Dec. 12, 1961 W. ENGEL 3,012,531

STITCH ADJUSTING DEVICE FOR SEWING MACHINES

Filed Jan. 28, 1959 2 Sheets-Sheet 1

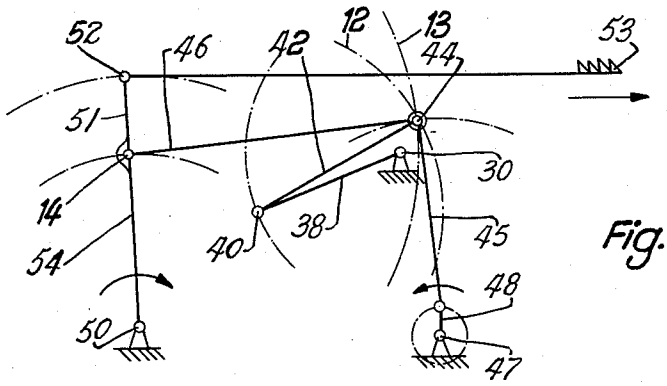

Fig. 1

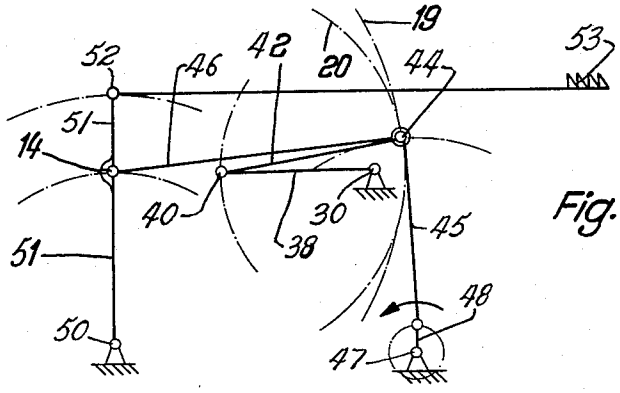

Fig. 2

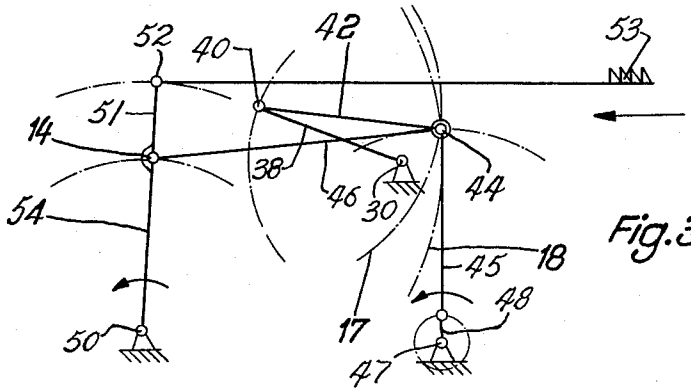

Fig. 3

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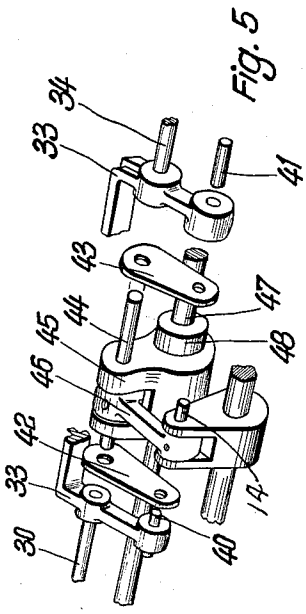

Fig. 5

Fig. 4

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United States Patent Office

3,012,531

Patented Dec. 12, 1961

3,012,531

STITCH ADJUSTING DEVICE FOR SEWING MACHINES

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Filed Jan. 28, 1959, Ser. No. 789,656
2 Claims. (Cl. 112—210)

The present invention relates to stitch adjusting devices for sewing machines, and is an improvement of the invention disclosed in applicant's U.S. Patent No. 2,846,966.

In stitch adjusting devices for sewing machines it is important inter alia to provide a zero work-feed setting sufficiently accurate for practical purposes. The stitch adjusting device should take up as little room as possible below the work supporting plate in the machine base, and it is also desirable to use the smallest possible moving masses for this stitch adjusting device, so that the sewing machine can be driven at a high speed.

In order to achieve these properties applicant's aforementioned earlier disclosure provided a hook disposed transversely to the direction of feed of the material being worked and feed shaft situated at the side of the needle bar remote from the operator, wherein the feed shaft is driven by the hook drive shaft, which is disposed at the same side of the needle bar as the feed shaft, by way of a cam and toggle lever arrangement comprising a cam arranged on the hook drive shaft and a substantially vertically arranged connecting rod between said cam and a substantially horizontally disposed toggle lever arrangement, said cam and the associated toggle lever arrangement being disposed close to the transversely disposed hook shaft. The connecting rod was articulated to the toggle joint pin of the toggle lever arrangement which comprised one element or link leading to the feed shaft and another element or link leading to stitch length adjusting means. By such arrangement, links of shorter length could be used. Therefore, there were smaller masses to be moved, and more accurate adjustment of the zero work-feed position could be achieved as compared with the prior art.

