June 24, 1930. R. S. KELSO 1,767,371

DRIVE CHAIN TENSION ADJUSTER

Filed Dec. 3, 1925

Fig. 1.

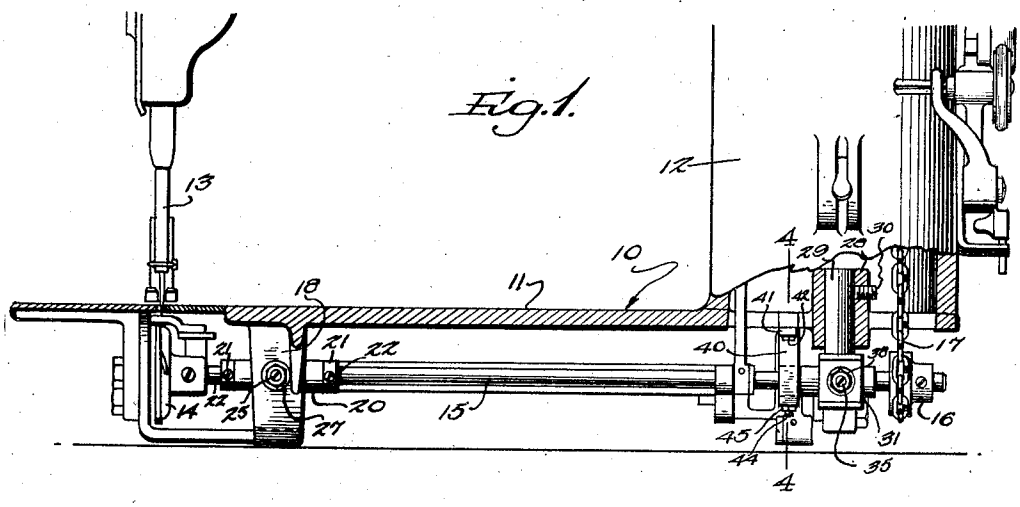



Fig. 2.

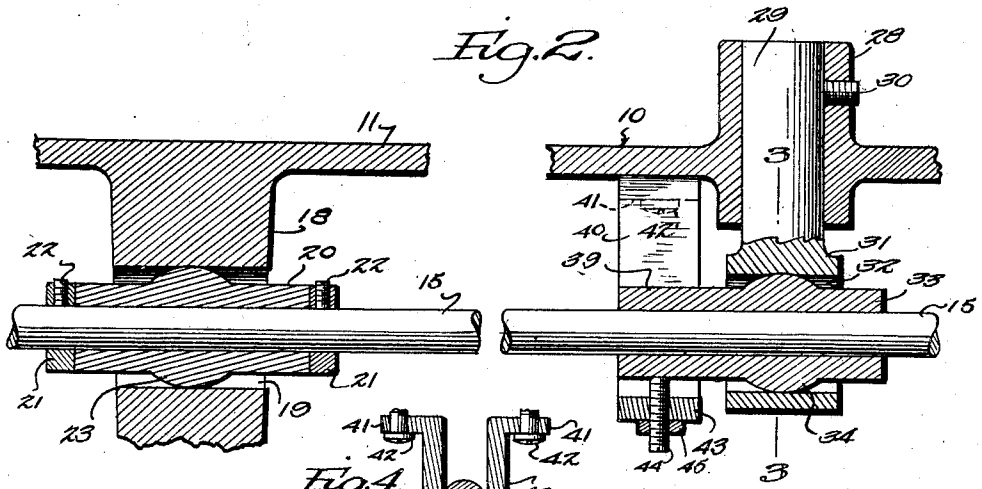



Fig. 4.

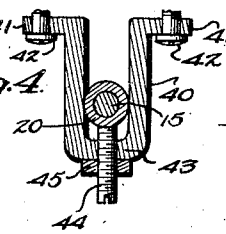
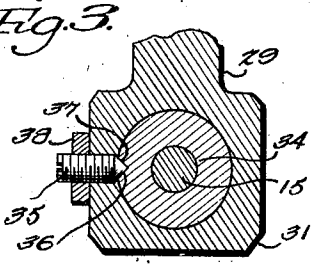



Fig. 3.



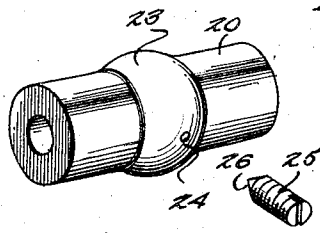




Fig. 5.

