C. S. BURTON.

TRACKER FOR AUTOMATIC MUSICAL INSTRUMENTS.

APPLICATION FILED SEPT. 3, 1910.

1,033,871.

Patented July 30, 1912.

3 SHEETS—SHEET 1.

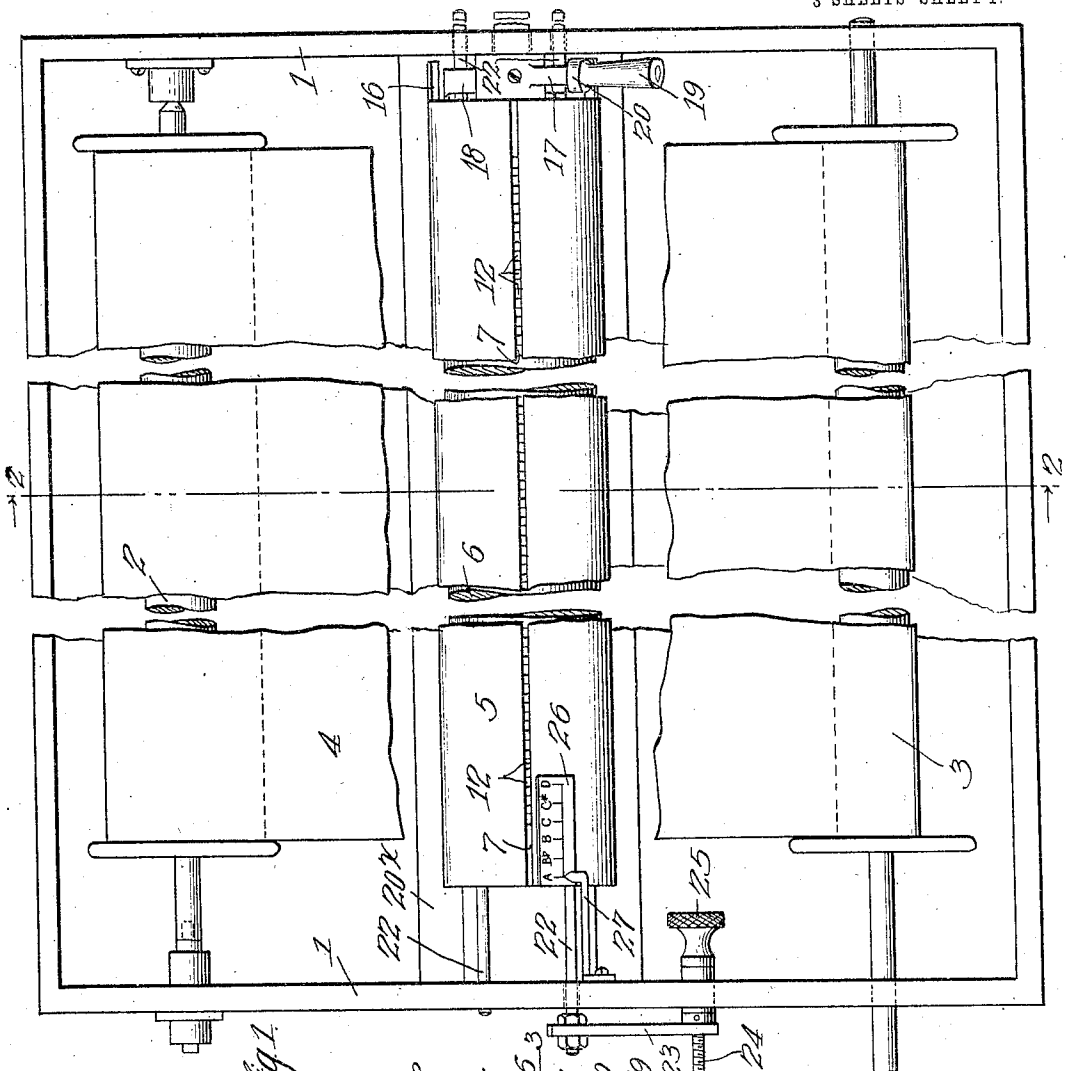

Fig. 1.

