S. L. FISHER.

MUSIC ROLL SPINDLE.

APPLICATION FILED NOV. 9, 1916.

1,402,060.

Patented Jan. 3, 1922.

2 SHEETS—SHEET 1.

Fig. 1.

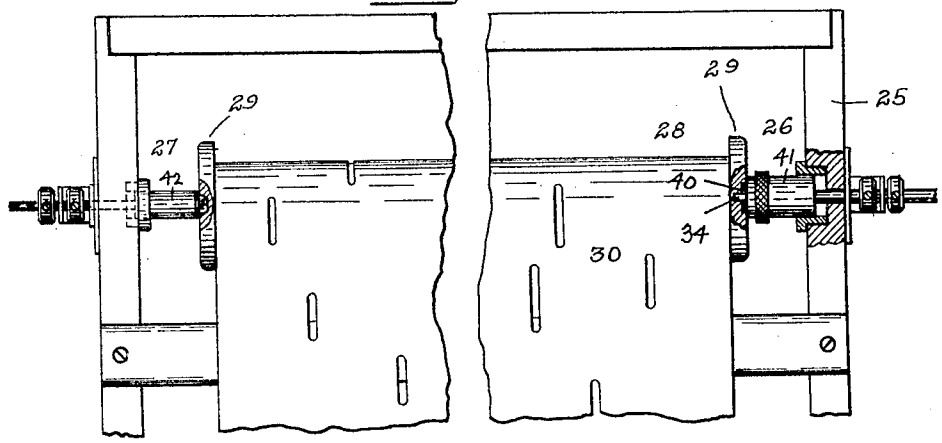


Fig. 2.

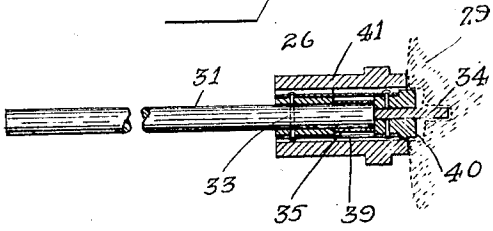


Fig. 3.

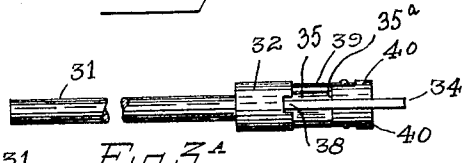


Fig. 3A.



Fig. 4.

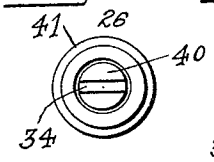


Fig. 5.

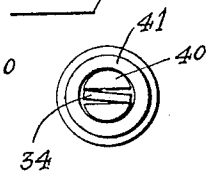


Fig. 7.

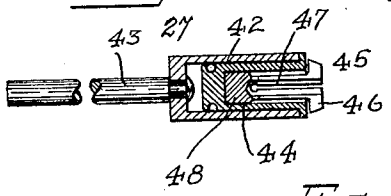


Fig. 8.

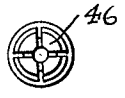


Fig. 6.

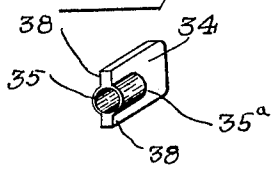
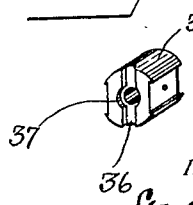


Fig. 6A.



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2 SHEETS—SHEET 2.

Fig. 9.

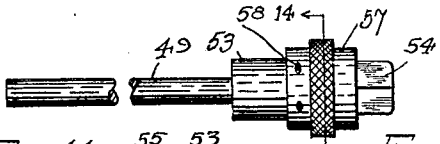


Fig. 10.

