

Dec. 3, 1963

L. BONO

3,112,718

WORK HOLDING ATTACHMENT FOR A SEWING MACHINE

Filed June 27, 1960

4 Sheets-Sheet 1

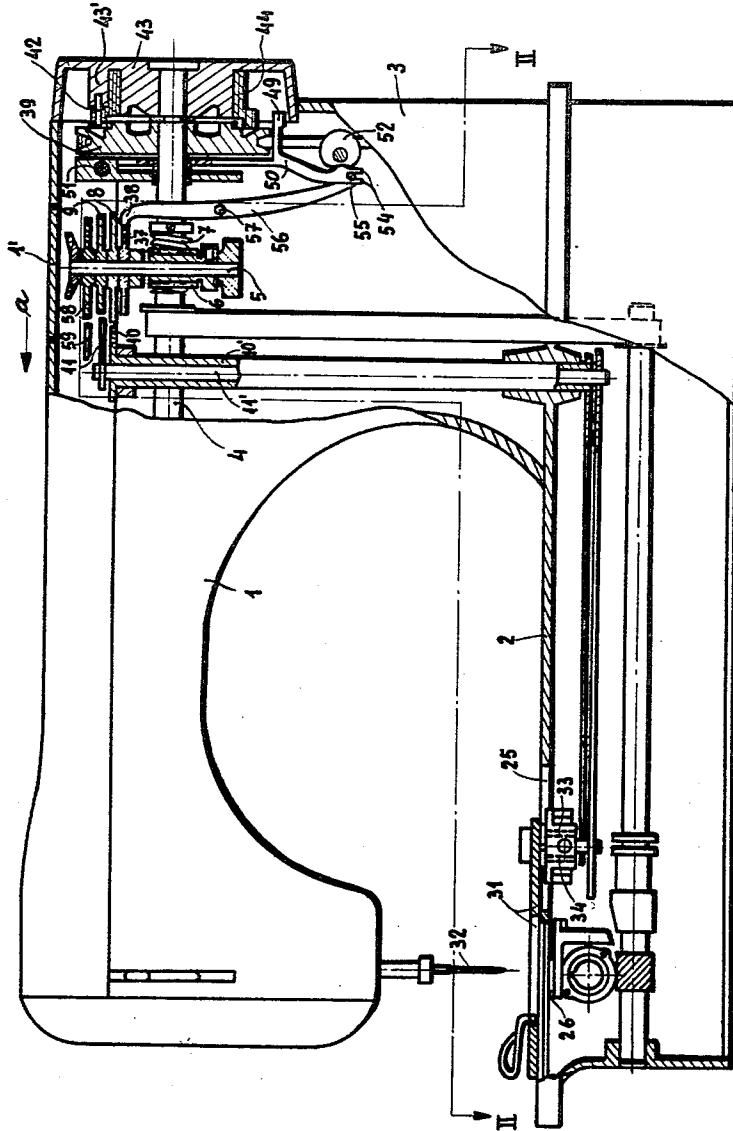


FIG. 1

Inventor  
Luigi Bono  
By *Stevens Davis Miller & Mosher*  
Attorneys

Dec. 3, 1963

L. BONO

3,112,718

WORK HOLDING ATTACHMENT FOR A SEWING MACHINE

Filed June 27, 1960

4 Sheets-Sheet 2

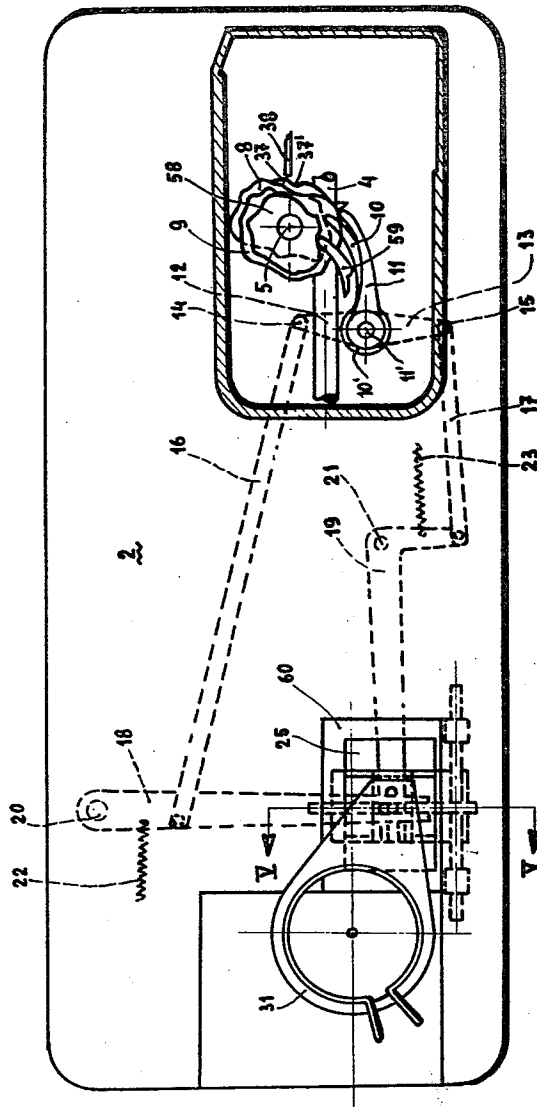


Fig. 2

Inventor  
Luigi Bono  
By Steven Dain Miller & Mooker  
Attorneys

Dec. 3, 1963

L. BONO

3,112,718

WORK HOLDING ATTACHMENT FOR A SEWING MACHINE

Filed June 27, 1960

4 Sheets-Sheet 3

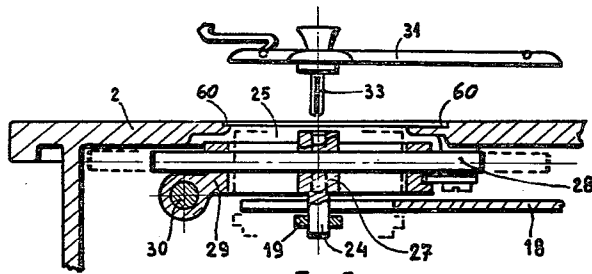


Fig. 5

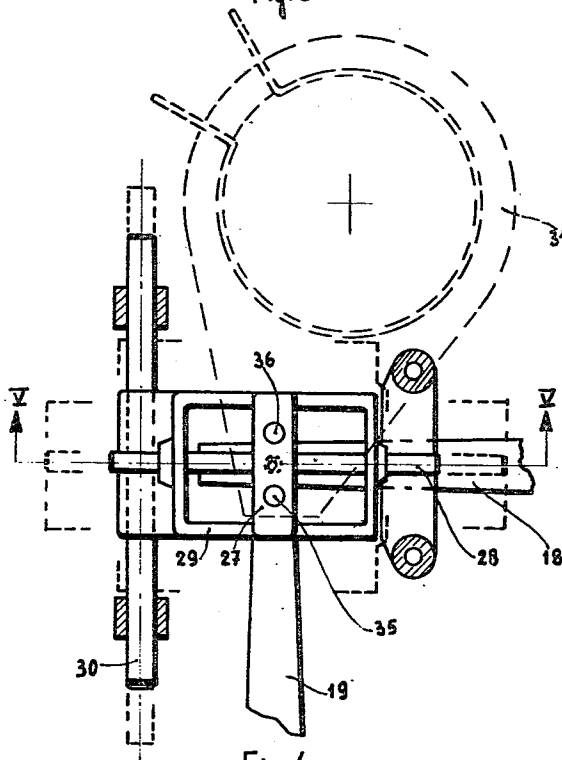


Fig. 4

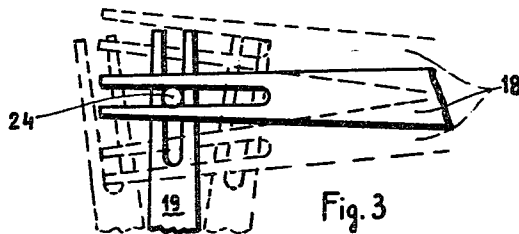


