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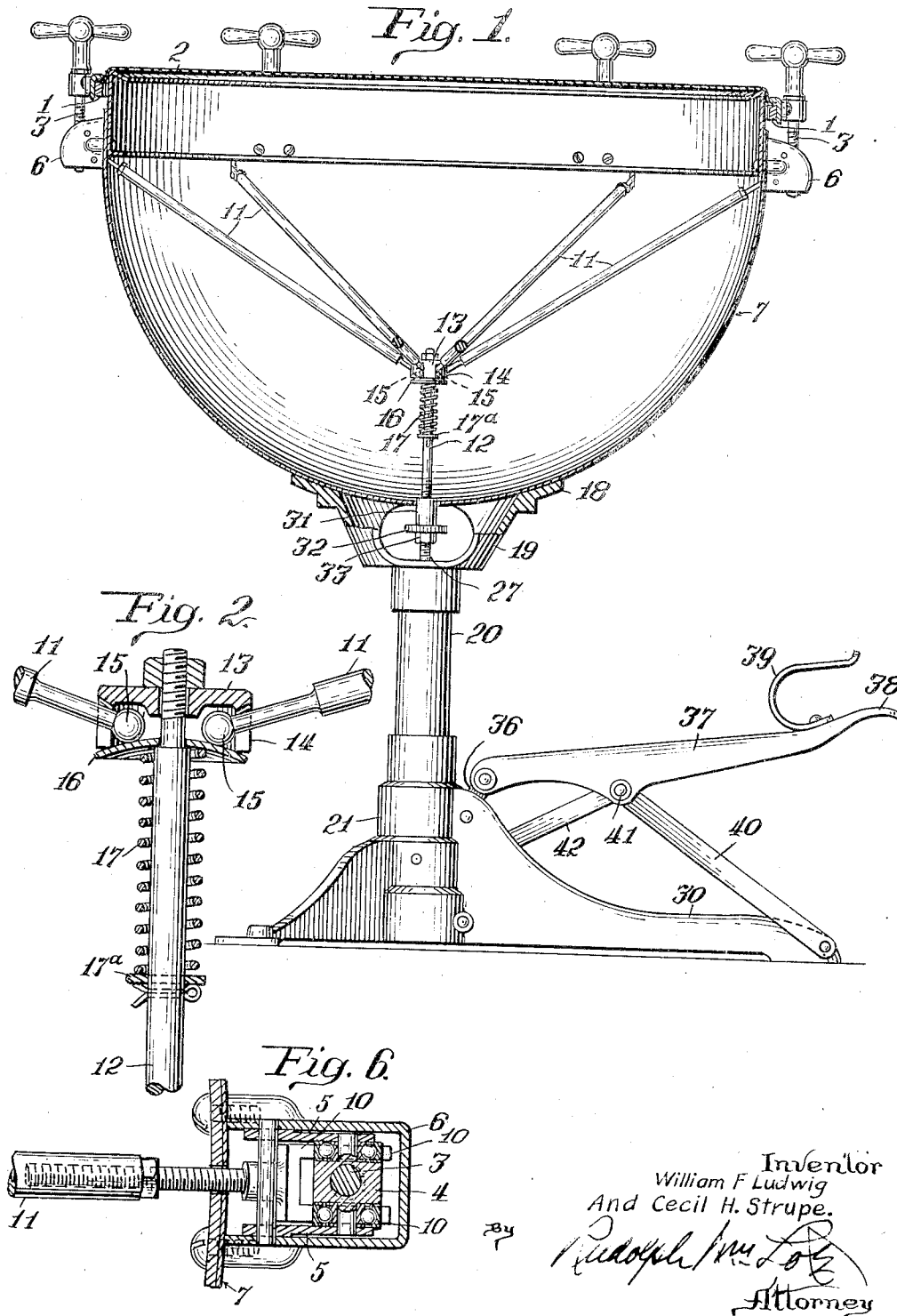
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KETTLE DRUM TUNING MECHANISM OR TYMPANO

