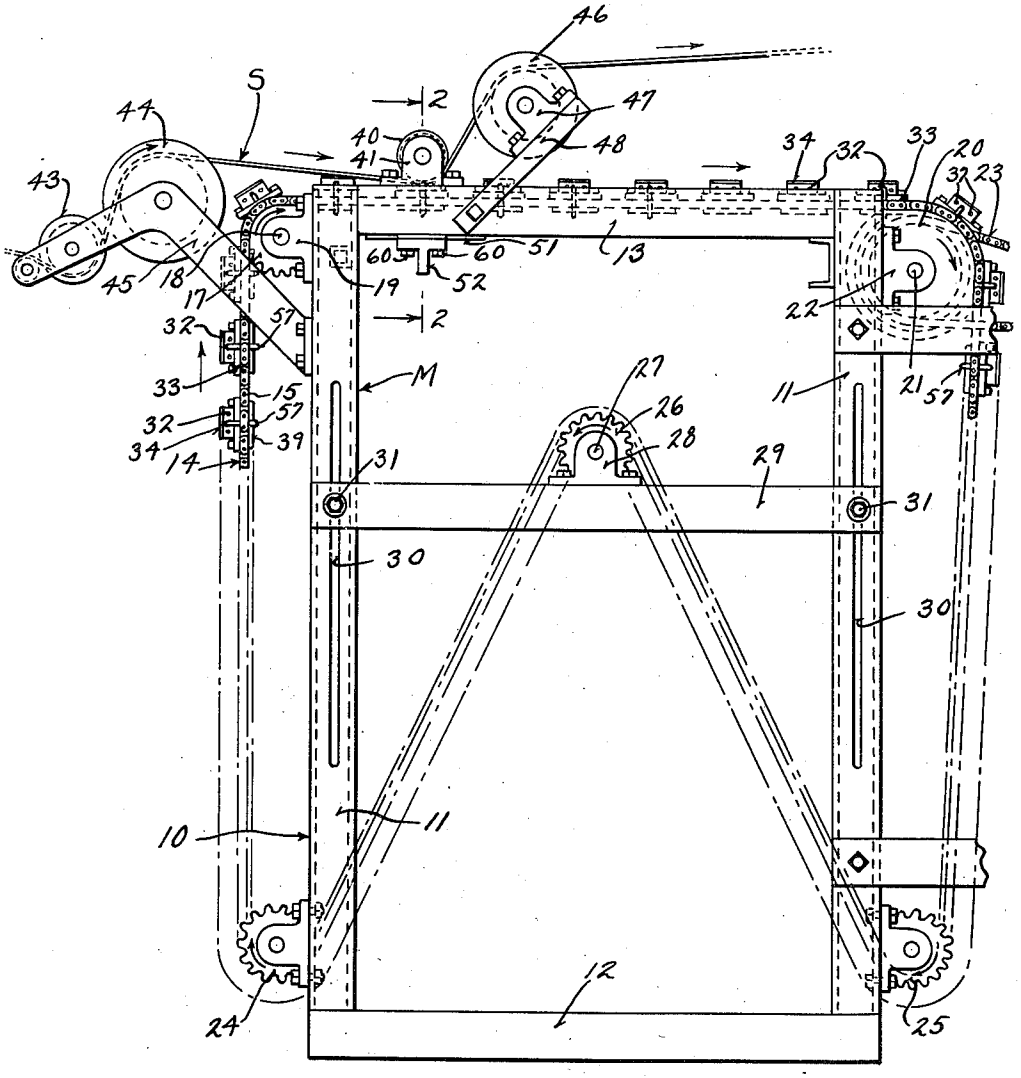
April 2, 1957 M. VAN ANTWERPEN ET AL 2,787,323

SLITTING MACHINE

Filed May 16, 1955 3 Sheets-Sheet 1

Fig. 1.



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Fig. 2.

