

Nov. 15, 1955

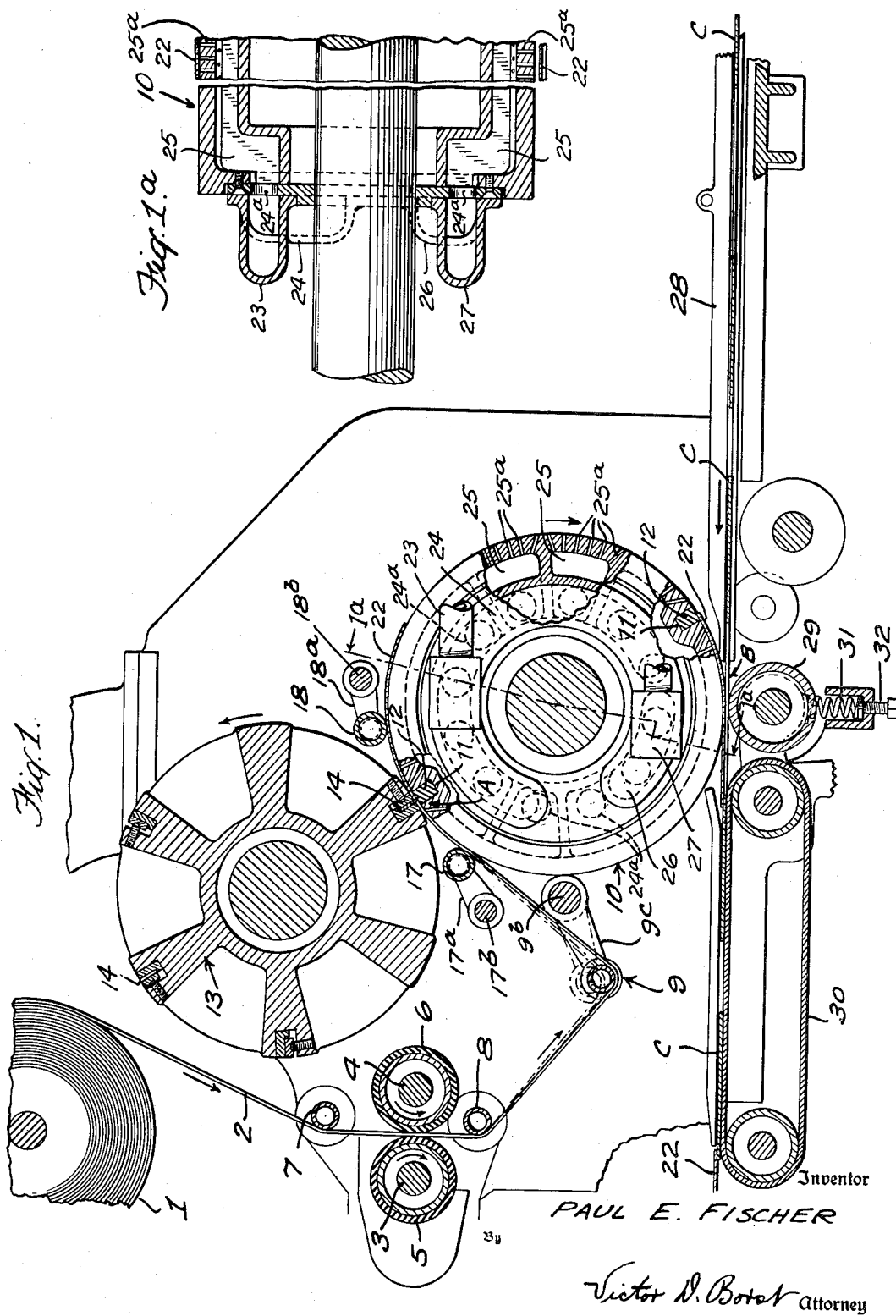
P. E. FISCHER

2,723,604

WINDOW APPLYING MACHINE

Filed Oct. 26, 1951

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 2.