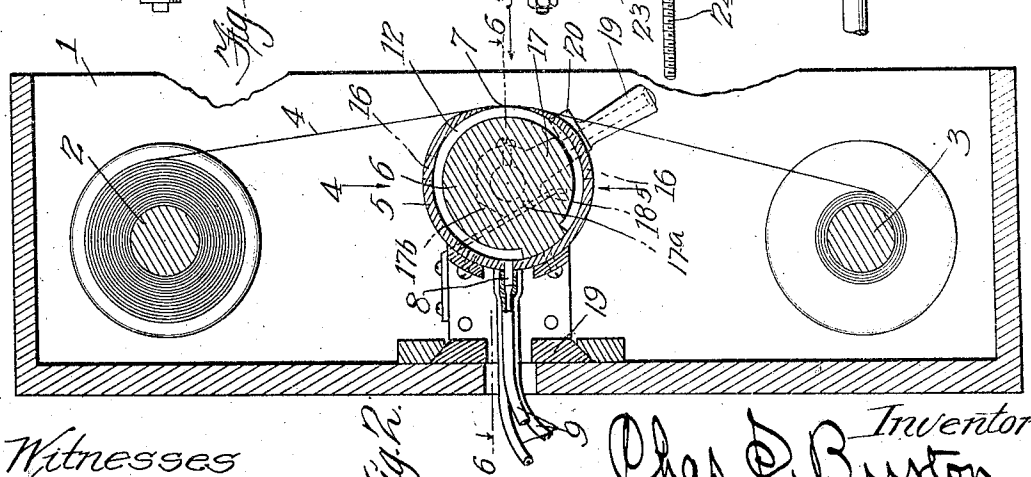

Fig. 2.

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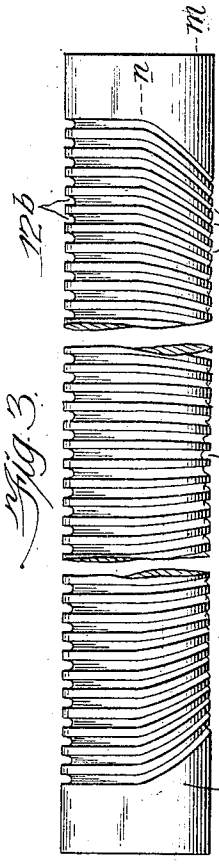

Fig. 3.

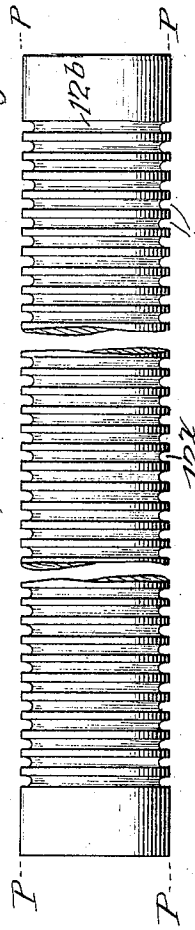

Fig. 4.

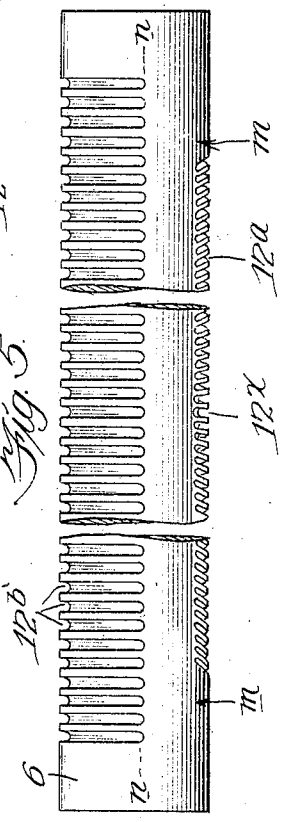

Fig. 5.

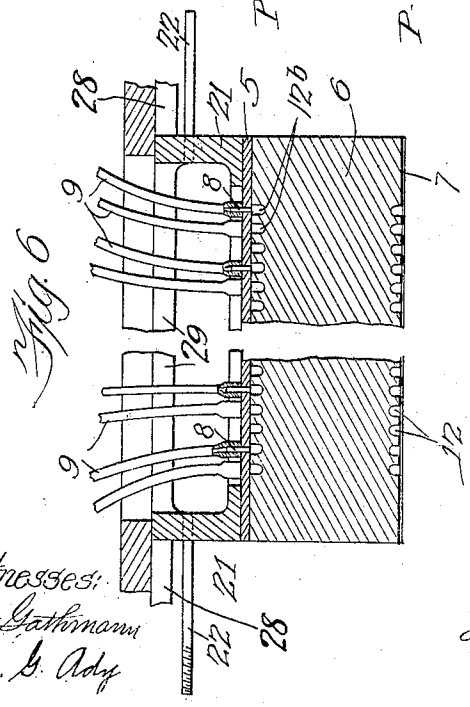

Fig. 6.