Fig. 3

Inventor  
Luigi Bono  
By Stevens Paris Miller & Mosher  
Attorneys

Dec. 3, 1963

L. BONO

3,112,718

WORK HOLDING ATTACHMENT FOR A SEWING MACHINE

Filed June 27, 1960

4 Sheets-Sheet 4

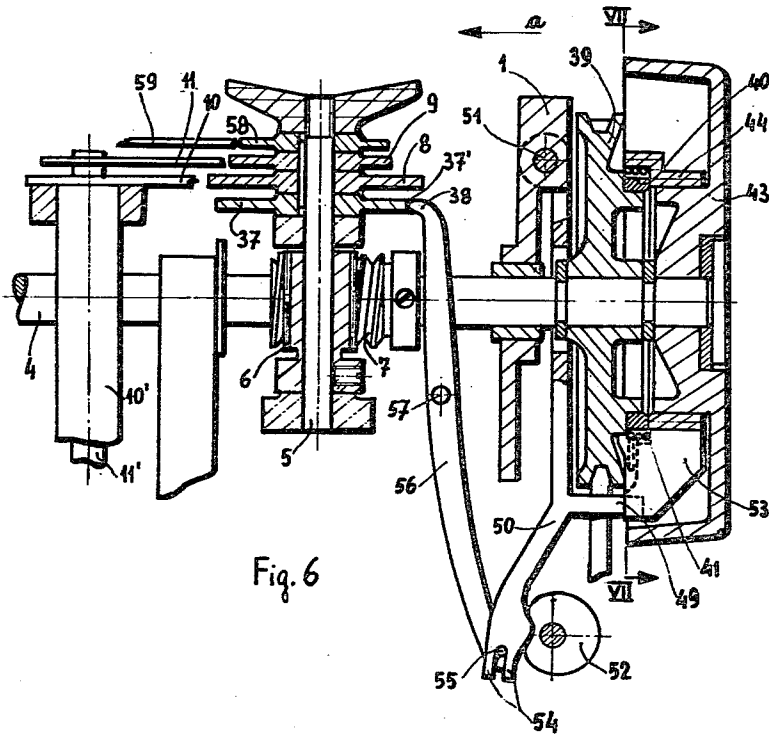


Fig. 6

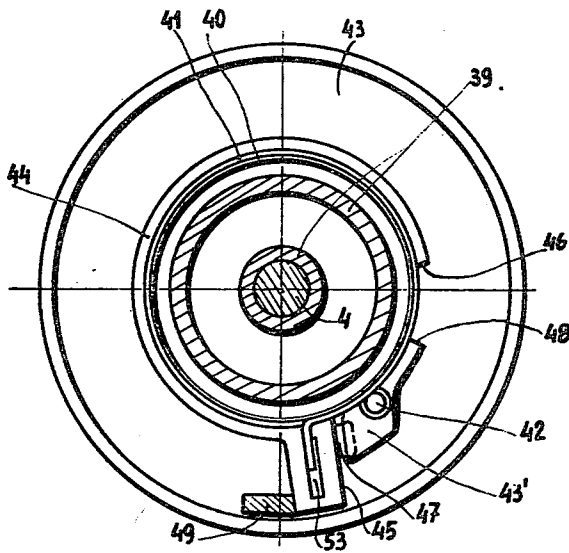


Fig. 7

Inventor

Luigi Bono

By Steven Davis Miller & Mosher  
Attorneys

1

3,112,718

## WORK HOLDING ATTACHMENT FOR A SEWING MACHINE

Luigi Bono, Pavia, Italy, assignor to Necchi Società per Azioni, Pavia, Italy

Filed June 27, 1960, Ser. No. 39,012

Claims priority, application Italy July 7, 1959  
3 Claims. (Cl. 112-102)

This invention relates to new and useful improvements in sewing machines, and more particularly relates to a work holding attachment for sewing machines.

The primary object of this invention is to provide a novel work holding attachment for sewing machines which is automatically operated and which is of a nature which permits the work holding attachment to be mounted within and on a sewing machine of conventional appearance and dimensions.

Another object of the invention is to provide a novel work holding attachment for a sewing machine, the work holding attachment being provided with a cam drive including two cams, one for transverse work holder movement and one for longitudinal work holder movement, which are interchangeable with other cams whereby the pattern of work holder movement may be readily varied.

