 71 adjustably and detachably held within a rod or the like 72, by suitable means, as a set screw 73. The other end of this rod is flattened, as seen at 74, in Fig. 9, and embraces the support or shaft 27 which carries the sprocket wheel 30, being interposed between the collar 75 bearing against the friction disk 51, and the hub or the like 76 of the sprocket wheel 47, whereby when the rod 72 is moved in the direction of its length by the means as hereinafter described, the right hand spindle of the music spool is moved in one direction or the other. It is to be understood that this actuation is produced automatically and is controlled by the valve member in conjunction with the ports 55 and 56 which, as seen in Fig. 12, are vertically elongated.

With the parts constructed and arranged substantially as hereinbefore described, the operation is as follows:—When the music sheet is first applied to the music spool and the free end thereof fastened to the take-up roll in the usual manner and wound a couple of times or so around said take-up roll or sufficient to bring the first set of perforations in the music sheet over the ducts of the tracker bar, if the perforations of the paper then be found not to be in perfect alinement with the ducts of the tracker bar, the tracker bar is adjusted by means of the slotted nut 24, so as to move the tracker bar in the one direction or the other laterally of the machine, that is in the direction of the length of the tracker bar, so as to bring the holes in the tracker bar in perfect alinement with the perforations of the music sheet. This relative position of the tracker bar and music sheet and the alinement of the ducts of the tracker bar and the perforations of said music sheet remains unchanged regardless of the position of the music sheet on the music spool, the music sheet remaining practically in the same position on the tracker bar during the playing of the entire piece, the mechanism being so sensitive that the least movement laterally of the music sheet, which is hardly perceptible to the eye, causes automatic adjustment of the music spool to compensate for such slight lateral movement of the music sheet. When such slight lat-

eral movement of the music sheet takes place, the edge guide 33 being in contact at all times with the adjacent edge of the music sheet follows the latter in its movements and such movement causes, by reason of the movement of the edge guide upon its pivot, the valve member 39 to be moved slightly on its pivot, sufficiently to slightly expose one edge of one of the ports 55 or 56 and admit atmospheric air through said port and through the tube connecting the same with the appropriate diaphragm of the pneumatics. This inrushing air acting upon the diaphragm actuates the corresponding valve in a well-known manner, putting the interior of its pneumatic into communication with the exhaust and closing it to the atmosphere. This causes the pneumatic or bellows to be deflated sufficiently to cause its movable member to move the lever 68 and this through the connection with the rod 72 which, with its flattened portion 74 disposed between the members 75 and 76, causes endwise movement of the spindle or shaft 27, moving the music spool in the direction of its length to compensate for the slight lateral movement of the music sheet, whereby the latter is maintained with its perforations in perfect alinement with the ducts of the tracker bar. This lateral movement of the music spool serves to return the valve member to its normal position, practically closing both valve ports, although it is to be understood that the valve and valve ports may be so proportioned as to at all times permit an infinitesimal leakage through each port by way of the bleeds 81 into the exhaust chamber 77, but not sufficient to actuate the valves of the pneumatics. By this means an infinitesimal lateral movement of the music sheet will serve to entirely close the one port and open the other sufficient to actuate the valve of the pneumatic. It is to be understood that the lateral movement of the sheet in one direction will cause the valve member 39 to cover the one port and open the other port, while the opposite lateral movement of the music sheet will bring about a reversal of such movements. In Fig. 11 the parts are shown in the position which they assume during re-winding, being thrown into such position by the movement of the lever 45 to the right or in the direction of the arrow seen in said figure, this lever being moved in any suitable manner sufficiently to bring the valve member 39 into such position as to entirely uncover both the ports 55 and 56. Under these conditions, atmospheric air being admitted through both ports and through their connecting tubes to the pneumatics, the pneumatics will both be held in their central position, as the condition of both is now the same, both being put into communication with the exhaust and closed to the atmosphere. As the wind and re-

wind mechanism is old and well-known in the art, it is not deemed necessary to show it in detail nor to describe the same or any of its connections. The exhaust chamber 77 is connected by tube 78 with the governor or regulating bellows 7, as seen clearly in Fig. 1. 9 (see Fig. 1) is a tube extending from the governor 7 and is designed for connection with the exhaust mechanism of the player, not shown, but of usual construction and mode of operation. The pneumatics which actuate the music spool are operated under low tension. It is to be understood that the pressure on the valve member is the same as and controlled by the pressure in the pneumatics. As the edge of the music sheet is frail and in order to make the edge guide as delicate as possible against the edge of the paper, it is desirable to reduce the atmospheric pressure of the slide on the ports. To accomplish this I reduce the tension on the valve member to a minimum in order that the movement may be as sensitive as possible by operating the pneumatics under low tension or throttle pressure. The tube 78 is, therefore, connected with the interior of the throttle or governor pneumatic 7, while the tube 9 may be connected with either high or low tension according to the conditions under which the player is operated. This tension, however, does not affect that in the interior of the governor pneumatic. It is to be understood that the valve 80 is the throttle valve acting in the well-known way.