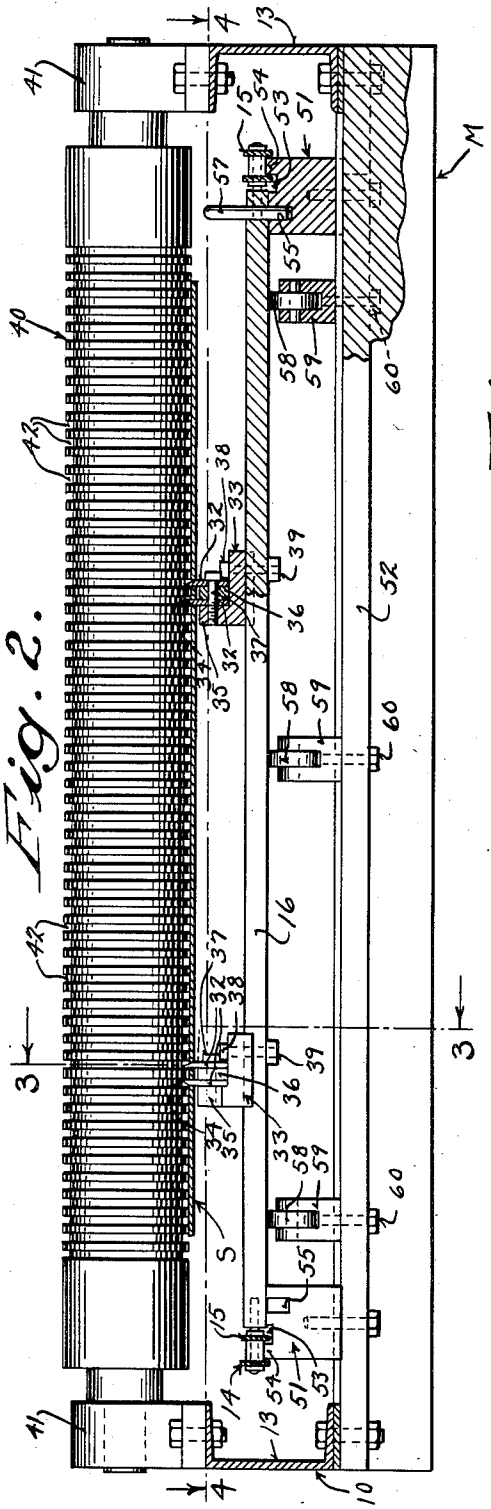
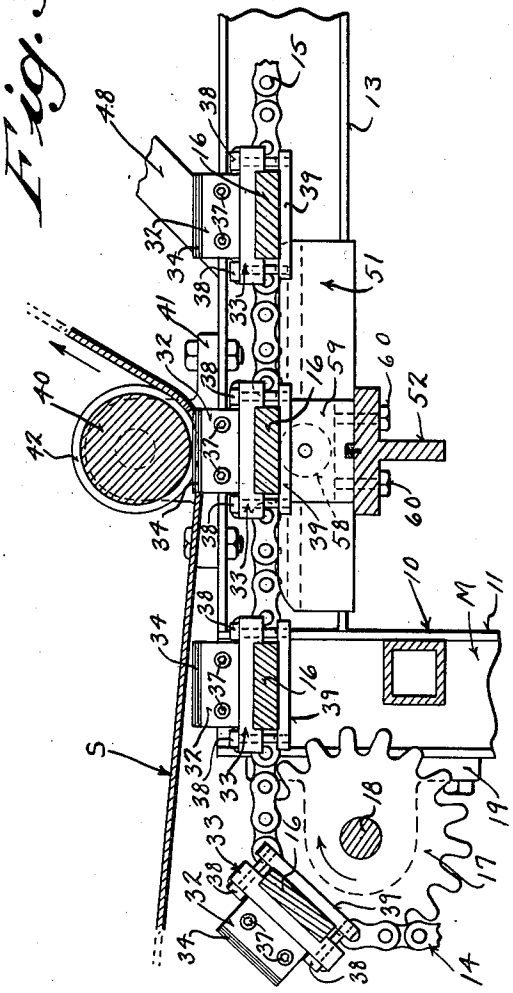


Fig. 3.



