May 12, 1970 R. B. HOWELL 3,511,200

PRESSER FOOT ASSEMBLIES

Filed Oct. 2, 1968

Fig. 1.

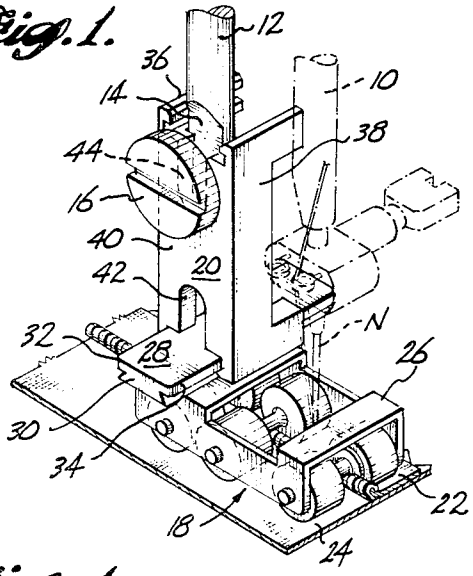


Fig. 2.

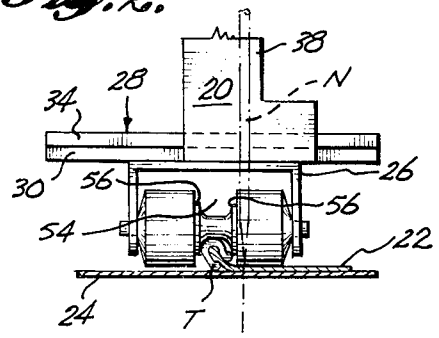
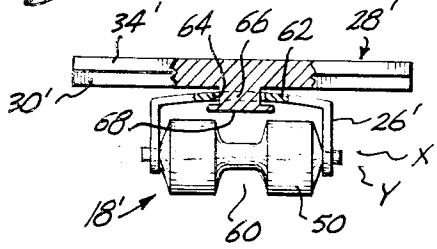


Fig. 4.



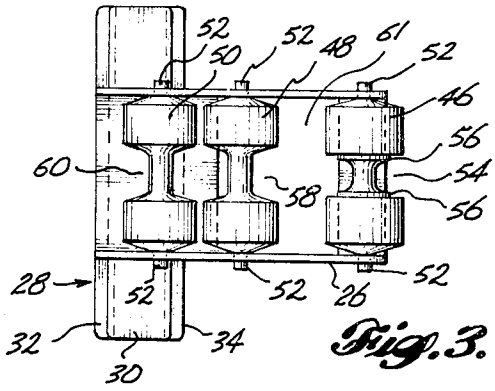
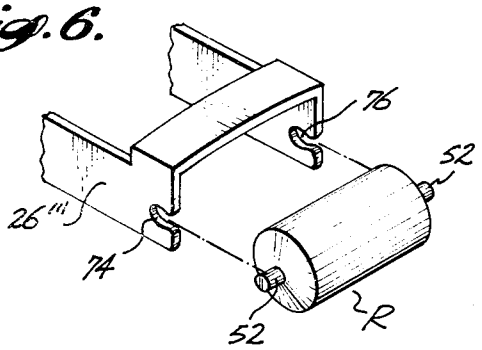


Fig. 3.

Fig. 6.



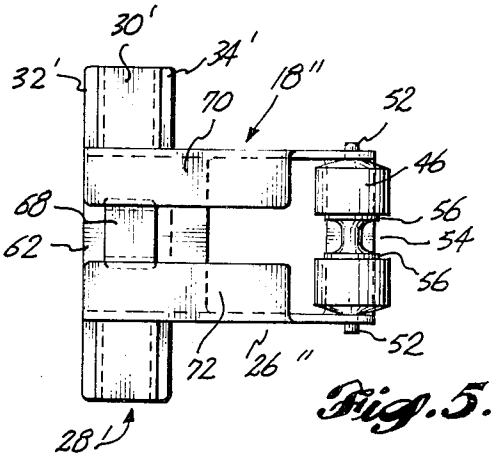
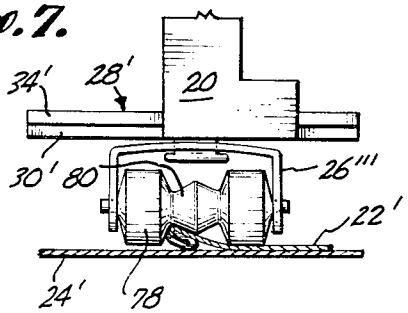


