July 27, 1965 D. E. FOWLER 3,197,094

POWER OPERATED HOSIERY EXTENSION MACHINE

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Fig. 1

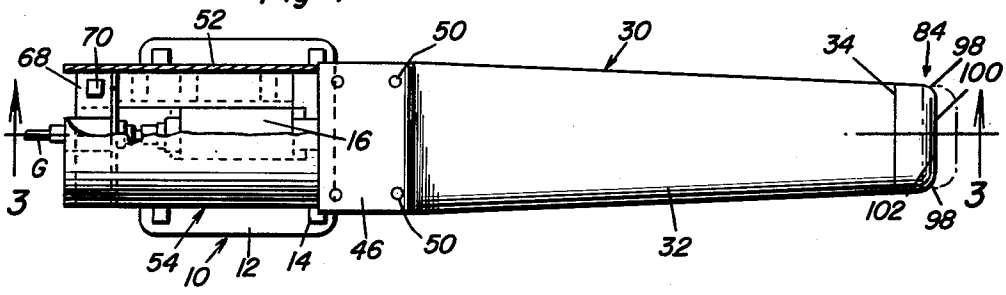



Fig. 2

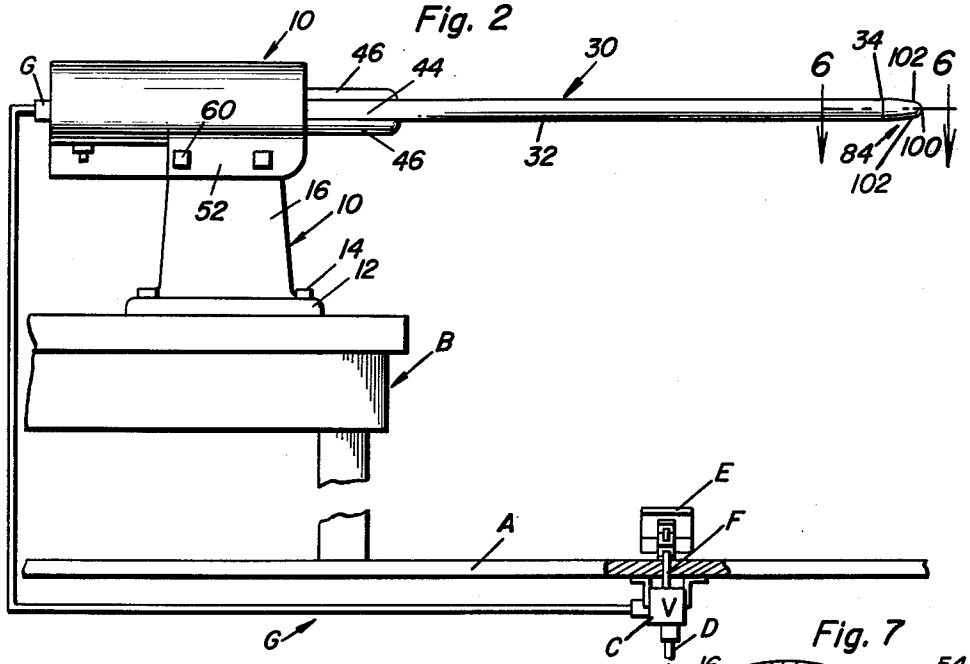



Fig. 6

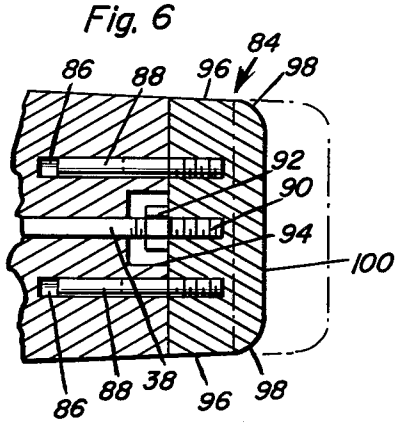
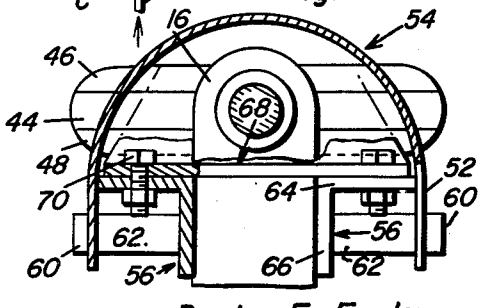