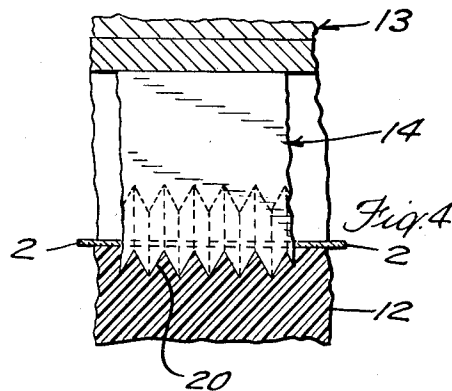
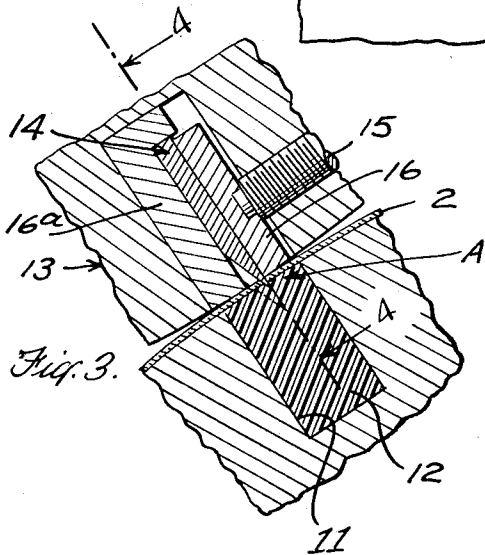
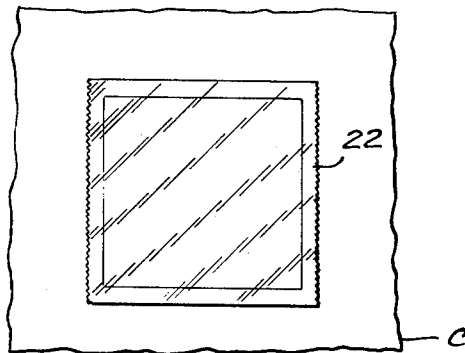
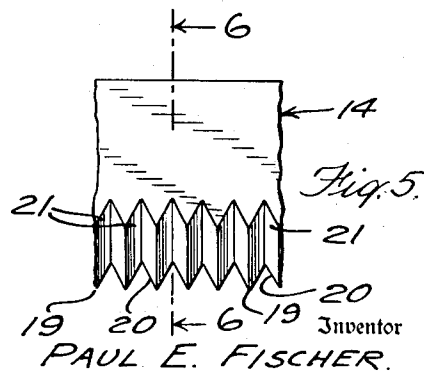
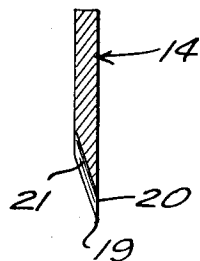


Fig. 6.



Inventor
PAUL E. FISCHER.

Victor D. Bost Attorney

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2,723,604

WINDOW APPLYING MACHINE

Paul E. Fischer, Minneapolis, Minn., assignor, by mesne assignments, to E. G. Staude Manufacturing Company, Inc., Concord, N. H., a corporation of New Hampshire

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6 Claims. (Cl. 93—61)

This invention relates to cutting devices of the type that are employed for cutting very thin sheet material, such, for example, as the window material used on cartons or envelopes to form transparent closures for so-called windows or openings provided in the cartons or envelopes. Since the cutting of window strips successively into patches for application to window openings in traveling blanks in patch applying machines is one special use for the cutting devices of this invention, they will be described in their association with such machines, although they have very general application and utility in mechanisms which perform cutting operations on like material.

Sheet material as thin as .0008 of an inch is employed as window material, and it has been the usual practice to use knives for the cutting of the window patches which operate against hardened anvils and sever the patches by a pinching or nipping action. Obviously this requires extreme accuracy in the setting of the knives.

There are certain other problems peculiar to the operation of machines for automatically cutting and applying window patches which arise from the fact that the window material strip is fed at a slower rate than the passage rate of the blanks to which they are to be applied, in the proportion that the length of the window opening bears to the total length of the blank. Therefore, there has to be a slip feed of the window material strip on the carrier member that is to apply it until the patch is severed, whereupon the severed patch must immediately take up the speed of the carrier and thus accelerate to the speed of the blank. This operation therefore requires that the cutting be positive, instantaneous and without slippage during the cutting.