Filed June 3, 1939

2 Sheets-Sheet 1



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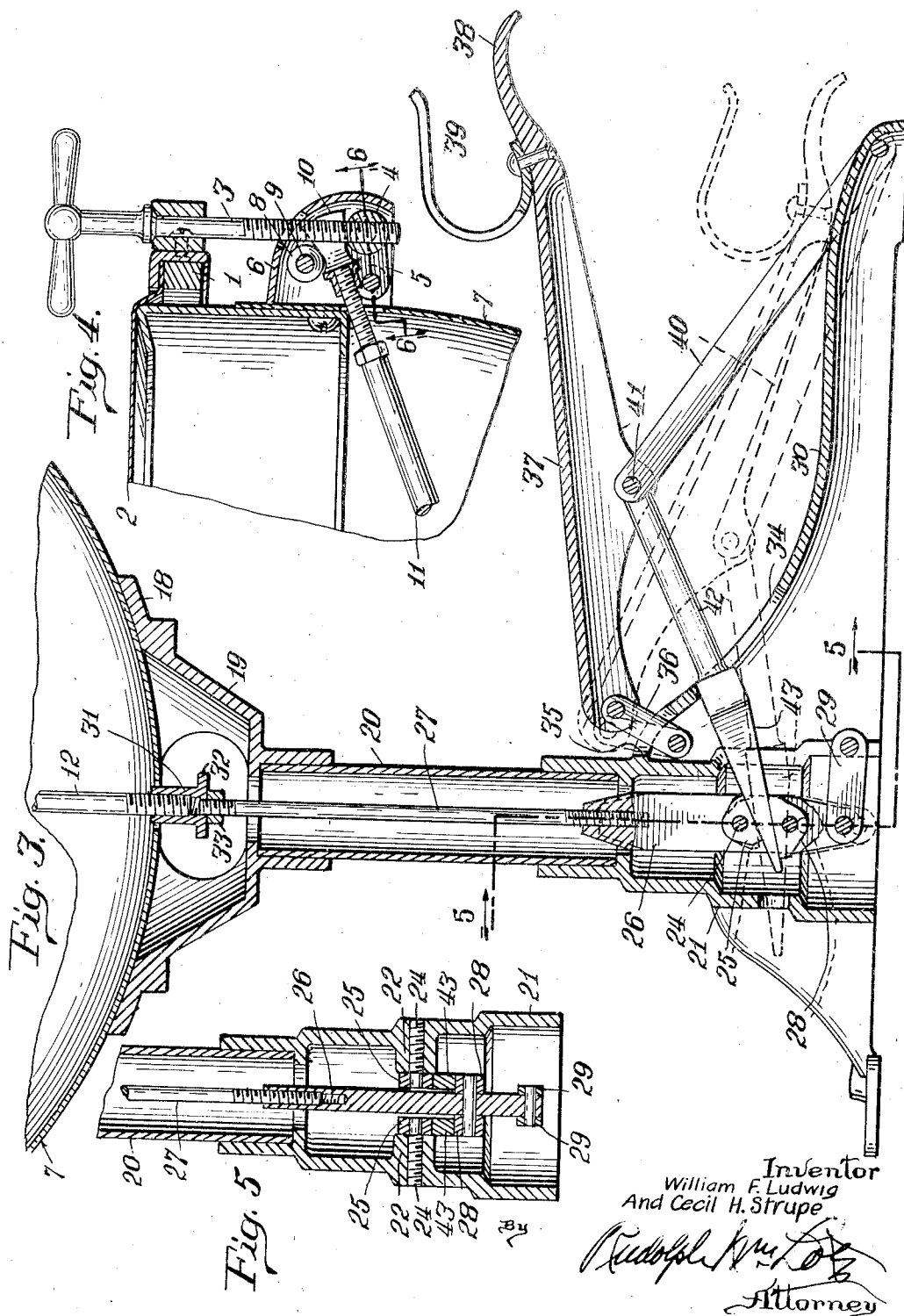
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KETTLE DRUM TUNING MECHANISM OR
TYMPANO

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14 Claims. (Cl. 84—421)

The present invention relates to improvements in mechanisms for varying the tension of drum heads for the purpose of producing different tone effects in the drum and is applicable particularly to kettle drums which require frequent tuning in many orchestral compositions. Hence, while the mechanism is designed especially for kettle drums, it may be adapted for use on drums of practically all types, if desired.

