Feb. 28, 1956 H. BIERMAN ET AL 2,736,282

SEVERING ATTACHMENT FOR SEWING MACHINES

Filed March 5, 1951 3 Sheets-Sheet 1

Fig. 1

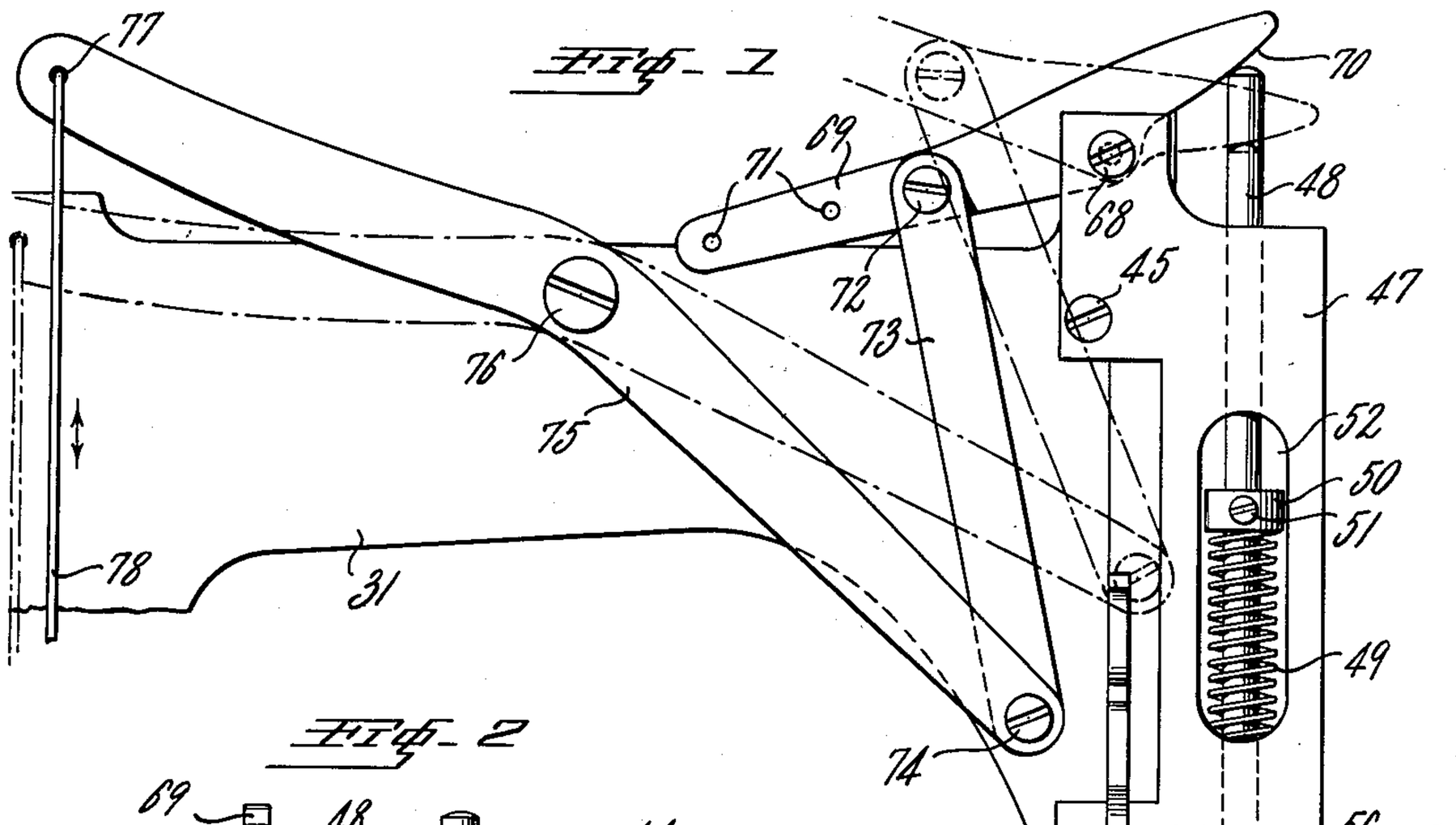


Fig. 2