Still another object of the invention is to provide a novel drive for a work holding attachment which includes a cam drive and means for stopping the cam drive and the operation of the sewing machine with the needle thereof in an elevated position.

A further object of the invention is to provide a novel shaft drive which includes a spring friction type clutch and stop means wherein a single revolution operation of a sewing machine may be readily accomplished with the sewing machine stopped with the needle disposed in a predetermined position.

A sewing machine formed in accordance with the invention is adapted to have a work holder mounted above the base plate thereof under the needle and driven by drive means concealed entirely within the base plate, arm and support of the sewing machine with the work holder being readily movable to permit ordinary sewing operations.

With the above, and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claims, and the several views illustrated in the accompanying drawings:

In the drawings:

FIGURE 1 is an elevational view with parts broken away and shown in section of a sewing machine equipped with the work holding device.

FIGURE 2 is a horizontal sectional view taken along the line II-II of FIGURE 1, and shows the general arrangement of the work holder drive components.

FIGURE 3 is an enlarged schematic view of the movements of the control levers disposed under the sewing machine bed plate.

FIGURE 4 is an enlarged fragmentary plan view of the slides per se disposed under the bed plate of the sewing machine.

FIGURE 5 is an enlarged fragmentary cross-sectional view taken along line V-V of FIGURE 4 through the slides and through an associated portion of the bed

2

plate, and shows the work holder in elevation in a removed position slightly above its operative position.

FIGURE 6 is an enlarged fragmentary vertical section taken through the upper right hand portion of the sewing machine of FIGURE 1 with portions of the frame of the sewing machine omitted, and shows the details of the power take-off for the work holder drive.

FIGURE 7 is an enlarged vertical sectional view taken along the line VII-VII of FIGURE 6.

Referring now to the drawings in detail, it will be seen that there are illustrated the general details of a conventional appearing sewing machine modified to incorporate a work holding attachment in accordance with the invention. The frame of the sewing machine is formed of an upper arm 1, a lower bed plate 2, and an upright support 3 connecting the arm 1 to the bed plate 2. A main drive shaft 4 extends horizontally through the arm 1.

As is best shown in FIGURES 1 and 6, a vertical shaft 5 is suitably mounted in the right portion of the arm 1 adjacent the shaft 4. Mating gears 6 and 7 on the shafts 5 and 4, respectively, drive the shaft 5 from the shaft 4.

A group of two interchangeable cams 8 and 9 are carried by the upper portion of the shaft 5. Fingers 10 and 11, which are connected to the upper ends of coaxial vertical shafts 10', 11', respectively, extending through the support 3, are engaged with the cams 8, 9, respectively. Levers 12 and 13, which are disposed beneath the bed plate 2, are connected to the lower ends of the shafts 10', 11', respectively, as is best shown in FIGURE 2. A pivot 14 connects a lever 16 to the lever 12 while a pivot 15 connects a lever 17 to the lever 13. The lever 16 is, in turn, pivotally connected to a lever 18 mounted for oscillatory movement beneath the base plate 2 on a depending shaft 20. The lever 17 is pivotally connected to one leg of a bell-crank lever 19 mounted for oscillatory movement beneath the base plate 2 on a depending shaft 21. Springs 22 and 23 extend between the levers 18 and 19, respectively, and the bed plate 2, and urge the fingers 10 and 11 into engagement with the cams 8 and 9.

As is best shown in FIGURE 3, the levers 18 and 19 have overlapped forked ends between which an upstanding pin 24 is disposed. The pin 24 is aligned with an opening 25 in the bed plate 2 which is spaced from the customary feed dog 26 of the sewing machine. The pin 24 is connected to slide 27 which is carried by a transversely disposed slide pin 28. The slide pin 28 is mounted in an elongated slide 29 for sliding movement which, in turn, is carried by a longitudinally extending slide pin 30 suitably mounted in housings depending from the bed plate for sliding movement.

At this time, it is pointed out that in lieu of the levers 18, 19 engaging the single pin 24, the levers 18, 19 could be separately connected to the slides 29 and 27, respectively.

