May 10, 1938. C. S. THOMPSON ET AL 2,116,987

SEWING MACHINE

Filed March 4, 1936 3 Sheets-Sheet 1

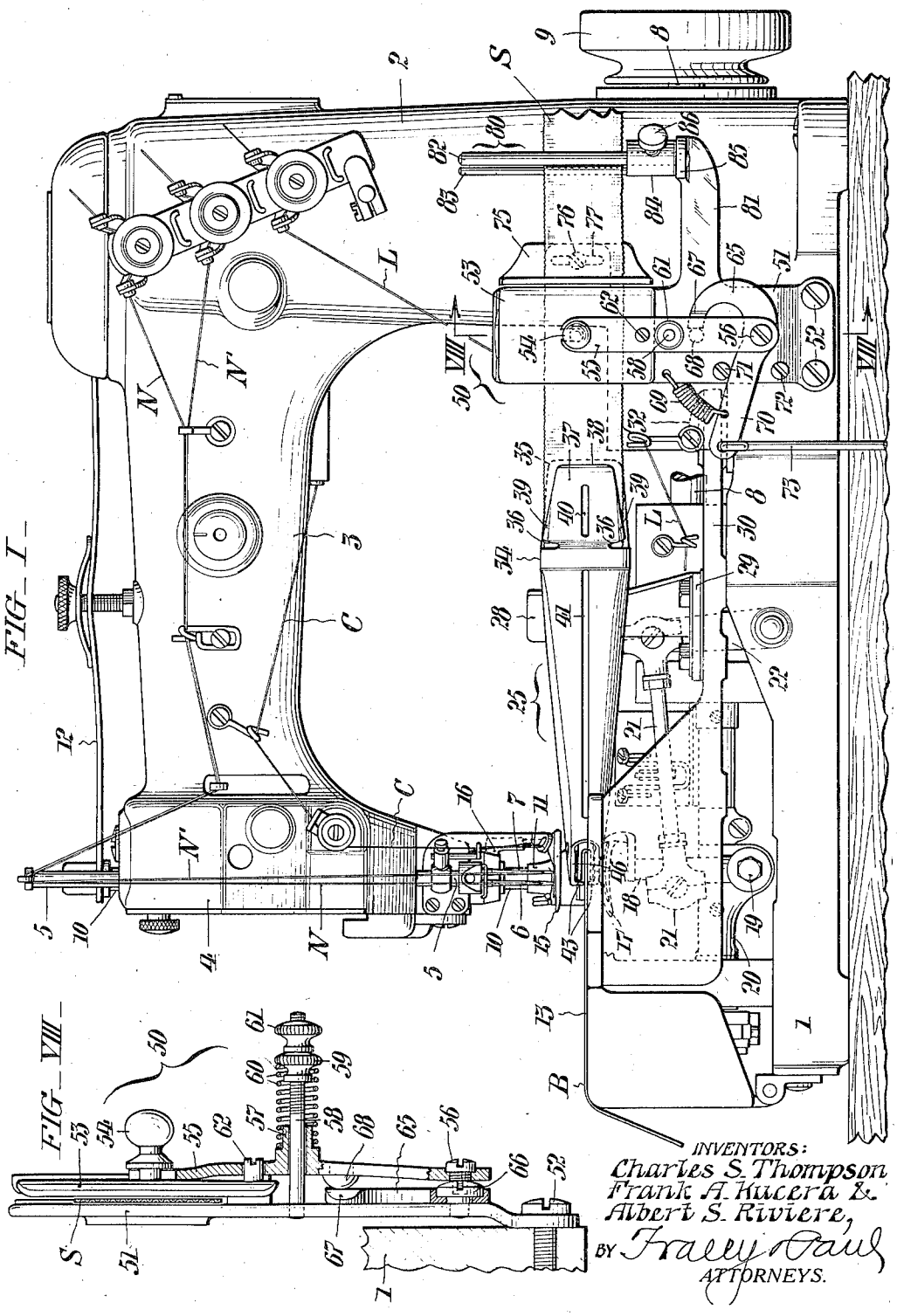


FIG. I.

FIG. VIII.