Fig. 5.

Fig. 7.



INVENTOR
ROBERT B. HOWELL
BY Graybeal, Cole, & Barnard
ATTORNEYS

United States Patent Office 3,511,200
Patented May 12, 1970

3,511,200

PRESSER FOOT ASSEMBLIES

Robert B. Howell, 2115 Madrona Point Drive, Bremerton, Wash. 98310

Continuation-in-part of application Ser. No. 678,742, Oct. 27, 1967. This application Oct. 2, 1968, Ser. No. 764,518

Int. Cl. D05b 29/00

U.S. Cl. 112—235 13 Claims

ABSTRACT OF THE DISCLOSURE

A laterally adjustable presser foot components including one or more presser rollers or wheels making contact with the material. A forward guide roller including one or more grooves sized and shaped to closely fit and guide a chain of zipper teeth or some other elongated article. The foot component may include a plurality of interchangeable guide rollers or wheels, each adapted for use in installing a different type of zipper or article. A presser roller mounted for some vertical movement of its ends so that downward pressure on the roller carrier will place the roller into a position of contact with the material at each of its ends.

Cross references to related applications

This is a continuation-in-part of my copending application Ser. No. 678,742, entitled Installation of Concealed Zippers and Presser Foot Attachments, and filed Oct. 27, 1967, as a continuation-in-part of my then copending application 501,066, entitled Zipper Foot Attachment and filed Oct. 22, 1965, as a continuation-in-part of my earlier copending application Ser. No. 475,486, filed July 28, 1965, and entitled Universal Presser Foot Attachment. Application Ser. No. 475,486 issued as U.S. Pat. No. 3,342,151 on Sept. 19, 1967. Application Ser. No. 501,066 issued on U.S. Pat. No. 3,349,736 on Oct. 31, 1967.

BACKGROUND OF THE INVENTION

Field of the invention

The present invention relates to presser foot assemblies for sewing machines, and more particularly to such assemblies for use in installing zippers or other types of elongated articles which need guiding during their installation, e.g. cording, piping.

Description of the prior art

Known presser foot attachments for sewing machines comprise a member having one or more elongated lower body parts presenting a relatively flat lower surface to the material. Each such surface is generally narrow and long and provides a substantial area of contact with the material. A disadvantage of presser feet of this type is that they involve a large area of sliding contact with the moving material. This most often results in an uneven movement of the material below the pressure applying member, due to frictional grab, resulting in the development of puckers in the material. Typical examples of this type of presser foot are disclosed in my aforementioned U.S. Pat. Nos. 3,342,151 and 3,349,736, and in Smallbone U.S. 1,930,628; Dixon et al. U.S. 2,909,136 and Yoshida U.S. 3,098,460.

Summary of the invention

This invention relates to presser foot components which are characterized primarily by their inclusion of one or presser rollers adapted to make a rolling contact with the material. The rolling contact lessens frictional drag on the material and this in turn lessens the probability of puckers being formed in the material.

A zipper foot assembly according to the present invention includes a foot component having at least one presser roller located near its forward end. This roller may be trailed by either an additional one or two rollers, or by flat bottom surfaces on the foot component. In preferred form the forward roller is a guide roller and is formed to include one or more guide avenue grooves. By way of typical example, a guide roller may include a single guide groove shaped to correctly orient the teeth of an invisible zipper and guide such teeth in their travel through the sewing region. The front or guide roller of the foot component may be removably mounted so that it can be replaced by a different forward roller adapted for use in performing a different sewing function. Also, the rollers may be mounted so that they can tip sideways somewhat to place the presser surfaces near each end into contact with the material.