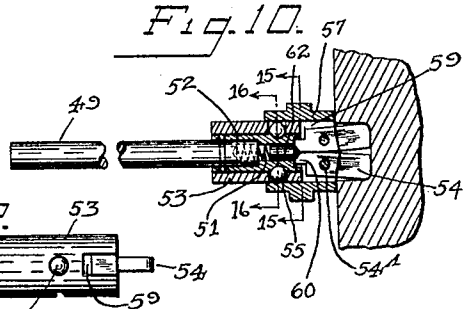


Fig. 11.

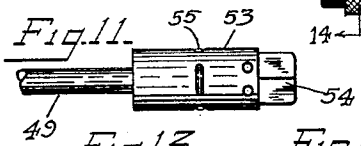


Fig. 12.

Fig. 13.

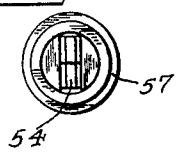


Fig. 14.

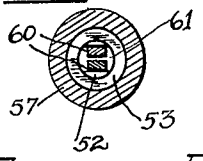


Fig. 15.

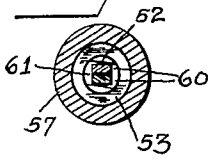


Fig. 16.

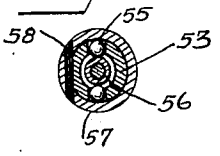


Fig. 17.

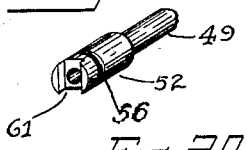


Fig. 18.

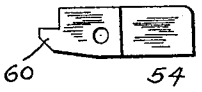


Fig. 19.

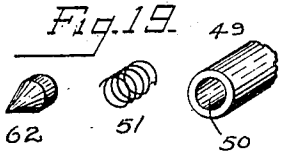


Fig. 20.

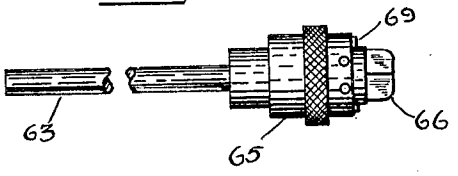


Fig. 21.

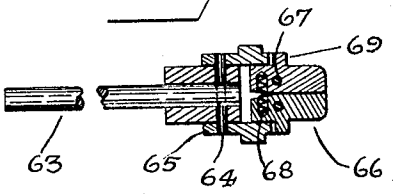


Fig. 22.

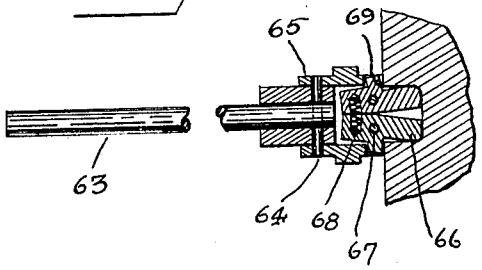
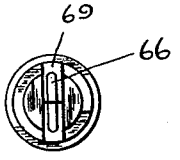


Fig. 23.



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STANLEY L. FISHER, OF CHESTER, CONNECTICUT, ASSIGNOR TO THE PRATT READ PLAYER ACTION COMPANY, OF DEEP RIVER, CONNECTICUT, A CORPORATION OF CONNECTICUT.

MUSIC-ROLL SPINDLE.

1,402,060. Specification of Letters Patent. Patented Jan. 3, 1922.

Application filed November 9, 1916. Serial No. 130,469.

To all whom it may concern:

Be it known that I, STANLEY L. FISHER, a subject of the King of Great Britain, residing in Chester, county of Middlesex, State of Connecticut, have invented certain new and useful Improvements in Music-Roll Spindles, of which the following is a full, clear, and exact description.

This invention relates to spindles for holding and rotating music rolls or spools in self-playing pianos or the like, and it has special reference to means for mounting an eighty-eight note music roll of standard type having relatively shallow sockets in the heads thereof. These sockets are engaged by corresponding supporting spindles, and one of the sockets (usually that located at the right of the spool box) is provided with a diametrical groove or mortise adapted to be engaged by a tenon or lip on the corresponding spindle so that the roll may be positively rotated when the spindle is turned by the usual motor in rewinding.

