Fig. 1.

INVENTOR
Berthold P. Pinkvoss, Deceased
Agnes Pinkvoss, Executrix

BY
Marshall J. Berlin
ATTORNEY
This invention relates to a work feeding mechanism for a sewing machine and, more particularly, to mechanism in a sewing machine having both upper and under work feeding instrumentality for regulating the relative effectiveness of each of said instrumentality.

It is an object of this invention to provide mechanism in a sewing machine whereby a fine degree of regulation of the extent of feeding movement of a belt driven top roller feed member may be obtained relative to the feeding motion of a lower work feeding device.

A further object of this invention is to provide mechanism for readily and conveniently varying the diameter of a pulley which is arranged to actuate a belt driven top roller feed member of a sewing machine.

With the above and other objects and advantages in view as will hereinafter appear, this invention comprises the devices, combinations, and arrangements of parts hereinafter described and illustrated in the accompanying drawings of a preferred embodiment in which:

Fig. 1 is a vertical cross sectional view of a sewing machine having the feed regulating mechanism of this invention applied thereto.

Fig. 2 is an enlarged cross sectional view of the variable diameter pulley mechanism taken substantially along line 2—2 of Fig. 1.

Fig. 3 represents an exploded perspective view of the variable diameter pulley mechanism of Figs. 1 and 2.

Referring to the drawings, the invention is illustrated in Fig. 1 as applied to a sewing machine having a work supporting post 11 mounted upon a machine bed 12 which also carries a pedal 13 surmounted by a bracket arm 14 which terminates in a sewing head 15 overlying the post 11. The sewing machine illustrated in Fig. 1 is constructed and arranged substantially in accordance with U. S. patent of Pinkvoss, No. 2,678,010, May 11, 1954, to which reference may be had for a general description thereof.

The present invention concerns a regulating mechanism for the work feeding instrumentality of the sewing machine which comprise a lower feed wheel 16 journaled in the work supporting post 11, and an upper or top roller feed member 17 journaled in a bracket 18 carried by the conventional presser bar (not shown) of the sewing machine.

A main drive shaft 20 journaled in the bucket arm carries a hand wheel pulley 21 and is fitted with conventional driving connections in the sewing head for reciprocating a needle bar 22 carrying a needle 23. By means of a clip belt 24 rotary motion is transmitted from the main drive shaft 20 to a bed shaft 25 which is geared, as described in detail in the above referenced patent, to a hook shaft 26 journaled vertically in the post 11 and carrying at its upper extremity a rotary hook 27 adapted to cooperate with the needle 23 in the formation of lock stitches.

The feed wheel 16 is carried in the post 11 by means of a vertically adjustable bracket 30 and has formed as a part thereof bevel-gear teeth 31 disposed in mesh with a pinion 32 fast on the upper part 33 of a feed shaft journaled vertically in a sleeve bushing 34 in the post 11. A universal connection 35 is provided between the upper part 33 and a lower portion 36 of the feed shaft. A one-way clutch device 37 of the type disclosed in the U. S. patent of Hacklander, No. 2,277,971, is carried by the lower portion 36 of the feed shaft. This clutch 37 is adapted to be oscillated by means of an actuating arm 38 connected to a plunger 29 which embraces an eccentric (not shown) fast on the bed shaft 25. Intermittent rotary motion in one direction is transmitted to the feed wheel 16 by actuation of the clutch 37.

The top roller feed member 17 is drivenly connected with the feed shaft so as to insure synchronism of feed wheel and top roller movements. The driving connections include a pulley 41 fast on the lower portion 36 of the feed shaft, a belt 42 engaging the pulley 41 with a pulley 43 fast on the lower extremity of a shaft 44 which is journaled vertically through the pedestal 13 and the bracket arm 14, and a belt 45 which is arranged to engage the top roller 17 and is driven over a pair of idler rollers 46 to a pulley indicated generally as 47 carried at the upper extremity of the vertical shaft 44.

Although the belts 42 and 45 and the vertical shaft 44 serve to synchronize movements of the feed wheel and top roller, proper control of the work fabrics gives rise to a need for control of the relative magnitude of movement of the work feeding wheels 16 and 17. It is also pointed out that the relative extent of work feeding motion between the feed members has no single optimum value but changes as the nature of the work changes. Thus, there is no one relationship to which the parts could be adjusted and provide which would be satisfactory under all conditions.

In this invention, control of the extent of work feeding motion of the top roller 17 relative to the feed wheel 16 is obtainable by means of the pulley 47 on the vertical shaft 44. The pulley 47 is constructed so as to provide a compact arrangement of parts, disposed so as to be readily accessible to the machine operator and arranged to provide a micrometer adjustment of the diameter of the belt-engaging portion thereof so that the extent of feed motion of the top roller may be regulated with respect to that of the feed wheel. Regardless of the character of work being stitched, therefore, the present invention provides convenient regulation effective to insure that each of the plies being stitched will be fed at precisely the required rate.