Modifications in details may be resorted to without departing from the spirit of the invention or sacrificing any of its advantages.

What is claimed as new is:—

1. In a tracking device, a trackerbar, means for preliminarily adjusting the same, an endwise movable music spool, an edge guide engageable with one edge only of a music sheet, and pneumatic means controlled by the edge guide for moving only said music spool in both directions endwise.

2. In a tracking device, an endwise movable music spool, a tracker, means for preliminarily adjusting the same, an edge guide mounted for constant contact with one edge only of a music sheet, and automatically controlled pneumatic means governed by said edge guide for moving said spool only.

3. In a tracking device, an endwise movable music spool, a tracker, means for preliminarily adjusting the same, an edge guide mounted for constant contact with one edge only of a music sheet, and means for moving such spool back and forth in the direction of its length and controlled automatically by the movement of the edge guide.

4. In a tracking device, an endwise movable music spool, a relatively fixed trackerbar, an edge guide mounted for constant contact with one edge only of a music sheet and means for moving such spool backward

and forth in the direction of its length and controlled pneumatically by the movement of the edge guide for automatically maintaining alinement of the perforations of the music sheet and trackerbar.

5 5. In a tracking device, an endwise movable music spool, a relatively fixed trackerbar, an edge guide mounted for constant contact with one edge only of a music sheet and means for moving such spool back and forth in the direction of its length and controlled automatically and pneumatically by the movement of the edge guide for automatically maintaining alinement of the perforations of the music sheet and trackerbar.

10 6. In a tracking device, an endwise movable music spool, a relatively fixed tracker with means for preliminarily adjusting the same, a relatively fixed take-up roll, an edge guide mounted for constant contact with one edge only of a music sheet, and means controlled by the music sheet for pneumatically moving only the music spool back and forth in the direction of its length to maintain alinement of the perforations of the music sheet and tracker.

15 7. In a tracking device, an endwise movable music spool, a relatively fixed tracker with means for preliminarily adjusting the same, a relatively fixed take-up roll, an edge guide mounted for constant contact with one edge only of a music sheet, and means controlled by the music sheet for automatically moving only the music spool back and forth in the direction of its length to maintain alinement of the perforations of the music sheet and tracker.

20 8. In a tracking device, an endwise movable music spool, a relatively fixed tracker with means for preliminarily adjusting the same, a relatively fixed take-up roll, an edge guide mounted for constant contact with one edge only of a music sheet, and means controlled by the music sheet for automatically and pneumatically moving only the music spool back and forth in the direction of its length to maintain alinement of the perforations of the music sheet and tracker.

25 9. In a tracking device, an endwise movable music sheet, a relatively fixed tracker, means for preliminarily adjusting the tracker, an edge guide mounted for constant contact with one edge only of a music sheet, pneumatics controlled by the movement of the edge guide, and a member controlled by the pneumatics for giving endwise movement to the music spool only back and forth in the direction of its length, independently of the take-up roll.

30 10. In a tracking device, an endwise movable music sheet, a relatively fixed tracker, means for preliminarily adjusting the tracker, an edge guide mounted for constant contact with an edge only of a music sheet, a pneumatic, means interposed between the

pneumatic and the edge guide for controlling the former, and a reciprocatory member controlled by the pneumatics for giving back and forth endwise movement to the music spool only for maintaining alinement between the perforations of the music sheet and the tracker.

35 11. In a tracking device, an endwise movable music spool, a relatively fixed trackerbar and take-up roll, means for preliminarily adjusting the tracker, an edge guide mounted for constant contact with one edge only of a music sheet, pneumatics operatively connected with said music spool, valve means interposed between the edge guide and the pneumatics and connected with the latter and controlled by the edge guide, and means controlled by the pneumatics to give back and forth endwise movement to the music spool to maintain alinement between the perforations of the music sheet and the tracker.