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SEWING MACHINE

Filed March 4, 1936 3 Sheets-Sheet 2

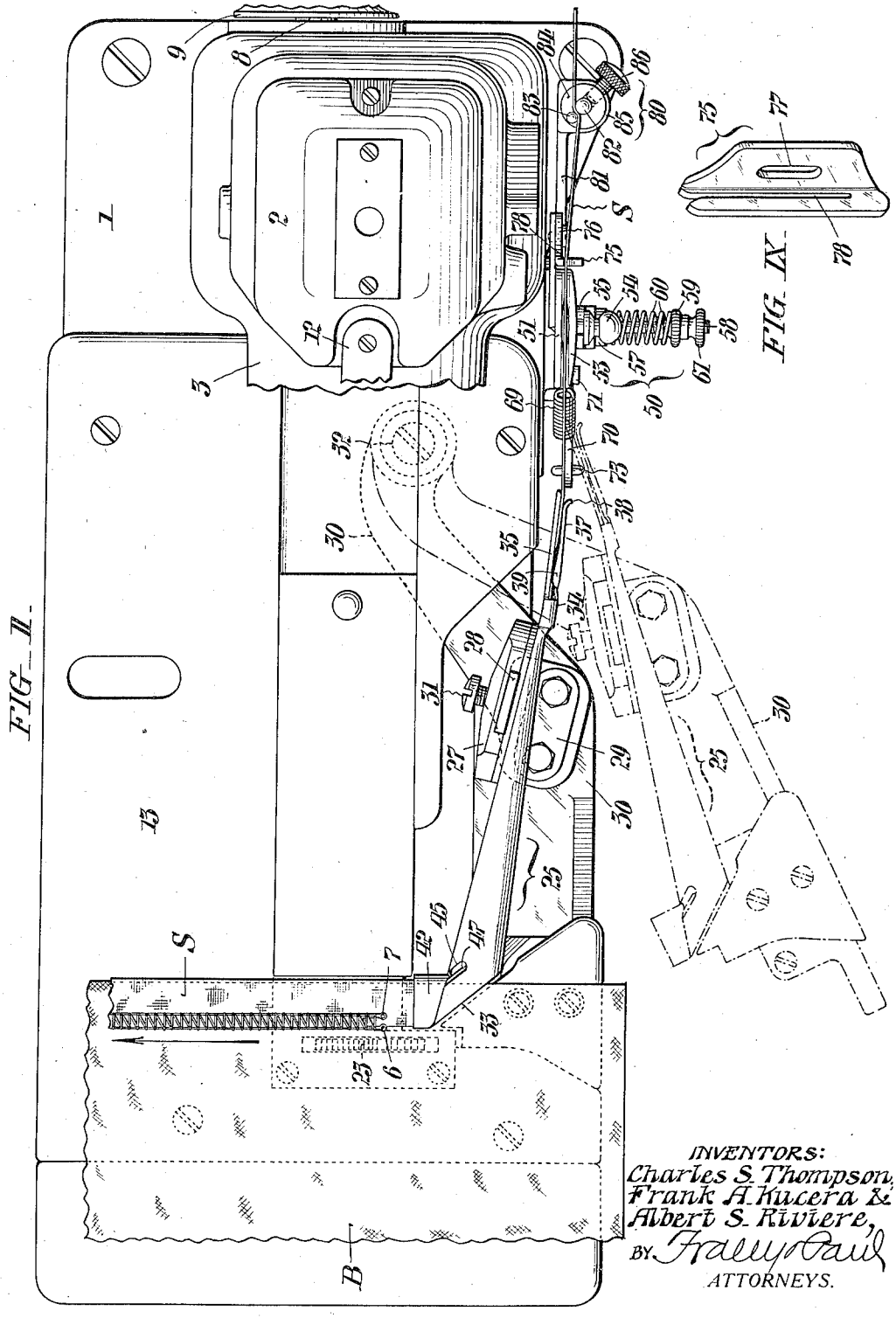


FIG. II.

FIG. IX.

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Filed March 4, 1936 3 Sheets-Sheet 3

FIG. III.

