

J. A. WESER, DEC'D.

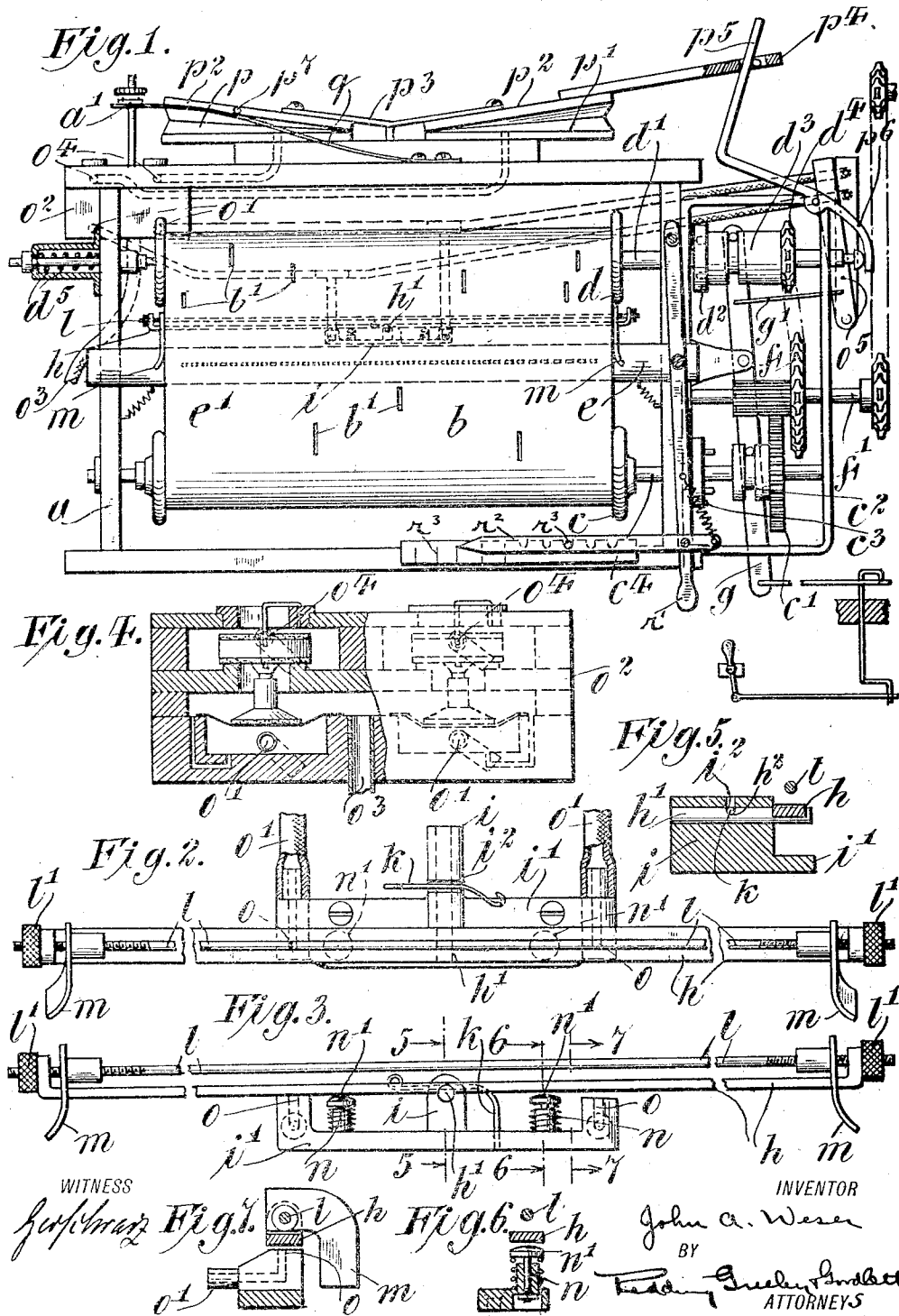
E. L. WESER, ADMINISTRATRIX.

