Oct. 10, 1961 J. F. CONDRAN 3,003,443

FEEDING MECHANISM FOR SEWING MACHINES

Filed June 27, 1958 2 Sheets-Sheet 1

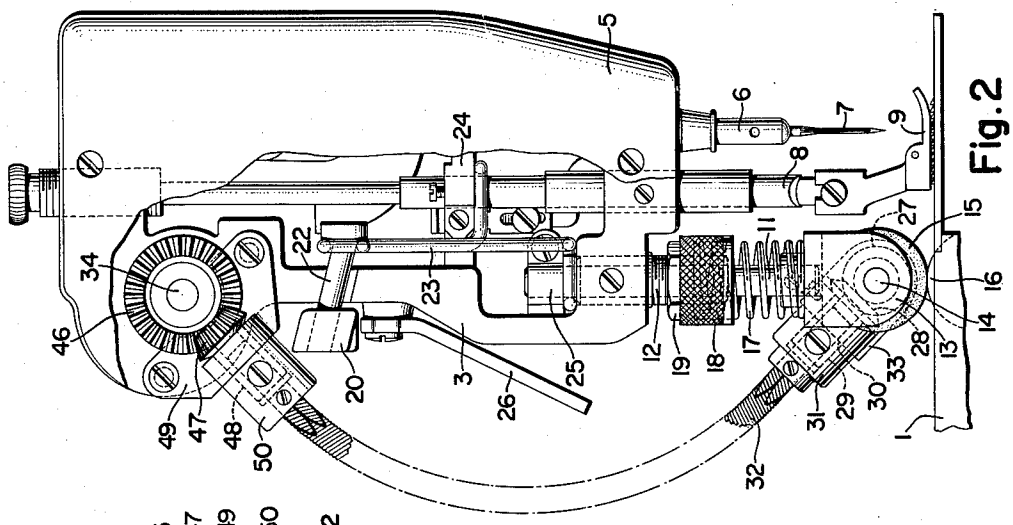

Fig. 2

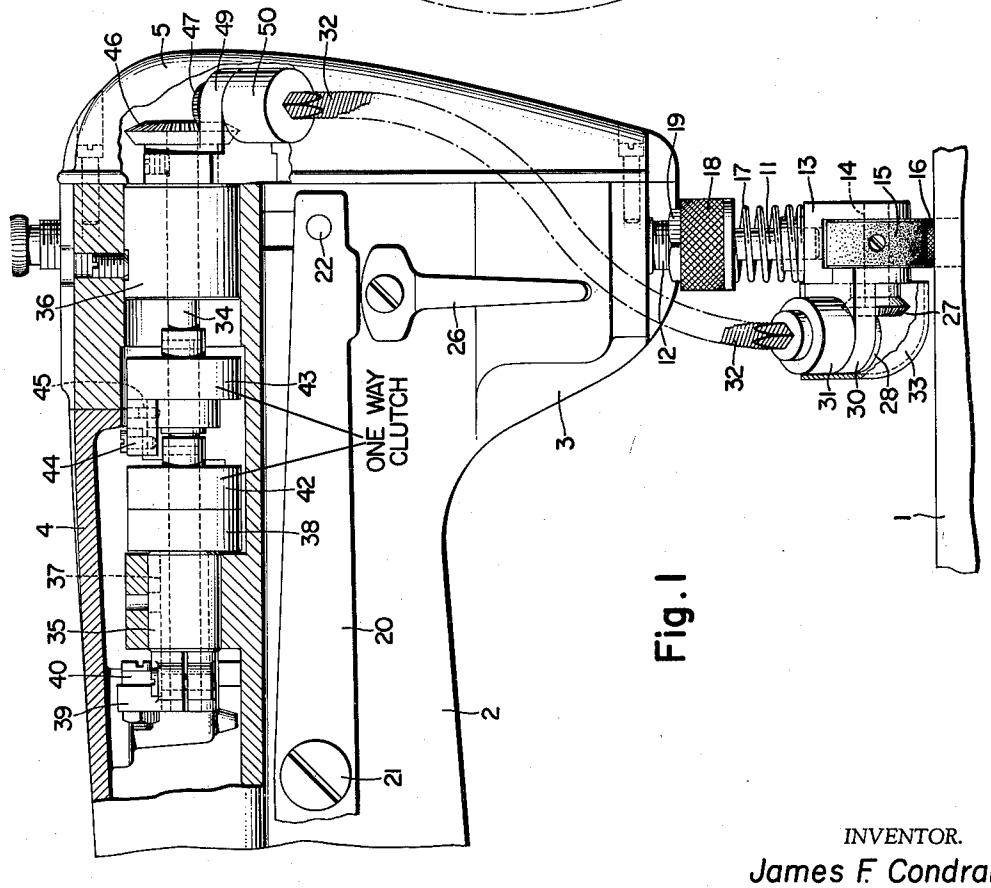

Fig. 1

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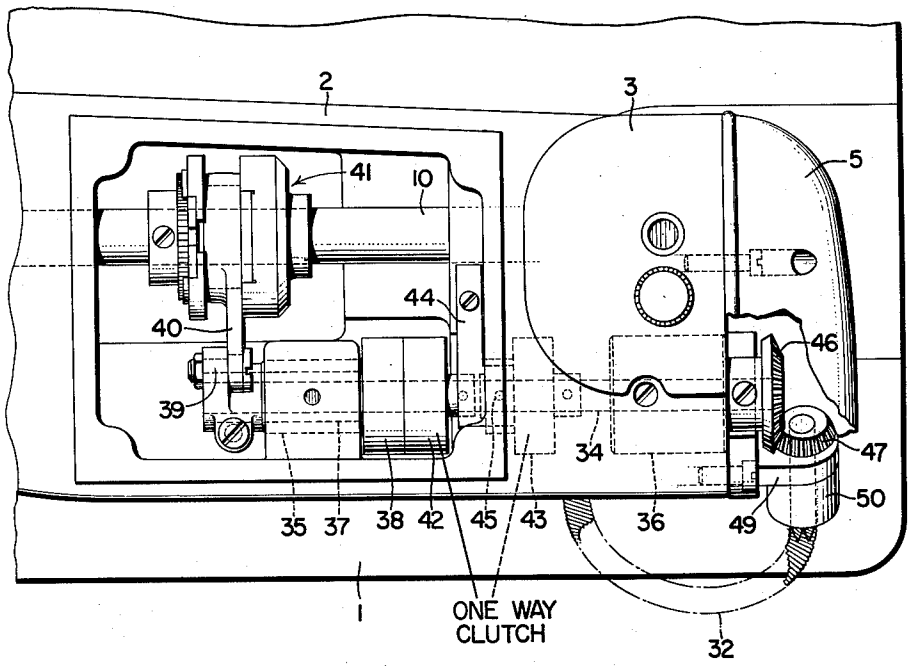

Fig. 3

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FEEDING MECHANISM FOR SEWING MACHINES

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1 Claim. (Cl. 112—214)

The present invention relates to sewing machines and particularly to a feeding mechanism of the so-called close-coupled puller feed type.

The object of this invention is to provide an improved puller feed mechanism for sewing machines which can be located at a minimum distance behind the point of stitch formation and which can be readily accommodated in a sewing machine having in mind the space limitations and lubrication requirements of the machine as well as the necessity to maintain a clear and unobstructed working surface. Further objects of this invention are to provide an improved puller feed mechanism for sewing machines that is efficient, dependable and durable and which is also economical.

Having in mind the above and other objects that will be evident from an understanding of this disclosure, the invention comprises the devices, combinations and arrangements of parts as illustrated in the presently preferred embodiment of the invention which is hereinafter set forth in such detail as to enable those skilled in the art readily to understand the function, operation, construction and advantages of it when read in conjunction with the accompanying drawings in which:

FIG. 1 is a fragmentary elevational view partly in section and illustrating the back of the head end of a sewing machine embodying the present invention.

FIG. 2 is a fragmentary head end elevational view of the sewing machine of FIG. 1 with the face plate partly broken away.