These and other features of the invention are exemplified by the embodiments described below with reference to the drawing.

Brief description of the drawing

FIG. 1 is a fragmentary pictorial view taken in the needle region of a sewing machine of a type having a high presser bar equipped with a side entry clamp screw, such view showing a presser foot attachment according to the present invention installed in an operative position for sewing a tape of an invisible zipper, and showing the needle and needle bar assembly in reference;

FIG. 2 is a front elevational view of the presser foot assembly of FIG. 1, such view showing a guide groove configuration in the front roller adapting it for use in sewing an invisible zipper of the type having a rounded enlargement at the ends of the zipper teeth which set in the fold of the material when the zipper is closed;

FIG. 3 is a bottom plan view of the foot component portion of the presser foot assembly of FIGS. 1 and 2;

FIG. 4 is a cross sectional view taken through a modified form of foot component which differs from the foot component shown by FIGS 1–3 only in the manner in which the transverse slide bar is attached to the body of the foot component;

FIG. 5 is a bottom plan view of another modified form of foot component, such form including only a single front roller backed by laterally spaced bottom panels having lower presser surfaces;

FIG. 6 is a fragmentary pictorial view of the front portion of yet anothetr modified form of foot component, characterized by the front roller being removable and replaceable by a differently configured roller for performing a different sewing operation; and

FIG. 7 is a side elevational view of a roller configured to include a generally M-shaped groove, the opposite side inner surfaces of which are shaped to guide the opposite chains of an oval tooth type of invisible zipper.

Description of the preferred embodiments

Referring specifically to FIG. 1, a reciprocating needle bar **10** (in reference) is shown spaced forwardly of a presser bar **12** of the upright high bar type. Bar **12** is equipped with a side clamp type of presser foot mounting mechanism, and when bar **12** is in its operative position such mounting mechanism is spaced relatively high above the needle plate (hence the name "high bar").

The mounting mechanism comprises a flat side surface **14** formed on the lower end portion of bar **12**, a threaded aperture (not shown) entering into the side of said lower portion, substantially perpendicularly to both surface **14** and the sewing path, and a clamp screw **16**. Surface **14** is parallel to the sewing path. Clamp screw **16** has a large head, with a flat inner surface that is

parallel to surface **14**, and a threaded shank that is threadable into and out from said aperture.

In FIG. 1 a zipper foot assembly constructed according to the present invention is shown mounted in an operative position by the presser bar **12**. Such attachment consists of two interlocking parts: a foot component **18** and a high bar mounting shank **20**. The foot component **18** is shown to be positioned for sewing a tape **22** of an invisible zipper to a piece of material **24**. A material advance mechanism (not shown) is located below the material **24** and below that part of component **18** that rests on and presses downwardly against the tape **22**.

Foot component **18** is shown to be constructed in two parts. The first part **26** is shown to be of rectangular proportions and is hereinafter referred to as the body of the foot component. The second part is an elongated slide bar **28** which is secured to the upper surface of the rear portion of the body **26**, and with said rear portion forms the heel of the foot component **18**. Slide bar **28** is shown to be composed of a stem **30** and a stop flange formed by a pair of laterally protruding lips **32, 34**. This gives slide bar **28** a T-shape in cross-section which is substantially uniform throughout the length of slide bar **26**.

The high bar mounting shank **20** is shown to be of channel form and to comprise a pair of spaced apart flanges **36, 38** and a web **40** interconnected between corresponding edges of the flanges **36, 38**. Each end of web **40** is provided with an end surface adapted to slidably abut against the side portions of the upper surface of the slide bar **28**. The end portions of web **40** are also formed to include an outwardly opening blind slot. These slots designated **42, 44**, respectively, are colinearly related. At each end of shank **20** the end portions of the flanges **36, 38** extend beyond the end of web **40** an amount substantially equal to the depth of slide bar **28**. The end portions of the flanges **36, 38** are in effect tines or side parts of a spring clamp. Each is provided with a groove in its inner surface for receiving one of the slide bar lips **32, 34**.