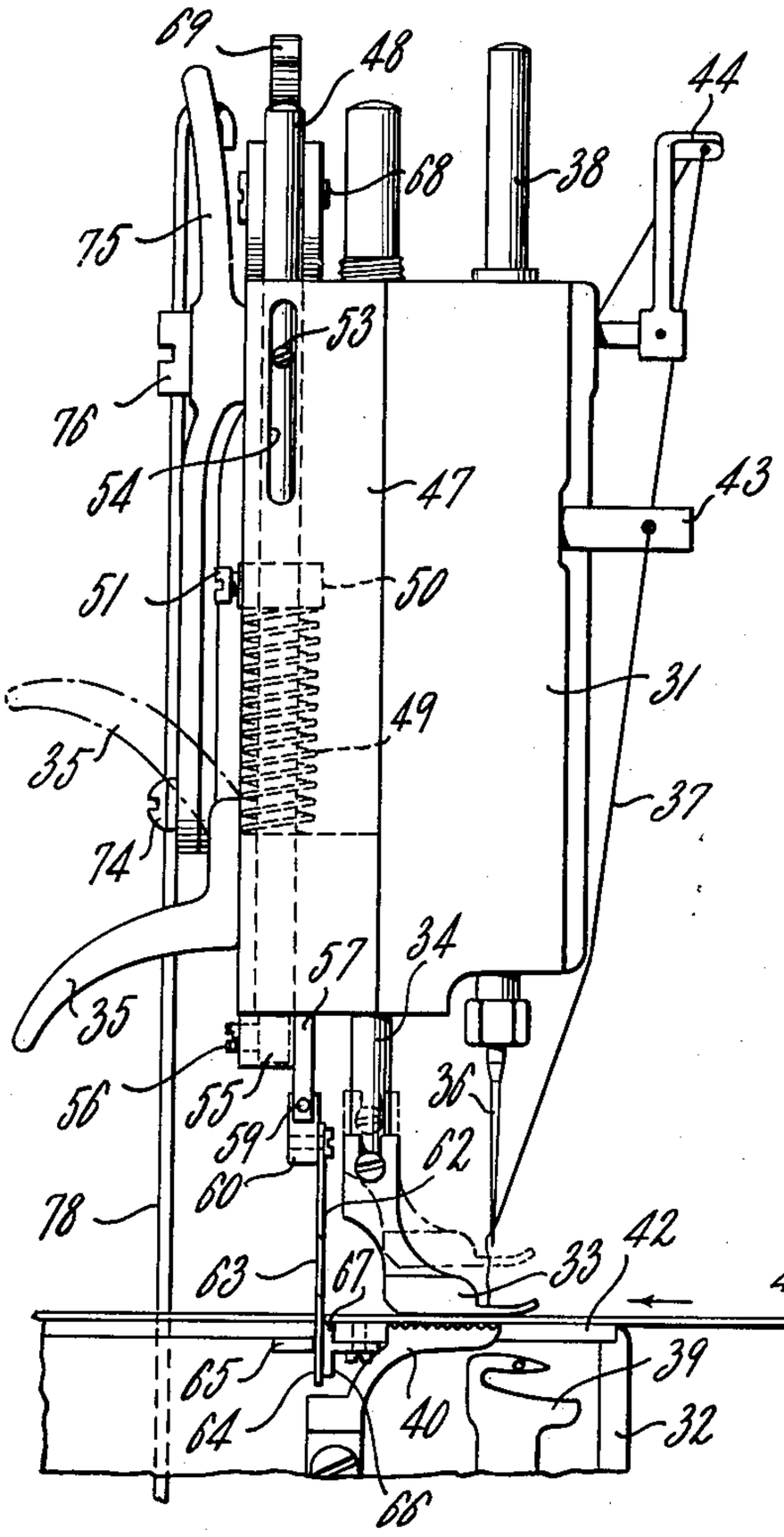
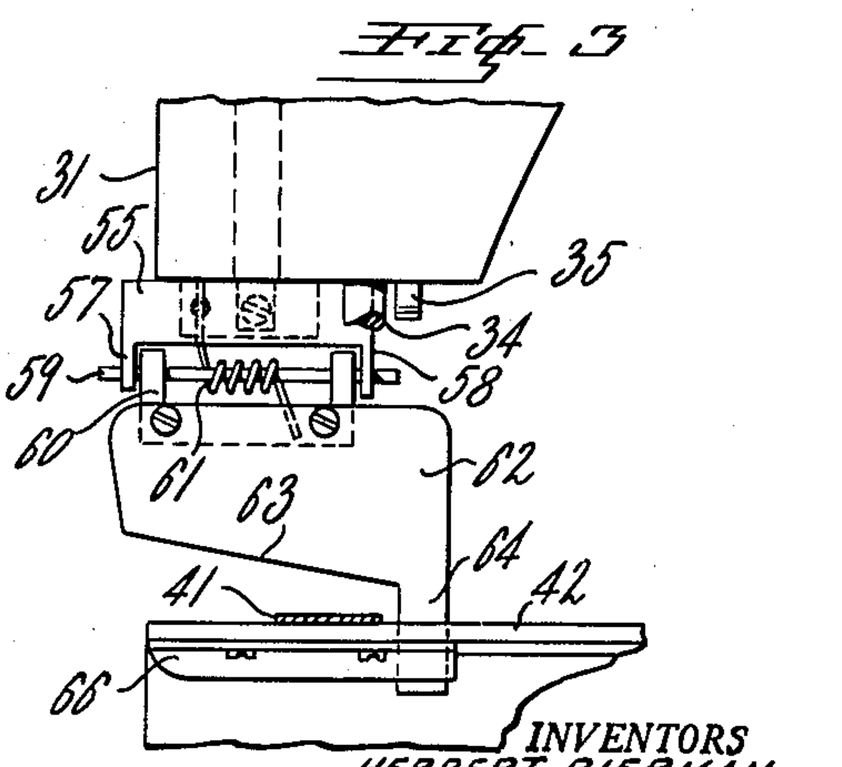


Fig. 3



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SEVERING ATTACHMENT FOR SEWING MACHINES