40 12. In a tracking device, an endwise movable music spool, a relatively fixed trackerbar and take-up roll, means for preliminarily adjusting the tracker, an edge guide mounted for constant engagement with one edge only of a music sheet, a valve member connected with said edge guide, pneumatics controlled by said valve member, and a member controlled by said pneumatics to give back and forth endwise movement to the music spool to maintain alinement between the perforations of the music sheet and the tracker.

45 13. In a tracking device, an endwise movable music spool, a relatively fixed trackerbar and take-up roll, means for preliminarily adjusting the tracker, a pivotally mounted edge guide mounted for constant engagement with one edge only of a music sheet, a valve member connected therewith, pneumatics controlled by said valve member, a pivotally mounted member controlled by the pneumatics, and a rod connected with said pivoted member to give endwise movement to the music spool in both directions to maintain alinement between the perforations of the music sheet and tracker.

50 14. In a tracking device, an endwise movable music spool, a relatively fixed trackerbar and take-up roll, means for preliminarily adjusting the tracker, a pivotally mounted edge guide mounted for constant engagement with one edge only of a music sheet, a valve member connected therewith, pneumatics controlled by said valve member, a pivotally mounted member controlled by the pneumatics, and a rod connected with said pivoted member and with the pintle of the music spool to give back and forth endwise movement to the music spool to maintain alinement between the perforations of the music sheet and tracker.

55 15. In a tracking device, a music box, a

- trackerbar, a relatively fixed member parallel with the trackerbar and disposed entirely within the music box, a member movable on said fixed member within the music box and cooperating means projecting from the trackerbar at right angles to said fixed member for cooperation with said movable member to give endwise movement to the trackerbar.
16. In a tracking device, a music box, a trackerbar mounted therein and endwise movable, a member within said music box fixed relatively to the trackerbar, a member adjustable on said fixed member and having a peripheral slot and means rigid with the trackerbar and projecting at right angles therefrom and movable therewith and received in said slot to give endwise movement to the trackerbar.
17. In a tracking device, a trackerbar, a relatively fixed support upon which the trackerbar is mounted for endwise movement, a screw-threaded member on said support, a peripherally grooved nut on said screw-threaded member and movable thereon with and in the same direction as the trackerbar, and means rigid with and projecting at right angles from the trackerbar and loosely received within the groove of said nut whereby adjustment of said nut moves the trackerbar.
18. In a tracking device, an endwise movable music spool, a spring actuated pintle for one end thereof, an endwise movable pintle for the other end thereof, a relatively fixed trackerbar, an edge guide mounted for constant contact with one edge only of a music sheet, a valve mechanism controlled by the movement of the edge guide, and pneumatic means controlled by said valve mechanism for giving back and forth endwise movement to the last-named pintle and the music spool only.
19. In a tracking device, a music spool, pneumatic means for moving the same endwise, a relatively fixed trackerbar, and a pivotally mounted member having an upturned portion forming an edge guide, and an upturned portion at an angle thereto, and a valve controlling member pivotally connected with said angular upturned portion and with the pneumatic means.
20. In a tracking device, an endwise movable music spool, an edge guide mounted for constant contact with an edge of a music sheet, a valve member connected therewith, pneumatics connected with said music spool controlled by said valve member, and a connection from said pneumatics to a low tension chamber of a pneumatic governor.
21. In a tracking device, an endwise movable music spool, an edge guide mounted for constant contact with an edge of a music sheet, a valve member connected therewith, pneumatics connected with said music spool controlled by said valve member, a connection from said pneumatics to a low tension chamber of a pneumatic governor, and a pipe leading from the throttle valve of said governor.
22. In a tracking device, an endwise movable music spool, a relatively fixed tracker, pivoted means movable over and controlling a plurality of ports, said means mounted to be operated by one edge of a music sheet, and connections between said means and the music spool for causing the endwise movement of said spool only, to maintain alinement between the perforations of the music sheet and the tracker.
23. In a tracking device, a trackerbar mounted for endwise movement, a relatively fixed non-rotatable support parallel with the trackerbar, a member adjustably and rotatably mounted on said support, and cooperating means projecting from the trackerbar at right angles to said fixed member for cooperation with said movable member to give endwise movement to the trackerbar.
24. In a tracking device, an endwise movable music spool, a relatively fixed tracker, means mounted for constant contact with the edge of a music sheet for controlling the endwise movement of the spool, means actuated by said means movable over and controlling a plurality of ports, and pneumatic means controlled by said ports for automatically maintaining alinement between the perforations of the music sheet and those of the tracker.
25. In a tracking device, an endwise movable music spool, a relatively fixed tracker, means operated by the edge of a music sheet movable over and controlling a plurality of ports and means controlled by said ports for causing the endwise movement of the music spool only with relation to the tracker for maintaining alinement between the perforations of the music sheet and the tracker.
26. In a tracking device, an endwise movable music spool, a relatively fixed tracker, means operated by the edge of a music sheet movable over and controlling a plurality of ports, and means controlled by said ports for causing endwise movement of the music spool only in both directions to maintain alinement between the perforations of the music sheet and the tracker.
27. In a tracking device, an endwise movable music spool, a relatively fixed tracker, means operated by the edge of a music sheet movable over and controlling a plurality of ports, and pneumatic means controlled by said ports for causing the endwise movement of the music spool only in both directions, and a connection from said pneumatic to a low tension chamber of a pneumatic governor.
28. In a tracking device, an endwise movable pintle for a music spool, means controlled by said valve member, a connection from said pneumatics to a low tension chamber of a pneumatic governor, and a pipe leading from the throttle valve of said governor.