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3 SHEETS—SHEET 3.

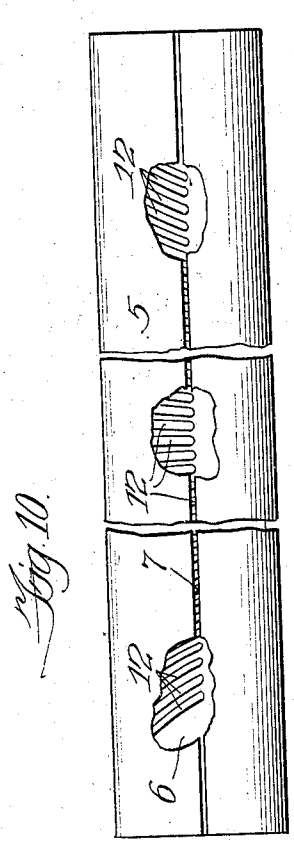

Fig. 10.

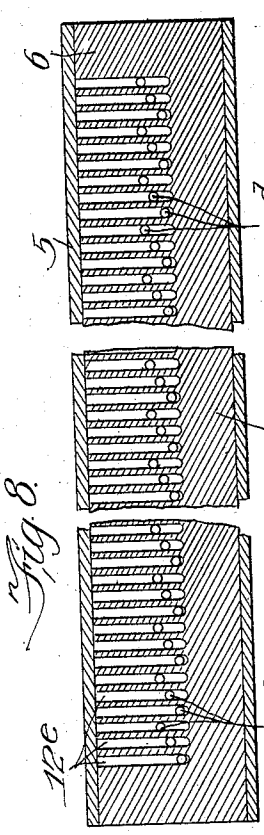

Fig. 8.

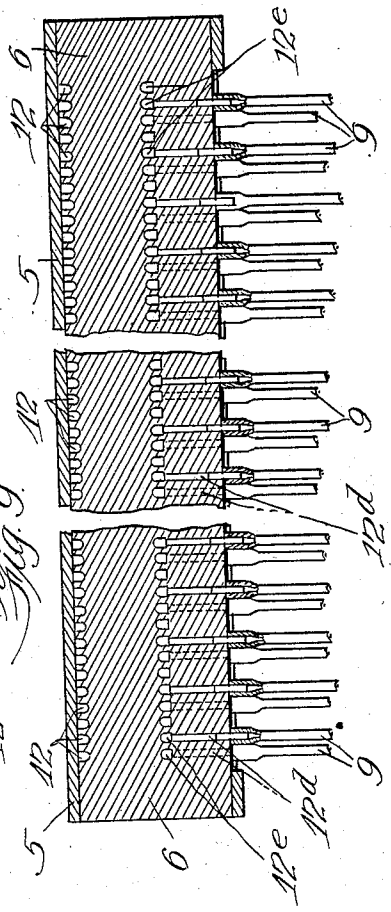

Fig. 9.

