

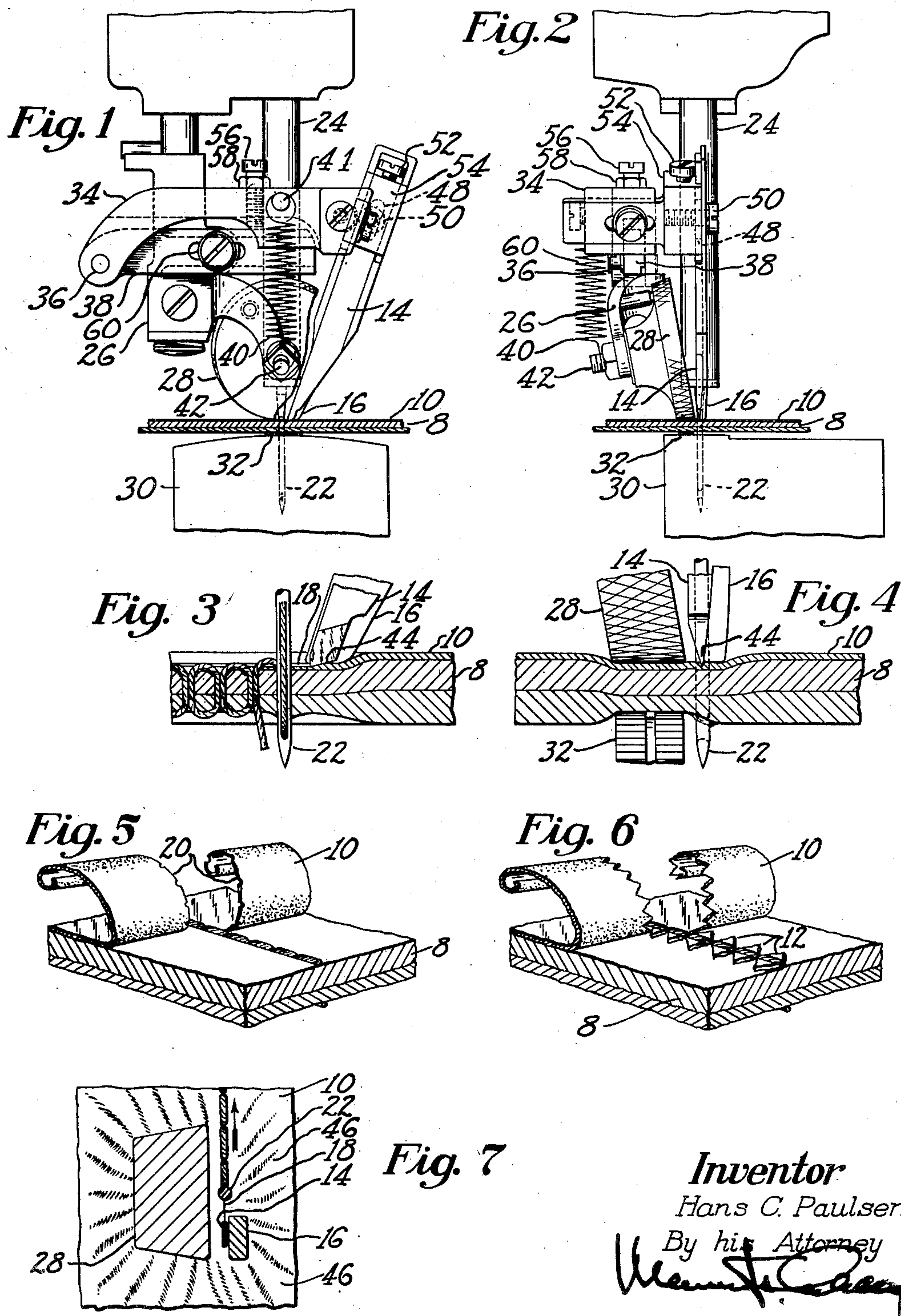
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SEWING MACHINE WITH PROTECTIVE COVERING SLITTING MEANS

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SEWING MACHINE WITH PROTECTIVE
COVERING SLITTING MEANSHans C. Paulsen, Medford, Mass., assignor to
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This invention relates to machines for sewing compressible sheet material covered with a protective coating of peelable film, particularly of the type disclosed in United States Letters Patent No. 2,410,878, granted November 12, 1946, on an application of V. F. Harrington.