It is an object of the present invention to improve this arrangement further to enable the zero work-feed position of being approximated even more closely to the theoretically ideal setting, at which no movement whatsoever of the feed device would occur in a feed direction.

In accordance with the present invention there is provided a stitch adjusting device for a sewing machine wherein feed movement for the material being worked is derived from a cam arranged on a hook drive shaft by way of a substantially vertically arranged connecting rod articulated to the toggle joint pin of a toggle lever arrangement comprising one link leading to a feed shaft, to provide the feed movement, and another link leading to stitch length adjusting means, these two links being both situated at the same side of the toggle joint pin and being operative, in a zero work-feed position of the adjusting means, to describe about their ends remote from the toggle joint pin arcs which substantially coincide with one another in the region of movement of the toggle joint pin.

An embodiment of such a stitch adjusting device is hereinafter described, by way of example, with reference to the accompanying drawings in which:

FIGURES 1 to 3 are diagrammatic views of the stitch adjusting device in three different positions,

FIGURE 4 is a cut-away perspective view of part of a sewing machine comprising the device, showing in particular the driving mechanism associated with the device, and

FIGURE 5 is an exploded view of the device of FIGURE 4.

FIGURE 1 shows the basic construction of the feed drive with the stitch adjusting device. A double rocker consisting of two rockers 54 and 42 and a connecting rod 46 is pivotally mounted at a point 50 in the housing and at a point 40 on an adjusting crank 38 which is pivotally mounted at a point 30 in the housing but is to be regarded first of all as being fixed in the illustrated position. The rocker 42 and connecting rod 46 and their connecting pin 44 constitute a toggle lever arrangement. The rocker 42 and connecting rod 46 are referred to hereinafter as links of such toggle lever arrangement. When the double rocker is driven at the pin 44 by way of a connecting rod 45 by a crank or cam 48 rotatable about a point 47, the pin 44 can only move over the arc 12 formed by rotation of the link 42 about the point 40. Since, on further rotation of the crank 48 in the direction of the arrow and in the position indicated the toggle joint pin 44 owing to this positive guiding by the link 42 cannot move through an arc 13 which would be produced by rotation of the link 46 about its other pivot point 14, but only over the arc 12 further to the right, the rocker 54 is obliged to move about the point 50 in the direction of the arrow. Corresponding movement is transmitted to a feed dog 53, for feeding the material being worked, which is articulated at a point 52 to an extension 51 of the rocker 54 beyond the point 14, and the feed dog therefore moves towards the right in the direction of the arrow. (A cam for producing vertical movement of the feed dog 53 is not shown, but may be provided as shown in the aforementioned earlier Patent No. 2,846,966.)

When this direction of movement of the feed dog 53 is to be changed for reversing the direction of work feed, the adjusting crank 38 is pivoted into the position shown in FIGURE 3. Upon rotation of the crank 48 the link 42 carries out a movement about the new position of the point 40 which resulted from this pivoting movement, which causes the toggle joint pin 44, with the link 46 articulated thereto, to move through an arc 17 which is at the lower left-hand side of the arc 18 which the link 46 would produce in moving about the point 14. The rocker 54 then turns in the direction of the arrow (i.e. in the opposite direction to that resulting in FIGURE 1) about the point 50 and pulls the feed dog 53 with it towards the left. Therefore the direction in which the work is fed is reversed.

FIGURE 2 shows the zero-feed position into which the adjusting crank 38 has to be brought if the movement of the rocker 54 and therefore the feed of the work are to stop. The lengths of the links 42 and 46 are so dimensioned that the curvatures of the arcs 19 and 20 which they described about the points 14 and 40, respectively, substantially coincide in the region of movement of the pin 44. Thus, upon rotation of the crank 48, the rocker 54 and therefore the feed dog 53 do not move, so that no feed movement of the work takes place.

The embodiment illustrated in FIGURES 4 and 5 shows the construction of the stitch adjusting device in more detail:

In the standard 22 on the base 21 of a sewing machine housing there is mounted a hand lever 23 for stitch length adjustment. The lever 23 is secured on one end of a shaft 25 which is rotatably mounted in a bearing 24 in the standard 22. Also secured to the shaft 25 at its other end is an arm 26 whose free end, by way of a ball joint 27, operates a connecting rod 28 which in its turn acts, by way of a ball joint 29, on an arm 31 which is secured to a shaft 30. Thus, pivoting movement of the hand lever 23 rocks the shaft 30 and also a supporting extension 34 which is secured to the shaft by way of a bridge 33. The shaft 30 and extension 34 rest

in bearings 32. A spring 35 returns the shaft and therefore the hand lever 23 to the zero work-feed position after said lever has been released, as one end 36 of the spring is attached to the housing and the other end to a ring 37 fastened to the shaft 30. Two arms 38 and 39 of the bridge 33 are represented in a symmetrical construction in FIGURES 1 to 3. Arranged on the arms 38, 39, on pins 40 and 41 in FIGURES 1 to 3, are links 42 and 43. These links 42 and 43 are connected at their free end by a pin 44 (FIGURE 5) which corresponds to the toggle joint pin 44 according to FIGURES 1 to 3. Also pivotally mounted on the pin 44 are a forked connecting rod 45 (as also indicated in FIGURES 1 to 3) and a link 46. The fork of the connecting rod 45 consists of two arms arranged one at each side of the link 46.