Fig. 7



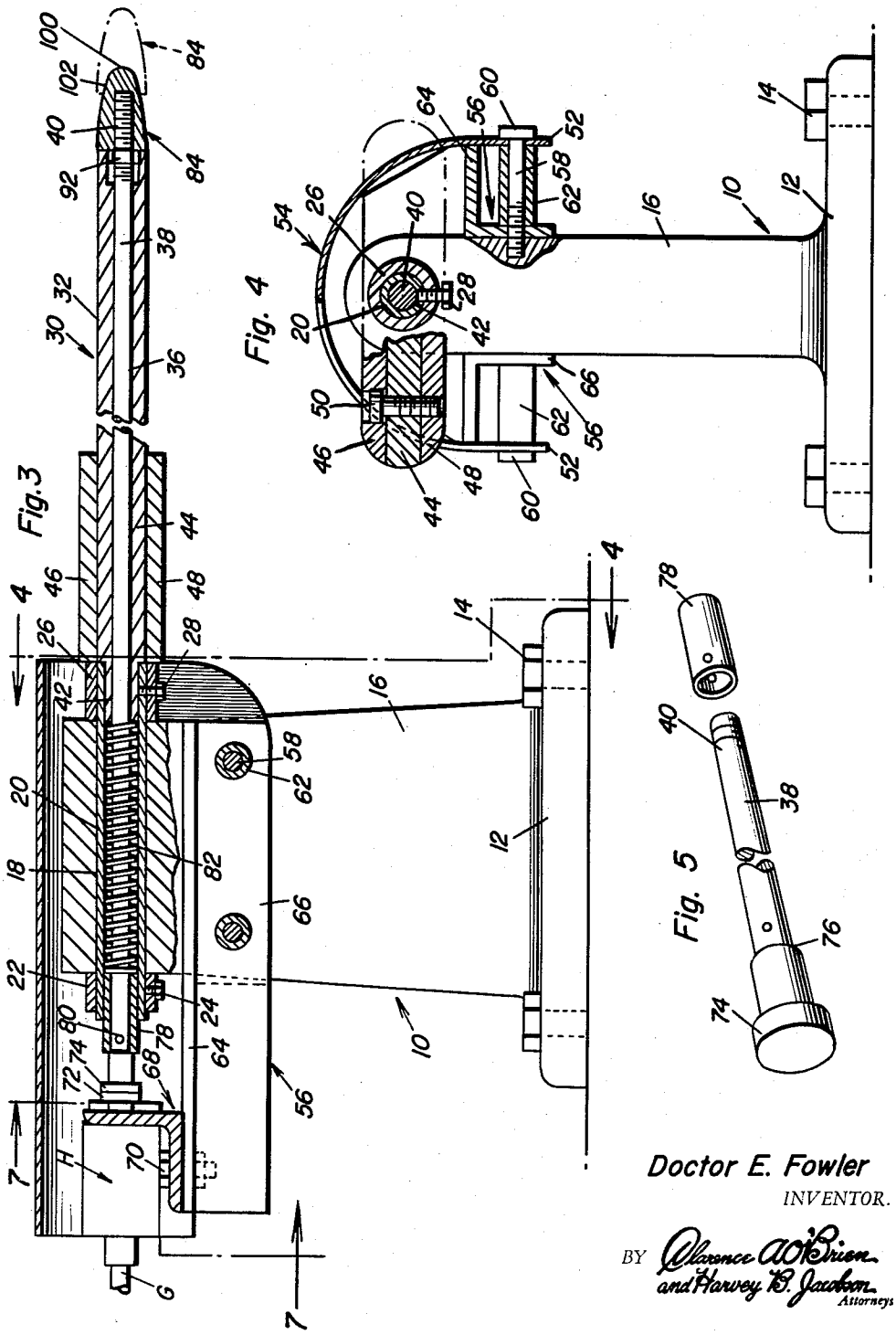

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POWER OPERATED HOSIERY EXTENSION MACHINE

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3,197,094

# POWER OPERATED HOSIERY EXTENSION MACHINE

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4 Claims. (Cl. 223—77)