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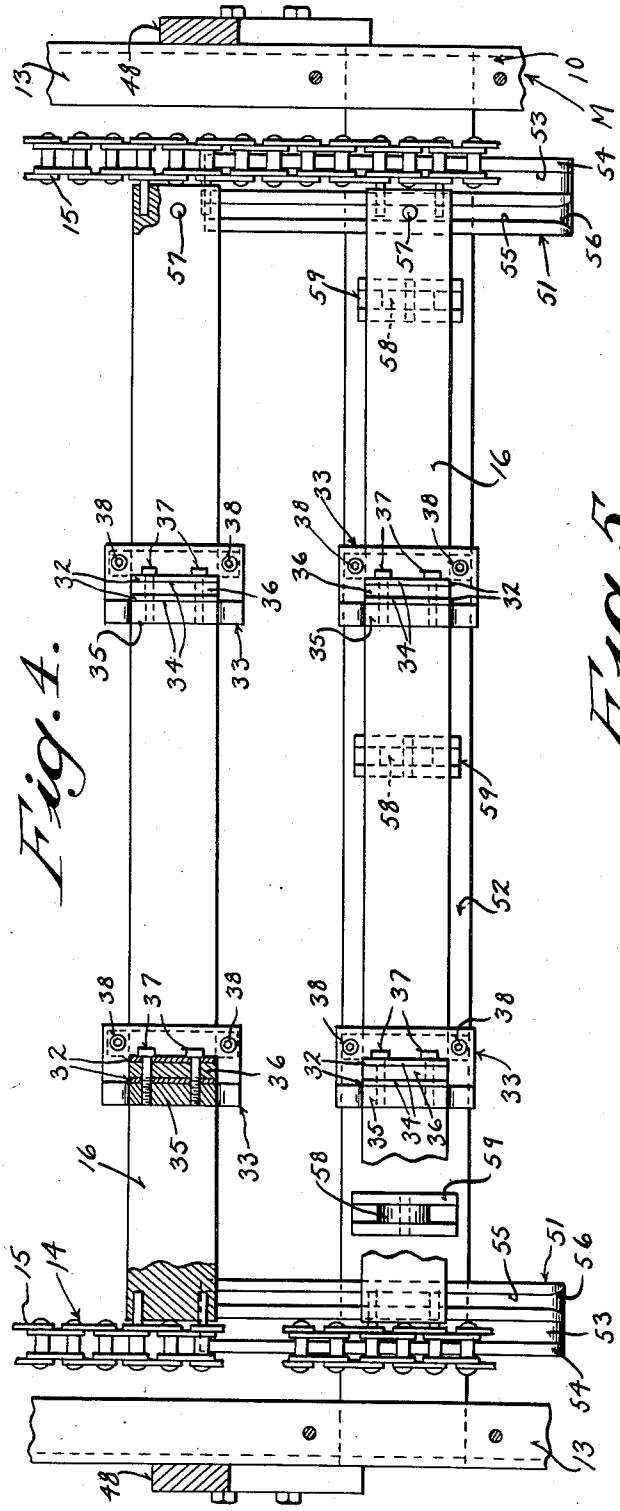


Fig. 4.