In the art to which the invention relates, so far as we are informed, mechanisms for effecting rapid changes in the tension of drum-heads for varying the tone effects of the instrument over an appreciable range between what may be termed the extreme bass and tenor, respectively, include a foot lever suitably associated with the drum head for actuation to increase drum head tension, but are operable to decrease such tension without recourse to an intermediate manual operation to effect release of the foot lever from associated mechanical means, such as a pawl and ratchet mechanism, to permit or cause said lever to be moved back to its normal position responsively to drum head tension before said lever can be moved to or disposed in a position wherein the drum head tension desired to be attained lies between the extreme bass and the tone of less tenor quality than that resulting from the previous position of said foot lever from which the latter was required to be released.

Another explanation of the operation of prior art mechanisms known to us, is that the foot lever can be moved, step by step, to increase drum head tension, as, for example, ten steps from lowest to highest tension, each step being a predetermined degree.

Hence, any tone effects which may lie between those resulting from the movements of the foot lever from one to another of the steps of its tensioning movement must be obtained by operation of the group of hand screws associated with the drum head.

The main object of the present invention is to provide a very simple and efficient drum head tensioning mechanism which is operable by the foot of the drummer to increase and decrease drum head tension to any extent desired, without resort to any operation or manipulation other than lowering and raising the foot lever.

A further object of the invention is to provide drum head tensioning mechanism which is self-retained in any position to which it may be moved for producing tone variations of infinite range between the extremes of bass and tenor tones.

In harmony with the foregoing objects of the

invention, another object of the same is to provide an absolutely noiseless mechanism for the purpose set forth, which is operable with ease.

A suitable embodiment of the invention is illustrated in the accompanying drawings, wherein:

Fig. 1 is a view partly in side elevation and partly in section, of a kettle drum and tympano controlling mechanism constructed in accordance with the invention.

Fig. 2 is a fragmentary detail sectional view on an enlarged scale showing a detail of construction.

Fig. 3 is a fragmentary, vertical, central, sectional view on an enlarged scale of the mechanism for varying the tension of the drum head, constructed in accordance with the invention.

Fig. 4 is a fragmentary detail sectional view on an enlarged scale showing the connection between the drum head and the mechanism for varying the tension of the latter.

Fig. 5 is a fragmentary detail vertical sectional view on an enlarged scale taken on the line 5—5 of Fig. 3.

Fig. 6 is a fragmentary detail sectional view taken on the line 6—6 of Fig. 4.

The essentially novel feature of the invention resides in the use of frictionally retained means for transmitting the motions of the operating lever of the mechanism to the drum head tensioning means employed. The specific type of means employed is of secondary importance, so long as the same performs its function of transmitting foot lever movement as aforesaid, and acts by friction to retain the latter and the devices to which its motions are transmitted in any position to which they are moved.

In the instance illustrated resort is had to the use of a wedge as the simplest, cheapest and most efficient and reliable means for transmitting motion from the operating lever to the drum head tension adjusting means, the latter being of any type adaptable to the purpose.

The type of tensioning means illustrated and described in Re-issued Patent No. 16,226 comprising radial rods connecting devices associated with a central reciprocable plunger and with devices associated with the drum head, is exemplary of a suitable means associable with the plunger actuating means of the present invention, and is illustrated in the accompanying drawings in an improved form of lower manufacturing cost and greater efficiency than the specification structure of the said reissue patent.