Filed March 5, 1951 3 Sheets-Sheet 2

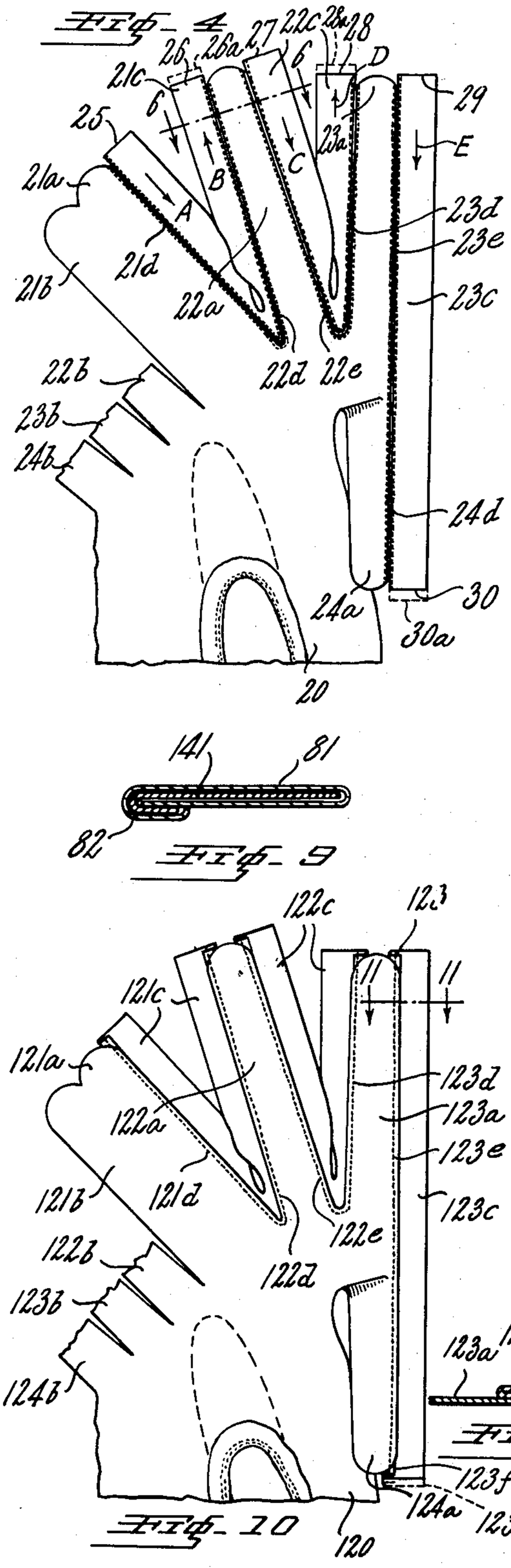


Fig. 4

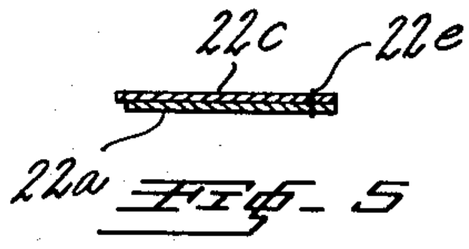


Fig. 5



Fig. 6

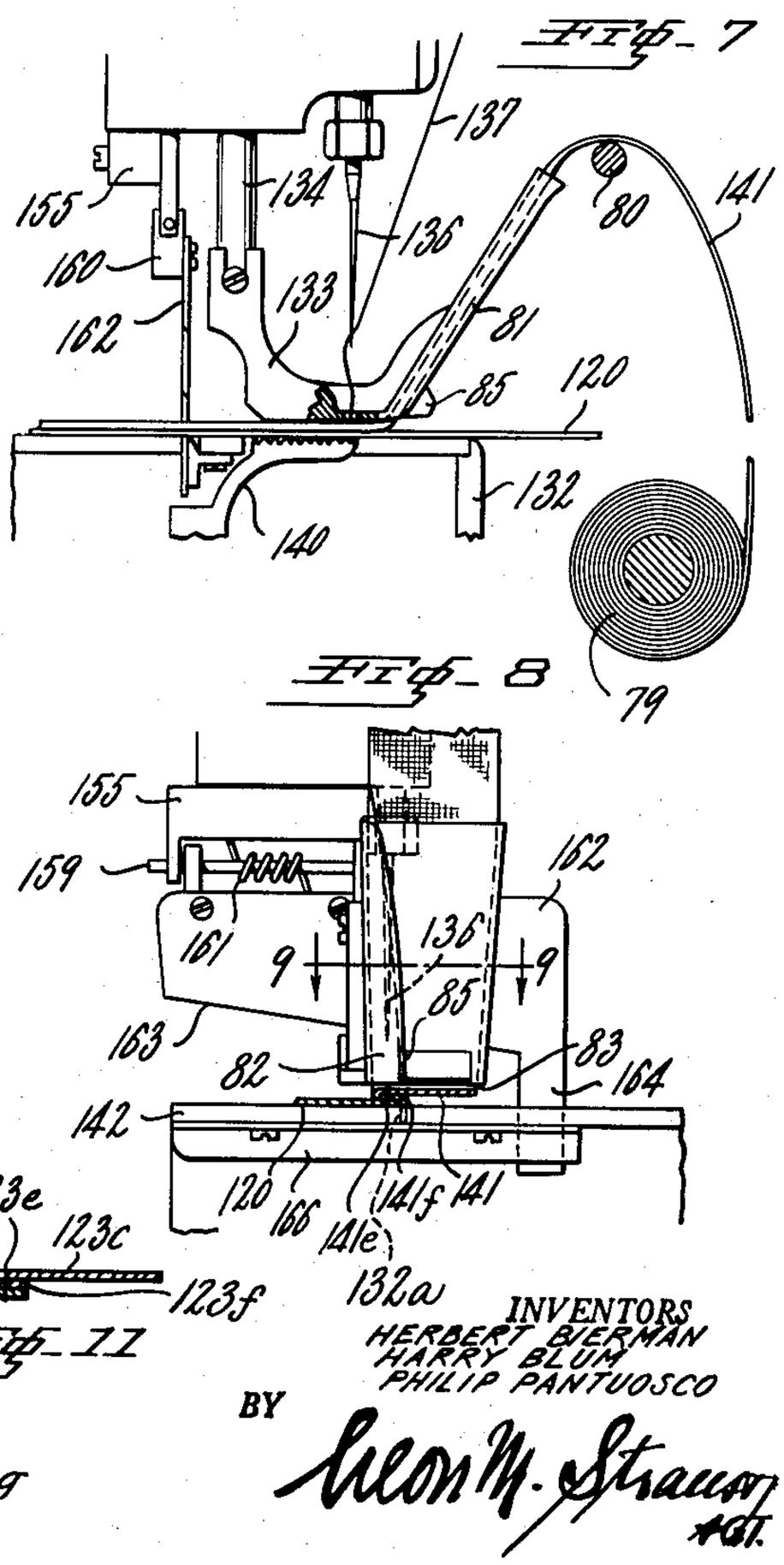


Fig. 7

Fig. 9