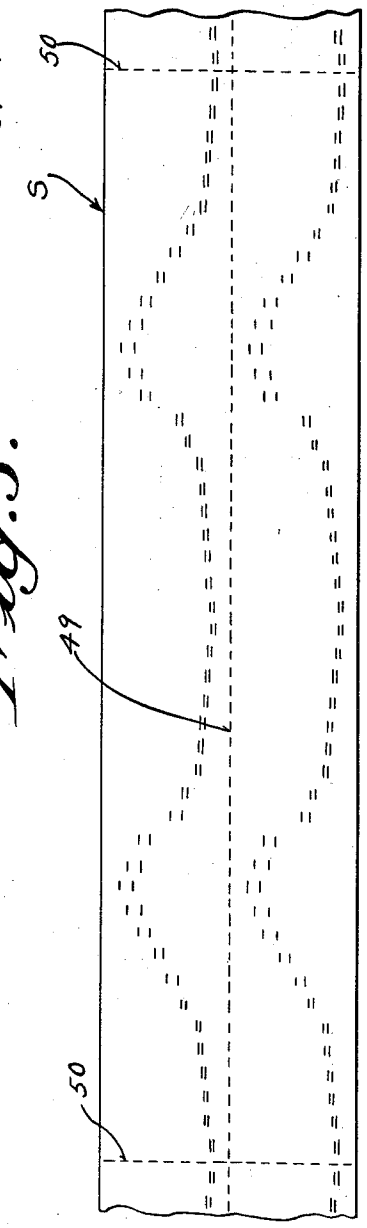


Fig. 5.

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SLITTING MACHINE

Martin Van Antwerpen and Lloyd D. Van Antwerpen, Milwaukee, Wis.

Application May 16, 1955, Serial No. 508,517

3 Claims. (Cl. 164—60)

This invention appertains to a novel machine for fabricating cushioning and shock absorbing packaging strips for frangible articles, such as mirrors, glass replacement parts for automobiles including wrap-around windshields, etc., and is an improvement over the Van Antwerpen Patent 2,504,473 issued April 18, 1950.

The strip fabricated by the machine shown in the above-mentioned patent includes a flat base strip, an intermediate cushioning strip and an inner face strip folded to form a series of outwardly projecting longitudinally aligned substantially V-shaped portions. The V-shaped portions are in turn provided with longitudinally aligned slots for receiving the peripheral edges of the glass being protected when the strip is placed around the glass. In a preferred construction of the strip, the inner face strip is provided with parallel slits and when the inner face strip is folded to form the V-shaped projections, the material between the slits is depressed to form the slots for the edge of the glass and the depressed material functions as an additional cushioning medium for the glass. The slots vary in width according to the width and the shape of the glass being handled and in packaging curved or wrap-around windshields, the slots at different points in the same strip vary in width. (See the pending application of Van Antwerpen, entitled "Packaging for Wrap-Around Windshields," Serial Number 441,991 filed July 8, 1954.)

It is, therefore, one of the primary objects of the present invention to provide a novel mechanism for slitting the inner face strip before the folding thereof, whereby the desired slots in the inner face strip can be conveniently formed therein during the fabrication of the cushioning, packaging strip itself.

Another salient object of the present invention is the provision of novel means for carrying and supporting the slitting knives, whereby the distance between the slits can be readily varied to form the desired width of slots, and whereby the spaced parallel slits for each V-shaped projection can be spaced apart an exact desired distance.

Another important object of the invention is the provision of means whereby the spaced parallel slitting knives can be placed at any desired distance apart transversely of the inner face strip so that an exact desired pattern of spaced parallel slits can be formed in the inner face strip.

A further object of the invention is the provision of an endless power driven chain, in the nature of a conveyor embodying a plurality of transversely extending slats or bars, with means for securing the slitting knives in desired, selected positions on the slots or bars to form the slits in the inner face strip in the desired exact pattern.

A further important object of the invention is the provision of a novel bed roll disposed above the endless chain having a plurality of annular grooves spaced equidistantly apart for receiving the slitting knives during the slitting of the inner face strip, whereby to facilitate the forming of clean slits in the strip.

Another further important object of the invention is

the provision of means for forming the annular grooves in the roll relative to the knives, so that the knives will enter the grooves without striking the roots or inner walls of the grooves whereby to prevent dulling of the knives.

A still further object of the invention is the provision of guide bars on the machine and means on the chain for cooperation with the guide bars, whereby to exactly hold the chain during the travel of the chain in a predetermined position at the time the knives enter the grooves of the roller, so that the knives will enter the grooves without striking the walls thereof.