Thus, as shown in Figs. 1 and 4, the hoop 1 to which the peripheral or circumferential edge por-

tion of the drum head 2 is suitably secured, is adjustably connected by means of hand screws 3 with the middle portions of large diameter of shafts 4. The latter are equipped with threaded openings to receive the shanks of the hand screws 3 and have their end portions journalled in bearings in the outer end portions of links 5 which are pivotally mounted in the side walls of inverted cup members 6 rigidly mounted upon the drum casing 7.

The end portions of the shaft 4 are equipped with anti-friction rollers which are spaced from and opposed to an anti-friction roller 8 mounted on the shaft or pin 9 rigid with the side walls of the member 6.

A bifurcated wedge 10, mounted upon the outer end portion of a radial rod 11, is interposed between the roller 8 and the rollers on the end portions of the shaft 4 for causing the hand screw 3 to be drawn downwardly responsively to inward movement of the rod 11, thereby to increase the tension of the drum head 2. The latter is self-restoring to a normal degree of tension determined by the hand screw 3 during outward movements of the rods 11.

A central vertically reciprocable plunger 12 disposed axially of the casing 7 is equipped at its upper end with a hub member 13 (Fig. 2) equipped in its circumferential flange 14 with recesses to receive the spherical inner extremities 15 of the rod 11 to provide a substantial equivalent of a universal joint connection between each rod 11 and said hub member 13. A dished plate 16 held by a compression spring 17 constitutes a closure for all of the recesses of the flange 14, said spring 17 being interposed between a collar 17^a on the plunger 12 and said plate 16.

The plunger 12 projects through a central opening in the bottom of the casing 7 and is externally threaded along its lower end portion.

The drum casing is mounted upon the rim flange 13 of the cup-like upper end portion 19 of the hollow standard 20 of the supporting base 21, the peripheral wall of said portion 19 being provided with openings for digital access to the interior thereof.

Said standard 20 is substantially tubular and is equipped adjacent its lower end portion with opposed horizontal projections 22 having their opposed inner ends spaced from each other and through which the pins 24, project. A pair of what may be termed "brake shoes" 25, having flat lower face and which are substantially triangular, are pivotally mounted upon the inner end portions of the said pins 24.

A flat side-faced member 26 mounted upon the lower end of a rod 27 connected with the plunger 12 is disposed in part between the brake shoes 25 and is equipped with a pair of similar but inverted brake shoes 28 pivotally mounted thereon and having thin flat faces opposed to those of the shoes 25. The lower extremity of the member 26 is bifurcated and pivotally connected with one end of a link 29 pivotally secured at its other end to the base member 21 in the side walls of long hollow foot 30 of the latter.

The rod 27 has a long threaded engagement at its lower end with member 26. Upon the upper end of said rod 27 there is suitably mounted an internally threaded sleeve 31 equipped with a knurled annular flange 32. Said sleeve 31 is suitably held against rotation relatively to the rod 27 by means of the lock nut 33.

Said sleeve 31 receives the lower threaded end 75

of the plunger 12 by effecting rotation of the rod 27 to unscrew it in part from the member 26 while engaging the threads of plunger 12 with said sleeve 31.

The foot 29 of base 21 extends at its inner end to a level appreciably higher than that of said projections 22, its outer end portion being shallow. The top wall of said inner end portion of said foot is provided, between its ends, with a longitudinal slot 34 and at its innermost or highest portion with a slot 35. A link 36 projects through said slot 35 and is pivotally secured to the foot 30 adjacent said slot. The other end of said link is pivotally connected with one end of the foot lever 37 which is equipped at its outer end with a pedal 38 overhung by a toe member 39 adapted to be engaged in an obvious manner for swinging said lever upwardly.

A link 40 is pivotally connected at one end with the outermost end portion of the foot 30 and at its other end to the lever 37 between the ends of the latter by means of a pin 41, the portion of said link 40 connected with the foot 30 being forked.