FIG. 3 is a fragmentary top plan view of the sewing machine of FIG. 1 with the top cover plate removed and the face plate partly broken away.

With reference to the drawings, the present invention is illustrated as embodied in a sewing machine having a frame including a bed 1 and a bracket arm 2 overhanging the bed 1 and terminating in a head 3. There is an access aperture in the top of the bracket arm 2 that is closed by a top cover plate 4 while the open face of the head 3 is closed by a face plate 5. A needle bar 6 carrying a needle 7 at its lower end is mounted in the head 3 for endwise movement, the needle 7 defining the point of stitch formation on the work supporting surface of the bed 1. Also mounted in the head 3 for endwise movement is the presser bar 8 carrying a presser foot 9 at its lower end. Journaled longitudinally of the bracket arm 2 is a rotary needle bar actuating shaft 10 which in the illustrated machine is used to drive the puller feeding mechanism.

The puller feed mechanism in accordance with this invention comprises a feed bar 11 mounted vertically in the head 3 in a bushing 12 for endwise sliding movement. A yoke 13 is secured on the lower end of the feed bar 11 and has a feed roller shaft 14 journaled in the tines thereof. A feed roller 15 is secured to the shaft 14 between the tines of the yoke 13. The feed roller 15 is biased downwardly into cooperation with a lower roller 16 that is freely journaled in the bed 1, the biasing being effected by a coil compression spring 17 that is wound around the feed bar 11. At its lower end the spring 17 abuts against the top of the yoke 13 and at its upper end abuts against an adjusting nut 18 that is threaded on the lower threaded end of the bushing 12 beneath the head 3. The nut 18 is secured in adjusted position by a locking nut 19. To provide for the introduction and removal of

work, the feed roller 15 is raised out of engagement with the roller 16 against the action of the spring 17 by the presser lifter mechanism for the presser foot 9, which mechanism comprises a lever 20 pivotally mounted intermediate its ends on the back of the bracket arm 2 by a pivot screw 21 and having a stud 22 on the head end thereof. The stud 22 is connected to the presser bar 8 and to the feed bar 11 by means of a wire link 23 having the one end thereof bent to encircle the presser bar 8 beneath a collar 24 and the other end thereof bent to encircle the feed bar 11 beneath a collar 25. The lever 20 is adapted to be actuated in the usual fashion by a treadle mechanism and by a hand lifter lever 26.

Intermittent one-way rotation is imparted to the feed roller 15 by means of a gear 27 fast on the shaft 14 and in mesh with a gear 28 on the lower end of a stub shaft 29 that is journaled in an arm 30 of the yoke 13. On the upper end of the stub shaft 29 there is mounted the coupling element 31 that is formed to receive in a key-like fashion the lower end of a flexible shaft 32. A cover 33 is designed to enclose the gears 27 and 28.

A feed shaft 34 is journaled in the upper rear portion of the bracket 2 in bearing bushings 35 and 36 and is arranged parallel to the needle bar actuating shaft 10. A sleeve 37 having a flange 38 is interposed between the feed shaft 34 and the bushing 35 with the flange 38 disposed between the bushings 35 and 36. The sleeve 37 is loosely mounted for oscillation relative to the shaft 34 and upon the free end thereof there is mounted a crank arm 39 that is connected by a pitman 40 to an adjustable eccentric 41 on the needle bar actuating shaft 10. Adjacent to the flange 38 there is mounted on the feed shaft 34 a one-way clutch 42 having its outer race coupled to the flange 38 for unitary oscillation and its inner race secured to the feed shaft 34. To prevent reverse rotation of the feed shaft 34, there is a second one-way clutch 43 having the inner race secured to the shaft 34 and having the outer race held against turning by an arm 44 that is mounted on the bracket arm and includes a pin 45, FIG. 1, that enters a bore in the hub thereof.

The feed shaft 34 extends through the bushing 36 and upon the free end thereof, which is on the outside of the head 3, there is mounted a gear 46 that meshes with a gear 47 having a stub shaft 48 that is journaled in a bracket 49 secured to the head 3. A coupling element 50 is secured on the end of the stub shaft 48 and has a bore into which the upper end of the flexible shaft 32 is fitted.