TRACKING DEVICE FOR AUTOMATIC MUSICAL INSTRUMENTS.

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JOHN A. WESER, OF NEW YORK, N. Y.; ELSIE L. WESER, ADMINISTRATRIX OF SAID JOHN ALBERT WESER, DECEASED, ASSIGNOR TO WESER BROS. INC., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

TRACKING DEVICE FOR AUTOMATIC MUSICAL INSTRUMENTS.

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To all whom it may concern:

Be it known that I, JOHN A. WESER, a citizen of the United States, and a resident of the borough of Manhattan of the city of New York, in the city of New York, have invented certain new and useful Improvements in Tracking Devices for Automatic Musical Instruments, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

In Letters Patent of the United States No. 1,243,620, dated Oct. 16, 1917, there is shown and described a tracking device for automatic musical instruments in which the movement of the controlling member for the tracking devices is initiated by the frictional drag of the music sheet on the controlling member exerted in the direction of movement of the note sheet to control the lateral alinement. In the present invention this novel principle of operation is retained but the particular embodiment is different and, perhaps, superior, in some respects. As is pointed out in said Letters Patent, the controlling member might be placed in any relation to the music sheet without departing from the spirit of the invention so long as the movement of this controlling member is initiated by lateral drag thereon exerted by the sheet in the direction of its movement. In said patent the controlling member comprises a pivoted bar, the longitudinal edge of which rests in engagement with the rear surface of the traveling note sheet which bar is adapted to be rocked upon deviation of the sheet whereby a differential frictional drag is imposed on the bar. In the present embodiment the frictional drag exerted by the sheet in the direction of its travel is transmitted to the controlling member at the edges of the sheet. Normally, the sheet remains entirely out of contact with the controlling member but, upon wandering, engages the same and immediately initiates operation of the tracking members by the frictional drag exerted on the controlling member in the direction of movement of the sheet. The invention will be described in greater detail hereinafter as will other details of importance related to its successful practice. In the drawings—

Figure 1 is a view in front elevation of so

much of a tracker box and music sheet as is necessary for an understanding of the application of the improved tracking mechanism thereto.

Fig. 2 is a detail view in plan of the controlling member.

Fig. 3 is a detail view in elevation of the controlling member showing the same in tilted position for initiating operation of the tracking mechanism.

Fig. 4 is a detailed view on an enlarged scale, partly in vertical section and partly in elevation, of the valve chest for controlling the bellows.

Fig. 5 is a detail view in section of the controlling member and its support taken along the plane indicated by the line 5—5 of Fig. 3 and looking in the direction of the arrows.

Fig. 6 is a detail view at another portion of the controlling member taken along the plane indicated by the line 6—6 of Fig. 3 and looking in the direction of the arrows.

Fig. 7 is a detail view at another part of the controlling member, taken along the plane indicated by the line 7—7 of Fig. 3 and looking in the direction of the arrows.

In Fig. 1, there is illustrated, somewhat conventionally, the usual elements of an automatic musical instrument, including the tracker box *a*, the music roll *b*, the wind-on roll *c*, the carrier spool *d* and the tracker bar *e*, all of which may be disposed in the usual relationship to each other. Rotation of the wind-on roll *c* may be effected through any suitable driving mechanism associated with the gear *c'*, which may be carried with a sliding clutch collar *c²* movable into and out of engagement with the cooperating clutch collar *c³* on the shaft *c⁴* of the spool in a manner often employed. The shaft *d'* of the carrier spool *d* also carries a suitable clutch collar *d²* with which may cooperate a sliding clutch sleeve *d³* on which is formed a sprocket *d⁴* connected operatively with the gear *c'* through suitable transmission elements indicated generally at *f*. These transmission elements may be driven from any available source of power, their shaft *f'* being considered for the purposes of this application a source of power. The sliding clutch collars *c²*, *d³* are interconnected by a shifting lever *g* by which the collars may