Fig. 10

Fig. 11

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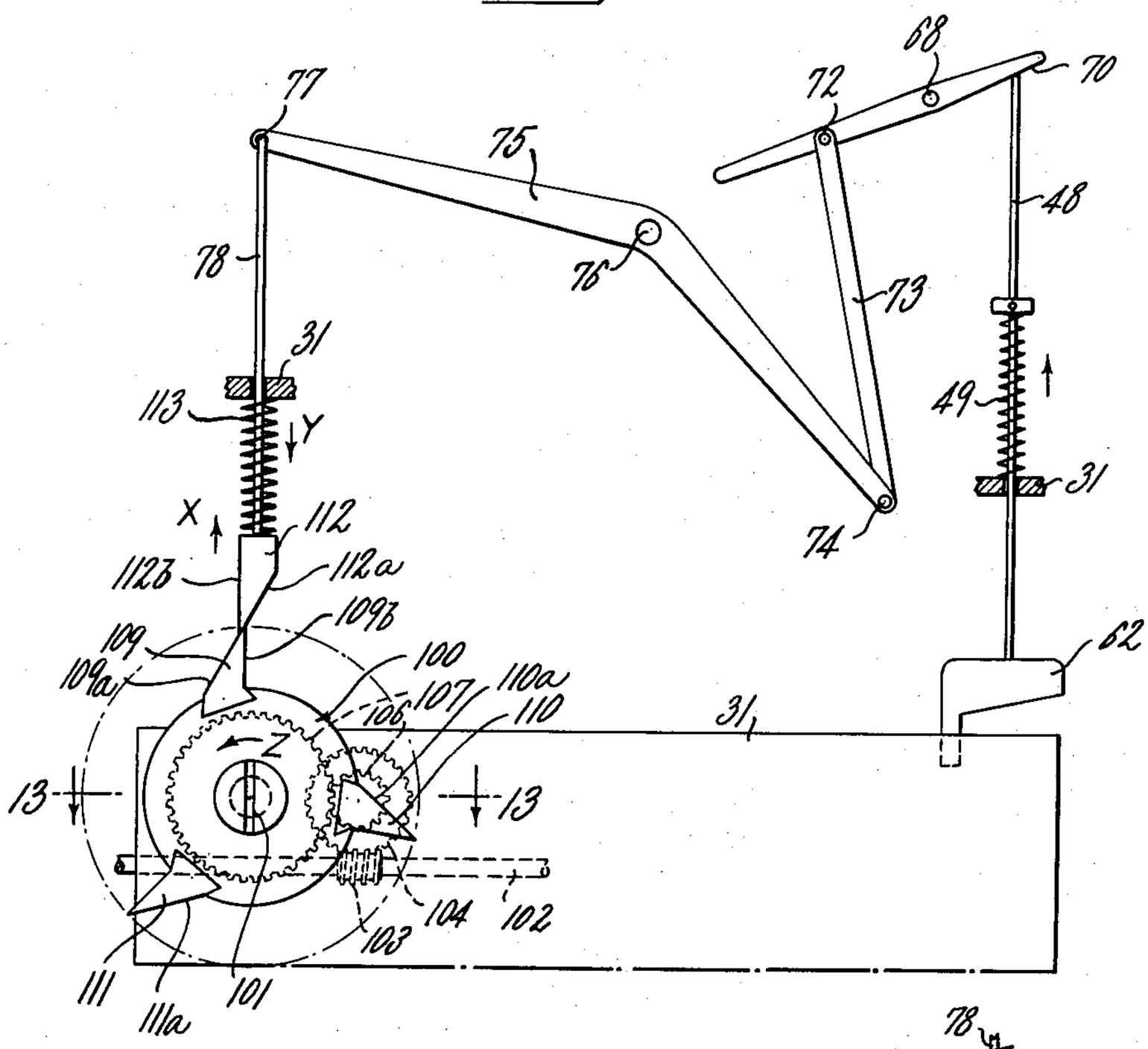
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SEVERING ATTACHMENT FOR SEWING MACHINES