It is well known that the sockets in the ends of music rolls may be of greatly varying sizes, and hence the supporting spindles, which of necessity must be small enough to fit the smallest socket, do not fit the larger sockets accurately. This inaccuracy results in the roll dropping or shifting about on the spindles, particularly when it is being rewound, which causes a noticeable and distressing knocking, chattering or pounding.

One of the primary objects of the present invention is to overcome this drawback, and to furnish what might be called a compensating spindle which will snugly fit music roll sockets of varying sizes within certain limits, so as to avoid any looseness or chattering.

Another object of the invention is to furnish a music roll spindle having a socket engaging portion, which is expansible automatically by the rotation of the music roll, thereby causing the socket to be snugly and firmly engaged by the spindle without the necessity of any manual adjustment.

A still further object which I have in view is the provision of a driving spindle with diametrically expanding parts, and means for causing said parts to be firmly engaged with the side wall of the driving socket automatically on the rewinding of the roll.

To these and other ends, the invention consists in the novel features and combinations of parts to be hereinafter described and claimed.

In the accompanying drawings,

Fig. 1 is a fragmentary front elevation of a spool box having diametrically expansible spindles;

Fig. 2 is an enlarged longitudinal section of the driving spindle shown in Fig. 1;

Fig. 3 is a side elevation of the driving spindle, with the enclosing shell or barrel detached;

Fig. 3^{A} is a view similar to Fig. 3, with the driving tenon or lip omitted;

Fig. 4 is an end view of the driving spindle, showing the position of the parts when the roll is at rest;

Fig. 5 is a similar view, showing the spindle in the expanded position, which it occupies in a comparatively large diametered music roll socket when the roll is rotated;

Fig. 6 is a detail perspective view of the driving tenon;

Fig. 6^{A} is a detail of the tenon-rotating block.

Fig. 7 is a longitudinal section of the supporting spindle or so-called left-hand spindle;

Fig. 8 is an end elevation of Fig. 6;

Fig. 9 is a side elevation of an expansible driving spindle of modified form, showing the parts in the normal position;

Fig. 10 is a longitudinal section through the spindle shown in Fig. 9, illustrating the operation thereof in engaging the music roll;

Fig. 11 is a side elevation of the spindle shown in Fig. 9, with the outer shell or sleeve omitted;

Fig. 12 is a view similar to Fig. 11, but taken at right angles thereto;

Fig. 13 is an end view of the spindle shown in Fig. 9;

Figs. 14, 15 and 16 are transverse sections on lines 14—14 of Fig. 9 and 15—15 and 16—16 of Fig. 10 respectively;

Fig. 17 is a detail perspective view of the member for expanding the tenon;

Fig. 18 is an enlarged detail view of one of the tenon sections or jaws;

Fig. 19 is a detail perspective view of additional parts, as hereinafter described;

Fig. 20 is a side elevation of a driving spindle of still further modified form;

Fig. 21 is a longitudinal section of this

last-mentioned spindle, showing it in the normal position;

Fig. 22 is a longitudinal section, showing the same spindle in the operating position; and

Fig. 23 is an end view of the spindle shown in Fig. 20.

Referring to the drawings, and more particularly to Fig. 1, 25 is a spool box of usual construction, having a supporting and driving spindle 26 at the right hand end, and a supporting spindle 27 at the left hand end. These spindles are adapted to support a music roll 28 having socketed heads 29 and a note sheet 30. The music roll selected for illustration is of the standard eighty-eight note type, having heads with relatively shallow sockets therein, the socket at the right hand end being provided in the bottom thereof with a diametrical groove or mortise to engage a driving lip on the spindle 26, as hereinafter described, while the socket at the left hand end is of frusto-conical form to fit the correspondingly shaped inner end of the supporting spindle 27. In the particular form shown, both of the spindles 26, 27 are mounted for longitudinal movement in the walls of the box, and suitable mechanism (not shown) is provided for holding the spindles in engagement with the music roll.