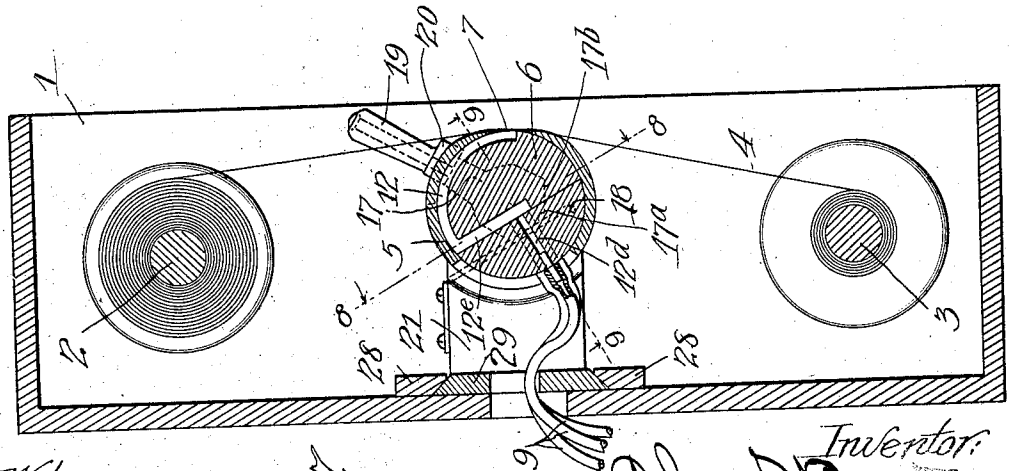

Fig. 7.

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UNITED STATES PATENT OFFICE.

CHARLES S. BURTON, OF OAK PARK, ILLINOIS.

TRACKER FOR AUTOMATIC MUSICAL INSTRUMENTS.

1,033,871. Specification of Letters Patent. Patented July 30, 1912.

Application filed September 3, 1910. Serial No. 580,402.

To all whom it may concern:

Be it known that I, CHARLES S. BURTON, a citizen of the United States, residing at Oak Park, in the county of Cook and State of Illinois, have invented new and useful Improvements in Trackers for Automatic Musical Instruments, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

The purpose of this invention is to provide an improved construction of the tracker bar for automatic musical instruments adapted to be employed with note sheets made upon different scales, that is, in which the note features are differently spaced, whether the difference is one which is caused in the original manufacture of the sheets or is one which arises or is liable to happen from expansion or contraction of the sheets due to atmospheric conditions.

It consists of the elements and features of construction generally and described as indicated in the claims.

In the drawings:—Figure 1 is a front elevation embodying this invention comprising the tracker and its supporting frame, the tracker and roll carriage and the note sheet rolls thereof. Fig. 2 is a section through line 2—2 of Fig. 1. Figs. 3, 4 and 5 are elevations of the rotatable members of the tracker looking in the direction of the arrows 3, 4 and 5, respectively, of Fig. 2. Fig. 6 is a section at the line 6—6 of Fig. 2. Fig. 7 is a view similar to Fig. 2, showing a modification. Fig. 8 is a section at the line 8—8 of Fig. 7. Fig. 9 is a section at the line 9—9 of Fig. 7. Fig. 10 is the front elevation of the modified form of the tracker device shown in Fig. 7.

In the structure shown in the drawings 1—1 are the side brackets or cheeks of the frame structure in which the tracker and note sheet roll and take up roll are mounted, commonly called the roll carriage or tracker frame.

The note sheet roll is represented at 2; the take up roll is represented at 3 and 4 is the note sheet. The tracker comprises an exterior member 5 and an interior member 6. The exterior member is hollow and interiorly cylindrical having a longitudinal rift 7 at the side over which the note sheet 4 passes, and having formed in it at a position circumferentially considerably removed from the rift 7, apertures at which are connected nipples 8 for the flexible tubes 9 which lead to the pneumatic action, not shown. These apertures for nipples are preferably in a plurality of rows in a staggered arrangement for the familiar purpose of obtaining more adequate space for the nipple connection.

The interior member 6 is exteriorly cylindrical and fits within the outer member snugly for relative rotation. In the forms illustrated, the inner form is rotated. This member may be supported as illustrated only on the outer member, though if desired it may be provided with an axle or trunnions journaled or mounted in the cheeks.