This invention relates, broadly classified, to mechanical means for concentrating and imposing a force or thrust against the toe attaching seam of a seamless stocking and wherein, as a result of which the irregular ridge and attending puckered or gathered portions of the sewn seam are straightened out and smoothed, whereby to thus perfect and finish an otherwise imperfect seam.

It is a matter of common knowledge in this field of endeavor that many and varied machines and devices have been devised to enable users thereof to expand and distend stretchable stockings and hose for inspection and detection of objectionable imperfections. Prior art adaptations in this field of endeavor are, as suggested, chiefly for inspection purposes. The present invention, while susceptible of use for inspection, has been expressly constructed and functionally designed for the unique purpose of acting on the toe portion of a stocking and stretching or straining the toe attaching seam in a manner to remove the usually existing, but objectionable, ridge and also to straighten out the sewn edges of the seam whereby to provide a "ridgeless" smooth-finished seam which is objectionably suitable for wear by the discreet wearers.

As above revealed many patents have been issued on hosiery inspecting devices. Therefore, it is old in the art to position full fashioned (seamless hose, too), over an elongated form and, by incorporating suitable cams and other mechanism in the form, to distend the fabric and thus spread the same for inspection requirements. As a matter of fact a survey of this field of endeavor would bring to light a patent to one Ammon which has to do with stretching mechanism which is adapted to distend the toe fabric of a stocking so that the fashioning areas on each side of the toe, the toe seam, and especially the looping across the end of the toe will be substantially distended for purposes of inspection. The Ammon Patent 2,023,946 is dated December 1935. This particular patent is being mentioned here because of the fact that in addition to the relatively stationary form, mechanical foot-operated means is employed for purposes of extending and retracting a head-like member which is employed to act on the toe and seam portions of the stocking but for inspection purposes only.

In carrying out the principles of the present invention significant structural adaptations have been devised and experimental use of the same shows that by resorting to nominal structural refinements and improvements the desired seam-smoothing result is effectively accomplished.

The herein disclosed preferred embodiment is characterized by a stationary stand and novel means for mounting the form thereon and, in addition, by an air cylinder or equivalent power means. The essence of the concept has to do with an improved stocking form, a projectible and retractible seam smoothing head on the outer or distal end of said form, and a spring retracted plunger, more particularly a rod, for extending and retracting said head.

Briefly summarized the invention pertains to a hosiery handling machine or device on which the toe portion of a seamless stocking is extended lengthwise and then acted on in a manner to more adequately finish an otherwise unfinished seam. It comprises a form which is constructed for conformable reception and retention of the stocking which is to be acted on, said form being perched



on support means therefor. The form is characterized by an elongated body portion over which the top, leg portion and principal part of the foot portion is fitted and held, said form having a terminal head portion at an outer end thereof shaped to accommodatingly lodge itself in a snug-fitting manner in the seam-attached toe portion, said head portion having coacting contoured surface and edge portions which when forcibly thrust against the sewn edge portions of the seam function to stretch and tension the seam lengthwise in a manner to remove puckered portions and straighten out and finish the seam to the desired standard of smoothness.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a top plan view, with one of the component parts broken away and appearing in section, said view illustrating a stocking positioning, holding and extending machine or device constructed in accordance with the present invention;

FIGURE 2 is a view in side elevation of the structure depicted in FIGURE 1 and which view shows, somewhat diagrammatically, the pedal controlled air valve;

FIGURE 3 is a central longitudinal sectional view on a larger scale and with parts appearing in section and elevation, the view being taken on the longitudinal section line 3—3 of FIGURE 1;

FIGURE 4 is a section on the vertical section line (parts in elevation) 4—4 of FIG. 3, looking in the direction of the arrows;

FIGURE 5 is a fragmentary perspective view showing the reciprocable spring returned plunger rod and a component sleeve associated therewith;

FIGURE 6 is an exaggerated view with parts in elevation taken on the section line 6—6 of FIGURE 2; and

FIGURE 7 is a view similar in some respects to FIGURE 4 but taken approximately on the plane of the irregular section line 7—7 of FIGURE 3.