be thrown alternately into and out of driving engagement with their respective spools for winding or rewinding of the sheet. In describing the improved tracking devices, it has been elected to illustrate the wind-on roll as being shiftable axially for the purpose of restoring the traveling sheet to its intended path but, as is well recognized in the art of tracking devices, it is equally within the scope of the invention to mount this roll fixedly in the tracker box *a* and make provision for the shifting of the tracker bar *e* for restoration of the desired registration between the perforations *b'* in the note sheet *b* and the usual ducts *e'* in the tracker bar.

In this embodiment there is mounted on some convenient support, such as the tracker bar *e*, at the rear side of the music sheet *b*, a pivoted bar *h*, the supporting pin *h'* of which may be journaled in a bracket *i* carried on a plate *i'*. This pin *h'* may be held releasably against axial movement by means of a spring rod *h* which is supported on the plate *i'* and may enter registering grooves *h²*, *h²* cut in the bracket *i* and the pin *h'* respectively. By tripping the rod *h* the pin *h'* may be released and removed from the supporting bracket. On the carrier *h* or on the screw rod *l* supported thereon, are mounted two forwardly extending ears *m*. These ears are of such form and so spaced as to receive between them loosely the traveling sheet *b* and yet be maintained respectively, in such close proximity to the edges of the sheet as to be engaged thereby whenever the sheet deviates from its intended path of travel ever so slightly. These ears, being threaded on to the screw rod *l*, may be moved toward or away from one another by manipulation of suitable, knurled nuts *l'* on the ends of the rod *l*, so as to facilitate the adjustment of the ears with relation to the web. In this way, webs of differing widths may be used with the improved tracking devices with the same effectiveness.

Normally, the bar *h* is held in a truly horizontal position by spring-pressed stops *n* which are disposed at opposite sides of the pivot pin *h'* and engage the under face of the bar with antifriction bearing heads *n'*. When in this position, the bar *h* is held away from its seats on the air ducts *o* which may be formed in the plate *i'*. However, the bar *h* is disposed in close proximity to these ducts so that when it is tilted to one side or the other, it will seat on one of the ducts as is indicated in Fig. 3. These ducts are connected by tubes *o'* with a valve chest *o²* of the usual character with the interior of which communicate the main wind-way *o³* and separate tubes *o⁴* in the secondary chambers, which tubes lead to the bellows *p*, *p'* by which the shiftable element of the tracking mechanism is moved for restoring

registration. There is nothing new in the pneumatic features of the illustrated embodiment and, indeed, it will be evident that not only may the pneumatic controls be changed by one skilled in the art within wide ranges, without departing from the principle used in initiating their operation, but equivalent mechanical and electrical actuating devices may be substituted in their place. The movable members *p²* of the actuating bellows *p*, *p'* are interconnected by a bridge piece *p³* so as to move in unison and one of these movable members *p²* of the bellows *p'* carries an arm *p⁴* for engagement with the lever *p⁵* by which the shiftable roll *d* is moved whenever the bellows *p*, *p'* have their conditions changed by the controlling member for the sheet. The lever *p⁵* may be fulcrumed on the tracker box and have its free end *p⁶* in engagement with the end of the shaft *d'* for the shiftable spool *d*, movement of this shaft under the action of the lever *p⁵* being opposed by a spring *d⁵* disposed at the other end of the spool and engaged operatively with the end of the shaft *d'*.