The rotatable inner member 6 has grooves, 12, for air channels extending around or partly around it. These grooves, starting at the longitudinal line *m—m*, are spaced from each other at uniform distances from center to center, corresponding to the most closely spaced note sheets with which the device is designed to coöperate. As is well understood, at the present time about 1/9 of an inch is the standard spacing of the apertures of note sheets of all automatic musical instruments which are arranged for playing eighty eight notes or more within a total compass or width of note sheet which is regarded as the narrowest practicable; and in the drawings the grooves, 12, may be taken as spaced 9 to the inch at their commencement at the longitudinal line *m—m*, and they diverge thence around said tracker member to the line *n—n*. The middle groove, $12^{\times}$, extends around the tracker member, 6, in a plane directly transverse to the axis of the grooves or air channels, 12. At the right of the groove $12^{\times}$ the grooves 12 diverge from each other to the right as they extend around the tracker member 6 to the line *n—n*, and the grooves at the left to said middle groove $12^{\times}$ similarly diverge to the left as they thus extend around the member 6 to the line *n—n;* and thereby the entire system of said grooves or channels, 12, are spaced at the line *n—n* at a uniform distance apart, corresponding to the widest scale for which the tracker is designed to be adapted, this scale being on the basis of 6 to the inch, *i. e.* the grooves being at the line *n—n* $\frac{1}{6}$ of an inch apart measuring from center to center. From the line *n—n* to the line *p—p*, all the grooves extend parallel around the member 6 and in a plane directly transverse to the axis of said member, and at this part of

their length said grooves are therefore spaced on the wider scale of 6 to the inch.

The nipple apertures of the exterior of the fixed member 5 of the tracker are spaced longitudinally of the tracker, according to the wider scale, and are positioned so that they register with the air channels or grooves 12 at the line *n*—*n* and from that line to the line *p*—*p*. For convenience of reference the portions of the air channels or grooves 12 between the lines *m*—*m* and *n*—*n* will be referred to by the reference character 12^a and the portion of said grooves between the lines *n*—*n* and *p*—*p* will be referred to by the reference character 12^b.

The side of the fixed member 5 of the tracker at which the longitudinal rift or slot 7 is formed is chamfered or flattened to bevel the margin of the slot which is thereby bounded by knife edges, the plane of the outer surface of the outer member being at this point approximately tangent to the cylindrical surface of the circumference of the inner member which is exposed at the slot, and in so far as it diverges from perfect tangency, being positioned between the tangent plane and said cylindrical surface of the inner member, so that the note sheet flexed over the tracker at the slot, will be certain to rest in contact with the portion of the surface of the inner member of the tracker, which is exposed at the slot or rift 7 of the outer member between the knife edges of said slot.

Upon consideration of the structure described it will be evident that by rocking or turning the inner member of the tracker within the outer member through the arc lying between the lines *m*—*m* and *n*—*n*, the mouths formed by the slot 7 in the outer member 5, crossing the grooves 12 of the inner member, will be spread from the minimum scale of 9 to the inch to the maximum scale of 6 to the inch. It will also be evident that the spacing of these mouths can be adjusted to any intermediate scale by correspondingly limited rotation of the inner member.

It is well known that the paper on which perforated note sheets for musical instruments are commonly made is liable to expansion and contraction by change of moisture in the atmosphere, such change having the effect of changing the scale or spacing intervals of the rows or lines of apertures of the note sheet. The change is very slight at each interval but sufficient in the entire width of the sheet to defeat accurate rotations of the perforations of the paper with the duct mouths of the tracker, and accurate playing is liable to be defeated by such expansion and contraction of the note sheet, causing misregistration or imperfect registration of the apertures with the tracker mouths. Obviously the above described tracker affords a perfect means of overcoming this difficulty of the expansion or contraction of the note sheet, since any amount of change in the perforations and the apertures in the note sheet can be accomplished by proper amount of rotation of the rotatable member (6) of the tracker in one direction or the other, according to whether the paper is expanded or contracted from its normal width.

Since it will usually be desired to adjust the device only for the two extremes, that is for the two standard scales in common use, there are provided on the outer member or on the cheeks or on one of them, that is upon any part with respect to which the inner member turns in its adjustment from one position to the other, stops 16—16, against which a lever handle, 17, attached to the inner member 6, of the tracker is stopped at the two opposite limits of the rocking or turning movement of said member.