Referring first to FIGURE 2, which view gives a general idea of the ready-to-use assemblage, the room floor is designated at A, the desired table or equivalent structure at B, an air delivery (normally closed) valve at C, air supply line at D, pivoted foot pedal E and operating link or rod F for the valve C. The air feeding and delivery line proper is denoted at G. These parts including the air cylinder H (FIG. 3) are old and well known. It is obvious that some other means (of an equivalent mechanical manually regulatable type) could be substituted for that shown and briefly described.

With respect now to the component parts of the seam stretching and straightening device or machine the numeral **10** designates a support, more particularly a stand having a base **12** bolted or otherwise fastened at **14** on the table B, said stand having an upright or standard **16** attached to and rising vertically therefrom. The upper end of this standard as shown in FIG. 3 is provided with a horizontal open-ended bore **18** which is lined with a sleeve **20** which latter constitutes a suitable bushing. It will be noted that the end portions of the sleeve or bushing project beyond the forward and rearward vertical ends of the standard **16** and the end portion at the left is provided with an assembling and retaining collar **22** held in place by a setscrew **24** with the collar abutting the surface of the standard. A similar collar **26** is provided at the other end, embraces the extending end portion, abuts the standard, and is held in place on said extending end portion by an assembling and retaining screw **28**.

Taking up now the significant aspect of the invention

attention is directed to the horizontal fixedly supported stocking accommodating form **30**. This form comprises an elongated tapering main or primary section or form which is designated at **32**, the outer end thereof being straight across at right angles and denoted at **34** (FIG. 1). This form is provided at its center with an open-ended longitudinal bore or passage **36** which houses and permits reciprocable operation of an extensible and projectible plunger rod **38** which as shown in FIGS. 3 and 5 has a screw-threaded outer end **40**. Before further discussing the rod attention is directed to a reduced cylindrical end portion **42** (FIG. 3) of the form which is fitted in the aforementioned sleeve **20** and secured suitably in place.

The end portion **44** is interposed or sandwiched between reinforcing plates **46** and **48** which as shown in FIG. 4 are bolted together as at **50**. These plates have their lefthand edge portions (FIGS. 1 to 3) resting against the adjacent edge portions of the depending side walls **52** of a horizontal semi-circular shield or guard **50**. The guard encompasses the component parts which are located therebeneath in the manner illustrated in FIGURE 3. The depending wall portions are securely held in place by angle irons **56** which are disposed in horizontal spaced parallelism and are bolted as at **58** to diametrically opposite sides of the standard. The head portions of the bolts are denoted at **60** and the numeral **62** designates spacing sleeves. The horizontal flanges **64** have their outer marginal edges bearing against the depending wall portions **52** and their vertical flanges **66** bearing against the intervening post or standard **16** (FIGS. 4 and 7, in particular). The end portions of the angle irons to the left of the standard as shown in FIG. 3 serve to support an angle iron **68** which is at right angles thereto and bolted thereon as as **70**. This angle iron supports the headed end **72** of the pneumatically operated hammer or plunger in the air cylinder H. This head **72** is engageable with a head **74** on the shouldered end portion **76** of the aforementioned plunger rod **38**. A portion of the rod is provided with a sleeve **78** secured in place at **80**. One end of the sleeve engages the shoulder **76** and the other end engages an endmost convolution on the coil spring **82** which spring is housed in the bushing and has its righthand end bearing against the shoulder provided by the reduced neck **42**. Thus it will be seen that the form **30** is suspended in a horizontal position on the stand, the stand serving to support the shield **54**, angle irons **56** and **68**, the latter supporting the air cylinder H. As the plunger head or piston in the air cylinder is operated through the medium of the aforementioned foot pedal E (which cuts the air supply off and on by way of the valve C) the plunger rod **38** is projected from left to right to provide one stroke and is returned from right to left by way of the return spring **82** as is believed to be obvious.