It is an object of this invention to effect these desiderata by means which dispense with the need for accurate adjustments and which are simple, durable and economical. Other objects and advantages will appear from the description of the embodiment of the invention illustrated in the accompanying drawings.

The invention contemplates a knife having a serrated cutting edge and a cooperating anvil of resilient material into which the serrated edge of the knife will enter and thus effect a shearing action. The knife may be ground from one or both sides to form beveled grooves and thus get the continuous but serrated sharp cutting edge, but where it is desirable to get a straight cut, as is usually the case with window patches, it is preferable to have the grinding all on one face of the knife.

When used on window patch applying machines the points of the knife edge will preferably be sharp so that there is an immediate piercing of the window strip material when the knife and anvil come into register, the cutting progressing in both directions from each point, thus providing a scissors or shearing cut from a number of points and effecting a quick severance across the whole line of cut. There is a measureable period of time between the engagement of the strip by the knife and the completion of the severance of the patch and when, as in these window machines, the knife and anvil are on rotating drums having the same peripheral speed, it is essential that the ma-

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terial be traveling at knife speed during this period of time, to avoid tearing or irregularity of cut. Therefore in this slip feed operation the sharp points have the merit of seizing the strip of material at the instant of contact and immediately accelerating it to the speed of the knife and anvil.

It is found that the distribution of the cutting so that it originates simultaneously at and progresses from several points makes possible the cutting of patches which are too short to create the tension that would be required for a knife which cuts progressively from one end to the other.

Other features of the invention will hereinafter appear. The illustrated embodiment of the invention will now be described, after which the invention will be pointed out in claims.

Fig. 1 is a diagrammatical vertical section of a window patch applying machine into which is incorporated one embodiment of the invention;

Fig. 1a is a fragmentary longitudinal section of the patch carrying and applying roller, on the line of section 1a—1a of Fig. 1;

Fig. 2 is a fragmentary portion of a carton blank including the window opening and showing the patch applied;

Fig. 3 is an enlarged sectional view of the knife and anvil in cutting relation together with the immediate portions of the respective rollers carrying the two elements;

Fig. 4 is a fragmentary section on the line 4—4 of Fig. 3;

Fig. 5 is an elevation of a fragmentary portion of the knife; and

Fig. 6 is a section of the knife on line 6—6 of Fig. 5.

Only those parts of the machine which involve or are directly associated with the novel features of the invention are shown in the drawings. Referring to the drawings numeral 1 indicates a reel of transparent strip window material (not shown in full) from which the window strip 2 is unreeling. Within a functional distance of the reel 1 and mounted on shafts 3 and 4 are rubber pull rollers 5 and 6 for unreeling the strip from the said supply reel 1. The pull rollers are independently driven at a variable speed by chain and gear means (not shown). Idle rollers 7 and 8 are stationed on either side of the said pull rollers. A loop forming roller 9 which can assume various positions, as shown by the dotted lines in Fig. 1, depending on the relative position of the knives to the severed material, is employed below and in advance of the rubber pull rollers to cause a loop to form in the strip. The loop forming roller 9 pivots about the shaft 9b to which it is connected by an arm 9c. The mechanical cam means for turning the shaft 9b in timed relation with the window strip cutting-off operation are not shown. Reference may be had to Patent No. 2,291,841 for the details of construction and operation of the loop forming roller. In advance of the pull rollers and the loop forming roller is applicator drum 10 which is driven at a higher peripheral speed by means not shown than the rate at which the transparent strip is fed onto its circumferential surface. Secured within a plurality of longitudinal cavities 11 in the peripheral surface of the applicator drum are resilient anvils 12 two of which are shown in the broken away portions of the applicator drum in Fig. 1. The anvils 12 are removably retained in their respective cavities 11 by any suitable means as for example by set screws (not shown). The anvils are made of a natural or synthetic rubber material such as those known by the trademark names, Resistoflex, Koroseal, Hycar, Teflon or Polyethylene.