connected with said pintle for moving it in both directions, a pivotally mounted edge guide for contact with one edge only of a music sheet, pneumatic means connected to said first-named means and valve controlled means intermediate the pneumatic means and the edge guide and controlled by the latter for moving the music spool in both directions.

29. In a tracking device, an endwise movable pintle for a music spool, rigid means in addition to and movable with said pintle for moving it in both directions, an edge guide mounted for constant contact with one edge only of a music sheet, pneumatic means connected with said rigid means, and valve controlled means intermediate said pneumatic means and edge guide and automatically controlled by the latter for giving back and forth endwise movement to the music spool.

30. In a tracking device, an endwise movable pintle for a music spool, pneumatic means for operating the same endwise in both directions, an edge guide mounted for constant contact with one edge only of a music sheet, and valve controlled means controlled by connection with the edge guide and operatively connected with said pneumatic means for moving the music spool back and forth in the direction of its length.

31. In a tracking device, an endwise movable pintle for a music spool, a relatively fixed trackerbar, an edge guide mounted for constant contact with one edge only of a music sheet, and valve controlled pneumatic means actuated by the edge guide for moving the said pintle back and forth in the direction of its length.

32. In a tracking device, an endwise movable pintle for a music sheet, an edge guide mounted for constant contact with one edge only of a music sheet and interposed valve controlled and pneumatic means controlled by the edge guide for giving back and forth endwise movement to the music spool only.

33. In a tracking device, an endwise movable pintle for a music spool, a relatively fixed tracker, an edge guide mounted for constant contact with and operated by one edge only of a music sheet and valve controlled and pneumatic means interposed between the edge guide and music spool for

giving back and forth endwise movement to the latter.

34. In a tracking device, an endwise movable music spool, an endwise movable pintle therefor, an edge guide mounted for constant contact with and operated by one edge only of a music sheet and valve controlled means and connections actuated by the movement of the edge guide, and pneumatic means controlled by said valve controlled means for giving endwise movement to the music spool relatively to the tracker.

35. In a tracking device, an endwise movable pintle for a music spool, a relatively fixed tracker, positive means for moving said pintle in both directions, and an edge guide controlling said positive means, said edge guide being always in contact with the edge of a sheet and working from one edge only of said sheet to automatically move the music spool endwise in both directions.

36. In a tracking device, an endwise movable pintle for a music spool, positive means for moving the pintle in both directions, an edge guide, pneumatic means for operating said positive means, valve controlled means for controlling said pneumatic means and controlled by the edge guide, said edge guide being always in contact with one edge only of a sheet and working against the "fixed" edge only to give endwise movement to the music spool in both directions.

37. In a tracking device, an endwise movable pintle for a music spool, a relatively fixed tracker, positive means for moving said pintle in both directions, pneumatic means for actuating said positive means, valve controlled means controlling said pneumatic means, an edge guide controlling said valve controlled means, said edge guide being pivotally mounted for constant contact with and operated by one edge only of a sheet for automatically moving the music spool back and forth endwise relatively to the tracker.

Signed by me at Washington, D. C., this 7th day of May, 1910.

GEORGE P. BRAND.

Witnesses:

E. H. BOND,
JOHN SCRIVENER.