A plunger 42 is pivotally connected at one end to the pin 41 and at its other end is equipped with a wedge formation 43 tapered toward its extremity and which is bifurcated to receive the member 26. The said wedge projects between the shoes 25 and 28, the flat faces of which engage the taper faces of said wedge and accommodate themselves to the variations in position of said wedge due to a slight swinging movement of the latter responsively to the vertical swinging movements of the said lever 37.

The said link 40 and said plunger 42 constitute the substantial equivalent of a toggle lever which is rendered straighter progressively as the lever 37 is depressed and thereby causes the wedge 43 to be projected with great force in the direction to force the shoes 25 and 28 apart and thereby draw the members 26, 27 and 12 downwardly. The downward movement of the plunger 12 causes the rods 11 to swing downwardly and move inwardly and thereby cause the wedges 10 to cooperate with the rollers 8 to move the shafts 4 and hand-screws 3 downwardly and thus increase tension on the drum head 2 to a degree proportionate to the arc of downward swing of said lever 37.

The angular relation of the wedge faces is very acute so that the tension of the drum head upon the member 26 and the corresponding pressure upon the brake shoes 25 and 28 is exerted in a direction almost perpendicular to the wedge faces and is thus rendered incapable of forcing the wedge back from any position to which it is moved by depression of said lever 37 nor from any retracted position to which it is moved by upward swing of said lever 37.

When it is appreciated that the pull on the plunger 12 approximates twenty-five hundred pounds when the lever 37 is disposed at the lower limit of its movement, the difficulty of retaining said plunger 12 frictionally in any position to which it has been moved will be apparent. This pull decreases progressively during upward swing of the lever 37 until the minimum pull determined by the extent to which the drum head has been adjusted by the hand screws 3 has been reached.

The limit of upward swing of the lever 37 is attained substantially when the pivots of the link 36 are aligned with the pin 41. When this limit of swing of the lever 37 is reached the plunger 12 will also be disposed at the upper limit of its

movement and thus the limit of slack in the drum head will also be attained.

Obviously the connection of the rod 27 with the plunger 12 will be effected when the lever 37 is disposed at the upper limit of its movement and at this time the drum head will be under no appreciable tension. Immediately following the operation of coupling plunger 12 with rod 27 by access to the knurled flange 32 of sleeve 31 through an opening in the member 19, and while the lever 37 remains at the upper limit of its movement, the hand screws 3 will be operated to tension the drum head for the lowest bass limit of tone production desired or requisite. This initial tension of the drum head has a direct relation to the arc of downward swing of the lever 37 to tension the drum head 2 to the next higher note of its range and, as no two drum heads respond equally to a given degree of increased tension, the desirability of a tensioning mechanism which is equally applicable to all drum heads, will be fully appreciated.

A particular advantage of utilizing the toggle links 40 and 42 to actuate the wedge will be fully appreciated by the fact that when the pressure on the wedge is at its maximum, the force of the pressure tending to force it back is exerted in a direction wherein the said links are most nearly in so-called "dead center" position, said direction of movement having to overcome the resistance to upward swing of link 40 plus the weight of the lever 37 as well as the frictional resistance of the brake shoes 25 and 28. Consequently, the flat faces of said shoes may be lubricated to obviate any squeak or other noise which might result from unlubricated opposed surfaces of the wedge and said shoes.

We claim as our invention:

1. A mechanism of the type specified including a vertically reciprocable drum-head tension controlling plunger equipped at its lower end with a formation, a companion formation on the drum support above and spaced from the formation of said plunger, a wedge element engaged with said respective formations and operable to vary the spacing apart thereof for effecting reciprocation of said plunger and maintaining the latter frictionally in any selected position, a manually operable lever operatively associated with said wedge element for actuation thereof, and a means operated by said lever simultaneously with said wedge element for additionally resisting movement of the latter responsively to drum-head tension on said plunger.