A work holder 31 is seated on the bed plate 2 and can move relative to the usual needle 32. Attachment of the work holder to the slide 27 for controlled movement therewith is accomplished by means of depending split pins 33, 34 which are releasably inserted in apertures 35, 36 in the upper portion of the slide 27. Fabric is attached to the work holder 31 in a well known manner for movement therewith.

Referring once again to FIGURES 2 and 6, it will be seen that the shaft 5 also carries a cam 37 of a constant

3

radius profile interrupted by a step or notch 37' of a smaller radius. The cam 37 is for operating machine stopping mechanism after each revolution of the shaft 5. This mechanism includes a finger 38 engaged with the cam 37 and other mechanism controlling the disengagement of a driving pulley 39 and the stopping of the main shaft 4.

The driving pulley 39 is freely rotatable on the shaft 4 and is driven by a belt. The pulley 39 has a surface 40 about which is wound a spring 41 which has one end connected to a pivot 42 carried by a balance wheel 43 which is secured to the shaft 4. The opposite end of the spring 41 is connected to ring 44 which is free to oscillate about the inner part of the balance wheel. The amplitude of the possible oscillations of the ring 44 about the balance wheel 43 and the direction of winding of the spring 41 allow the spring 41 to extend and slide on the surface 40 of the pulley 39 when the pulley 39 rotates with respect to the balance wheel 43 in a clockwise direction when viewing the sewing machine in the direction of the arrow *a* in FIGURE 6. On the other hand, when the pulley 39 is turned in a counterclockwise direction, the spring 41 tightly winds around the surface 40 and in this manner drives the balance wheel 43 and the shaft 4. The amplitude of the aforementioned oscillations is limited by the engagement of surfaces 45 and 46 of the ring 44 against a rubber pad 47 and an end surface 48 of the element 43' of the balance wheel 43, respectively. The rubber pad 47 may be in the form of any desired type of elastic means suitable for absorbing the shocks which occur when stop means engage the balance wheel 43 and at the same time cause the opening of the spring 41.

Suitable stop means may be in the form of an end 49 of a lever 50 which is fulcrumed on a pivot 51 carried by the sewing machine arm 1. The lever 50 is urged by a spring (not shown) against an eccentric 52 rotatably mounted on the arm 1 and towards the balance wheel 43 into a position to be engaged by an offset extension 53 of the ring 44. The lower end of the lever 50 is in the end of a fork 54 engaging a pivot 55 carried at the lower end of a lever 56, which lever 56 is fulcrumed on a pivot 57 carried by the arm 1. The lever 56 terminates at the upper end thereof in the aforementioned finger 38.

The eccentric 52 is rotated by a control (not shown) mounted externally of the arm 1. When the eccentric is rotated to position where the larger diameter engages the lever 50, the finger 38 is moved out of contact with the cam 37 and thus remains inactive. On the other hand, when the lever 50 engages the smaller diameter portion of the eccentric, the lever 50 tends to maintain its contact with the eccentric 52, but is resisted in its movement by the lever 56 and the engagement of the finger 38 thereof with the cam 37. Only when the cam 37, during its rotation, moves the receding step 37' thereof into engagement with the finger 38 can the lever 50 engage the smaller diameter portion of the eccentric 52 and the end 49 move into position for engagement by the extension 53 of the ring 44, as shown in FIGURE 7. When the lever 50 is in the last described position, the spring 41 opens on the surface 40 and the balance wheel 43 and the shaft 4 stop rotating while the pulley 39 freely rotates on the shaft 4. The extension 53 is positioned with respect to the balance wheel 43 in a position where the needle 32 is lifted well above the fabric (not shown) being worked upon, thereby making it possible to move the fabric under the needle 32.

When it is desired to resume sewing, it is necessary to turn the eccentric 52 to a position where its larger radius portion engages the lever 50 to thereby disengage the end 49 from the projection 53 and release the ring 44 and the balance wheel 43. Once the sewing machine is again operating, the eccentric 52 must be returned to the position where the smaller radius portion is aligned with the lever 50 before the cam 37 completes a full revolution

4

to permit the finger 38 to engage in the recessed step 37' at the end of one revolution of the cam 37 to again stop the machine. However, if it is desired to make the sewing moft with superposed seams, the eccentric need not be immediately returned to its lever releasing position. This can be useful to reinforce the seam itself or to improve its aspect.