While certain adjunct devices are provided for insuring the free and uniform rewinding of the sheet, these devices will be referred to hereinafter and the description of the operation of the tracking members when active be set forth now. After the sheet is placed in position in the usual manner the ears *m* are moved toward or away from one another by the knurled nuts *l'* to receive the sheet loosely, but yet remain in close proximity to the edges thereof. The driving devices are set in operation and the composition is played in the usual way. So long as the sheet travels in its intended path and registration is correct the bar *h* is held off its seats on the air ducts *o* by the spring-pressed studs *n*. At this time atmospheric air is admitted to the primaries of the valve chest *o²* so that the bellows *p*, *p'* are subjected constantly to the partial vacuum of the main wind-way *o'* and balance one another so that there is no tendency for the shiftable roll *d* to move. If the sheet wanders in either direction, however, its edge will engage the corresponding ear *m* and the frictional drag exerted on this ear in the direction of movement of the sheet will tilt the bar *h* about its pin *h'* and against the action of the opposed spring stud *n* until the bar seats on the corresponding air duct *o*. For instance, in Fig. 3, the sheet is indicated as having wandered to the left, so that the ear at the left end of the bar *h* has impressed on it the frictional drag and the bar is seated on the duct at the left end of the plate *i'*. Atmospheric pressure is thereupon cut off from the corresponding primary and the bellows *p'* has its communication with the main wind-way *o³* interrupted. This bel-

lows then tends to expand while the other bellows p collapses. The lever p^5 is thereupon rocked by the moving arm p^4 so as to permit the spring d^5 to shift the spool d toward the right thereby correcting immediately the wandering of the sheet and restoring registration of the perforations b' and the ducts c' . When the sheet is thus restored to its proper path its edge will be withdrawn from engagement with the ear m so that the spring-pressed studs n will be free to restore the bar h to its truly normal position, whereupon atmospheric air will be admitted to the closed duct o and the bellows p, p' through their controlling secondaries will both be connected to the windway o^3 and thereby balanced.

In tracking devices in which so called lateral control is relied on, a substantial deviation must be realized before the tracking members are responsive. A substantial lateral deviation in a forwardly traveling sheet requires a very substantial movement of the sheet forward so that such lateral control cannot be said to be sensitive. In the present construction, however, it is evident that immediately upon a very slight wandering of the sheet laterally, the extent being determined by the distance between the edge of the sheet and the ears m , the controlling bar has immediately pressed upon it a frictional drag exerted in the direction of travel of the sheet and is immediately moved to initiate operation of the tracking members. So responsive are the devices that the sheet need travel forwardly only a very slight distance before registration is entirely restored.

For rewinding, it has been deemed desirable to provide means for rendering the tracking mechanism inactive. The means provided are automatic. The air pipes o' in addition to their connection with the valve chest o^2 are led to a controlling valve o^5 which is, in turn, connected by a link g' to the controlling clutch lever g . The operation is such that whenever the lever g is rocked to bring the actuating mechanism into rewind position the valve o^5 is automatically moved to open the pipes o' to atmospheric pressure, so that even if the bar h is rocked to close one of the ducts o this closure can have no effect on the conditions within the valve chest o^2 . Since the parts are rendered inactive in the manner described, it is desirable to provide, in addition, some means for centralizing the spool d during the rewind and preventing its free axial movement. While many such devices may be evolved, in the illustrated embodiment there has been shown a leaf spring q , which is secured to the tracker box a and coöperates, as through a pin p^7 , with one of the movable members of one of the bellows p . This spring is limited in its upward

movement by a suitable button stop a' , while it is evident that the pin p^7 will engage with the spring only upon the collapse of the bellows p to a predetermined degree. The action of the spring q during rewinding is to oppose, through the bellows and intermediate connections, the action of the spring d^5 and thereby centralize the spool d regardless of the condition of the bellows p, p' .