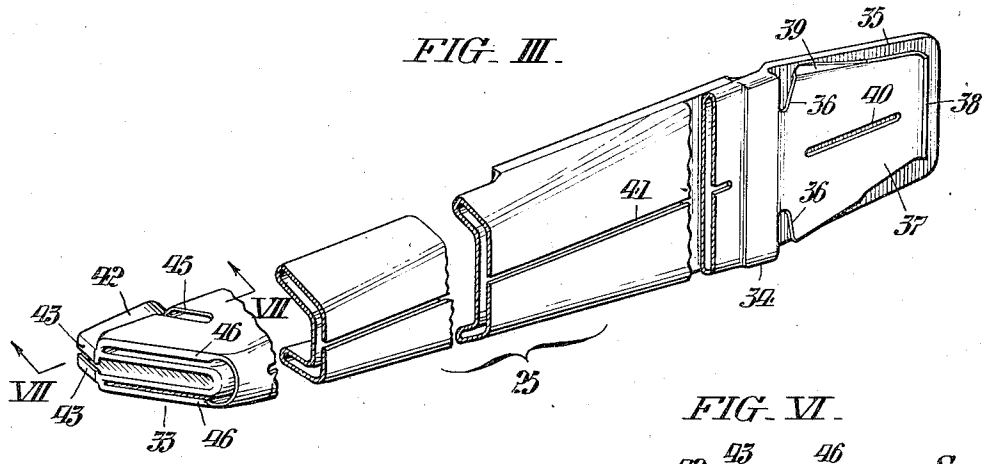


FIG. VI.

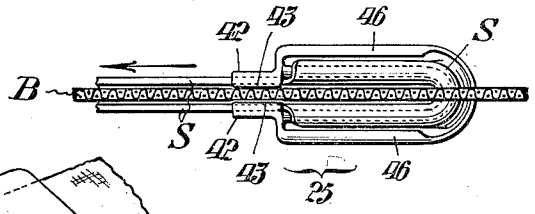


FIG. V.

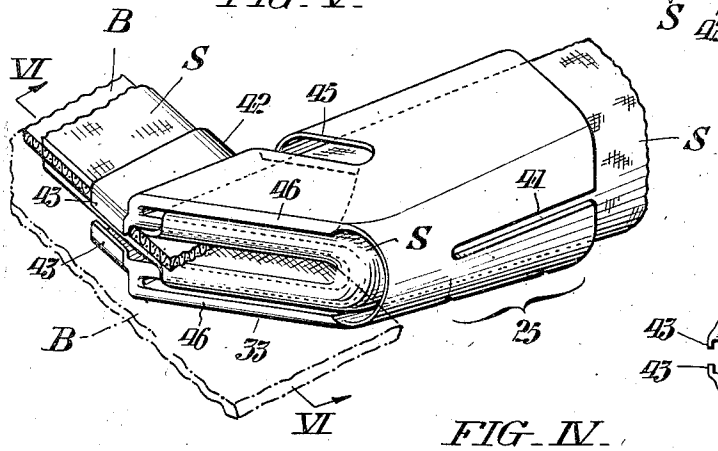


FIG. VII.

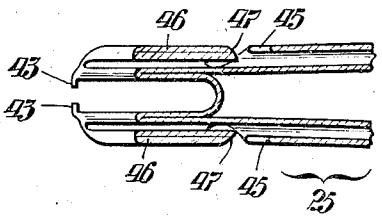
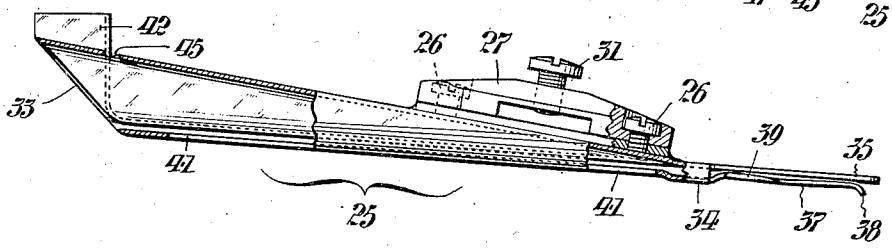


FIG. IV.



