BUTTONHOLE ATTACHMENT FOR SEWING MACHINES

Filed Feb. 19, 1929

2 Sheets-Sheet 1

Inventors:
Arthur Albrecht Bohmann
Kurt Schiebel

By their Attorney
Alma C. Herrick
BUTTONHOLE ATTACHMENT FOR SEWING MACHINES

Arthur Albrecht Bohmann
Kurt Scheibel

By their Attorney
Allyn C. Heising
The present invention relates to improvements in button-hole attachments for sewing machines, and it is the principal object of the invention to combine such an apparatus for the making of large as well as small button-holes in washable goods, lingerie or the like articles with a sewing machine, and to combine this attachment with means for effectively smoothing the ends of the button-hole to prevent fraying by combining an endless rack with a system of levers.

Another object of the invention is the provision of an apparatus of this character, combined with a sewing machine in which the longitudinally or transversely directed motions of the pressure foot are derived from the needle-bar and the constant movement of the endless rack is transmitted to a system of levers controlling the pressure-foot, so that by a suitably selected displacement of the point of leverage application large as well as small button-holes are made by one and the same apparatus.

The known button-hole making apparatus combined with sewing machines, is too complicated and does not allow a sufficient smoothing of the thread at the ends of the button-holes owing to the peculiar formation of the seam made by the sewing machine, so that the button holes quickly frayed at the ends.

It is a further object of this invention to provide an apparatus avoiding this disadvantage by making the apparatus in two parts, an upper movable part secured to the pressure foot-bar, and a lower rigid part secured to the bed of the sewing machine, and by connecting both parts by means of a special joint.

In the known devices of this character which were combined with sewing machines the button-hole making apparatus is comparatively heavy and consequently when attached to the pressure foot bar of the sewing machine weighted the same disproportionately down so that on account of the attachment of the apparatus at one point, it turned with the pressure foot bar so that the sewing machine was subjected to a certain displacement and the button-hole became frayed, ragged, or jagged.

Moreover, owing to the variation in the construction of the various systems of sewing machines the construction of a standard button-hole apparatus for all makes of sewing machines was very difficult, and the present invention has overcome these difficulties by securing the button-hole apparatus at two points, on the pressure foot bar as well as on the sewing machine bed, so that a solid and rigid support is presented which guarantees an efficient operation.

Furthermore, the present invention provides a means for specially smoothing the ends of the button-hole by transmitting the constant movement of an endless or oval rack bar onto a system of levers proportional to the length of the button-hole causing the stitches at the ends of the button-holes to become gradually narrower and interstitched.

While it is well known to change the size of button-holes by the displacement of the point of application of a lever, as it is for instance disclosed in Patents No. 678,397 and No. 1184,093 these patents do not disclose means for smoothing the button-hole ends. No further advance feed step is produced at the ends of the button hole in the direction of the longitudinal axis of the same as the rack shown in these patents does not have any teeth at these points, which means that it is not endless.

At these dead centers a torsion or distortion of the material feed invariably takes place caused by the second curve, and therefore the stitches do not become narrower or closer together at the ends of the button holes.

A still further object of the invention is therefore the provision of a button-hole apparatus combined with a sewing machine which positively avoids fraying of the button holes at their ends.

It is furthermore also one of the objects of the present invention to provide a button-hole attachment for sewing machines in which the needle plate cover is suspended
to execute a pendulum movement and adapts itself to the counter pressure face of
the movable material feeder etc., in order to securely and uniformly guide the ma-
terial during the feeding thereof.

According to the invention moreover the needle plate cover is arranged to oscillate
about a bolt which is secured within a stationary plate on the sewing machine bed,
in order to allow a swinging out of this needle plate cover to give better access to the
shuttle whereby means are provided to limit and hold the needle plate cover in its
operating position by means of a suitable abutment.

In the accompanying drawings, forming a material part of this disclosure:

Fig. 1 illustrates in diagrammatic side elevation a sewing machine equipped with
two buttons attachment constructed according to the present invention.

Fig. 2 is a sectional side elevation of the attachment.

Fig. 3 is a cross-section on line 3—3 of Figure 2.

Fig. 4 is a plan view of the attachment.

Fig. 5 is a plan view of a modified form of the attachment.

Fig. 6 is a side elevation thereof.

Fig. 7 is an end elevation of the attachment, Figure 5.

As illustrated in Figures 1 to 4, the button-hole attachment for sewing machines
comprises chiefly two parts, the base G (Fig. 1) secured to the bed plate F of the machine
by means of a fastening screw S of suitable well known construction, and the upper
part or body O attached to the pressure foot bar of the machine. Both parts, G and
O are connected by means of a joint D, or the like.