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# UNITED STATES PATENT OFFICE

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## DRIVE-CHAIN TENSION ADJUSTER

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This invention relates to a device for adjusting the tension of drive chains and more particularly to such a device for adjusting the tension of chains used in transmitting power from the needle bar operating shafts to the rotary shuttle or loop taker shafts of sewing machines.

In some forms of sewing machines, a rotary shuttle or loop taker is employed which is adapted to be driven by a rotatable shaft arranged beneath the bed plate of the machine, which shaft is adapted to derive its power from the needle bar operating shaft through a suitable chain or other flexible drive means. The shuttle or loop taker shaft is usually supported in bearings arranged adjacent its ends and power is supplied to the shaft through a chain or other flexible driving means passing about a pulley or sprocket arranged outwardly of one of the loop taker shaft bearings. It is sometimes desirable to adjust the tension of the driving chain, and when the tension is increased, there is a tendency for the shuttle or loop taker shaft to bow downwardly between the bearings thereof.

It is an important object of the present invention to provide means for adjusting the tension on the drive chain or other flexible drive means.

A further object is to provide a vertically movable shuttle or loop taker shaft bearing which is adapted to be moved to vary the tension on the drive chain.

A still further object is to provide means for properly alining the shaft to prevent bowing thereof between the bearings.

A still further object is to provide novel bearing bushings and supports therefor, surrounding the shuttle or loop taker shaft adjacent its ends, said bushings being adapted to assume positions alining with the shaft as one end thereof is moved to vary the tension on the drive chain.

A still further object is to provide a vertically movable bearing bushing surrounding the shuttle or loop taker shaft adjacent the drive chain and adapted to be moved downwardly to increase the tension on the drive chain, the bushing having a portion projecting in a direction opposite the chain and provided with means for forcing the projecting end of the bushing upwardly to overcome any tendency of the shuttle or loop taker shaft to bow downwardly between the bearings.

Other objects and advantages of the invention will become apparent during the course of the following description.

In the drawings I have shown one embodiment of the invention. In this showing:

Figure 1 is a central vertical sectional view of the lower portion of a sewing machine, parts being shown in elevation,

Figure 2 is an enlarged vertical sectional view showing portions of the rotary shaft and associated elements,

Figure 3 is a section on line 3—3 of Figure 2,

Figure 4 is a similar view on line 4—4 of Figure 1, and,

Figure 5 is a perspective view of one of the bushings and the set screw therefor.

Referring to the drawings the numeral 10 designates a sewing machine frame as a whole including a bed plate 11 and head 12. The head 12 supports a vertically reciprocating needle bar 13 adapted to be driven in the usual manner by an overhead operating shaft (not shown). In the present instance I have illustrated the machine as being provided with a rotating loop taker 14 adapted to be driven by a suitable rotatable shaft 15. The shaft 15 is provided adjacent the end thereof opposite the loop taker with a sprocket 16 about which passes a chain 17 or other flexible drive means. The upper end of the chain passes about a suitable sprocket carried by the needle bar operating shaft previously referred to.

The bed plate 11 is provided with a preferably integral depending bearing support 18 arranged adjacent the loop taker 14 and this support is provided with an enlarged opening 19 arranged coaxial with the shaft 15. A bearing bushing 20 is arranged within the opening 19 and surrounds the shaft 15 as shown in detail in Figure 2. Collars 21 are arranged against the ends of the bushing 20 and are adapted to be secured to the shaft

by suitable set screws 22 or other fastening means. It will be obvious that these collars prevent movement of the shaft 15 with respect to the bushing 20. The bushing 20 is provided intermediate its ends with an integral ball portion 23 having a conical depression 24 in one side thereof. The ball portion 23 of the bushing fits snugly within the opening 19, as shown. The bearing support 19 is provided at one side with a set screw 25 having a conical end 26 adapted to enter the depression 24. A lock nut 27 engages the face of the bearing support 18 to prevent movement of the set screw 25 as will be apparent. It will be apparent that the bushing 20 is adapted to shift its position, turning about the conical end of the set screw to assume a position truly coaxial with the shaft 15.

The bed plate is provided adjacent the opposite end of the shaft 15 with an integral tubular member 28 arranged vertically and above the center of the shaft 15. A shank 29 fits snugly within the tubular member 28 and is adapted to be moved vertically therein. A suitable set screw 30 is adapted to secure the shank 29 in any desired position. The shank 29 is provided at its lower end with a preferably integral bearing support 31 having an opening 32 therein arranged coaxial with the shaft 15. The opening 32 is similar to the opening 19 of the bearing support 18 and is adapted to receive a similar bushing 33. The bushing 33 is also provided intermediate its ends with a ball portion 34 which fits snugly within the opening 32 and is adapted to be maintained in proper position by a set screw 35 having a conical end 36 entering a similarly shaped depression 37 formed in the bushing. A lock nut 38 is adapted to engage against the face of the bearing support 31, surrounding the screw 35 to prevent rotating movement of the latter. It will be obvious that the shaft 15 is mounted to revolve within the bushings 20 and 33.