Filed March 5, 1951 3 Sheets-Sheet 3

Fig. 12



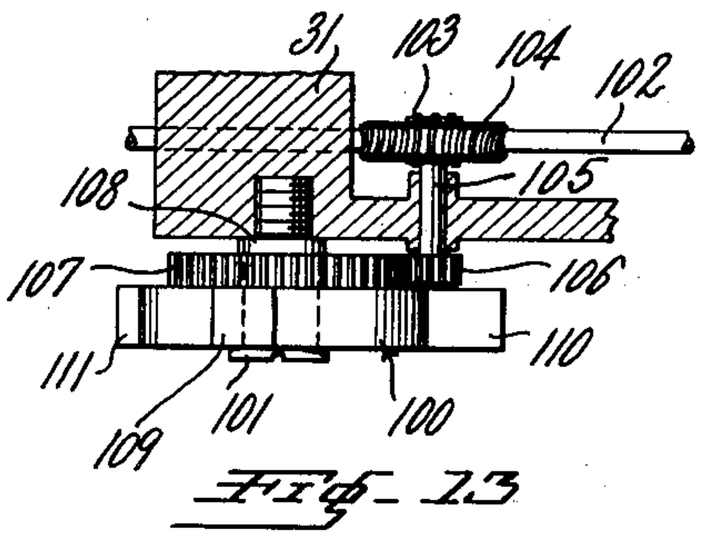


Fig. 13

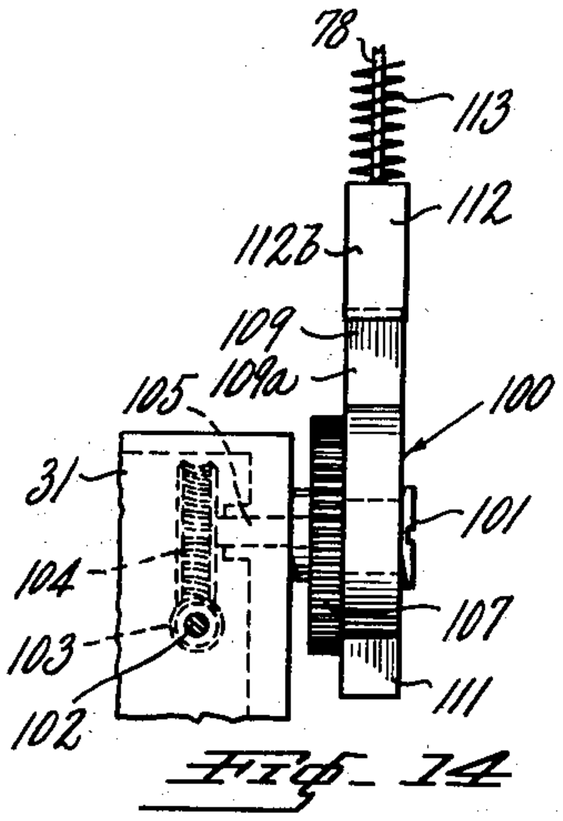


Fig. 14

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SEVERING ATTACHMENT FOR SEWING MACHINES

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Application March 5, 1951, Serial No. 213,978

2 Claims. (Cl. 112—130)

This application relates to a process and means for application of strip or like lengthy material to articles, such as gloves, corsets, and the like, for finishing purposes.

It is one of the objects of the present invention to provide means affording sewing of strip material of different lengths onto gloves and like articles to complete and finish the same whereby strips cut to different lengths form the fourchettes or keils of the fingers of the glove.

It is another object of the present invention to provide means facilitating application of lengthy strip material to the fingers of a glove providing fourchettes therefor, and cutting said strip material to predetermined length after it has been combined with the article whereby considerable reduction in waste of material and of working time is achieved.

It is still a further object of the present invention to provide means conducive to a marked decrease in the manufacturing cost of gloves, corsets and similar wearing apparel in which endless strip material is employed, fed, guided and sewn to the article, and subsequently cut.

Yet a further object of the present invention is to provide means rendering the possibility of simplifying the heretofore known operational steps in glove and similar manufacturing processes while simultaneously increasing the rate of safety for the worker.

Still another object of the present invention is to provide means facilitating speedy operation in the manufacture of gloves and like wearing apparel and resulting in an improved appearance of the finished glove and like product while strip material from a supply roll is used in making fourchettes or keils and cutting same to required length substantially exactly coextensive with the corresponding fingers of a glove and immediately upon termination of respective sewing operations.

It is also an object of the present invention to provide means adapting a conventional sewing machine to serve as a cutting mechanism for lengthy fabric or like strip or tape after the same has been sewn onto a body of fabric or like pliable material, means being further provided preventing untimely operation of said cutting mechanism so as to insure safety for the operator and to guard against rejects, impairment, defects and other damage of the body from which the finished product is obtained.

These and other objects and features will become apparent from the following detailed description, reference being had to the accompanying drawings:

In the drawings:

Fig. 1 shows, in rear elevation, part of a sewing machine with a cutting mechanism according to the invention;

Fig. 2 is a side elevation of the machine with the mechanism seen in Fig. 1.

Fig. 3 is a fragmentary front elevation of the machine with cutting mechanism;

Fig. 4 shows a glove in developed form to which the process according to the present invention is applied;

Fig. 5 is a fragmentary sectional view of two superposed and stitched pieces of material employed in the manufacture of the glove;

Fig. 6 is an enlarged sectional view taken along line **6—6** of Fig. 5;

Fig. 7 is a view similar to that of Fig. 2, showing the lower part of the sewing machine only which is provided with attachments for folding a lengthy tape material and guiding same for the ensuing sewing and cutting operations performed on said machine;

Fig. 8 is a front view of the lower part seen in Fig. 7.

Fig. 9 is a section of the attachment drawn to an enlarged scale and taken along line **9—9** of Fig. 8;

Fig. 10 is a view similar to that of Fig. 4, showing the inside of a blank of a glove in the process of being finished with the aid of fourchettes passed through the attachment shown in Figs. 7 to 9;

Fig. 11 is a section drawn to an enlarged scale and taken along line **11—11** of Fig. 10;

Fig. 12 shows schematically the drive for the cutting mechanism;

Fig. 13 is an enlarged section taken along line **13—13** of Fig. 12; and

Fig. 14 is an end view of Fig. 12, showing only the lower part thereof.