At one end of the mounting shank **20** the interiorly grooved end portions of the flanges **36, 38**, and the end surfaces of web **40** adjacent thereto, together define a slideway for the slide bar **28**. Such slideway has a cross-sectional shape that is substantially identical to the cross-sectional shape of the slide bar **28**, but is slightly undersized in comparison to the slide bar. Therefore, the end portions of the flanges **36, 38** must be sprung apart slightly to allow entry of the slide bar **28** into the slideway. This assures a tight fit and results in the slide bar being frictionally retained in any position in which it is set. It also permits easy repositioning of the foot component **18** relative to mounting shank **20**. The operator need only exert an endwise force on the slide bar **28** of sufficient magnitude to overcome the friction forces.

The slideway shown in FIG. 1 to be mated with the slide bar **28** is oriented relative to the shank **20** in such a way that the mounting shank **20** is perpendicular to the foot component **18** and is colinearly relatable to the upright presser bar **12**. The slideway at the opposite end of mounting shank **20** differs from such first slideway only in that it is oriented so that when the slide bar **28** is received in it the mounting shank **20** tilts rearwardly and is colinearly relatable to a slanted presser bar of the high bar type. The particular construction of the high bar mounting shank **20** is more specifically illustrated and described in my aforementioned U.S. Pat. Nos. 3,342,151 and 3,349,736. Such patents also disclose a low bar mounting shank and an end clamp type mounting shank which are usable in place of mounting shank **20** for mounting the foot component **18** onto differing presser bars of differing makes of sewing machine. Alternatively, the body **26** may be mounted by any one of the various mounting means disclosed in either my aforementioned

U.S. application Ser. No. 678,742, or my application entitled Presser Foot Mounting, filed concurrently with this application.

The disclosures of both of my aforementioned U.S. Pat. Nos. 3,342,151 and 3,349,736, and of my said application Ser. No. 678,742 and my application entitled Presser Foot Mounting are hereby expressetly incorporated herein by reference.

The foot component embodiment of FIGS. 1–3 includes three presser rollers or wheels **46, 48, 50**. However, it is to be understood that the number of rollers is a variable. As best shown by FIG. 3, each roller **46, 48, 50** is mounted for free rotation about an axis which is substantially parallel to the slide bar **28** and transversely related to the sewing path. Rollers **46, 48, 50** may be formed to include live end shafts or axles **52** which are loosely fitted in openings provided for them in the side panels of the body **26**. The rollers **46, 48, 50** may be configured to each include a central guide avenue groove flanked by peripheral presser surfaces. The exact configuration of the guide avenue grooves will vary in accordance to the type of zipper or other article for which the foot is adapted. The use of plain or ungrooved rollers (FIG. 6) for ordinary sewing is also within the scope of this invention.

The particular zipper shown by FIG. 2 is of the type covered by U.S. Pat. No. 3,121,928, issued Feb. 25, 1964 to Ikuo Takamatsu. The teeth of such a zipper are characterized by enlarged rounded end portions at their ends thereof which abut the inside of the fold of the fabric portions of the zipper tape. As shown in FIG. 2, the guide groove **54** for such a zipper includes a central portion configured to closely conform to the shape of the bight portion of the zipper teeth T when such teeth are correctly oriented. On each side of such central portion there is included a shoulder **56** adapted to closely contact the upwardly oriented surface portion of the rounded end portion of the zipper teeth T. Shoulders **56** aid in establishing the correct attitude of the teeth T.