2. A mechanism of the type specified including a reciprocable drum-head tensioning plunger, a drum support, opposed friction shoes, one thereof mounted upon the support and the other on said plunger, a wedge element interposed between said shoes and operable to vary their spacing apart to thereby effect reciprocation of said plunger, said shoes and wedge element constituting a friction clutch for retaining said wedge element in any position to which it may be moved, and a manually operable means connected with said support and operatively associated with said wedge element for actuating the latter.

3. A mechanism of the type specified including a reciprocable drum-head tensioning plunger, a drum support, opposed friction-shoes, one thereof mounted upon the support and the other on said plunger, a wedge element interposed between said shoes and operable to vary their spacing apart to thereby effect reciprocation of said plunger, said shoes and wedge element constituting

ing a friction clutch for retaining said wedge element in any position to which it may be moved, a manually operable lever pivotally associated at one end with said support, and a wedge element actuating device associated with said lever and said support for actuation by said lever.

4. A mechanism of the type specified including a reciprocable drum-head tensioning plunger, a drum support, opposed friction-shoes, one thereof mounted upon the support and the other on said plunger, a reciprocable wedge interposed between said shoes for varying their spacing apart and cooperating with said shoes to constitute a friction clutch for retaining said wedge frictionally in any position to which it is moved, and a manually operable means connected with said support and operatively associated with said wedge element for actuating the latter.

5. A mechanism of the type specified including a reciprocable drum-head tensioning plunger, a drum support, opposed friction shoes, one thereof mounted upon the support and the other on said plunger, a reciprocable wedge interposed between said shoes for varying their spacing apart and cooperating with said shoes to constitute a friction clutch for retaining said wedge frictionally in any position to which it is moved, a manually operable lever pivotally associated at one end with said support, and a wedge element actuating device associated with said lever and said support for actuation by said lever.

6. A mechanism of the type specified including a reciprocable drum-head tensioning plunger, a drum support, opposed friction shoes, one thereof mounted upon the support and the other on said plunger, a wedge element interposed between said shoes and operable to vary their spacing apart to thereby effect reciprocation of said plunger, said shoes and wedge element constituting a friction clutch for retaining said wedge element in any position to which it may be moved, a pair of pivotally connected toggle links, one thereof connected with the wedge element and the other thereof pivotally connected with said support, and a manually operable lever pivotally associated with said support at one end and pivotally connected with said toggle links between its ends for causing said wedge element to force apart said shoes as said lever is depressed.

7. A mechanism of the type specified including a reciprocable drum-head tensioning plunger, a drum support, opposed friction shoes, one thereof mounted upon the support and the other on said plunger, a wedge element interposed between said shoes and operable to vary their spacing apart to thereby effect reciprocation of said plunger, said shoes and wedge element constituting a friction clutch for retaining said wedge element in any position to which it may be moved, a pair of pivotally connected toggle links, one thereof connected with the wedge element and the other thereof pivotally connected with said support, and a manually operable lever pivotally associated with said support at one end and pivotally connected with said toggle links between its ends, said toggle links normally disposed in inverted obtuse angle relation when said lever is disposed at the upper limit of its movement and said angular relation being rendered more obtuse as said lever is depressed and thereby causing said wedge element to effect depression of said plunger.

8. In a structure of the type specified, a drum support equipped with a lateral projection at its base, a manually operable lever disposed over said

projection and having a link connection at one end with said support, a drum on said support, a drum-head tensioning mechanism including a vertically reciprocable plunger projecting into said support and equipped at its lower end with a friction shoe, a similar shoe mounted upon the support above said plunger shoe, a reciprocable wedge disposed between said shoes, a toggle link rigid with said wedge and pivotally connected at its outer end with the nether side of said lever between the ends of the latter, a second toggle link similarly pivotally connected at one end with said lever and pivotally connected at its other end with said projection and normally disposed at an obtuse angle to said first-named toggle link, said obtuse angle being increased as said lever is depressed, thereby to cause said wedge to be moved in a direction to effect depression of said plunger, said shoe cooperating with said wedge to form a friction clutch for retaining said wedge in any position to which it is moved.