For a thorough understanding of the invention, reference is first made to Figs. 4, 5 and 6 showing some operational steps in the manufacture of a glove. A blank **20** (Fig. 4) has been die-cut or otherwise preformed and comprises a number of lobes designed to form the fingers **21***a* and **21***b* (forming a unit) and the further lobes **22***a*, **22***b*, **23***a*, **23***b*, **24***a* and **24***b*. Lobes **21***a* and **21***b* are shaped to form the forefinger, lobes **22***a* and **22***b* the middle finger, lobes **23***a* and **23***b* the ring finger, and lobes **24***a* and **24***b* the little finger of the finished glove; only parts of the lobes **22***b*, **23***b* and **24***b* are shown in the drawing.

Complementing the respective lobes (for example **21***a* at **21***d* and **22***a* at **22***d*) in order to finish the glove fingers are fourchettes **21***c*, **22***c* and **23***c*. It will be seen that part of strip **21***c* is attached to finger portion **21***a* along edge stitching **21***d* while the remaining part of strip **21***c* is joined to lobe **22***a* along edge stitching **22***d* according to arrows A, B. Similarly, one portion of a different length fourchette strip **22***c* is sewn onto lobe **22***a* at **22***e*, while the remainder of said strip is connected to lobe or finger portion **23***a* along edge stitching **23***d* (according to arrows C, D), and finally one portion of fourchette strip **23***c* is attached to lobe **23***a* along edge stitching **23***e*, while the other portion of said strip is affixed onto lobe **24***a* along edge stitching **24***d* (according to arrow E), each fourchette sewing operation being performed uninterruptedly.

It will be understood that for the completion of the forefinger the free edge of lobe **21***b* is sewn onto the free edge of strip **21***c* opposite stitching **21***d*; the middle finger is completed by sewing the edges of lobe **22***b* to the free edges of strips **21***c* and **22***c* opposite the stitchings **22***d* and **22***e*.

The ring finger is finished in analogous manner by sewing the edges of lobe **23***b* onto the free edges of strips **22***c* and **23***c* opposite the stitchings **23***d* and **23***e*; and the little finger is produced by sewing the edges of lobe **24***b* to the free edges of lobe **24***a* and of strip **23***c* on opposite sides of the stitching **24***d*.

The invention is primarily concerned with the operational steps leading up to the stage of completion of said glove as illustrated in Fig. 4, and more particularly with the steps of guiding and sewing the strips **21***c*, **22***c* and **23***c* in place and cutting them to size. In accordance with the invention, the strips **21***c*, **22***c* and **23***c* are cut one after the other from a roll or other supply of tape,

each strip being sewn in a single operation to the two lobes or finger portions associated therewith.

First the tape is placed with its end **25** coextensive and flush with the end of finer portion **21***a* and then stitched along edges **21***d* and **22***d* on lobes **21***a* and **22***a*. Thereafter a cut is made at **26** just at or close to the end of lobe **22***a* to obtain fourchette **21***c* of substantially exact length as required for the final length thereof. In similar manner, an end of the tape is then placed adjacent the end of portion **22***a* as shown at **27**, followed by stitching at **22***e*, **23***d* and a cutting operation is subsequently performed to sever the endless tape at **28** and to form the strip of fourchette **22***c*.

The end of the tape is finally aligned with the outer end of the finger portion **23***a*, as shown at **29**, whereupon the stitchings **23***e* and **24***d* are made; after this the tape is cut at **30**, thus forming the fourchette **23***c*. The final cuts at **26**, **28** and **30** occur substantially coextensive with or just above the end of the respective finger end portions **22***a*, **23***a* and **24***a* and not a distance away from the latter as indicated in dotted lines at **26***a*, **28***a* and **30***a*, as would be the case if strips **21***c*, **22***c* and **23***c* would be cut by hand and by means of scissors, as is now usually done.

Thus, enormous waste of strip material is eliminated with a mechanism about to be described.

If the stitching is carried out by machine, the portion of tape designed to form the fourchette and the adjacent finger portion of the blank **20** may be superposed upon each other, as shown in Fig. 5 for the portion **22***a* and the fourchette **22***c*, whereupon the two strips are run through the machine to form the stitches such as **22***e*. After sewing, the superposed pieces may be spread and turned inside out as shown in Fig. 6.

A machine adapted to perform the stitching and cutting operations just described has been illustrated in Figs. 1, 2 and 3. The conventional parts of this machine include the head **31**, the cloth plate or work surface **32**, the presser foot **33** carried by a presser foot bar **34** and controlled by an operating lever **35**, the needle **36** traversed by the thread **37** and depending from a needle bar **38**, the looper **39** adapted to engage the thread **37** entrained by the needle **36**, and the feed rack or dog **40** serving to advance the cloth or like material **41** over the plate **32**, this dog moving in a slot of the feed plate **42** inserted in the plate. Guide means for the thread **37** are shown at **43** and **44**.

In accordance with the invention there is secured to the head **31**, by means of screws **45** and **46**, a body or housing **47** in which a vertical rod **48** is slidably held, this rod being urged upwardly by a coil spring **49** surrounding the rod within the housing **47** and bearing against a collar or ring **50** fixed to the rod by means of a set screw **51**. The position of the ring **50** on the rod **48** is adjustable by virtue of an elongated cutout **52**, provided in the housing **47**, which gives access to the set screw **51**. Another set screw **53**, projecting laterally from the rod **48**, serves as a means to prevent rotation of the rod by sliding in a slot **54** of the housing **47**.

Secured to the lower end of the rod **48**, which projects from the lower end of the housing **47** forwardly of the presser foot **33**, is a bracket **55** which is held on the rod by a screw **56** and acts as an abutment limiting the upward displacement of the rod. Bracket or holder **55** has two depending lugs **57**, **58** bridged by a pin **59** on which there is pivoted a U-shaped mounting member or hanger **60** which is acted upon by one end of coil spring **61** surrounding the pin **59**, the other end of this spring engaging the bracket **55** so as to tend to swing the member **60** counter-clockwise as viewed in Fig. 2, i. e. toward the presser foot **33**.