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Patented May 10, 1938 2,116,987

UNITED STATES PATENT OFFICE

2,116,987

SEWING MACHINE

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Application March 4, 1936, Serial No. 67,028

2 Claims. (Cl. 112—147)

This invention relates to sewing machines; and it has reference more particularly to sewing machines designed for attaching binding tape or other strip material about the edge of a body fabric, as, for example, in finishing underwear and the like.

In the operation of such machines, difficulty has been experienced heretofore in effecting uniform longitudinal folding of the binding strip and even application of the same about the edge of the body fabric, especially when the binding strip is of knitted material which is elastic and which has a tendency to curl along its edges.

Our invention is directed toward overcoming the drawback of which mention has just been made. This objective we realize in part, as hereinafter more fully disclosed, through provision of a folding device capable of effectively flattening out the edge curls of the binding strip, as well as of maintaining said strip under definite control while progressively folding it longitudinally, so that it is evenly folded with its fold margins perfectly flat and so placed about the edge of the body fabric concurrently as the latter is advanced to the stitch forming instrumentalities of the sewing machine. Accordingly in the finished product, the seam stitches will pass through but three thicknesses of material instead of five as ordinarily when the edges of the binding strip are turned under or hemmed. Thus, through our invention it is possible to produce a smoother, neater and less bulky edging than heretofore, and at the same time effect a great saving in material by reason of the narrower strip material employed.

A further object of our invention is to provide for cooperation with a folder having the foregoing attributes, main and auxiliary tensioning devices which can be independently adjusted, and which, moreover, can be relied upon to maintain the binding strip uniformly taut and under a predeterminable constant degree of tension so that upon relaxing of the strip after being sewed to the body fabric, a smooth and undistorted edge finish is assured.

Other objects and attendant advantages will appear from the following detailed description of the drawings, wherein Fig. I shows, in front elevation, a sewing machine for applying strip binding about the edge of a body fabric conveniently embodying our invention.

Fig. II is a plan view of the machine with a portion of its overhanging arm broken away.

Fig. III is a perspective view on an enlarged scale of the folder with portions broken out and in section to better show the details of its construction.

Fig. IV is a plan view of the folder with the opposite end portions shown in longitudinal section.

Fig. V is a perspective view on a still larger scale of the delivery end of the folder showing how the folded binding strip is delivered and positioned, with its fold margins perfectly flat, about the edge of the body fabric to which it is to be secured.

Fig. VI is a view looking as indicated by the arrows VI—VI in Fig. V.

Fig. VII is a fragmentary detail sectional view of the folder taken as indicated by the arrows VII—VII in Fig. III.

Fig. VIII is a fragmentary view partly in elevation and partly in section taken as indicated by the arrows VIII—VIII in Fig. I and showing the details of the main tensioning device by which the binding strip is tensioned before passing through the folder; and

Fig. IX is a perspective view of a guide associated with the tensioning means for the binding strip.

The sewing machine chosen for convenience of illustration herein has a hollow base 1 with a standard 2 rising from one end thereof and supporting an integrally-formed horizontal overhanging arm 3. Confined to axial movement in a head 4 at the outer end of the arm 3 is a vertical needle bar 5, which, in this instance, carries two spaced needles 6 and 7 at its lower end. The needle bar 5 is reciprocated endwise by suitable mechanism concealed in the hollows of the machine frame, and is actuated through interposed connections (not shown), from a horizontal main shaft 8 which is journaled within the base 1 and provided at its protruding right hand end with a combined hand and belt wheel 9. Also confined to axial movement in the head 4 is a vertical presser bar 10, which, at its lower end, carries a presser foot 11, said presser bar being yieldingly urged downward by a leaf spring 12 mounted on the top of the overhanging arm 3 of the machine. Cooperating with the needles 6 and 7 above the top or work supporting surface 13 of the base 1 is a cover thread manipulating hook 15 which is actuated by suitable mechanism from within the head 4 and the overhanging arm 3, the carrier arm 16 for said looper oscillating about the presser bar 10 as an axis. Cooperating with the needles 6 and 7 below the work supporting surface 13 of the base 1 is a looper 17 which is fixed in a carrier arm 18 fulcrumed at 19 on a