The patent above referred to discloses a method of applying a protective film cover to shoe uppers to prevent soiling or staining while various shoe-making operations are being carried out. When the shoe is completed and the film cover has served its purpose, it is peeled from the upper and discarded. The film cover is applied according to the method of the Harrington patent while the shoe upper is in folded condition. In some instances it is desired to apply the cover to the parts of the upper before assembly or to insert a seam in the upper after the film cover has been applied. In such instances, the stitches of a seam pass through the film cover as well as through the upper material. With a seam inserted in this manner it has been found difficult to remove the film cover completely merely by peeling the cover off the upper material. On account of perforations formed by the seam and the overlying threads of the seam a jagged edge is torn in the film adjacent to the line of the seam, leaving bits of the film trapped beneath the threads. Where fine stitches are employed it is difficult to remove these bits of film cover so that the benefit obtained in covering the upper to protect it against soiling or staining is offset to a substantial degree by the effort required in removing all of the film cover bits.

The object of the present invention is to provide a sewing machine operable on compressible sheet material covered with a protective coating of peelable film in which a seam may be inserted in such a way that the stitches of the seam will not cause difficulty in removing the film on account of tearing off bits of the film entrapped by the stitches.

This and other objects are achieved in an embodiment of the present invention comprising an improved sewing machine for operating on compressible sheet material covered with a peelable protecting film of extreme thinness, having a needle, a work support, a presser roll for clamping the work to the work support and a knife acting in line with the needle in which a film tensioning foot is mounted in proximity to the cutting edge of the knife at the side of the seam inserted by the needle opposite the presser roll to form a depression in the material beside the edge of the knife as the sewing operation progresses.

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Preferably the knife is provided with a cutting edge extending in the direction of the seam and the tensioning foot together with the presser roll imparts tension to the protecting film in a direction transverse to the cutting edge of the knife.

Other features of the invention consist in the constructions, arrangements, combinations of parts and procedures hereinafter described and claimed, the advantages of which will readily be apparent from the following description taken in connection with the accompanying drawings, in which

Fig. 1 is a view in left side elevation of a portion of a sewing machine embodying the features of the present invention and indicating the position of the work in section;

Fig. 2 is a view in front elevation of the same parts of the machine;

Fig. 3 is a detailed side view on an enlarged scale showing the manner of operation of the tensioning foot for the cutting knife in advance of the sewing point;

Fig. 4 is a detailed front view of the tensioning foot and knife showing its relation to the work engaging devices;

Fig. 5 is a perspective view illustrating the manner in which the protecting film is peeled from the materials sewed by the machine of the present invention;

Fig. 6 is a similar view illustrating the manner in which bits of protecting film are torn loose in attempting to peel the film from the materials operated upon when sewed by the ordinary methods; and

Fig. 7 is a detailed plan view partly in section of the parts surrounding the sewing point of the machine indicating the direction of the stresses set up by the tensioning foot.

The machine illustrated in the drawings is intended to sew a seam intersecting two layers of relatively compressible sheet material 8, such as in a leather shoe upper having cemented to the outer one, at least, a protective covering of peelable film 10 applied in a manner similar to that disclosed in the Harrington patent above identified. The film of that patent is composed of rubber hydrochloride one-thousandth of an inch in thickness. If a seam is inserted in the material after the film has been applied and an attempt is made to peel the film from the material, irregular shearing action will be exerted in the film along the seam. Irregular shearing action will cause the film to be torn along the seam line during the peeling operation, as in Fig. 6, and its torn edges to be lacerated in a jagged manner

leaving bits of film, indicated at 12, firmly secured beneath the exposed threads between the stitch receiving perforations in material.

The bits of film, besides being secured beneath the threads of the seam, also are retained in position by the cement bond originally employed to hold the film in place. To remove the bits necessitates picking off each one individually, sometimes requiring painstaking disengagement of separate halves of the bits at either side of the seam line. Removing the bits in this manner is a time-consuming operation and introduces a serious obstacle in the use of the film-covering as a protective means.