Preferably in order to insure the member 6, stopping accurately at the limits a flat spring, 18, is made fixed at one end to a fixed support on one of the cheeks, and at the other end bears against the periphery of the hub of the handle, 17, which has flat sides, 17^a, and 17^b, at an angle to each other corresponding to the angle through which the member 6, is rocked from one limit to the other, so that when either limit is approached the spring tends to complete the movement of the lever. In order to provide for the slight adjustment which may be desirable for controlling the expansion and contraction of the note sheet, there is mounted upon the lever arm, 17, a sleeve, 19, which constitutes the handle and which has an eccentric flange 20, at the inner end, the sleeve turning snugly upon the stem of the lever, and the eccentric flange bearing against the stop, 16, against which the lever rests at either limit. By rotating the sleeve the lever will be crowded back from the stop or allowed to approach it more closely, according to the direction of the rotation of the sleeve on the stem from its normal position thereon which is made to correspond to or properly position the handle for note sheets of normal width, that is, neither expanded nor contracted, when the stop is encountered by the flange at a point in the circumference of the latter intermediate its least and greatest eccentricity. A similar form of the same device which may be found equally effective in some situations is shown in Figs. 7, 8, 9, and 10. In this form the grooves 12 in the inner member 6 are made divergent between lines *m*—*m* and *n*—*n* as in the form already described, but said grooves have no portion corresponding to the portion 12^b of the grooves in the first form. Instead of continuing the grooves in said parallel portions there are formed, leading in from the wide

spaced ends of the groove, ducts, 12d, which connect with their respective continuations 12e, the latter emerging at a point upon the surface of the member 6, circumferentially distant from the ends of the grooves 12 as far as the extent of the rocking movement necessary to shift said diverging grooves 12 past the slot or rift 7 of the outer member to change the mouth by placing from narrowest to widest; and at the emerging ends of said ducts flexible tubes 9 are connected by nipples as shown. With this modified construction the flexible tubes are necessarily given enough slack to accommodate the changed positions due to their being carried by the member 6 in its rocking movement.

When the tracker as a whole is to be made adjustable endwise,—transversely of the travel of note sheet,—for transposition of the music, the preferable method is to mount the outer member of the tracker in a roll carriage for the desired movement. Such mounting is shown in the drawings, the member 5 being rigid with a base 29 which is dove-tailed into slide bearings 28—28 on the back wall of the roll carriage and has standards 21 to which the member 5 is secured at the end portions of the latter. The customary means are provided for moving endwise the base and the tracker mounted on it; said means, consisting of spindles or stems 22—22 in the cheeks 1 of the roll carriage, one of said stems having an arm 23 which is engaged with the threaded shaft or spindle 24, journaled into the cheek and operated by a thumb nut 25, the transposition effected by this rotation being indicated on the scale 26 fixed on the tracker and the fixed pointer 27 mounted on the cheek.

I claim:—

1. A tracker device for automatic musical instruments comprising an external member having a longitudinal slot and an internal member having a set of surface grooves, one for each note, extending transversely with respect to the slot of the outer member and having an outlet for communication with a pneumatic, the crossings of the slot and the grooves constituting the tracker duct mouths.

2. A tracker device for automatic musical instruments comprising an external member having a longitudinal slot and an internal member having a set of surface grooves crossing the slot and having each an outlet for communication with a pneumatic, the crossings of the slot and grooves constituting the tracker duct mouths; said outer member having its surface adjacent to the lateral margins of the slot in a plane tangent to the grooved surface of the inner member at said margins respectively.

3. A tracker device for automatic musical instruments comprising an outer member having a longitudinal slot and an inner member having a set of surface grooves crossing the slot and having each an outlet for communicating with a pneumatic, the crossings of the slot and grooves constituting the tracker duct mouths; said grooves of the inner member being all equally spaced apart from center to center at a certain longitudinal line of the surface of said inner member and thence diverging from each other uniformly, whereby they are equally but more widely spaced apart at all other longitudinal lines in said surface and means for moving the inner member with respect to the outer member transversely of the slot of the outer member.

4. A tracker device for automatic musical instruments comprising an exterior member having a longitudinal slot and an inner member having a set of grooves crossing the slot of the outer member and having an outlet for communication with a pneumatic, such crossings of the slot and grooves constituting the tracker duct mouths, such grooves being splayed or diverged from each other as they extend transversely over the slot from a certain line, one of the two members being movable transversely of the slot.

5. A tracker device for automatic musical instruments comprising an interior cylindrical rotatable member having in its cylindrical surface grooves starting at a longitudinal line at which they are all equally spaced apart and diverging from each other as they depart from said line uniformly, whereby they are all equally spaced apart at all longitudinal lines in said cylindrical surface parallel to the starting line, said grooves having each an outlet for communication with a pneumatic and an outer or cover member in which said cylindrical member is fitted for rotation therein, having a longitudinal slot crossing the grooves of the rotatable member, the crossings constituting the tracker duct mouths, and means for rotating the inner member in the outer member.