rocker 20. By suitable connections (not illustrated) the rocker 20 is actuated from the main shaft 8 to impart the needle avoiding movements to the looper 17. Through a horizontal link 21 and an oscillating arm 22 actuated from the main shaft 8 by connections also concealed within the base 1, the looper 17 is rocked about the center 19 to engage the needle threads in a well known manner. In Fig. I, the needle threads are indicated at N, N', the cover thread at C, the looper thread at L, said threads all passing through suitable tensions and directional guides as shown, on their way to the needles 6 and 7, the hook 15 and the looper 17 respectively. During the operation of the machine, the body fabric B is progressively advanced crosswise of the work supporting surface 15 by a feed dog indicated in dotted lines at 23 in Fig. I. Like the looper 17, the feed dog 15 is actuated by concealed mechanism coordinated with the main shaft 8 within the base 1.

In adapting a sewing machine of the type briefly described up to this point for applying strip binding S about one edge of the body fabric B in the manner shown in Figs. II and V, we have devised the cooperative binding strip folder, and the main and supplemental strip tensioning devices which are about to be described.

The device for folding the strip material S is comprehensively designated 25, and has the form of a horizontally-elongated member to the back of which is secured, by means of screws 26, a vertically-slotted plate 27 for engaging the upstanding tongue 28 of a bracket 29 bolted to a supporting arm 30. As shown, the plate 27 is provided with a set screw 31 for securing the folder 25 in vertically adjusted positions on the tongue 28 of the bracket 29, while the supporting arm 30 is fulcrumed at 32 to the base 1 of the machine with capacity to be swung to the position indicated in dot and dash lines in Fig. II. By virtue of this arrangement, the folder 25 can be moved toward and away from the stitch forming instrumentalities of the machine when desired or required. As shown in Fig. III, the folder 25 is fashioned from sheet metal and merges from a vertically-flat tubular cross section near its right hand or receiving end, see Fig. III, to a horizontally flat U-shaped tubular cross section at its left hand or delivery end, which latter has a bevel 33 at an angle of approximately forty-five degrees. The transverse dimension of the passage through the folder is uniform throughout and just slightly greater than the thickness of the binding strip. At the receiving end of the folder beyond the point 34, the upright back wall of said folder is extended as at 35, and the front wall is notched inward from the top and bottom as at 36 for reduction of its cross section, with incidental formation of a spring tongue 37 whereof the end is rounded outwardly as at 38. The top and bottom edges of the tongue 37, it will be noted, are divergent in the direction of travel of the binding strip S and rounded inwardly as at 39 toward the back wall 35 of the folder as they approach the notches 36. For a purpose later on explained, the tongue 37 and the front wall of the folder 25 are longitudinally slotted as at 40 and 41 respectively. At its left hand or delivery end, the folder 25 has a lateral inwardly directed outlet extension 42 which is of horizontal flat U-shaped cross section and which serves as a guide for the edge of the body fabric B, said extension having opposing flanges 43 at the top and bottom to guide the edges of the binding strip S after the latter is folded and providing a passage whereof the transverse dimension is substantially equal to the combined thicknesses of the body fabric and the two margins of said binding strip. The folder 25 is furthermore provided at the top and bottom near its delivery end with notches 45, see Figs. I, III, V, and VII which extend parallel with a bevel at 33, the portions 46 beyond the notches being thickened and rounded along one edge with formation of lips at 47. As a result of this construction there is formed, also for a purpose later on explained, a constricted U-shaped mouth at the bevel of the folder of which the cross dimension is just equal to the thickness of the strip S.