To overcome this obstacle, according to the present invention the film-covering is precut in a line intersecting the needle which inserts the seam and parallel to the direction of work feed as the seam is sewed, enabling the film to be peeled and separated from the upper material along the completed seam without leaving bits secured beneath the threads. Cutting the film in the line of feed, however, frequently is somewhat difficult because of the extreme thinness and flexibility of the film itself and because of the tendency for the cement to pull away from the upper material along segregated strips. When the material being sewed is flexed as, for instance, with a shoe upper formed by assembling together different parts along curved lines to impart shape to the upper, certain sections of the parts may be bent and distorted. Bending or distorting the parts induces strains in the film and produces pleated or rippled areas of looseness and tension in the film. If an attempt is made to precut or score the film across the pleated areas with a drag knife, the knife may produce irregular effects, sometimes riding over a ridge formed by looseness in a pleat without cutting the film below the ridge.

To avoid irregular cutting effects while sewing through an extremely thin protective film-covering for compressible sheet material such as employed in a shoe upper, there is provided, in the sewing machine of the present invention, a drag knife, indicated at 14, located in line with and in advance of the needle in the direction of work feed and, in addition, a film tensioning foot 16 so mounted that it acts in proximity to the cutting edge of the knife to form a depression both in the film and in the material being sewn. To do so with uniform results, the tensioning foot 16 exerts a uniform vertical pressure on the film causing a horizontal tension to be set up which will offset any possible looseness or pleating of the film on the material to which it is cemented. Accordingly, a smooth cut slit or score 18 will be formed in the film and when the film is peeled from the material, it will separate along smooth edges 20 (see Fig. 5) intersected only by semicircular serrations caused by the needle perforations. In this way formation of bits of film such as those, illustrated at 12, in Fig. 6 is avoided.

In the machine to which the illustrated film tensioning foot is applied the needle, indicated at 22, is of the straight eye pointed type secured to the lower end of a reciprocable needle bar 24 and a presser in the form of a bracket 26 having a cone faced roll 28 rotatably mounted thereon is arranged for engagement with the work close to the point of needle operation to clamp the work at one side of the line intersecting the needle against a work support 30. The work is fed by a conventional feed dog 32 operating from

beneath the work engaging surface of the work support and engaging the work directly opposite the presser roll 28.

For mounting the film tensioning foot a carrier 34 is provided pivoted at 36 to a bar 38 secured to the presser bracket 26. The carrier also has secured to it the knife 14 arranged for convenient adjustment relative to the foot 16. The carrier is urged downwardly to press the tensioning foot against the film at the side of the seam line opposite the roll 28 by a spring 40 connected at its upper end to a pin 41 on the carrier and on its lower end to a stud 42 forming an axis about which the presser roll 28 rotates. The use of a carrier and a spring separate from the presser roll for yieldingly urging the foot and knife against the covering film insures uniform pressure of the tensioning foot and the knife on the film regardless of irregularities in movement of the presser roll 28 along the surface of the work, particularly when the thickness of the work changes abruptly as in moving across a transverse seam in the material.

To provide uniform cutting action of the knife its lower work engaging end is beveled to form a cutting edge 44 extending in the direction of the seam inserted by the needle and with a slight inclination only rising forwardly with respect to the upper surface of the work. The tensioning foot 16 forms a depression in the work at the side of the knife and reduces the looseness in the film-covering 10, changing the lines of any pleats therein toward directions more or less radiating from the point of engagement of the foot. The tensioning foot also cooperates with the presser roll 28 in the manner more clearly illustrated in Fig. 7 to induce definite lines of tension in the film covering extending transversely to the cutting edge 44 of the knife. In so doing the tendency to pleat the film sets up a formation of ridges and valleys in the film according to a pattern indicated by the shade lines 46.

These shade lines are shown radiating from both the tensioning foot and the point of engagement of the presser roll with positive tension between the two extending transversely to the cutting edge of the knife and to the seam line. For this reason the cutting action of the knife is accentuated and, even though the adjustment of the knife is such as to produce only a superficial score in the film, the transverse tension in the film is sufficient to separate it at either side of the seam line so that the stitches may be inserted without securing the edges of the film beneath the threads. Such operation of the knife also avoids the necessity of adjusting the knife for a depth of cut which will mar the surface of the underlying upper material.

To provide adequate adjustment for the knife 14 and the tensioning foot 16, the upper end of the knife is slotted at 48 to receive a clamp screw 50 also passing through a perforation in the shank of the tensioning foot. The knife has a notch to receive one edge of a head on an adjusting screw 52 threaded into a block 54, the block 54 having a slotted side arm adjustably secured in a guideway along the carrier 34 running transversely of the seam line.