Mainly, however, the present invention is concerned as already suggested with suitable support and power means for a reciprocating plunger rod in an axially bored main form section **32** which is particularly unique in that it is provided at its outer end **34** with a special stocking extending means which is generally referred to as a projectible and retractible seam stretching and smoothing head **84**. More specifically this head constitutes an auxiliary form and in effect it constitutes a matrix or template in that it has a given shape and imparts its shape or rather the smoothing and "ironing" action thereof to the sewn seam embodied in currently produced seamless nylon and equivalent stockings and socks (not shown). More explicitly, as shown in FIG. 6, this seam straightening, smoothing and end thrust head comprises a block of suitable rigid or non-compressible material and it is generally rectangular in plan and conforms with the terminal end portion **34** of the main form section **32**. In fact, the main form section is provided on opposite sides of the passage with sockets **86** which receive guide and assembling studs or pins **88** provided on the lefthand marginal edge portion of the block or head. The block itself is provided with a socket to accommodate the screw-threaded end portion **90** of the reciprocable plunger rod which latter is also equipped with a nut **92** operating in a clearance pocket or recess **94** provided therefor in the manner shown. The arrangement and construction here is such that it is within the purview of the invention to employ seam straightening and shaping heads or blocks **84** which vary in marginal outline and cross-sectional dimensions. It is particularly significant to note that the block (in end elevation) resembles a wedge. The transverse end portions thereof are denoted at **96** and these merge by way of rounded corner portions **98** into a blunt or convex leading edge portion **100** which extends straight across from one end **96** to the other end. It will be further noted that the top and bottom surfaces of this shaping block are cambered or convex as at **102**. These surfaces merge with the corners **98** and intervening straight across edge **100**. These marginal surfaces and block surfaces conjointly provide a shaped surface which when pressed against the threads of the cross seam of the stocking's toe serve to stretch the seam from one end to the other and in doing so the seam is straightened lengthwise and any gathered portions are removed. Also, the likelihood of an objectionable rib formation of the toe seam is reduced to a minimum.



In practice by fitting the stocking over the main section **32** of the form **30** and positioning the foot of the stocking so that the seam smoothing block or head **88** is lodged in the toe portion, then by stretching the toe portion across the anvil-like surfaces of the block the final straightening step is capable of accomplishment. This is to say by holding the seam of the stocking tautly against the surfaces of the block or head then bringing the air cylinder and plunger rod into play the block or head is projected from its retracted full line position in FIG. 1 to the dotted line position whereupon any irregularities or rough portions of the seam lined up with the block surfaces are ironed out so to speak. The spring returns the plunger and retracts the block when the piston in the air cylinder is allowed to return to its normal position. With further reference to the mode of best achieving the improved result it is to be explained that the stocking or sock is normally grasped with one hand, say the right hand, and is manually fitted and drawn on the main and auxiliary components **32** and **84** of the form **30**. Then, both hands are employed to tautly pull and hold the sock (not shown) in its contemplated position. The toe fabric and internal ridge of the sewn seam must be snugly pressed and forcibly held against the firm top and bottom surfaces and particularly the leading and marginal edges **96–100** of the ready-to-function block **84**, usually by the left hand—depending on whether the machine is set up for a right-handed or left-handed operator. When the power is applied the thrust action and pressure is then between the hand and block **84** as above explained. To be sure trial and error and experience count in achieving the quality seam-smoothing result desired.