Driven in synchronization with the said applicator drum is knife roll 13 in the surface of which there are disposed cavities within which are rigidly held serrated knives 14.

The serrated knives are adjustably secured in place within the cavities by set screws 15 and blocks 16, cooperating with backing plates 16a and are spaced so as to coact with the anvils in the applicator drum. The serrated edges of the knives 14 extend lengthwise of and radially outwardly beyond the periphery of the knife roll by slightly more than the depth of serrations. Rolls 17 and 18, which lightly rest by gravity on the strip to facilitate its feeding and cutting, are carried by arms 17a and 18a, respectively, which are splined to shafts 17b and 18b, respectively.

When the window strip 2 is pushed against the soft anvil 12 by the clamping action of the serrated knife, the window strip must instantly travel at the surface speed of the applicator drum 10. It is at this instant the loop forming roll 9 is caused to rise to the dotted line position in Fig. 1, and allow the material 2 to yield as much of its slack as is necessary. As above stated, the knife must positively clamp the material at the start of its cutting action to avoid possibility of slippage or any relative movement between the knife and material during severance. The present knife construction precludes such slippage, by virtue of the penetration of its piercing points 19 into and through the material at substantially the instant of the clamping operation. The inclined edges 20, which are ground between the piercing points 19, quickly shear the material which is being accelerated to the peripheral speed of the applicator drum. Beveled grooves 21 which are ground on one side of the knife to form the serrated cutting edge slightly serrate the cut edge of the patch, as shown in Fig. 2, but this is minimized by having one face of the cutting edge smooth. The farthest penetration of the serrated knife through the strip and into the anvil is shown in Figs. 3 and 4.

The applicator drum 10 serves not only as a rotary cutting head, but also as a feed drum for advancing severed window patches 22 successively between cutting station A and assembly station B. Suitable means, such as suction, is provided to hold the window material to the drum. As shown a suction line 23 communicates with a manifold 24 that is disposed around the end of the drum against a plate which closes the end of the drum and is secured thereto. The manifold communicates through openings 24a in the plate with cored cavities 25 disposed circumferentially around the drum. Suction openings 25a in the surface of the drum communicate with the cavities 25.

The manifold 24 extends around the end of the drum from a point just ahead of the roller 17 to a point near the bottom of the drum where the patch is released and applied. If desired the pressure may at that point be reversed and the patch be blown off to make positive its separation from the drum. For this purpose there is shown a second manifold 26 which is comparatively short and is disposed against the same plate at the bottom of the drum just past the end of the manifold 24. The manifold 26 also communicates with the cavities 25 through holes 24a in the plate, and communicates with a source of pressure 27.

By these means the window material is held by suction against the surface of the drum from the point where it contacts the drum at the roller 17 until the severed patch reaches the assembly station B, as shown in Fig. 1, where the reverse pressure dislodges the patch and assists its transfer to the blank which is passing underneath at a speed equal to the peripheral speed of the drum 10.

It will be understood that the invention is independent of the particular construction of the patch applying machine and resides primarily in the knife and anvil construction in combination with such elements as effect coaction of these members.

What is claimed is:

1. In a window applying machine wherein a thin transparent window strip is fed through feed rolls from a roll stand for a roll of strip material onto a rotating applica-

tor drum driven at a greater peripheral speed than said feed rolls and is carried thereon by slip-drag before it is cut into window patches at the point of engagement of the applicator drum and a knife roll, said window patches being conveyed after severance at the peripheral speed of the said applicator drum until application to carton blanks is made, the improvement which resides in the combination with the said applicator drum and the said knife roll of a knife having a continuous serrated cutting edge retained by the said knife roll with the serrated edge projecting therefrom, whereby the tips of said serrated edge can contact the strip of patch material before the knife roll itself contacts the strip for accelerating the strip to the speed of the applicator drum just prior to severing it and an anvil retained by the said applicator drum and adapted to be entered by the serrations of said serrated knife to effect the severance of the said transparent window strip.