Referring to Figs. 2 and 3, the variable diameter pulley of this invention is carried directly upon the upper extremity of the vertical shaft 44 and is disposed to surround a bearing bracket 50 in which the upper extremity of the shaft 44 is journaled. Fast on the shaft 44, as by set screws 51—51, and contiguous with the bearing bracket 50 is a collar 52 formed with a counterbore 53. Screw threads 54 are formed on the upper extremity of the shaft 44 upon which a diameter regulating member 55 is threadedly engaged. The diameter regulating member 55 is formed with a conically shaped lower portion 56 provided with four evenly spaced slots 57—57 each extending lengthwise of the regulating member. Above the conical portion 56, the member 55 is formed with external threads 58 and with diametrically opposed screw driver slots 59—59. Endwise movement of the member 55 is limited by the bottom of the counterbore in a downward direction and by a locking screw 60 threaded into the shaft 44 at the upper end thereof.

The belt engaging portion of the pulley comprises a composite sheave made up of an assembly of four sector shaped pulley segments 61 arranged in the form of an annular ring. The inner surface 62 of each of the segments is tapered to match the angle of the conical portion 56 at the member 55. The outside surface of each of
the quadrants is formed with a straight cylindrical belt accommodating portion 63 and a projecting inclined portion 64, the portions being separated by an annular undercut 65 which provides a seat into which an annular spring clip 66 is disposed. The clip 66 serves yieldingly to urge the segments against the conical portion 56 of the diameter regulating member. Each of the segments is, in addition, formed with an aperture 67 adapted to receive a pin 68 of which the head portion is slidably arranged in one of the slots 57 of the regulating member so as to key the segments in place and prevent turning of the segments relatively to the regulating member. An annular locking ring 69 encircles and engages the projecting inclined portions 64 of the segments and is retained securely in place by means of a lock nut 70 which engages the external threads 58 of the regulating member. The locking ring 69 serves to clamp the segments, the diameter regulating member and the shaft together for rotation as a unit.

The bracket arm 14 of the sewing machine is fitted with a conventional top cover plate 71 formed with an aperture 72 through which protrude the diameter regulating member 55 and the lock nut 70. The major portion of the variable diameter pulley, therefore, is housed within the bracket arm and only those portions to which access is required for effecting the necessary adjustments are exposed for ready accessibility to the sewing machine operator.

In operation, the belt accommodating segments 61 are locked in position between the collar 52 and the locking ring 69. The position of the segments against the regulating member 55 determines the diameter of the belt accommodating surfaces 63. In order to vary the diameter of the pulley, the lock nut 70 must be loosened to free the segments 61, the diameter regulating member 55 may then be turned. If the member 55 is turned counterclockwise and moved upwardly, the spring clip 66 will cause the segments 61 to shift inwardly thus decreasing the pulley diameter. If the member 55 is turned in a clockwise direction, the conical portion 56 thereof will force the segments outwardly against the yielding force of the annular spring clip 66 and will thus increase the pulley diameter. When the proper setting is reached, tightening of the lock nut 70 will fix the parts in the proper position against accidental movement.

The construction of this invention, therefore, provides a feed regulator which is readily accessible and convenient to adjust by which a micrometer adjustment may be obtained of the relative extent of feed between opposed feed wheels. Regardless of the type of work being stitched, therefore, the sewing machine may be readied quickly and easily to advance both the upper and the lower plies at precisely the required rate past the stitch forming instrumentality.

Having thus described the nature of the invention, what is claimed herein is:

In a sewing machine having a hollow frame including a work support associated with a bed, a standard rising from said bed, and a bracket arm carried by said standard and disposed to overhang said work support, a compound work feeding mechanism comprising a lower work feeding instrumentality carried by said work support, mechanism actuated by said sewing machine for imparting intermittent work feeding motion to said lower work feeding instrumentality, an upper work feeding wheel carried by said bracket arm, a shaft journaled vertically in said standard, positive driving connections between said work feeding instrumentality and the lower extremity of said shaft, a variable diameter pulley carried at the upper extremity of said shaft, a belt extending between said variable diameter pulley and said upper work feeding wheel, said variable diameter pulley including an angularly adjustable diameter regulating member and an angularly adjustable locking member for said regulating member, said sewing machine bracket arm being formed with an aperture disposed substantially in axial alignment with said shaft through which said regulating and said locking members are disposed to extend outside the sewing machine frame.

References Cited in the file of this patent

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