In the operation of the present device, as will be obvious from the above disclosure, as the needle bar actuating shaft 10 rotates, intermittent one-way rotation will be imparted to the feed shaft 34 by the eccentric 41, pitman 40, crank 39, sleeve 37, flange 38 and clutch 42. Rotation of the feed shaft 34 will, through the gears 46 and 47, impart rotation to the flexible shaft 32 and it will in turn impart rotation through the gears 27 and 28 to the feed roller 15.

A puller feed which is arranged immediately behind the point of stitch formation provides for better handling of the work in that, for example, it facilitates turning sharp corners. With a construction in accordance with the present invention, the puller feed can be arranged a distance behind the point of stitch formation that from a practical standpoint is a minimum. At the same time, the mechanism in accordance with this invention constitutes a very simple and direct drive for a puller feed, which drive can accommodate the vertical movement of the feed roller as it is raised to introduce or remove work from the machine and constitutes a minimum of obstruction to the manipulation of work.

These advantages are a function of the fact that the upper set of gears 46 and 47 are arranged on the outside of a plane transversely of the head of the machine through the axis of the feed bar 11 while the lower set of gears 27

and 28 are on the inside of this plane. Thus, aside from obtaining an optimum arrangement of gears, the flexible drive shaft 32 is stepped laterally from the upper to the lower sets of gears as seen in FIG. 1 while it is merely bowed when viewed in the other direction as in FIG. 2 so that there is obtained a maximum rigidity and control of the shaft 32 while also obtaining the most efficient driving relationship and still providing for raising and lowering the feed roller 15.

The further advantages of this mechanism include the fact that it can be readily accommodated in a sewing machine and particularly in an automatically lubricated sewing machine having in mind the space limitations as well as the structural features of the machine that could not be economically changed. Contributing to these advantages is the use of a feed roller biasing spring that is located entirely below the head of the machine, thus providing for accommodation of the drive elements in the head in the area directly above the roller. In addition to accommodating vertical movement of the feed roller, the use of the flexible drive shaft which avoids the necessity of alignment of the axes of the gears 47 and 28 or using expensive complex connections, permits location of the gears to suit the physical characteristics of the machine. From the standpoint of lubrication, the only element of the puller feed drive that extends through the frame is the feed shaft 34 which can be readily sealed, thus adapting the mechanism for use in an automatically lubricated sewing machine in which most of the puller feed drive is located within the closed portions of the frame.

Numerous alterations of the structure herein disclosed will suggest themselves to those skilled in the art. However, it is to be understood that the present disclosure relates to a preferred embodiment of my invention which is for purposes of illustration only and not to be construed as a limitation of the invention. All such modifications which do not depart from the spirit of the invention are intended to be included within the scope of the appended claim.

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

In an automatically lubricated sewing machine having a frame including a bed and a bracket arm terminating in a head overhanging said bed, a rotary needle bar actuating shaft journaled longitudinally within said bracket arm, and a puller feed mechanism comprising a feed bar mounted in said head for endwise movement on an axis perpendicular to said bed, a feed roller rotatably carried by said feed bar, means for biasing said feed bar toward said bed, a feed shaft journaled within the upper rear portion of said bracket arm at the head end thereof and on an axis parallel to the axis of said needle bar actuating shaft, said feed shaft extending through said head and terminating in a free end on the outside of said head beyond a plane normal to the axis of said needle bar actuating shaft and through the axis of said feed bar, a rotary actuating element on said needle bar actuating shaft, a sleeve journaled on said feed shaft, a one-way clutch coupling said sleeve to said feed shaft, a crank arm on said sleeve, a pitman operatively connecting said rotary actuating element and said crank arm for imparting intermittent one-way rotation to said feed shaft upon rotation of said needle bar actuating shaft, a flexible cable drive shaft, gears connecting one end of said flexible cable drive shaft to the free end of said feed shaft, and gears disposed on the opposite side of said plane from said first mentioned gears and connecting the other end of said flexible cable drive shaft to said feed roller for imparting rotation to said feed roller upon rotation of said feed shaft.

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