2. In a window applying machine wherein a thin transparent window strip is fed through feed rolls from a roll stand for a roll of strip material onto a rotating applicator drum driven at a greater peripheral speed than said feed rolls and is carried thereon by slip-drag before it is cut at the point of engagement of the applicator drum and a knife roll said window patches being conveyed after severance at the speed of the said applicator drum until application to carton blanks is made the improvement which resides in the combination with the said applicator drum and the said knife roll of a serrated knife mounted on the said knife roll and comprising a body portion, piercing points, finely ground continuously sharp serrated cutting edges between the said piercing points and beveled grooves in the said body portion and immediately above the said cutting edges, whereby the piercing points of said serrated cutting edges can contact the strip of patch material before the knife roll itself contacts the strip for accelerating the strip to the speed of the applicator drum just prior to severing it and an anvil retained by the said applicator drum and adapted to be entered by the continuous sharp cutting edge of the said serrated knife to effect the severance of the said transparent window strip.

3. The combination according to claim 2 wherein the beveled grooves of the serrated knives are ground on one side of the said serrated knives and the coacting anvils are resilient.

4. In a window applying machine wherein a thin transparent window strip is fed through feed rolls from a roll stand for a roll of strip material onto a rotating applicator drum driven at a greater peripheral speed than said feed rolls and is carried thereon by slip-drag before it is cut into window patches at the point of engagement of the applicator drum and a knife roll and conveyed after severance on the said applicator drum with means to hold the said window patches thereon at the speed of the said applicator drum until application to carton blanks is made at an assembly station or is stripped from the peripheral surface of the said drum beyond the assembly station by a stripping device, the improvement which resides in the combination with the said applicator drum and the said knife roll of a resilient anvil set into and retained by the said applicator drum and having a cylindrical surface coextensive therewith and a serrated knife retained by the said knife roll and comprising a body portion immediately above the said cutting edges, said knife edge being continuous, sharp and serrated and adapted to pierce into the said resilient anvil to first to accelerate and then effect the severance of the said transparent window strip.

5. In a patch-applying machine which comprises the combination of a patch-applying cylinder for carrying cut patches into contact with a surface on which the patch is to be applied, means for rotating said cylinder at a peripheral speed equalling the speed of movement of said surface, a roll stand for a roll of strip material from which said patches are cut, feed roll means adjacent the roll stand and through which the strip of patch material is

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fed for progressing it, means for holding the end of the strip of patch material against the patch-applying cylinder, means for rotating the feed rolls at a peripheral speed less than that of the patch-applying cylinder, the improvement which resides in said patch-applying cylinder having a longitudinal piece of resilient material set level with the surface of the cylinder and a knife roll mounted for rotation in contact with the patch-applying cylinder and at the same speed, said knife roll having at least a segmental cylindrical surface and a serrated cutting knife projecting therefrom, said knife having a continuously sharp edge along said projecting serrations, said knife being set so that the serrations project beyond said surface and into the piece of resilient material of the patch-applying cylinder as they rotate together.

6. In a patch-applying machine which comprises the combination of a patch-applying cylinder and a knife roll mounted and provided with intergeared driving means for synchronous rolling contact with each other, a roll stand for supporting a rolled strip of patch material, a pair of feed rolls adjacent the roll stand mounted for running contact with opposite sides of the strip for feeding it to the cylinder and knife roll, means for rotating said feed rolls at a peripheral speed less than that of said cylinder, and means for guiding the strip along a free path leading to the line of contact of the cylinder and knife roll

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and means for holding the free end of the strip in dragging relation on the cylinder, the improvement which resides in said patch-applying cylinder being provided with equally spaced segments of resilient material inset longitudinally along its surface and the knife roll having similarly spaced knives positioned thereon, said knives having a continuously sharpened serrated edge projecting radially beyond the roll into said segments of resilient material as the cylinder and roll revolve together, said path of movement of the strip of patch material to the cylinder and knife roll being such that the projecting tips of the serrations of the knives contact the strip before the knife roll itself contacts the strip for accelerating the strip just prior to cutting it.

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