However, I desire to have it understood that my improvements are not limited to a device in which both spindles are mounted for longitudinal movement.

The detailed construction of the spindle 26 is shown in Figs. 2–6[A] inclusive. This spindle comprises a shaft or arbor 31, on which a small block 32 is rigidly secured adjacent the inner extremity of the shaft. In the particular example shown, the block is secured by a pin 33. The shaft extends through the block, and the inner end of the former projects out of the block to form a bearing for a driving lip or tenon 34, shown in detail in Fig. 6. The tenon comprises a flat plate having a sleeve 35 formed integral with the same at the rear part thereof, and at the center of the tenon, which sleeve fits snugly over the protruding end of the shaft 31. At that face which is disposed adjacent the inner protruding end of the shaft, the block 32 is provided with a diametrical recess 36, which has an enlarged curved intermediate portion 37 around the shaft to receive the rear extremity of the sleeve 35, and the grooves or recess portions on opposite sides of the shaft are adapted to accommodate the shoulders 38 of the tenon located on opposite sides of the sleeve. The recess 36 is, however, of greater width than the shoulders 38 of the tenon, so that the tenon may have a limited turning movement on the shaft when the end of the tenon is accommodated in the recess in the block. Mounted on opposite sides of the block 32 and extending inwardly therefrom (in reference to the music roll) are light leaf springs 39, which, in the present instance, are secured to the block by the same pin 33 which secures the block to the shaft, although of course this is not essential. At its inner end, each of the springs 39 carries a small block 40 of approximately semicylindrical form, said blocks being located on opposite sides of the tenon 34, and having their rear faces abutting the forward extremity 35[a] of the sleeve 35. In this manner, longitudinal movement of the tenon relatively to the shaft 31 is prevented when the parts are in the normal position, because movement of the tenon in one direction is prevented by the block 32, whereas movement in the opposite direction is prevented by the blocks 40. The tenon can, however, be placed in and removed from the assembled position by spreading apart the spring supported blocks or jaws 40, as will be understood.

Surrounding the blocks 32 and 40 is a cylindrical enclosing shell or barrel 41 which may be slipped over the parts shown in Fig. 3 into the position shown in Fig. 2, and which can be held in the assembled position in any convenient manner, for example, by the frictional engagement between the inner surface thereof and the block 32. At the inner end of the shell or barrel 41, the blocks 40 protrude from the shell to a slight extent, and the tenon in turn protrudes beyond the blocks 40. Where the shell 41 surrounds the blocks 40, the diameter of its bore or opening is somewhat greater than that of the spindle projection formed by the two blocks 40 in conjunction with the tenon 34 when the blocks 40 are held in contact with opposite surfaces of the tenon by the springs 34. This permits the blocks 40 to be separated by turning movement of the tenon and the shaft relatively to each other. When the shaft and the tenon are turned relatively to each other to the extent permitted by the recess 36 in the block 32, one side edge of the tenon will engage one side edge of one of the blocks 40, while the opposite side edge of the tenon will engage the opposite side edge of the other block, so as to spread said blocks apart, as shown in Fig. 5. The blocks 40 form in conjunction a protruding hub portion back of the protruding part of the tenon, which is normally contracted by the springs 39, but which is laterally expansible by the tenon as the tenon and shaft are turned relatively to each other. This expansible hub portion is of approximately cylindrical shape and is adapted to engage the cylindrical part of the music roll socket.

