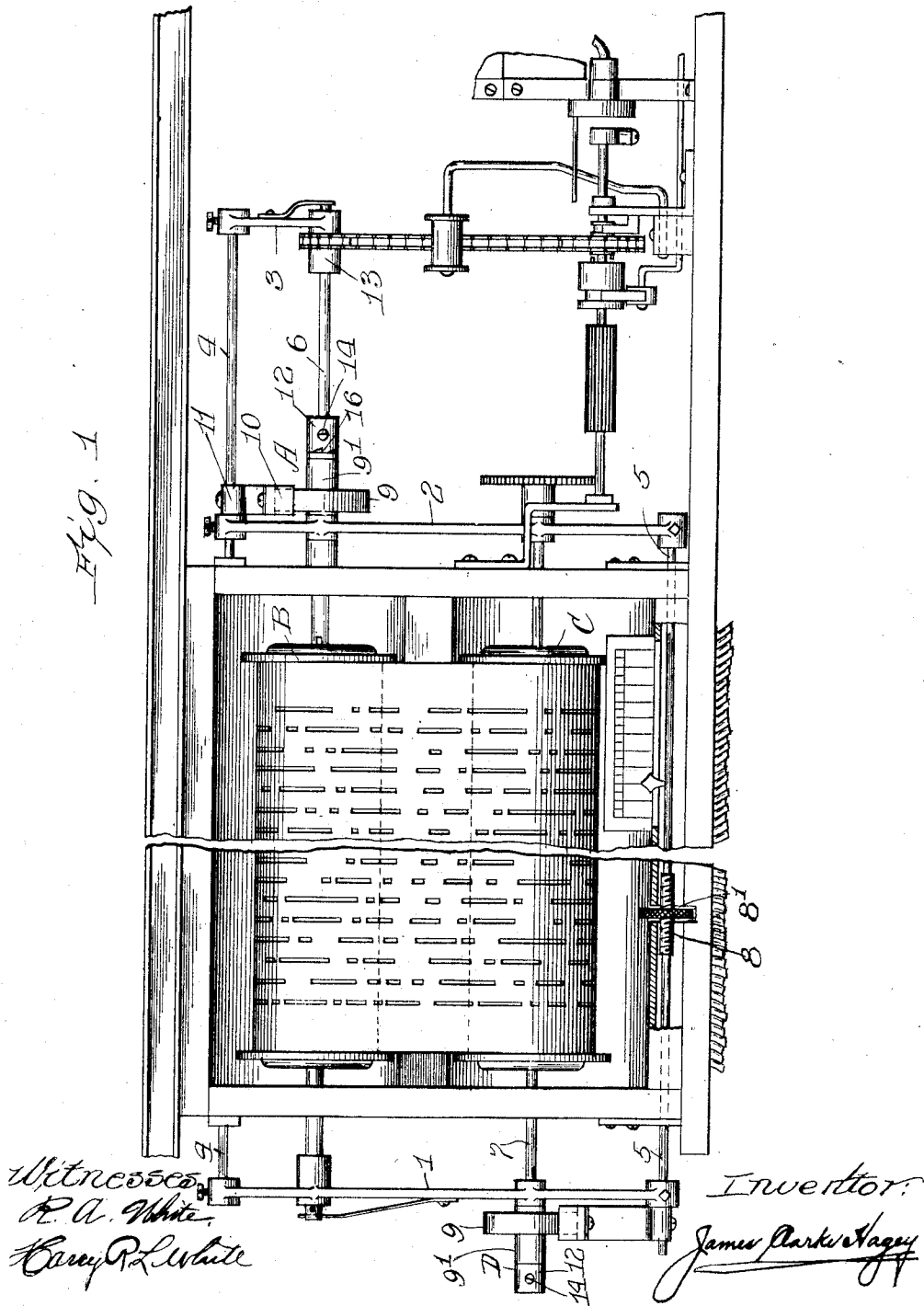


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APPLICATION FILED JUNE 20, 1908.