The space immediately rearwardly of the front roller **46** is open substantially entirely across the width of the body **26**. As shown by FIG. 1, the needle N is positioned in this space during sewing. A substantial laterally open space is necessary because the relative position of the needle N varies an amount greater than the width of the center groove **54**. As shown by FIG. 2 when the assembly is being used for sewing a right tape (as shown) of a zipper the needle N is located to the immediate right of the righthand shoulder **54**. When the opposite or left tape is being sewn it is necessary to slide the foot component **18** sideways to the right until the needle is to the immediate left of the left side shoulder **56**.

Preferably the center grooves **58, 60** in the two trailing rollers **48, 50** are both wider and slightly deeper than the forward guide groove **64**. This permits the zipper teeth to roll inwardly slightly in the needle region in the event it is struck by the moving needle N.

FIG. 4 shows a modified form of foot component which is like the foot component shown by FIGS. 1–3 except for one respect. The slide bar **28'** is not rigidly affixed to the body **26'**. Rather, the body **26'** includes a top portion **62** which laterally considered (of the sewing line) is crowned. The lower surface of the slide bar **28'** is planar. A square, rectangular, triangular, etc. (i.e. noncircular) opening is provided in the top panel **62**. The slide bar **28'** includes a mounting stem **66** which in cross section is of a like configuration with the opening **64**, but which is slightly smaller in dimension so that some play exists between the slide bar **28'** and the rest of the foot component **18**. This arrangement permits the rollers **46, 48, 50** to tilt slightly and make contact with the tape on both sides of the chain of zipper teeth. The slide bar **28'** is fixed in position by virtue of its essentially nonyielding connection to the mounting shank **20** (or one of the other mounting shanks) which is in turn rigidly se-

cured to the presser bar **12**. A downward force on the top panel **62** will result in the assembly **26, 46, 48, 50** rocking sideways slightly until both side presser surfaces of the rollers **46, 48, 50** are resting on material. In FIG. 4 the approximate limits of vertical movement of the opposite ends of the rollers are indicated by a pair of broken lines *x, y*.

The stem **66** may be secured in place by flattening out its inner end portion **68** until such end portion **68** is larger than the opening **64**. It is to be understood that this particular connection affording a limited amount of lateral tipping of the roller assembly is merely one of many ways of achieving the same result.

FIG. 5 discloses still another possible modification. The foot component **18''** is shown to include only a single forward roller **46** trailed by a pair of side placed bottom panels **70, 72**. Panels **70, 72** have substantially flat bottom surfaces which are substantially coplanar with the line of contact of the presser surfaces of roller **46** with the material. This embodiment is also shown to include a connection between the body **26''** and the transverse slide bar **28'** which permits a limited amount of sideways rocking movement between such parts.

Referring now to FIG. 6, the forward end portion of the body **26'''** may be formed to include slot like openings **74, 76** having entrance portions which are slightly narrower than the end shafts **52** and inner circular portions which are slightly larger in diameter than the end shaft **52**. This construction permits the ready removal and reassembly of the forward guide roller, designated R in FIG. 6. This makes it possible to also interchange forward guide rollers so that the same foot component can be used for installing different types of zippers or other articles (e.g. cording), merely by substituting in a new front guide roller.

FIG. 7 shows a roller **78** which is formed to include a generally M-shaped groove. The opposite side surfaces of the triangular center portion of the groove function to correctly orient the opposite chains of zipper teeth of a plastic zipper, or a metal zipper of the type to which my aforementioned copending application Ser. No. 678,742 relates. Reference is made to FIG. 20 of such application for a showing of how surface **80** will function to orient the right side chain of metal zipper teeth.

Herein the term "roller" means any rolling contact means and includes rolling "tracks" providing more complete contact with the material.

The foregoing description and the accompanying drawing together describe specific embodiments which are within the scope of the present invention. The following claims actually define the scope of the invention.