The spindle is made of such size that when the blocks or jaws 40 are pressed

against the tenon 34, the expansible hub or trunnion formed by said blocks will readily enter the smallest music roll sockets to which the spindle is intended to be adaptable. Where the music roll spindle is of minimum diameter, the hub or trunnion will fit said socket while in the contracted position. Supposing, however, that the hub formed by the jaws 40 fits the socket quite loosely, which is often the case, the music roll will have more or less play upon the spindle. This is taken up automatically, however, by my invention, for when the playing of the music is commenced, friction applied to the shaft 31 (in the customary manner) while the music roll is being unwound, for the purpose of keeping the note sheet taut, results in a considerable turning moment being exerted on the tenon 34 by virtue of its engagement in the diametrical mortise or groove of the corresponding music roll socket, and by virtue of the rotation of the music roll from the usual take-up spool. In this manner, the tenon and shaft are caused to move angularly relatively to each other so that the tenon will expand the hub formed by the members 40, and will cause it to fit snugly the cylindrical part of the music roll socket. Thus, the music roll is effectively centered relatively to the axis of the spindle, and all knocking or pounding during the playing of the composition is prevented. In rewinding the music roll, also a firm and positive engagement of the hub portion of the spindle with the roll socket is obtained, for, in this case, the force required for rotating the roll rapidly is transmitted through the spindle itself, and the tenon will "lag" to a certain extent, and in doing so will expand the spindle diametrically in a positive and efficient manner.

The spindle 27 at the left of the spool box is preferably constructed in the manner shown in Figs. 7 and 8. A barrel 42 secured to the end of the shaft 43 contains a bushing 44, in which is inserted an expansible spindle-engaging member 45. This member 45 consists of a head 46 divided radially into segments, each segment being mounted resiliently on a spring arm 47 carried by a plug 48. The normal position of the head is shown in Fig. 8, but it will be obvious that the spring mounting of the segments permits the head to be contracted to a smaller diameter when the same is engaged by the corresponding music roll socket. It will be apparent, therefore, that the spindle 27 will snugly fit left hand roll sockets of varying dimensions within certain limits.

In Figs. 9–19 inclusive, I show a modified form of right hand driving spindle embodying my invention. Here, instead of having an expansible hub portion on the spindle, I provide an expansible tenon or lip. The tenon is movable angularly to a slight extent with respect to the supporting shaft, and as said movement occurs, the tenon is expanded laterally to engage the end surfaces of the mortise or groove of the music roll socket. In this form, the inner extremity of the shaft 49 is provided with a socket 50 for a small coiled spring 51, and an extension 52 in the form of a tube is pinned or otherwise rigidly secured to the end of the shaft. As shown in Fig. 10, the right hand end of the tubular extension extends beyond the end of the shaft. This extension forms a bearing for a sleeve-like member 53 (Figs. 11 and 12) which carries a laterally expansible tenon 54. The sleeve 53 encloses the member 52 and the rear end portion of the tenon, and is locked against longitudinal movement with reference thereto by suitable means which permits the relative rotation of the extension and sleeve. In the particular form shown, this means consists of balls 55 engaging openings formed in the wall of the sleeve 53 at opposite points and extending into a circumferential groove 56 formed on the outer surface of the extension 52 intermediate of its ends (Fig. 17). The balls 55 are held in place by another sleeve member 57 which surrounds the inner end of the sleeve 53, and is suitably secured thereto, for example, by a pin 58.

The sleeve 53 is provided at its forward end with a diametrical kerf 59 in which the tenon 54 is received. This tenon is made in two sections, being split longitudinally in a plane perpendicular to the general plane thereof. Each section of the tenon is pivoted intermediate of its length in the kerf 59 by a pin 54A. The butt ends of the sections are somewhat wider than the free ends thereof, as shown in Fig. 12. Each tenon section is provided at the rear end with a rearward extension 60 which enters a diametrical groove or recess 61 in the forward end of the extension 52. The rear extremities of the tenon sections are of less width than this groove. They are adapted to be spread apart by a wedge member 62 in the form of a small cylinder guided in the end of the extension 52, and acted upon by the spring 51 previously mentioned, socketed in the extremity of the shaft proper. The tendency of this spring is to thrust the conical head of the wedge member 52 between the rear extremities of the tenon sections to such an extent that the forward ends of said sections are held in contact with each other. In this position of the parts, the tenon is of the usual configuration, having its side edges parallel with each other. When, however, the shaft 49 is turned relatively to the sleeves 53 and 57, diagonally opposite portions of the recess or groove 61 are moved into engagement with the respective corners of the tenon portions 60, thereby pressing said