When the pressure foot bar is raised or lifted, the upper part O turns scissors-like
about the joint D and releases the material M, while in the lowered position of the pres-
sure foot bar its spring pressure is used to press the material or fabric M firmly upon
the base G.

The base G comprises a plate 1, which, as shown in Figure 2 constitutes also a
cover plate for the conveyer 2 in order to make an exchange of the conveyer 2 and the
needle plate 3 or removal unnecessary.

At the outer end of the plate 1, two upright bars 4, are provided limiting the
lateral displacement of the plate O, and between which the upper part of plate O
swings about the pintles or pins 5.

This upper part O consists of a cover plate 6 under which the cloth pressure-foot
7 moves.

This pressure foot carries at its front the material clamp 8 which is rotatably ar-
anged about the bolts 9 and on its underside has teeth 10 for feeding the material.

The pressure foot 7 has imparted thereto during the making of the button-holes a
partly zigzag, and partly straight-lined movement by means of a feeder device 13,
14 operated from the needle bar 11 by means of a lever 12.

The lever 12 carries also a pin 15 extending into the slot 16 of a slide 17. During
the oscillation of the lever 12 the slide 17 is reciprocated and slides in the two bear-
ings 18 of the cover plate 6.

The slide 17 has also two projections 19 and 20, the projection 19 of which is adjust-
able to allow a regulation for various stitch intervals.

By means of its projections 19, 20, the slide 17 operates a lever 21 of the frictional
feeding mechanism 22 of well known construction and the feeding mechanism 22 during
the operation of the slide in the direction indicated by the arrow, or opposite to the
movements of the hands of a clock. During the return stroke of the slide 17 the fric-
tional feed mechanism 22 will execute a lost motion and the operating gear 23 will
remain stationary.

This step by step feeding operation is transmitted from the operating gear 23 ar-
ranged in cover plate 6 to an endless rack 24.

In order to prevent undesirable motion of the rack 24, a pin 25 of the gear 23 is
guided within a groove 26 of the rack 24. The movement of rack 24 is transmitted
through a slot 27 upon an adjusting lever 28.

As the rack 24 and the pressure foot 7 execute a straight as well as zigzag move-
ment about the gear 23 as pivot point, the straight or longitudinal movement towards
the lever 28 is not interfered with by the zigzag movement, as the same is compen-
sated in the slot 27 into which the pin 29 of the lever 28 engages.

The lever 28 turns about the bolt 30 secured in cover plate 6 and has a slot 31
formed on the arc of a circle into which is guided an adjusting bolt 33 adapted to be
locked in position by means of a nut 32, while bolt 33 is also guided within the arc
shaped slot 34 of the pressure foot 7.

The constant motion of the endless rack 24 is therefore transmitted as angular mo-
ton upon the lever 28 by means of pin 29.

The adjustment of the bolt 33, i.e. the point of application of the lever 28, varies
the length of the arc of the constant angular motion.

As the bolt 33 is guided within the arc-shaped slot 34 of the pressure foot 7 the
length of the adjustment varies according to the position of the bolt 33 relative to
the point of rotation of the lever for the pressure foot, so that button-holes of varying
length may be stitched.

The rack 24 also serves to determine the
width of the button-holes, and with this purpose in view, rack 24 is connected with the pressure foot 7 on its underside by means of a wedge 35 entering a groove 36 of the same.

The groove 36 is longer than the wedge, so that the rack with its wedge 35 can be displaced therein longitudinally, as the rack 24 has always imparted thereto a constant movement, and the longitudinal displacement of the pressure-foot varies with the variations in the length of the button holes.

When gear 23 arrives at the narrow side of the rack, the pressure foot 7 will be turned by the rack about the bolt 37 of a bell-crank lever 38.

The correct length of the button-hole in the material clamp under the needle 11 is determined by the lever transmission and the circular slot 34 must be made of a size to allow sufficient play for the adjusting bolt 33.

The bell-crank lever 38 transmits simultaneously the alternating movement of a drum curve piece 39 (Fig. 3) of well known construction which is operated from the feeder device 13, 14, and with which it is connected by means of a pin 40 during its movements about its fulcrum 41. The curve piece 39 is located within a housing 42 which is attached to the pressure-foot bar 44 of the sewing machine by means of a screw 43.

When the bar 44 is raised the entire upper part O swings scissors-like about the pintles 5.

In order to keep the feeding mechanism within the casing 42 in the plane of the pressure-foot bar, a suitable means is provided comprising a bracket 45 on the housing 42, two ears 46 on the cover plate and a connecting bolt 47.