6. A tracker device for automatic musical instruments comprising two members, one fixed and the other rotatable, one of said members being a cylinder having circumferentially extending grooves in its cylindrical surface which are equally spaced apart at all directly longitudinal lines crossing them and having each an outlet for communicating with a pneumatic, the other member having a cylindrical seat or cavity in which the first member fits, and having a longitudinal slot crossing the grooves of the other member, such crossings constituting the tracker duct mouths.

7. A tracker device for automatic musical instruments comprising an interior member and an exterior member mounted upon each other for relative rotation, means for supporting said members and for relatively ro-

tating them about their common axis, the interior member having grooves in its surface which seats upon the exterior member extending divergently from each other from a certain longitudinal line through a certain arc of the cylindrical surface, and thence extending parallel to each other through a further arc substantially equal to the first, the outer member having at one side a longitudinal slot crossing the grooves of the interior member, such crossings constituting the tracker duct mouths, and having at an angular distance from said grooves as great as the angular distance occupied by the divergent portions of the grooves of the interior member, out-leading apertures for communication with pneumatics, said apertures being positioned for registration with the parallel portions of the said air channels respectively.

8. A tracker device for automatic musical instruments comprising a fixed exterior member and a rotatable interior member fitted within said exterior member for rotation therein, the exterior member having a longitudinal slot, the interior member having circumferentially extending grooves crossing such slot and which from a certain longitudinal line diverge through a certain arc of the cylindrical surface of said interior member and then extend parallel to each other through a certain additional arc substantially equal to the first, such crossings constituting the tracker duct mouths, the outer member having at an angular distance from said longitudinal slot substantially equal to the angular extent of the diverging portions of said air channels, outleading apertures for communication with pneumatics and registering with the parallel portions of said channels respectively, and means for rocking the interior member in its seat in the exterior member through substantially said angle.

9. A tracker device for automatic musical instruments comprising an exterior member and an interior cylindrical member, fitted within said exterior member for relative rotation, the exterior member having a longitudinal slot; the interior member having circumferentially extending grooves crossing said slot and having each an outlet for communicating with a pneumatic, which said grooves from a certain longitudinal line diverge through a certain arc of the cylindrical surface of said interior member, such crossings constituting the tracker duct mouths, a stop on the end of one member and two stops on the other member angularly separated a distance substantially equal to the angular extent of the divergent grooves and a spring device fixed at one end with respect to one member and operating at the other end upon the other member for rocking the latter member to either limit when it has been moved toward said limit past the point at which the spring presses toward the axis.

10. A tracker device for automatic musical instruments comprising an exterior member and an interior cylindrical member fitted within said exterior member for relative rotation, the exterior member having a longitudinal slot, the interior member having circumferentially extended grooves crossing said slot and having each an outlet for communicating with a pneumatic, which said grooves from a certain longitudinal line diverge through a certain arc of the cylindrical surface of said interior member, said crossing constituting the tracker duct mouths, a single stop on one member and stops between which it moves on the other member in relative rotation of the one with respect to the other, means for yieldingly holding members with their respective stops in contact at either limit; an eccentric cam mounted on said single stop for making the contact with the other stop and means for rotating the cam at will to relatively adjust the stops with each other.

11. A tracker device for automatic musical instruments comprising an interior and an exterior member mounted upon each other for relative rotation about the axis of the interior member, the exterior member having a longitudinal slot, the interior member having in its surface which seats in the outer member grooves crossing said slot, which said grooves commencing at a certain longitudinal line diverge from each other through a limited arc of the cylindrical surface of said interior member and thence extend parallel to each other through a further arc of said surface substantially equal to the first, the exterior member having at an angular distance from its said slot substantially equal to that occupied by the divergent portion of said grooves of the interior member, outleading apertures for communicating with pneumatics which said apertures register with the parallel portions of said air channels respectively; the exterior surface of said exterior member extending from both parallel margins of its said slot being substantially tangent to the cylindrical surface of the inner member.

In testimony whereof, I have hereunto set my hand at Chicago, Illinois, this 1st day of September, 1910.

CHARLES S. BURTON.

Witnesses:
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M. G. ADY.