tenon portions toward each other in opposition to the spring pressed wedge. In this manner, the forward ends of the tenon sections are separated from each other by the rocking movement of said sections on the pivots 54A and the side edges of the tenon are adapted to move into snug engagement with the end surfaces of the mortise in the music roll. When the sleeve 57 is oscillated relatively to the shaft 49, or vice versa, the protruding end of the tenon is alternately contracted and expanded in a lateral direction, as will be obvious.

The operation of this last described form of spindle will be more or less obvious. In playing the piece of music, the usual braking action on the shaft 49 will cause the same to lag behind the sleeve members 53, 57 carrying the tenon, and by the relative turning movement of the tenon and the extension 52, the tenon is expanded in opposition to its closing spring, as previously described. In this manner, it is caused to engage tightly with the ends of the mortise in the music roll, so as to prevent knocking or chattering. In rewinding the music roll, the shaft 49 is positively driven, and the sleeve member carrying the tenon lags behind the shaft with the same results previously noted.

In Figs. 20–23 inclusive, I have shown a still further modified form of driving spindle of the laterally expansible type. In this construction, the shaft 63 has connected to its end by a pin 64 a sleeve 65, on the forward end of which are pivoted tenon sections 66 by pins 67 located intermediate of the length of the respective sections. A spring 68 interposed between the butt ends of the tenon sections spreads said ends apart to such an extent as to maintain the outer side edges of the respective tenon sections in approximate parallelism with each other. A shoulder 69 carried by each tenon section intermediate of its length, and projecting exteriorly of the sleeve, is adapted to engage the end face of the music roll around the socket engaged by the forward portion of the tenon. When the tenon is socketed in the roll head with the forward ends of the tenon sections in engagement with the mortise in the roll head socket, the end face of the roll will press against the shoulders 69 to such an extent as to tilt the tenon sections slightly on their pivots in such a direction as to spread apart the forward ends of the sections, which are thereby caused to tightly engage the end surfaces of the mortise.

Various changes may be made in the details of the construction without departing from the scope of the invention as defined in the claims.

What I claim is:—

1. In a musical instrument, a spool box, a music roll provided with a socket and a music roll spindle mounted in said box and having laterally expanding means for tightly engaging the side wall of the music roll socket so as to prevent chattering.

2. A music roll spindle provided with expansible means to engage the socket of a music roll, said means being held against rotation relatively to said spindle.

3. In combination, a music roll and a music roll spindle, said spindle comprising relatively movable members, and expanding roll-engaging means actuated by the relative movement of said members; substantially as described.

4. A music roll spindle having a radially movable socket engaging member, said member being held against rotation relatively to said spindle.

5. A music roll spindle having a roll driving means and expansible means to engage the socket of a music roll to prevent chattering.

6. A music roll spindle having roll driving means and expansible means to engage the socket of a music roll to prevent chattering, said expansible means being actuated by the turning of the roll driving means.

7. The combination with a music roll having a cylindrical socket with a mortise in the bottom thereof, of a spindle having a part to engage the cylindrical part of said socket, and another part to engage said mortise, one of said parts being expansible laterally; substantially as described.

8. The combination with a music roll having a cylindrical socket with a mortise in the bottom thereof, of a spindle having a part to engage the cylindrical portion of said socket, and another part to engage said mortise, one of said parts being composed of diametrically expansible sections; substantially as described.

9. The combination with a music roll having a cylindrical socket with a mortise in the bottom thereof, of a spindle having a part to engage the cylindrical portion of said socket, and another part to engage said mortise, one of said parts being composed of diametrically separable sections, and means for separating said sections automatically on the rotation of the roll; substantially as described.