A blade **62**, having an upwardly slanting knife or cutting edge **63**, is secured to the member **60** and is provided with a downward projection or extension **64**

which extends below the suitably slotted needle or feed plate **42**; this projection is positively retained and guided between a strip of metal **65**, fixed to the plate **42** rearwardly of the blade **62**, and a backing plate **66**, attached to the feed plate to the rear of the blade and provided with a horizontal and stationary upper cutting edge **67** which comes up flush with the top surface of feed plate or work supporting surface **42**.

It will be noted that coil spring **61** urges the extension **64** into firm contact with the backing plate **66**, thus insuring smooth co-operation between the cutting edges **63**, **67** which sever the strip of cloth, leather or similar tape, **41** in a drawn cut when the blade **62** is lowered relative to plate **42** by a mechanism about to be described.

Swivelled on the top of housing **47**, with the aid of a pivot bolt **68**, is a lever **69** provided on its underside with a cam surface **70** which bears upon the tip of the rod **48**. Lever **69** has a plurality of tapped holes or perforations **71**, differently spaced from the pivot **68**, which may be selectively engaged by a pivot screw **72** around which swings a link **73**, the latter being similarly joined at **74** to an extremity of a two-arm lever **75** which is pivoted at its center **76** to the machine head **31** and which has its other extremity engaged, at **77**, by an operating rod element **78**. When element **78**, which may be a wire, thin rod or cord, is pulled down, by hand or by a treadle (not shown), the levers **75**, **73** and **69** are swung around their respective pivots into the position illustrated in dot and dash lines, and the cam surface **70** depresses the rod **48** against the action of spring **49** to cause the blade **62** to cut the tape **41**.

It will be noted that the length of the stroke of the guillotine blade **62** may be varied by inserting the pivot screw **72** into a different perforation **71**. It is further to be mentioned that the cutting edge of blade **62** may have any other profile (scallop-shaped, arc-shaped, etc.) according to the purpose intended.

It will be understood that in the manufacture of a glove as shown in Fig. 4, the operator will actuate the mechanism **69**—**78** upon noticing during sewing operation that the end of the finger lobe has been reached and when tape **41** becomes coextensive with said end (as hereinabove explained) rod **78** will be pulled to cause severance of tape **41** by means of blade **62**.

From Fig. 1 it will be seen that the linked ends of the lever members **73** and **75** swing past the operating lever **35** when the blade **62** is being depressed, this movement being possible only when lever **35** is in its lower or operating position as shown in solid lines in Fig. 2. In the other extreme or upper position of the lever, in which the presser foot **33** is lifted off the plate **32** as shown in dot and dash lines, the swing of the lever **75** and of the other lever members connected therewith will be blocked by lever **35** after a short movement, so that accidental actuation of the cutter mechanism during adjustment of the fabric blank and tape or at other inopportune moments will be prevented.

It will be apparent that the actuation of the operating lever arm **75** may be brought about, if desired, automatically, e. g. by means of suitable feeler-controlled relays or with the aid of switches responsive to the movement of a template conforming to the outline of the blank **20**.

Figs. 7 and 8 illustrate guide and folding means for the tape from which fourchettes are manufactured to be attached to a glove blank or body. Thus the blank **120** in Fig. 10 is provided with finger portions **121***a*, **121***b*, **122***a*, **123***a*, etc. and has strips **121***c*, **122***c*, **123***c*, etc. sewn to it by corresponding stitchings **121***d*, **122***d*, **122***e*, **123***d*, etc. The difference between the gloves shown in Figs. 4 and 10 is that in the latter case, as best seen in Fig. 11, the fourchettes (kips), such as **123***c*, are folded over at their edges, such as **123***f*, and are affixed by the stitchings **123***e*.

123*g* indicates in dotted lines again the extent of the

waste of strip material heretofore necessarily allowed and now completely eliminated according to the invention. In Fig. 7 there is shown how tape **141**, before reaching the work table **132** underneath the needle **136**, is taken from a supply roll **79** from which it passes around a guide roller **80** toward the presser foot **133**. In order to carry out automatic folding of the tape **141** before the stitching operation, presser foot **133** has been combined with a tubular attachment **81** extending therefrom toward the guide roller **80** and forming a channel within which the tape is received; as best shown in Figs. 8 and 9, flat tubular attachment **81** is bent over at **82** to cause doubling up of the tape **141** as it emerges therefrom at lower end **83**.

It is to be noted that the folded over wall **82** of the folding attachment is provided with a sight piece **85** indicating the extent of the fold of tape **141** at fold end **141***f* next to the stitching **141***e* which also traverses blank **120**.

In order to provide a suitable permanent guide and abutment for the tape **141** in lateral direction and with respect to the lobes of blank **120**, a pin **132***a* is set in plate **142**, so that even if presser foot **133** together with folding attachment **81** are lifted, the fed folded tape portion will not laterally give.

An automatic drive for the knife **62** of the the sewing machine is illustrated in Fig. 12 according to which a cam wheel **100** is employed to automatically regulate the cutting operation in accordance with different lengths of stitchings and fourchettes employed in a glove structure having a predetermined finger size or length. The cam wheel **100** is mounted on the machine frame or head structure **31** (Fig. 13) by means of an interchangeable machine screw **101**.