With the improved tracking devices there has been associated a slidable tracker bar which may be moved manually through fixed distances which bear the proper relation to the distances between the ducts in the tracker bar, for the purpose of transposing. No matter what relation the tracker bar bears to the music sheet, it is evident that the tracking devices heretofore described will function in their desired manner. For transposing the tracker bar e is slidable in the tracker box, its position being controlled by a manually operable swinging lever q' which is pivoted on the tracker box and connected to the tracker bar. On this lever may be carried pivotally a spring-pressed detent q^2 which has a stud q^3 coöperating with a fixed rack bar q^4 carried on the tracker box. By raising the detent q^2 and swinging the lever arm q' the tracker bar may be given any desired relation to the music sheet. The key to which this adjustment effects the transposition may be indicated by graduations on the rack bar q^4 over which the detent q^2 moves.

As indicated hereinbefore, mechanical or electrical tracking members may be substituted for the pneumatic system provided so long as the controlling member for such tracking devices has its movement initiated by frictional drag exerted thereon in the direction of movement of the sheet. From this indication of the latitude of the invention it will be evident that the particular mechanical devices shown may be changed through wide ranges so long as their prescribed functions are realized in the accomplishment of the intended result. Further, while the ears m have been shown as being carried on a rocking bar, it is evident that their equivalents may be supported independently of each other and yet be subjected to the frictional drag described for the purpose of controlling independently, means for initiating operation of the tracking elements.

I claim as my invention:

1. In a musical instrument employing a traveling note sheet, pneumatic means for effecting the lateral displacement of the note sheet, and a controlling member having devices for contact with the edge of the sheet and controlled by the frictional drag of the edge of the sheet thereon exerted in the

direction of movement of the sheet for initiating operation of said pneumatic means.

2. In a musical instrument employing a traveling note sheet, means for effecting the lateral displacement of the note sheet; and a pivoted bar having at its opposite ends devices for contact with the opposite edges of the sheet and controlled by the frictional drag of the edge of the sheet on said devices exerted in the direction of movement of the sheet upon wandering of the sheet for initiating operation of said means.

3. In a musical instrument employing a traveling note sheet, pneumatic means for effecting the lateral displacement of the note sheet, and a pivoted bar having at its opposite ends devices for contact with the opposite edges of the sheet and controlled by the frictional drag of the edge of the sheet on said devices exerted in the direction of movement of the sheet upon wandering of the sheet for initiating operation of said means.

4. In a musical instrument employing a traveling note sheet, means for effecting the lateral displacement of the note sheet, a music roll, a winding-on roll, a tracker bar, and means interposed between one of the rolls and the tracker bar and having devices for contact with the edge of the sheet and controlled by the frictional drag of the edge of the sheet thereon exerted in the direction of movement of the sheet for initiating operation of said first named means.

5. In a musical instrument employing a traveling note sheet, means for effecting the lateral displacement of the note sheet, a music roll, a winding-on roll, a tracker bar, and a pivoted bar disposed between one of the rolls and the tracker bar and having devices for contact with the edge of the sheet and controlled by the frictional drag of the edge of the sheet thereon exerted in the direction of movement of the sheet for initiating operation of said means.

6. In a musical instrument employing a traveling note sheet, motor bellows and devices operated thereby to maintain the sheet in its normal path of travel, valves to control the action of said bellows, and controlling means having devices for contact with the edge of the sheet and controlled by the frictional drag of the edge of the sheet thereon exerted in the direction of movement of the sheet to control said valves.

7. In a musical instrument employing a traveling note sheet, motor bellows and devices operated thereby to maintain the sheet in its normal path of travel, a main windway connected operatively to said bellows and serving normally to subject the same to pressure, valves to control the action of said bellows, and controlling means having devices for contact with the edge of the sheet

and controlled by the frictional drag of the edge of the sheet thereon exerted in the direction of movement of the sheet to control said valves.

8. In a musical instrument employing a traveling note sheet, motor bellows and devices operated thereby to maintain the sheet in its normal path of travel, valves to control the action of said bellows, and a pivoted bar having devices for contact with the edge of the sheet and controlled by the frictional drag of the edge of the sheet thereon exerted in the direction of movement of the sheet to control said valves.