10. The combination of a music roll having a socket in the end thereof, a music roll spindle having a part entering said socket, and means on said spindle operable automatically by the turning of the spindle to engage the music roll tightly and take up lost motion between the roll and spindle.

11. A music roll spindle having laterally separable roll-engaging portions, and means engaging a music roll for separating said portions automatically on the rotation of the roll; substantially as described.

12. In a musical instrument, a spool box, a music roll spindle mounted therein, a part on said spindle movable laterally of the spindle to engage the side wall of a music roll socket snugly so as to prevent chattering, and a spring for normally holding said part in a predetermined position laterally with respect to the spindle.

13. A music roll spindle having an expansible roll-engaging portion, and means for expanding said portion automatically when the roll is rewound to prevent a noisy operation of the roll; substantially as described.

14. A music roll spindle having relatively movable roll-engaging means, and means for preventing noisy operation of the roll by moving said means to engage the same during its unwinding movement; substantially as described.

15. In combination, a music roll and a music roll spindle, and means operable by the rewinding of the roll for expanding said spindle into snug engagement with the roll socket and thereby preventing chattering of said parts.

16. In combination, a music roll and a music roll spindle having laterally separable roll-engaging members, and means for separating said members to engage the roll automatically as the roll is turned in either direction; substantially as described.

17. A music roll spindle, composed of separate parts having a lost motion connection between them, and laterally expansible means for engaging the music roll, operated automatically on the taking up of the lost motion between said parts; substantially as described.

18. A music roll spindle comprising a shaft, a tenon, a lost motion connection between said shaft and said tenon, which permits a slight relative turning movement of said parts, and roll-gripping means automatically operated on such turning movement; substantially as described.

19. In a musical instrument, a music roll spindle, an element movable laterally with respect to the spindle for engagement with the side wall of the music roll socket, and a spring mounting said element yieldingly on said spindle.

20. A music roll spindle having a tenon turnable relatively thereto, and diametrically expanding roll-engaging means operated thereby; substantially as described.

21. A music roll spindle having a tenon turnable relatively thereto, and members on opposite sides of the tenon forced into contact with the music roll by the turning movement of said tenon relatively to the spindle; substantially as described.

22. The combination of a music roll having a socket, a spindle loosely engaging said socket, and roll engaging means for expanding said spindle laterally to engage said socket tightly to prevent chattering; substantially as described.

23. In combination, a music roll provided with a socket and a music roll spindle having a radially movable roll-socket-engaging member and means engaging the music roll to move said member to engaging position; substantially as described.

24. In combination, a music roll provided with a socket and a music roll spindle having a radially movable roll-socket-engaging member, and means for operating said member by the unwinding or rewinding of the roll; substantially as described.

25. The combination of a rotary music roll, a rotary supporting spindle therefor, a radially movable roll-engaging element on said spindle, and means engaging the music roll for moving said element to operative position by the rotation of one of said rotary parts; substantially as described.

26. The combination with a music roll having a socket, of a spindle, and expansible means on the spindle for engaging the side wall of said socket at diametrically opposite points to prevent chattering; substantially as described.

27. In a musical instrument, a spool box, a music roll provided with a socket and a music roll spindle mounted in said spool box, and having a radially movable roll-socket-engaging member operated by the relative turning of the spindle and roll, said member being non-rotatably mounted on the spindle.

28. The combination with a music roll having a socket with a cylindrical portion and a mortise portion, of a spindle having a means engaging said cylindrical portion and means engaging said mortise portion, one of the aforesaid engaging means being expansible diametrically; substantially as described.

29. In a musical instrument, a spool box, a music roll spindle mounted therein, a music roll having a socket in the end thereof, and spring controlled means on the spindle movable laterally with respect to said spindle for snugly engaging the side wall of the music roll socket.

In witness whereof, I have hereunto set my hand on the 30th day of October, 1916.

STANLEY L. FISHER.