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Fig. 2

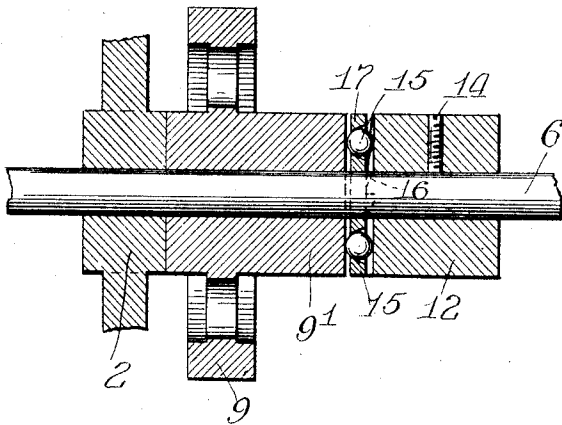


Fig. 4

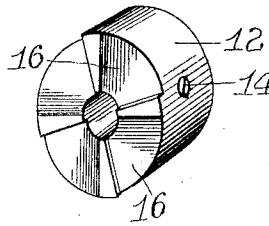


Fig. 3

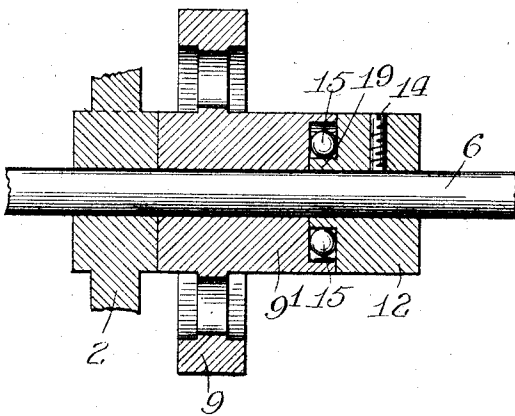
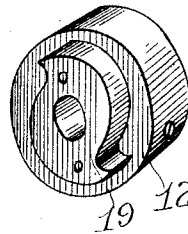


Fig. 5



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UNITED STATES PATENT OFFICE

JAMES CLARKE HAGEY, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE CABLE COMPANY,
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TENSION DEVICE FOR SHEET-PROPELLING MECHANISMS.

988,333.

Specification of Letters Patent.

Patented Apr. 4, 1911.

Application filed June 20, 1908. Serial No. 439,617.

To all whom it may concern:

Be it known that I, JAMES CLARKE HAGEY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Tension Devices for Sheet-Propelling Mechanism, of which the following is a specification.

My invention relates to mechanism for propelling sheets or webs upon or between rolls or spools and has as its object to provide means which may act through one or more of the spools to maintain an even tension upon the sheet or web while it is moving in one direction and to automatically relieve such tension upon reverse direction of its movement.

The invention is particularly applicable to the music-winding devices of automatic music-playing mechanisms and I have shown such an application in the drawings.

Figure 1 is a view of the spool-mechanism of an automatic piano comprising my improved tension-device; Fig. 2 is an enlarged sectional view of the device as shown at A, Fig. 1; Fig. 3 is a view similar to Fig. 2 showing an alternate construction; and Figs. 4 and 5 are perspective views of the clutch members used in the construction shown in Figs. 2 and 3, respectively.

In musical instruments employing spooled perforated controlling-sheets it is desirable during operation to cause an even movement of the sheet across the tracker under a degree of tension that will insure close and even contact therebetween and, after the roll has been unwound from the spool, to relieve this tension and permit rapid rewinding. There are numerous devices in use for this purpose upon automatic musical instruments of well known types wherein there is little, if any, lateral movement to the spool. Such devices usually comprise a shaft having a friction pulley fixed thereupon and a spring-pressed brake-shoe which may be applied or released by mechanism connected with other adjustable parts.

In the construction shown in Fig. 1, the

spools B and C are supported in a laterally movable frame through shaft bearings in the side members 1, 2, and 3. These members are secured firmly together by the slide-rods 4 and 5, the lower one of which (5) is provided with a screw-thread 8 and nut 8' for adjustment of the frame thus formed in either direction as desired. The frame and spools may be moved laterally a considerable distance and the direct purpose of my invention is to provide a simple construction incorporating the usual functions of brake-application and release together with an allowance for the described lateral movement of the parts.

The shaft 6 is supported in bearings provided in the side members 2 and 3 and carries the loose pulley 9, the fixed collar 12 and fixed sprocket 13. The music-spool B may be supported in any desirable manner to turn with the shaft 6. Rigidly secured by one end to the rod 4 is a flat spring 11 provided with a brake-shoe 10, preferably of wood, which it holds at a desired degree of pressure against the face of the pulley 9.

In Figs. 2 to 5, inclusive, I have shown an enlarged view of some of the parts mentioned and two methods of efficient construction. Collar 12 is fixed upon shaft 6 by the set-screw 14, and in the four-ball, side-thrust construction shown in Figs. 2 and 4 is provided upon one side with four ratchet faces 16. The ball-retaining washer 17 is loose upon shaft 6 and serves to correctly space four balls 15 in position between the faces 16 of the collar and the adjacent hub 9' of the pulley 9. As the pulley 9 is held from lateral movement in one direction by the member 2 and rotation thereof is retarded by the brake-shoe 10, rotation of the shaft 6 in one direction causes the ratchet faces 16 to press or wedge the balls 15 against the hub 9', gripping it for rotation with the shaft and collar. Reverse rotation of the shaft will release the grip of the collar upon the hub as such movement of the inclined ratchet faces will withdraw pressure upon the balls 15. If preferred, a set-collar may be placed

upon the shaft to receive the end thrust of pulley 9 instead of the shaft-bearing 2.