Located immediately to the right of the folder 25 is a binding strip tensioning device which is generally designated by the numeral 50, and which comprises a vertically-arranged back plate 51, said plate being secured near its bottom edge to the front of the machine frame by a pair of screws 52, see Figs. I and VIII. Opposing the upper part of the back plate 51 is a clamp plate 53 which has a central stud 54 loosely engaged in the bifurcated upper end of the vertical supporting arm 55. At its lower end, the supporting arm 55 has a loose universal pivotal connection with a headed screw 56, and at its midpoint said arm has a boss 57 which is axially apertured to clear a stem 58 projecting horizontally forward from the back plate 51. Interposed between a shoulder on the boss 57 of the clamp plate 53 and a finger knob 59 in threaded engagement with the end of the stem 58 is a helical compression spring 60 which yieldingly urges said clamp plate toward the back plate 51 to impose frictional restraint upon the binding strip S. Associated with the finger knob 58 is a jam nut 61 for fixing said knob against accidental rotation after the desired adjustment of the spring 60 is secured. A screw stud 62 projecting from the clamp plate 53 and loosely engaging an aperture of the supporting arm 55 serves to prevent rotation of said clamp plate about the axis of the stud 54. In order that the binding strip S may be relieved of tension when desired or required, there is provided a curved finger 65 which is fulcrumed about another screw 66 on the back plate 51 into which screw the fulcrum screw 56 for the clamp supporting arm 55 is axially threaded as shown in Fig. VIII. At its end the curved finger 65 has a cam surface 67 adapted to cooperate with a rounded projection 68 at the back of the clamp plate supporting arm 55. Thus, as the finger 65 is swung anti-clockwise in Fig. I, the cam end 67 of the finger 65 is brought into engagement with the rounded projection 68 on the arm 55 with the result that the clamp plate 53 is moved away from the back plate 51 of the tensioning device against the action of the spring 60. Normally, the finger 65 is held in the retracted position shown in Fig. I by a spring 69 with the tail projection 70 thereof engaging a fixed stop 71 on the back plate 51. On the other hand, when the finger 65 is actuated, its movement is limited by another fixed stop 72 on said back plate 51. The tension release finger 65 may be operated by any suitable means, for example, through a wire connecting link 73 from a foot treadle or knee lever, not illustrated. Associated with the strip tensioning device 50 is an angular guide piece 75 (Figs. I, II, and IX) which is secured, with capacity for vertical adjustment, to the back plate 51 by a screw 76 pass-

ing through an elongate slot 77 therein. As shown in Fig. IX, the guide piece 75 has a vertical slit 78 for the binding strip S, said slit, it will be particularly noted, being open at the top.

Also associated with the strip tension device 50 is the supplemental binding strip guide and tensioning device 80 which is supported by a lateral bracket arm extension 81 of the back plate 51. As shown, the device 80 is in the form of an upright fork with spaced cylindric tines 82 and 83 between which the binding strip S passes. The tine 83 is fixed in a collar 84 rotatably adjustable about the tine 82, which, in turn, is anchored at the bottom in a lug 85 at the end of the bracket arm 81. A finger screw 86 is provided for securing the collar 84 in adjusted positions.

The operation of the machine is as follows:

As hereinbefore stated, the body fabric B is progressively advanced crosswise of the work supporting surface 13 of the machine base 1 by the action of the feed dog 23. At the same time, the binding strip S is delivered by the folder 25 and placed, with its fold margins perfectly flat, about the edge of the body fabric B as said edge passes through the end guide portion 42 of said folder, and sewed fast to the body fabric through coaction of the needles 6, 7, the cover thread hooks 15 and the looper 17. The seam thus produced is similar to that shown in another U. S. Patent No. 1,473,636 also granted to J. R. Moffatt on November 13, 1923, with a double row of stitches passing through both edges of the binding strip S and the body fabric B, and connected above and below by concatenation of the cover and looper threads between them, except in that the stitches formed by one of the needles penetrate but three thicknesses of material—the body fabric and the strip margins. Under the pull of the body fabric B, the binding strip S is drawn from a suitable source of continuous supply (not shown), passing horizontally upright first through the supplemental tensioning device 80, then through the main tensioning device 50, and finally through the folder 25. By rotative adjustment of the supplemental device 80, the binding strip S is diverted more or less from a straight course as shown in Fig. II and an initial drag consequently induced in it. In passing from the preliminary tensioning device 80 the binding strip S is directed, by the guide 75, between the plates 51 and 53 of the main tensioning device 50, which, by means of the finger knobs 59 and 60, can be adjusted to impose additional tension on said strip by frictionally restraining its progress. In leaving the main tensioning device 50, the binding strip passes into the receiving end of the folder 25, where, under the influence of the inwardly curved edges 39 of the tongue 37 any edge curls or irregularities therein are effectively removed. In reeving through the transversely narrow passage of the folder 25, the binding strip S is progressively folded longitudinally, with its margins constrained and held flat, by reason of the gradual mergence of said folder from vertically flat tubular cross section at the receiving end, to horizontally flat U-shaped cross section at its delivery end, where the direction of travel of the strip is changed and the strip inverted or reversed as its folds pass about the bevel at 33 in the manner clearly shown in Figs. I and V. Due to the uniformity and narrowness of the transverse dimension of the passage in the folder, the traversing strip except for being longitudinally folded, is otherwise maintained perfectly flat at all times. As the strip passes through the restricted U-shaped mouth at the bevel of the folder, it is obviously so confined and controlled that recurling of its edges cannot possibly reoccur. The flat condition of the strip margins is moreover maintained as the strip continues in its advance by the added tension imposed thereupon as it turns about the bevel edges and enters the lateral continuation 42 of the folder where it meets with the body fabric B. Here again, due to the confining action of the guide extension 42 of the folder, the strip margins are maintained perfectly flat against the opposite edges of the body fabric and so presented to the stitch-forming instrumentalities of the sewing machine for seaming, positive registry of strip with the body fabric being assured by the action of the lips 43 of said extension. The purpose of the devices 50 and 80 is to impose considerable degree of tension on the binding strip, particularly if the latter is of knitted material and applied crosswise of the wales of a knitted body material. Thus, after the work passes beyond the stitch forming instrumentalities of the machine, a compensative relaxing action takes place between the body fabric and the strip, with the formation as a result, of a neat, non-bulky perfectly finished edging.

The guide 75 functions to prevent sagging of the binding strip S in the tensioning device 50, and through proper adjustment, said guide will determine travel of the strip along a direct straight line to the folder 25.

Since the main tensioning device 50, the associated guide 75 and the supplemental tensioning device 80 are all accessible for threading from the top, it is evident that the starting of the strip S through them initially is greatly facilitated. The longitudinal slotting of the folder at 40 and 41 permits the use of a pointed implement in starting the strip S through said folder; while the notches 45 at the delivery end of the latter render the edges of the strip accessible for the purpose of flattening them out in the event that they become creased before reaching that point.

Having thus described our invention, we claim:

1. A folder for longitudinally folding a binding strip of knitted material or the like and continuously guiding it to the stitch-forming instrumentalities of a sewing machine with its fold margins lapping opposite sides of a concurrently fed body fabric, said folder having means beyond its receiving end for removing the natural curl at the edges of the strip so that the latter enters perfectly flat, and being tubular and mergent from flat cross section at its receiving end to U-shaped cross section at its delivery end with provision of an uninterrupted passage therethrough whereof the transverse dimension is substantially uniform and slightly greater than the thickness of the strip, whereby the strip edges are maintained flat during traverse of the strip in the folder, and said folder having inwardly-directed opposing lips forming a constricted slit mouth at its U-shaped delivery end which constrains the strip folds throughout their widths and precludes reforming of the edge curls as the strip emerges and is applied about the edge of the body fabric.

2. A folder for longitudinally folding a binding strip of knitted material or the like and continuously guiding it to the stitch-forming instrumentalities of a sewing machine with its fold margins lapping opposite sides of a concurrently fed body fabric, said folder having means beyond its receiving end for removing the natural curl

at the edges of the strip so that the latter enters perfectly flat, and being tubular and mergent from flat cross section at its receiving end to U-shaped cross section at its delivery end with provision of an uninterrupted passage therethrough whereof the transverse dimension is substantially uniform and slightly greater than the thickness of the strip, whereby the strip edges are maintained flat during traverse of the strip in the folder, said folder also having inwardly-directed opposing lips forming a constricted mouth extending at an angle crosswise of its U-shaped delivery end which constrains the folds of the strip throughout their widths and precludes reforming of the edge curls as the strip emerges and about which the strip margins are inverted for change in the travel of the strip, and an aligned lateral U-shaped extension in line with said mouth, with opposing lips which lap the edges of the strip at the region of application of the latter about the edge of the body fabric.

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