The device is thus firmly connected with the sewing machine at two points, at the pressure foot bar 44, as well as also by means of the screw 5 at the base, so that a torsion of said bar or of the apparatus is positively avoided.

This means of securing the apparatus has the further advantage that approximately half of the weight only of the upper part O (Fig. 1) is carried by the pressure-foot bar, while the other half of the weight of the apparatus is borne by the joint D.

It is of great importance for the feeding of the material that the material clamp 8 with its teeth 10 rest with its entire face upon plate 1. For this reason the material clamp is articulated to bolts 9 to move in one direction, while in the opposite direction the clamp 8 is controlled by the bolt 5. It is not desirable to arrange these parts to be movable in all directions on button-hole apparatus on account of the necessarily complicated construction thereof.

It is desirable to make the bolts 5 adjustable in vertical direction, in order to enable a smooth support of the material clamp in the opposite direction.

In the known apparatus of this type now combined with the sewing machines the teeth 10 of the clamp 8 are unsufficient to securely hold and feed the material during the turning of the same and during the stitching of the button-holes it was discovered that the material was raised and moreover drawn from under the clamp 8 during the tensioning of the thread, as no pressure foot was present and because it was absolutely necessary to strongly brake the tension of the upper thread.

In the specially constructed button-hole making machines the upper thread cannot be sufficiently braked as the pressure on the material is not sufficient.

In these special button-hole making machines the spring pressure of the pressure foot bar alone is available to produce this effect, if no other additional clamping devices for the material are provided.

For this reason the teeth 10 according to our invention are formed differently than the teeth usually employed for this purpose, as shown in Figures 2 and 3. The angle of the teeth is so selected that it is oppositely directed to the pull on the material.

Therefore, if the material is raised, the teeth will engage the same in the manner of a saw and hold the same securely.

In the modification illustrated in Figures 5 to 7 the plate 51, which also constitutes the base of the apparatus, is secured by means of a clamp screw 52 to the bed of the sewing machine.

This plate 51 has an extension or arm 52 which is somewhat springy in its action, and serves as a bearing for the pin 53 which is riveted to the movable upper needle plate 54.

This plate 54 is rectangularly bent on its opposite end and is rounded at its supporting face to facilitate the oscillation in the horizontal plane.

The plate 54 is therefore resting at one point on arm 52 and at the other on a bridge 55 constituting the fulcrum points of the needle plate 54.

The pressure foot 56, which as in the construction of Figures 2 and 3, is turnable about the bolts 57, in the present construction adjusts itself automatically in one direction, while the cover plate 54 swings in the opposite direction. By such arrangement a perfect engagement of the pressure foot is obtained for readily feeding the material.

The cover plate 54 does not only cover the conveyer 58 of the sewing machine and the needle plate 59 but also part of the shuttle path, as it is preferable in machines in which the shuttle oscillates horizontally, as indicated at 60.

The introduction of the shuttle is usually
connected with difficulties on account of the pressure of the cover plate 54 or it is impossible as may be seen by inspection of Figure 5, if the cover plate 54 is rigidly connected with plate 51. Therefore in the present construction the cover plate is movable in the direction of the arrow about bolt 53, thus allowing the ready introduction of the shuttle without difficulty.

In order to position the stitch-hole directly under the needle 62, the plate 54 is positioned upon a bolt 63 and a grip 64 on the plate facilitates the handling of the plate. A suitable spring may also be provided on bolt 53 so as to make the members of the plate frictional to a certain degree.

By arranging the bolt 53 as well as the bolt 63 with the stationary bed 51 the stitch-hole will always be correctly positioned relatively to the needle.

The operation of our device will be entirely clear from the above description in connection with the drawings, and it will be understood that we have disclosed the preferred form of our invention only as one example of the many ways to practically construct the same and that we may make such changes in its construction as come within the scope of the appended claims without departure from the spirit of our invention and the principles involved.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent is:

In a button hole attachment for sewing machines, in combination with a cloth clamp plate, and a pressure foot carried thereby, feeder devices for imparting during the operation of the machine to said pressure foot a combined zigzag and straight-lined movement, a lever for operating said feeder devices from the needle bar of the sewing machine, one of said feeder devices including an endless rack having a groove and determining the width of the button-hole sliding within said clamp plate, a gear, a pin on said gear guided within the groove of said rack, and a system of levers for transmitting the movement of said rack to said cloth clamp plate as longitudinal motion in order to allow a smooth stitching of the button-hole at its ends.

Signed at Dresden, Germany, in the county of Saxony and State of Germany, this 26th day of January, A. D. 1929.

ARTHUR ALBRECHT BOHMANN.
KURT SCHEIBEL.