This cam wheel **100** is driven from the main shaft **102** of the machine which is accommodated within the base thereof through a worm **103** and worm wheel **104** which is seated on a transverse shaft **105**. This transverse shaft **105** carries at its free end a pinion **106** which, in turn, is in mesh with a suitable reduction gear **107** which drives cam wheel **100**.

This reduction gear **107** is joined to cam wheel **100** in any appropriate manner and is spaced from the frame or head **31** by a suitable spacer element **108** seated on the screw **101**. On the cam wheel **100** there are provided, in the present instance, three suitably shaped cam members **109**, **110**, **111** which are adapted to co-act with a cam follower **112** connected to the pusher rod or link **78**. This rod **78** is joined to the double-armed lever **75**, as hereinabove disclosed, so that a further explanation of the lever connections of the drive for operating the cutting blade **62** can be omitted.

Follower **112** is urged by a spring **113** which surrounds the lower part of pusher rod **78** and abuts against a predetermined portion of the head structure **31** of the machine (Fig. 12).

It will be noted that the cam members **109**, **110** and **111** and the follower **112** have cooperating surfaces **109***a*, **110***a*, **111***a* and **112***a*, respectively, which when the follower surface **112***a* is in contact, for instance, with the cam surface **109***a* and when the cam wheel **100** is driven in the direction of arrow Z, cause successively a rising of the follower **112** in the direction of arrow X until it reaches the peak and the end of the cam surface **109***a*, whereupon the follower surface **112***b* is urged to slide alongside a similar cam surface **109***b* while spring **113** presses follower **112** in the direction of the cam wheel body **100** (as indicated by arrow Y in Fig. 12).

Pusher rod **78** is thus instantaneously shifted and brings about movement of the cutting blade **62** through the link and drive mechanism, as hereinabove mentioned.

Since the distance between the cam members **109**, **110** and **111** on cam wheel **100** are different from each other (in accordance with the lengths of the fourchettes to be sewn to the various finger lengths **21***a*, **22***c* and **23***c*) the cutting operations by means of the blade **62** are performed accordingly and in timed relation.

It is further to be noted that the clutch mechanism (not shown) of the machine will automatically stop the machine as well as the drive of the main shaft upon termination or completion of the seam or stitching performed on the respective fourchettes.

If, for instance, fourchette **23***c* has been stitched along finger or lobe **23***a* and subsequently along lobe **24***a* and reaches the end of the stitching at **30**, the clutch of the machine will become ineffective in a well-known manner while the follower **112** performs its instantaneous downward movement in the direction of arrow Y and causes the cutting blade **62** to cut the tape **23***c* at the very end **30** of the fourchette **23***c* (see Fig. 4).

It is further to be noted that the spring **113** is stronger than the spring **49** to overcome the action of the latter and to bring about the instantaneous cutting operation of blade **62** whereupon spring **49** will become effective to return blade **62** to its uppermost or inoperative position.

It is well to be mentioned that the distance between the cams may be arranged for relative adjustment on cam wheel **100** in any suitable manner, if desired, or a new cam wheel with predetermined cam distances may be employed and fixed in place by means of screw **101** on the machine frame **31** in accordance with the variations of fourchette lengths commensurate with the different sizes of gloves to be sewn and worked upon. Owing to the fact that different glove sizes vary in the proportions of the fourchettes and their stitchings with respect to each other, the cam wheel **100** with respective cams **109**, **110** and **111** is interchangeably mounted and may be replaced by a similar cam wheel with different settings, shapes and distances of cams to correspond to the actual changes necessitated by different sizes of gloves.

While several embodiments of the invention have been shown and herein described, it will be understood that the same are capable of modifications without departure from the general scope and spirit of the invention as defined in the claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent, is:

1. In a sewing machine having a work surface provided with a slot; severing means detachably securable to a portion of said machine, said severing means comprising a vertically reciprocable cutter bar, adjustable spring means surrounding said cutter bar and normally maintaining said cutter bar in a position spaced from said work surface, a springedly disposed cutting blade, means pivotally mounting said cutting blade with respect to said cutter bar, said cutting blade being disposed to extend transversely of the direction of feed of the workpiece on said work surface, said cutting blade being provided with a positive guide extension arranged for movement within said slot of said work surface and further provided with a first cutting edge normally disposed above said work surface in a position corresponding to said normal position of said cutter bar, a fixed member adjacent said slot and defining a second cutting edge complementary to said first cutting edge and fixed substantially flush with said work surface, resilient means wound around said pivot means and urging said first cutting edge of said cutting blade into operative cutting contact against said second cutting edge, and means for actuating said cutter bar and for periodically depressing the latter against the action of said spring means and driving said first cutting edge into said slot and against said second cutting edge to thereby sever said workpiece on said work surface.

2. In a sewing machine, the combination, with a work surface provided with a slot, of a spring-biased and swingable cutting blade provided with an extension projecting into and positively guided in said slot and further provided with a first cutting edge normally positioned above said

slot and said work surface, a plate member in said slot and provided with a complementary cutting edge and substantially flush with said work surface, a mechanism for depressing said cutting blade and driving said first cutting edge thereof into said slot against said complementary cutting edge to thereby sever a strip material when positioned on said work surface, said mechanism including a vertical rod with said cutting blade secured to the lower end thereof, a body, an actuating member operatively connected with said rod and mounted on said body, a control arm pivoted to said body, link means adjustably connecting said control arm with said actuating member, thereby enabling variations in the stroke of said cutting blade, a vertically displaceable holder for said cutting blade, means on said holder for pivotally connecting said holder with said

cutting blade, and spring means on said holder urging said cutting blade extension into contact with said plate member.

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