What is claimed is:

1. For use with a sewing machine equipped with a presser bar, a reciprocating needle and a material advancing mechanism, a presser foot assembly comprising:

a foot component including at least one presser roller mounted for free rotation about an axis which extends generally transversely of the sewing path, said roller including a material contacting peripheral surface and at least one peripheral groove configured to serve as a guide means for a chain of zipper teeth and for orienting such teeth into a particular attitude as they move relatively past the reciprocating needle, said foot component including passage space throughout the area rearwardly of said groove through which the zipper teeth pass; and

mounting means for securing said foot component to the presser bar in a position at least partially over said material advancing mechanism.

2. A presser foot assembly acording to claim **1**, wherein said roller is formed to include a peripheral groove shaped to roll an invisible zipper chain as it passes relatively through the region of the needle from its normal attitude offset upwardly from a tape being sewn into an outwardly leaning attitude.

3. A presser foot assembly according to claim **2**, wherein said mounting means includes adjustable means permitting lateral adjustment of the foot component relative to the presser bar.

4. A presser foot assembly according to claim **1**, further including presser means in addition to said presser roller spaced rearwardly of said presser roller and including material contacting surfaces.

5. A presser foot assembly acording to claim **4**, wherein the additional presser means comprises at least one fixed member on the foot component having a generally flat bottom surface.

6. A presser foot assembly according to claim **4**, wherein the additional presser means comprises at least one additional presser roller spaced rearwardly of said first roller.

7. A presser foot assembly according to claim **1**, wherein said mounting means includes adjustable means permitting lateral adjustment of the foot component relative to the presser bar.

8. A presser foot assembly according to claim **1**, further including means removably mounting said roller on said foot component.

9. A presser foot assembly according to claim **1**, wherein said mounting means includes a mounting shank securable to the presser bar, a transverse slide bar attached to one of the foot components and the mounting shank, and a transverse slideway secured to the other of said foot component and mounting shank, said slideway being sized to snugly receive the slide bar.

10. For use with a sewing machine equipped with a presser bar, a reciprocating needle and a material advancing mechanism, a presser foot assembly comprising:

a foot component including support means for removably mounted a presser roller for free rotation about an axis which extends generally transversely of the sewing path;

a plurality of selectively usable presser rollers mountable on said foot component by said support means, each said roller being specially configured for presser use in a different sewing operation; and

mounting means for securing said foot component to the presser bar in a position at least partially over said material advancing mechanism.

11. A presser foot assembly according to claim **10**, wherein said mounting means includes adjustable means permitting lateral adjustment of the foot component relative to the presser bar.

12. For use with a sewing machine equipped with a presser bar, a reciprocating needle and a material advancing mechanism, a presser foot assembly comprising:

a foot component including at least one presser roller mounted for free rotation about an axis which extends generally transversely of the sewing path, said roller including a material contacting peripheral surface; and

mounting means for securing said foot component to the presser bar in a position at least partially over said material advancing mechanism, said mounting means including means permitting a limited amount of opposite vertical movement of the roller ends, so that the roller can assume a position of full lateral contact with the material even if the presser bar is off-vertical laterally.

13. For use with a sewing machine equipped with a presser bar, a reciprocating needle and a material advancing mechanism, a presser foot assembly comprising:

a foot component including at least one presser roller mounted for free rotation about an axis which extends generally transversely of the sewing path, said roller including a material contacting peripheral surface, and at least one peripheral groove configured to serve as a guide roller for a chain of zipper teeth and for orienting such teeth into a particular attitude as

they pass relatively through the region of the needle;

at least one additional roller located rearwardly of, and in parallelism with, the first roller, said additional roller including a groove that is generally in line with the groove in the first roller; and

mounting means for securing said foot component to the presser bar in a position at least partially over said material advancing mechanism.

References Cited

UNITED STATES PATENTS

1,069,836	8/1913	Wieczoreck	112—235
2,513,343	7/1950	Maxson	112—235
3,342,151	9/1967	Howell	112—235
3,433,192	3/1969	Pingitore et al.	112—235

PATRICK D. LAWSON, Primary Examiner