It is obvious that when the eccentric 52 is oriented to engage the lever 50 with the large diameter portion thereof and the finger 38 is disengaged from the cam 37, it is possible to remove the cam 37 from the shaft 5 through the opening 1' in the upper part of the arm 1. At this time, it is pointed out that the eccentric 52 is useful in a sewing operation without the work holder in that it can be used to immediately stop the machine with the needle elevated above the fabric.

From the foregoing, it will be apparent that the device of this invention may also be fitted to zig-zag machines. In such event, the cams may include a further cam 58 which contacts a finger 59 controlling the lateral movement of the needle in a known manner.

When normal seams are to be sewn which do not require the use of the work holder, the work holder may be removed simply by disengaging the pins 33, 34 from their respective holes 35, 36, and the opening 25 is closed with a small plate (not shown) which is placed within the housing 60 provided in the base plate 2. When so arranged, the machine presents the same over-all dimensions and esthetic features as an ordinary sewing machine for straight, zig-zag or automatic stitching.

From the foregoing, it will be seen that novel provision has been made in the example apparatus for carrying out the desired end. However, attention is again directed to the fact that variations may be made in the example apparatus disclosed herein without departing from the spirit and scope of the invention as defined in the appended claims.

What is claimed as new:

1. A sewing machine comprising a frame with an arm and a hollow base and a vertical standard connecting the arm and base, a drive shaft supported in said arm, a needle bar extending downwardly from said arm, a feed dog disposed in said base in vertical alignment with said needle bar, feed dog opening means disposed in said base in alignment with said needle bar and feed dog, said base having an opening disposed in the top thereof normally closed by a removable plate, said opening being spaced laterally of said feed dog opening means in a direction toward said vertical standard, a movable work holder support mounted within said base in vertical alignment with said opening, actuating means connected to said drive shaft and disposed within said frame and operating said movable work holder support in a transverse and longitudinal direction, and means on said work holder support for detachably connecting a work holder thereto in vertical alignment with said needle bar and above said feed dog.

2. In combination with a sewing machine of the type having a hollow frame including a base plate, an arm and a support, a needle drive shaft supported in said arm and a reciprocating needle; a work holding attachment comprising a work holder overlying the base plate in alignment with the needle, a work holder support mounted beneath said base plate, and drive means disposed entirely within said frame and drivingly connecting said work holder support to said needle drive shaft, said drive means including first and second lever means for imparting transverse and longitudinal movement, respectively, to said work holder support, separate cams driven from said needle drive shaft, fingers engaged with said cams for independently actuating said levers, and coaxial shafts carrying said fingers, control means for effecting a single cycle operation of said work holder including a cam mounted with said first-mentioned cams.

3. In combination with a sewing machine of the type

5

having a hollow frame including a base plate, an arm and a support, a needle drive shaft supported in said arm and a reciprocating needle; a work holding attachment comprising a work holder overlying the base plate in alignment with the needle, a work holder support mounted beneath said base plate, and drive means disposed entirely within said frame and drivingly connecting said work holder support to said needle drive shaft, said drive means including first and second lever means for imparting transverse and longitudinal movement, respectively, to said work holder support, separate cams driven from said needle drive shaft, fingers engaged with said cams for independently actuating said levers, and coaxial shafts carrying said fingers, a pulley freely rotatable on said needle drive shaft, and a releasable driven connection between said pulley and said needle drive shaft including

5

10

15

6

a driven member, and a coil spring windable about said driven member.

## References Cited in the file of this patent

## UNITED STATES PATENTS

268,804	Keith	Dec. 12, 1882
1,603,644	Sibbald et al.	Oct. 19, 1926
2,264,779	Tillett	Dec. 2, 1941
2,612,127	Hayes	Sept. 30, 1952
2,721,526	Ivanko	Oct. 25, 1955
2,938,477	Graham et al.	May 31, 1960
2,939,414	Slinn	June 7, 1960

## FOREIGN PATENTS

13,952	Great Britain	June 9, 1914
--------	---------------	--------------