As clearly shown in Figure 2, the bushing 33 is provided with an axially extended portion 39 which projects a substantial distance beyond the bearing support 31 at the side thereof opposite the sprocket 16. A substantially U-shaped yoke or stirrup 40 surrounds the extended portion 39 of the bushing, as shown in Figures 2 and 3. The upper ends of the stirrup are turned outwardly as at 41 and are adapted to be secured to the lower face of the bed plate by screws or the like 42. The base 43 of the stirrup is arranged a substantial distance beneath the extended portion of the bushing, as shown, and a screw 44 passes through the base 43. The upper end of the screw 44 is adapted to contact with the extended portion of the bushing and is adapted to be fixed against rotation by a suitable lock nut 45.

The operation of the device is as follows: The shaft 15 is adapted to be driven by the chain 17 passing about the sprocket 16, as will be understood. The chain 17 is driven from above by the rotating needle bar operating shaft which in turn may be driven by any suitable means such as an electric motor (not shown). The shaft 15 rotates in the bushings 20 and 33, each of the latter being adapted to pivot about its set screw to permit the bushings to be properly alined with the shaft. The chain 17 may be adjusted to the proper tension by loosening the set screw 30 and moving the support 31 downwardly until the proper tension is obtained, whereupon the set screw 30 may be tightened against the shank 29. It will be apparent that the tensioning of the chain tends to lift the outer end of the shaft 15 which in turn has a tendency to bow the shaft 15 downwardly between the bushings. The screw 44 then may be turned to elevate the projecting end 39 of the bushing 33 until the shaft assumes a straight position whereupon the lock nut 45 may be tightened. If it is found that the tension placed upon the chain is too great, the set screw 30 may be loosened and the shank 29 moved upwardly slightly. The screw 44 should be operated to properly line the shaft 15 when the chain 17 is at its proper tension, as will be apparent. Vertical movement of the shank 29 to vary the tension of the spring obviously will cause the bushings 20 and 33 to swing slightly about their pivots whereby the bushings at all times will aline with the shaft. The ball portions of the bushings fit snugly within their openings to prevent play therein, but do not fit sufficiently tightly to prevent free pivoting movement of the bushing.

It is to be understood that the form of my invention herewith shown and described is to be taken as a preferred example of the same and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

I claim:

1. A device of the character described comprising a rotatable shaft, spaced bearing bushings surrounding said shaft, each of said bushings being provided with a substantially spherical enlargement, supports for said bushings, said supports being provided with cylindrical openings corresponding in diameter to said enlargements, a flexible driving element passing around said shaft adjacent and outwardly of one of said bearing supports, the bushing in said last named support being extended inwardly, means adapted to contact with the inwardly extending portion of said last named bushing to exert a lateral force thereagainst, means for permitting adjustment of said last named support in a line substantially at right angles to the axis of said shaft, and a set screw passing through

each of said bearing supports, said enlargements being provided with depressions pivotally receiving the ends of said set screws.

2. A device of the character described comprising a rotatable shaft, bearings for said shaft arranged near the ends thereof, said bearings being universally supported substantially centrally thereof, a flexible driving element passing about said shaft outwardly of and adjacent one of said bearings, means adjacent said last named bearing for adjusting it transversally to the axis of said shaft, means for correcting lateral flexing of said shaft between said bearings, comprising a substantially U-shaped member having its base portion arranged adjacent said shaft and provided with a threaded opening, and a set screw arranged in said opening, and adapted to contact with the inner end of the bearing adjacent said flexible element.

3. A device of the character described comprising a rotatable shaft, spaced bearing bushings surrounding said shaft, one of said bushings having an inwardly directed extension, supports for said bushings, means for driving said shaft, and means contacting with said extension to exert a lateral force thereagainst to correct flexing of said shaft.

4. A device of the character described comprising a rotatable shaft, spaced bearing bushings surrounding said shaft, supports for said bushings, one of said bushings having an inwardly directed extension, means arranged outwardly of said last named bushing for driving said shaft, a substantially U-shaped member having its base portion arranged adjacent said extension and provided with a threaded opening, and a set screw arranged in said opening and adapted to contact with said extension to prevent flexing of said shaft.

In testimony whereof I affix my signature.

RALPH S. KELSO.