It is believed that a careful consideration of the specification in conjunction with the views of the drawing will enable the reader to obtain a clear and comprehensive understanding of the component parts and the manner in which they are assembled to provide the novel machine herein disclosed. The features and advantages are self-evident and the manner in which the projectible and retractible auxiliary form operates is clear. Therefore, a more extended description is regarded as unnecessary.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A power operated stocking and toe extension machine wherein objectionable irregular puckered portions of a turned-in sewn seam can, where necessary, be straightened, flattened and acceptably smoothed comprising: support means, a two-part horizontally elongated form over which the upper portion, leg portion and sewn seam foot-portion are adapted to be removably slid and temporarily manually held in a predetermined manner, said form embodying a rigid elongated main body portion and a complemental auxiliary head portion, power projected spring retracted means mounted for projectible and retractible reciprocation in said body portion and having an outer end joined to said head portion, said head portion having a rearward end abutting the cooperating forward end of said main body portion, also having horizontal top and bottom surfaces and side marginal surfaces flush with and constituting uninterrupted extensions of conformable and corresponding top, bottom and marginal surfaces of said body portion, said head being incompressibly rigid and being marginally and otherwise delineated to embody an oriented leading edge portion which is adapted to be forcibly pressed against the aforementioned sewn seam.

2. A power operated stocking and toe extension machine wherein objectionable irregular puckered portions of a turned-in sewn seam can, where necessary, be straightened, flattened and acceptably smoothed comprising: support means, a two-part elongated form over which the upper portion, leg portion and sewn seam foot-portion are adapted to be removably slid and temporarily manually held in a predetermined manner, said form embodying a rigid elongated main body portion having a free terminal end portion which is planar and at right angles to the longitudinal axis of said body portion, and a companion head portion which is auxiliary to and constitutes a complemental anvil-like terminal for the free end of said body portion, power projected and retractible means carried by said body and head portions respectively, and connected to said head portion and functioning to normally hold the rearward end of said head portion against the adjacent terminal end of said body portion, said rearward end being planar and conformable with the planar end of said body portion, said head portion constituting a sewn seam finishing and perfecting head and being disposed in axial alignment with said main body portion and being shaped at top and bottom surfaces, said surfaces being flush with and constituting a continuation of top and bottom surfaces of said body portion and having side marginal edges which are oriented and aligned with the corresponding side marginal edges of the body portion, said head constituting a substantially incompressible block and being oriented with the body portion and having contoured surface portions which when forcibly pressed and wedged against the aforementioned sewn seam serve to stretch the stitchings of said seam in a manner which enables the user to employ his hands in conjunction with the anvil-like surfaces of said head, whereby to strain the seam and uniformly flatten and straighten out otherwise existing imperfections and irregularities.



3. The structure defined in claim 2 and wherein said head comprises a rigid elongated block generally rectangular in plan and having a straight-across convexed leading edge merging at the respective end portions thereof into rounded corners, said rounded corners merging into straight marginal edges at the respective transverse ends of said head.

4. A power operated stocking toe extension machine capable of enabling skillfully manipulable hands of the user to act on and remove objectionable irregular puckered portions of a turned-in machine sewn seam comprising: a relatively stationary elongated form embodying a rigid elongated main body portion gradually reduced in transverse cross-section from an inner toward an outer end and having a generally flat outer end and further provided at the outer end with a companion head portion, said head portion having a flat rearward end normally abutting and cooperating with the flat forward end of said main body portion, said body portion being provided with an axial bore, a plunger rod spring loaded and mounted for reciprocation in said bore, power means for applying motion to one end of said rod, the other end of said rod being axially joined to said head, said head comprising a rigid incompressible block which is of a cross-sectional dimension conformable with the adjacent cooperating outer end portion of said main body portion, being generally rectangular in bottom and top plan, provided with transverse edge portions oriented and flush with the respective longitudinal edge portions of said main body portion and being provided with an intervening leading edge portion, said leading edge portion being straight across and merging with the transverse edge portions by way of rounded corners, the top and bottom surfaces of said head being cambered and accordingly convexly shaped, said convex surfaces cooperating with adjacent convex surfaces provided on top and bottom sides of said main body portion and also with the aforementioned marginal edge portions in imparting a prescribed delineation to said head and which adapts the head to cooperate with the stitches of the sewn seam, whereby the reciprocating projected function of the block and the manipulation of the hands of the user enable the user to flatten and straighten any of the objectionable imperfections of the seam.


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