The purpose of this symmetrical arrangement of the bridge 33, links 42 and 43, and the forked connecting rod and link mounting is to avoid component parts becoming jammed when the machine is running at a high speed. The crank 48 of FIGURES 1 to 3 is embodied by the cam 48 which is fixed on the hook drive shaft 47 and on which the connecting rod 45 is mounted. The link 46 transmits its movement, the production of which has already been described with reference to FIGURES 1 to 3, to a rocker 54 which is mounted fast on a feed shaft or dog advancing shaft 50 which extends between two pintles or bearing pins 49, such shaft being indicated as a fixed point 50 in FIGURES 1 to 3. Mounted further forward on this feed shaft 50 are two lever arms 51 to which the feed dog 53 for feeding material to be worked is articulated symmetrically by means of a pin 52.

As FIGURE 4 shows, the links 42, 43 and 46 are of substantially the same length as one another. This promotes to a particularly satisfactory extent the coincidence of the corresponding arcs which they describe within the region of movement of the toggle joint pin.

Having now described the invention with reference to the embodiment illustrated in the drawings, I do not wish to be limited thereto, but what I desire to protect by Letters Patent of the United States is set forth in the appended claims.

I claim:

1. In a zig-zag sewing machine of the type having a machine base presenting front and rear longitudinal sides, a looper drive shaft disposed longitudinally of said base, a feed dog disposed transversely above and endwise of said looper drive shaft, a feed bar supporting said feed dog, a feed dog advancing shaft extending parallel to said looper drive shaft and rearwardly of said feed dog and feed bar and a rocking lever connecting said feed bar to said feed dog advancing shaft, a stitch setting mechanism having a setting member extending externally of the machine and including a setting shaft having one end linked to said setting member, a cam on said looper drive shaft, a connecting rod having one end in operative engagement with said cam and the other end in engagement with a link member of said stitch setting mechanism, a crank arm on said dog advancing shaft, and a toggle joint extending generally rearwardly of said setting shaft having a joint portion including a joint pin in engagement with said connecting rod, one arm in engagement with said crank arm, a pair of arms defining said link member of said stitch setting mechanism, and a bridge member pivotally supported on the other end of said setting shaft and having parallel arms supporting the ends of said pair of arms remote from said joint portion, said one arm and said pair of arms extending substantially parallel to said parallel arms on the same side of said joint pin, said cam, said connecting rod, said crank arm, said dog advancing shaft, said feed bar and said toggle joint being concentrated in an area extending proximate said dog and on one side thereof over a length substantially that of said feed bar, thereby reducing the dimensions of said dog advancing shaft and reducing vibration of said machine.

2. In a zig-zag sewing machine of the type having a machine base presenting front and rear longitudinal sides, a looper drive shaft disposed longitudinally of said base, a feed dog disposed transversely above and endwise of said looper drive shaft, a feed bar supporting said feed dog, a feed dog advancing shaft extending parallel to said looper drive shaft and rearwardly of said feed dog and feed bar and a rocking lever connecting said feed bar to said feed dog advancing shaft, a stitch setting mechanism having a setting member extending externally of the machine and including a setting shaft having one end linked to said setting member, a cam on said looper drive shaft, a connecting rod having one end in operative engagement with said cam and the other end in engagement with a link member of said stitch setting mechanism, a crank arm on said dog advancing shaft, and a toggle joint extending generally rearwardly of said setting shaft having a joint portion including a joint pin in engagement with said connecting rod, one arm in engagement with said crank arm, a pair of arms defining said link member of said stitch setting mechanism, and a bridge member pivotally supported on the other end of said setting shaft and having parallel arms supporting the ends of said pair of arms remote from said joint portion, said one arm and said pair of arms extending substantially parallel to said parallel arms on the same side of said joint pin, said cam, said connecting rod, said crank arm, said dog advancing shaft, said feed bar and said toggle joint being concentrated in an area extending proximate said dog and on one side thereof over a length substantially that of said feed bar, thereby reducing the dimensions of said dog advancing shaft and reducing vibration of said machine, said one arm and said pair of arms being of a length providing for substantially the same arcuate movement of the ends of said arms in the rocking area of said joint pin when said advancing shaft is in neutral position.

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UNITED STATES PATENT OFFICE

CERTIFICATION OF CORRECTION

Patent No. 3,012,531 December 12, 1961

Wolfgang Engel

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

In the grant, lines 2 and 12, and in the heading to the printed specification, line 5, name of assignee, for "Phoenex-Naehmaschinen A.G. Baer & Rempel", each occurrence, read -- Phoenix-Naehmaschinen A.G. Baer & Rempel --.

Signed and sealed this 24th day of April 1962.

(SEAL)
Attest:

ESTON G. JOHNSON
Attesting Officer

DAVID L. LADD
Commissioner of Patents