Figs. 3 and 5 illustrate an alternate construction, in which the individual parts serve the same purposes but the balls 15 of the clutch act radially instead of laterally as in Figs. 2 and 4. In this device the side face of the collar 12 may be perfectly flat and provided with an S-shaped projection 19 the edge of which forms a double cam. In manufacture, this member may be stamped out of substantial material and riveted or otherwise secured upon the side face of the collar as shown in Fig. 5. One end of the hub 9' is bored out a sufficient distance to accommodate the member 19, leaving an annular rim extending thereabout to reach the face of the collar 12. Each of the chambers thus formed by the cam-shaped edge of the member 19 and the inside of the annular rim on the hub 9' is provided with a ball or roller, which, when the shaft 6 is rotated in one direction is moved outwardly by the cam-shaped edge of the member 19 against the annular rim of the hub, gripping the hub for rotation with the collar. Reverse rotation of the shaft will release the grip of the collar upon the hub as such movement of the cam-shaped edge will withdraw pressure of the balls or rollers 15 against the annular rim.

It may thus be seen that when the music-sheet (Fig. 1) is being unwound from the upper spool B, the tension-device will be active and the pulley 9 is moved by the unwinding of the sheet against the friction of the brake-shoe 10, causing the desired tension upon the unwinding sheet. When, however, it is desired to rewind the music-sheet, the rotation of the spool B and shaft 6 must necessarily be reversed and through such reversal the collar 12 releases the grip upon the hub 9' of loose pulley 9, and the shaft 6, together with the parts secured thereupon, may rotate without turning the pulley 9 under the brake-shoe 10. Release of the pulley upon reverse rotation of the shaft not only permits increased speed and the use of high gearing but reduces by half the necessity of lubrication of the brake-shoe.

At D, Fig. 1, I have illustrated an application of my device to the shaft of the take up spool, which in some instances may be desirable. I have applied in this instance the construction shown in Figs. 3 and 5, although either type may be utilized without alteration as the purpose of the device upon shaft 7 is identical with that in service upon shaft 6, which is to allow free winding rotation of the spool but retarded unwinding of the roll therefrom.

In connection with my invention there are none of the usually employed articulated devices for brake-application and release which are connected with the gear-shifting and

valve-operating mechanism and which in some instances cause springy and unstable positioning of such mechanism.

I do not lay claim to the particular constructions of clutch devices herein shown or of any particular construction, but claim broadly, as follows:

1. In a sheet-propelling mechanism, in combination with the sheet or web, a clutch-member secured for rotation in reverse directions upon reverse movement of said sheet, a pulley, and a friction-device acting upon said pulley to retard the rotation thereof; said pulley being rotated against the retarding action of said friction-device by the automatic action of said clutch-member thereupon when the sheet is moved in one direction and said pulley being automatically freed from rotation by said clutch-member when the sheet is moved in a reverse direction.

2. In a sheet-propelling mechanism, in combination with the sheet and a roller rotatable in a reverse direction upon reverse movement of said sheet, a tension device, an element of which device may be connected for or disconnected from movement with said roller and means through which movement of said sheet and rotation of said roller in one direction causes connection of said tension device element for movement with said roller and consequent application of tension upon said sheet and movement of said sheet and rotation of said roller in reverse direction causes disconnection of said tension device element from movement with said roller.

3. In a sheet-propelling mechanism, the combination with the sheet, a spool upon which the sheet is wound and a shaft in connection with said spool, of an automatic clutch and a friction-device; said clutch comprising two members, one member being secured upon said shaft and the other member free upon said shaft and in frictional contact with said friction-device; said friction-device acting to retard the unwinding of said sheet from said spool through said automatic clutch and said clutch acting to allow rewinding of said sheet upon said spool free from the action of said friction-device.

4. In a sheet-propelling mechanism, the combination with the sheet, a roller rotatable in a reverse direction upon reverse movement of said sheet and means for axially moving said roller, of a device wholly movable with such axial movement of said roller through which tension may be intermittently applied to retard rotation of said roller and movement of said sheet.

5. In a sheet-propelling mechanism, the combination with the sheet and a roller rotatable in a reverse direction upon reverse movement of said sheet, of a tension device alternately acting and ceasing to act through

said roller to apply tension upon said sheet when the movement of said sheet and the rotation of said roller is reversed; the alternate action and cessation of action of said
5 tension device depending upon the direction of rotation of said roller.

Signed at Chicago, Illinois, this fifteenth

day of June, 1908, in the presence of two subscribing witnesses.

JAMES CLARKE HAGEY.

Witnesses:

ELIZABETH H. CONNER,
W. M. BROWNLEE.

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