9. A mechanism of the type specified including a kettle drum equipped with conventional manually operable means for tensioning the head thereof, and mechanism operable independently of said means for effecting variations in tension of said head including a reciprocable plunger connected with said first-named means a support for the drum into which said plunger projects, a cam member mounted upon the lower end of said plunger, a companion device mounted in the support in opposed relation to said cam member and above the same, a reciprocable member equipped with a device projecting between and engaged frictionally with said cam member and said device to force the former away from the latter when moved in one direction, and a foot-lever pivotally associated at one end with said support and between its ends with one end of said reciprocable member for moving the latter in the last-named direction as said foot-lever is depressed, the said frictional engagement acting to maintain said foot-lever in any position to which it is moved.

10. A mechanism of the type specified including a kettle drum equipped with conventional means for tensioning the head thereof, and mechanism including a reciprocable plunger connected with said means, a support for the drum into which said plunger projects, a cam member mounted upon the lower end of said plunger, a companion device mounted in the support in opposed relation to said cam member and above the same, a reciprocable member equipped with a device projecting between and engaged frictionally with said cam member and said device to force the former away from the latter when moved in one direction, and a foot-lever pivotally associated at one end with said support and between its ends with one end of said reciprocable member for moving the latter in the last-named direction as said foot-lever is depressed, the said frictional engagement acting to maintain said foot-lever in any position to which it is moved, and additional means associated with said reciprocable member for resisting reverse movement thereof responsively to pressure of said cam member thereon.

11. A mechanism of the type specified including a kettle drum equipped with conventional means for tensioning the head thereof, and mechanism including a reciprocable plunger connected with said means, a support for the drum

into which said plunger projects, a foot-lever pivotally associated at one end with support, a reciprocable member pivotally connected with said foot-lever between the ends of the latter, and frictionally cooperating devices mounted upon the said support and said plunger, respectively, for cooperation with said reciprocable member to actuate said plunger in the direction to increase drum-head tension as said foot-lever is depressed and resist frictionally the reverse movement of said plunger responsively to drum head tension, said foot lever being equipped at its outer end with a pedal and a member rigid with and overhanging the same and the latter and said member being movable in a substantially vertical line in effecting actuation of said lever in both directions.

12. A mechanism of the type specified including a kettle drum equipped with conventional means for tensioning the head thereof, and mechanism including a reciprocable plunger connected with said means, a support for the drum into which said plunger projects, a foot-lever pivotally associated at one end with said support, a reciprocable member pivotally connected with said foot-lever between the ends of the latter, cooperating cam devices mounted upon the said support and said plunger, respectively, for cooperation with said reciprocable member to actuate said plunger in the direction to increase drum-head tension as said foot-lever is depressed and resist frictionally the reverse movement of said plunger responsively to drum-head tension, and a member operatively associated with said support, and said reciprocable member for automatically frictionally resisting reverse movement of the latter.

13. A mechanism of the type specified comprising a support for a drum equipped with drum-head tensioning means including a reciprocable plunger projecting into said support, a shoe mounted upon said support, a companion shoe mounted upon said plunger in opposed and spaced relation to the first-named shoe, a reciprocable wedge element disposed between and engaged with said shoes, and a foot-lever pivotally associated with said support and operatively associated with said wedge-element for actuating the latter, said foot lever being equipped at its outer end with a pedal and a member rigid with and overhanging the same and the latter and said member being movable in a substantially vertical line in effecting actuation of said lever in both directions.

14. A mechanism of the type specified comprising a support for a drum equipped with drum head tensioning means including a reciprocable plunger projecting into said support, a shoe mounted upon said support, a companion shoe mounted upon said plunger in opposed and spaced relation to the first-named shoe, a reciprocable wedge element disposed between and engaged with said shoes, and a foot-lever pivotally associated with said support and operatively associated with said wedge-element for actuating the latter, and a device operatively associated with said foot-lever and said support for cooperation with said wedge-element and said shoes to maintain said foot-lever frictionally in any position to which it is moved.

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