To raise the knife and tensioning foot from the work when the presser roll 28 is raised at the end of a seam, the carrier 34 has threaded through it a set screw 56 provided with a check nut 58. The lower end of the set screw engages the bar 38 when the presser roll is raised to

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release the work. To locate the knife and tensioning foot in as close proximity to the point of operation of the needle as practical, the bar 33 is slidably mounted in a guideway formed in the presser bracket 26 and is retained in position lengthwise of the seam line by a set screw 60 passing through a slot in the bar and into threaded engagement with the bracket 26.

The adjustments provided for the knife enable an accurate regulation for the depth of cut formed by the knife, its location and the degree of pressure exerted by the tensioning foot. The knife is useful while sewing film coverings of Plio-film and also of other compounds either applied by the method set forth in the Harrington patent or by spraying on a solution of film-forming substance dissolved in a volatile solvent.

The method of the present invention comprises the application of a protective film covering either to the parts of a shoe upper before assembly or before the lasting operation is performed to the assembled shoe upper, sewing the material of the upper and at the same time scoring or slitting the exposed protective covering and thereafter peeling the covering from the upper at both sides of the line of the seam to expose the overlying upper. Not only does the score or slit formed in the protective covering assist in peeling the covering with clean cut edges along a seam line but also the stitches inserted are drawn more securely into place forming a tighter joint in the parts secured by the seam than would otherwise be possible where the stitches are inserted in the usual way with a similar protective cover. In removing a protective covering through which stitches are inserted, if the threads overlie the covering they will be loosened when the covering is removed.

The nature and scope of the invention having been indicated and a specific embodiment and a particular procedure having been described what is claimed is:

1. A sewing machine for operating on compressible sheet material covered with a peelable protective film, having a needle, a work support, a feed dog operating below the work support, a presser roll for clamping the work on the work support close to the point of needle operation at one side of a line parallel to the direction of work feed and intersecting the needle, and a knife extending in the line intersecting the needle, also close to its point of operation to form a cut in the film, in combination with a film tensioning foot mounted in proximity to the cutting edge of the knife at the side of said line opposite the presser roll for forming a depression in the material being sewn to tension the film beside the edge of the knife between the roll and the foot.

2. A sewing machine for operating on compressible sheet material covered with a peelable protective film of a thickness in the vicinity of a thousandth of an inch, having a needle, a work support, a feed dog operating below the work support, a presser roll for clamping the work on the work support close to the point of needle operation at one side of a line extending in the direction of work feed and intersecting the needle, and a knife provided with a cutting edge extending in the line intersecting the needle and located in advance of the needle close to its point

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of operation to form a cut in the film, in combination with a film tensioning foot acting together with the presser roll at the side of the knife in proximity to its cutting edge and at the side of said line opposite the roll for forming a depression in the material being sewn to tension the film transversely of the cutting edge of the knife between the roll and the foot.

3. A sewing machine for operating on compressible sheet material covered with a peelable protective film of a thickness in the vicinity of a thousandth of an inch, having a needle, a work support, a feed dog operating below the work support, a presser roll for clamping the work on the work support close to the point of needle operation at one side of a line extending in the direction of work feed and intersecting the needle, a bracket on which the roll is rotatably mounted, and a knife provided with a cutting edge extending in the direction of the line intersecting the needle and located in advance of the needle close to its point of operation to form a cut in the film, in combination with a film tensioning foot acting at the side of the knife in proximity to its cutting edge and at the side of said line opposite the roll for forming a depression in the material being sewn to tension the film transversely of the cutting edge of the knife between the foot and the roll, and a carrier for the tensioning foot movable on the presser roll bracket and yielding means connected between the bracket and the carrier for urging the foot with a uniform pressure against the film.

4. A sewing machine for operating on compressible sheet material covered with a peelable protective film of a thickness in the vicinity of a thousandth of an inch, having a needle, a work support, a feed dog operating below the work support, a presser roll for clamping the work on the work support close to the point of needle operation, a bracket on which the roll is rotatably mounted, and a knife provided with a cutting edge extending in the direction of work feed and located close to the point of needle operation to form a cut in the film, in combination with a film tensioning foot acting at the side of the knife in proximity to its cutting edge and at the side of said line opposite the roll for forming a depression in the material being sewn to tension the film transversely of the cutting edge of the knife between the foot and the roll, a carrier on which the tensioning foot and knife are mounted for movement on the presser roll bracket and yielding means connected between the bracket and the carrier for urging the foot and knife with a uniform pressure against the film.

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