9. In a musical instrument employing a traveling note sheet, a music roll, a winding-on roll, a tracker bar, motor bellows and devices operated thereby to maintain the sheet in its normal path of travel, valves to control the action of said bellows and a pivoted bar mounted between one of the rolls and the tracker bar and having devices for contact with the edge of the sheet and controlled by the frictional drag of the edge of the sheet thereon exerted in the direction of movement of the sheet to control said valves.

10. In a musical instrument employing a traveling note sheet, a music roll, a winding-on roll, a tracker bar, one of the rolls and the tracker bar being relatively shiftable, operating means for the shiftable member, and means having devices for contact with the edge of the sheet and controlled by the frictional drag of the edge of the sheet thereon exerted in the direction of movement of the sheet for initiating operation of said operating means.

11. In a musical instrument employing a traveling note sheet, a music roll, a winding-on roll, a tracker bar, one of the rolls and the tracker bar being relatively shiftable, operating means connected to the shiftable member, motor bellows connected with said operating means to operate the same, and means having devices for contact with the edge of the sheet and controlled by the frictional drag of the edge of the sheet thereon exerted in the direction of movement of the sheet for initiating operation of the motor bellows.

12. In a musical instrument employing a traveling note sheet, a music roll, a winding-on roll, a tracker bar, one of the rolls and the tracker bar being relatively shiftable, an oscillating device in operative relation with the shiftable member, two motor bellows connected to the oscillating device in opposition to one another, and means having devices for contact with the edge of the sheet and controlled by the frictional drag of the edge of the sheet thereon exerted in the direction of movement of the sheet for initiating operation of said bellows.

13. In a musical instrument employing a

traveling note sheet, motor bellows and devices operated thereby to maintain the sheet in its normal path of travel, valves normally open to the atmosphere and operatively connected with said bellows, and means having devices for contact with the edge of the sheet and controlled by the frictional drag of the edge of the sheet thereon exerted in the direction of movement of the sheet to control said valves.

14. In a musical instrument employing a traveling note sheet, motor bellows and devices operated thereby to maintain the sheet in its normal path of travel, a main wind-way connected to the bellows and normally subjecting the same to pressure, valves open to the atmosphere to control the connection between the bellows and the wind-way, and a pivoted bar having devices for contact with the edge of the sheet and controlled by the frictional drag of the edge of the sheet thereon exerted in the direction of movement of the sheet for initiating operation of said valves.

15. In a musical instrument employing a traveling note sheet, means for effecting the lateral displacement of the note sheet, a pivoted bar having devices for contact with the edge of the sheet and controlled by the frictional drag of the edge of the sheet thereon exerted in the direction of movement of the sheet, devices acted upon by said bar to initiate operation of said means, and spring-pressed studs engaging said pivoted bar at opposite sides of its pivot to hold it yield-

ingly out of engagement with said last named devices.

16. In a musical instrument employing a traveling note sheet, a rewind mechanism including a clutch, motor bellows and devices operated thereby to maintain the sheet in its normal path of travel, air ducts to control the bellows, a controlling member for said air ducts, independent air ducts to place said bellows in inactive condition during the rewind, and a valve connected operatively to said clutch to control said last named ducts, whereby upon throwing of the clutch the ducts are opened.

17. In a musical instrument employing a traveling note sheet, bellows to maintain the sheet in its normal path of travel, means to place said bellows in inactive condition during rewind, and a spring coöperating with the bellows to hold them in centralized position during rewind.

18. In a musical instrument employing a traveling note sheet, means for effecting the lateral displacement of the note sheet, a controlling member having devices for contact with the edge of the sheet and controlled by the frictional drag of the edge of the sheet thereon exerted in the direction of movement of the sheet, and means independent of the sheet for restoring the controlling member to normal inoperative position.

This specification signed this 14th day of February, A. D. 1917.

JOHN A. WESER.

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