A still further important object of the invention is the provision of means cooperating with the guide bars for supporting the slats of the chain during the forming of the slits in the inner face strip, so as to insure the penetration of the knives entirely through the strip.

A still further important object of the invention is to generally improve the machine so that the machine will effectively perform the desired slitting operation.

With these and other objects in view, the invention consists in the novel construction, arrangement and formation of parts, as will be hereinafter more specifically described and claimed, and illustrated in the accompanying drawings, in which drawings,

Figure 1 is a side elevational view showing the improved slitting mechanism for the machine shown in the Van Antwerpen patent heretofore referred to;

Figure 2 is a fragmentary transverse sectional view through the slitting mechanism taken on the line 2—2 of Figure 1, looking in the direction of the arrows, the view illustrating the relationship of the slitting knives relative to the grooved bed roll and the means for supporting and aligning the slats carrying the slitting knives relative to the roll;

Figure 3 is a fragmentary longitudinal sectional view through the slitting machine, taken on the line 3—3 of Figure 2, looking in the direction of the arrows;

Figure 4 is a fragmentary horizontal sectional view taken on the line 4—4 of Figure 2, looking in the direction of the arrows, showing a fragment of the conveyor chain in plan, and

Figure 5 is a fragmentary top plan view of the sheet after being slitted by the slitting mechanism preparatory to forming the packaging strips.

Referring to the drawings in detail, wherein similar reference characters designate corresponding parts throughout the several views, the letter M generally indicates the improved slitting mechanism utilized in a machine for fabricating a shock absorbing and cushioning strip. The slitting mechanism M includes a supporting frame 10 of any desired construction and as illustrated, the frame includes spaced upright standards 11 arranged on opposite sides of the machine. The lower ends of the standards 11 on each side of the machine can be connected together by base beams 12 and the upper ends of the standards are connected by top beams 13. As best shown in Figure 2, the beams 13 can be of a channel construction. This frame 10 carries for travelling movement an endless conveyor 14 which forms an important part of this invention.

The conveyor 14 includes side sprocket chains 15 connected together by transversely extending slats or slitting knife supporting bars 16. Normally the slats or supporting bars 16 are spaced equal distances apart and these distances can be varied should such be desired. At the top of the machine, the sprocket chains 15 travel over idler sprocket wheels 17 rotatably carried by a transversely extending shaft 18 mounted in bearings 19. The bearings 19 are securely fastened to the front standards 11. The chains at the top of the machine also travel over drive sprockets 20 keyed or otherwise fastened to a rotatable drive shaft 21 mounted in bearings 22. The

bearings 22 are securely fastened to the rear pair of standards 11 and the shaft 21 is power driven at a constant rate of speed through any desired mechanism. By referring to Figure 1, it can be seen that the shaft 21 is turned by a drive sprocket chain 23 leading from any suitable source of power and this drive chain 23 is trained over a sprocket wheel, keyed or otherwise secured to the shaft 21. The idler sprocket 17 and the drive sprockets 20 form an upper horizontal stretch in the conveyor chain, the purpose of which will later appear. The lower end of the frame 10 rotatably carries idler sprocket wheels 24 and 25 and the chains 15 of the conveyor are trained over these idler sprockets.

To take up slack in the chain, intermediate idler sprockets 26 mounted on a shaft 27 for free turning movement are provided between the idler sprockets 25 and 24 and the chains 15 are trained over these idler sprockets 26. The shaft 27 is mounted in bearing blocks 28 carried by longitudinally extending adjusting bars 29. The adjusting bars 29 abut the standards 11 and the standards 11 are provided with vertical slots 30 through which protrude adjusting bolts 31 carried by the supporting bars 29. Obviously, by tightening or loosening the bolts 31, the idler sprockets 26 can be raised and lowered with their supporting bars 29. This arrangement also provides means for adjusting the slitting mechanism for longer or shorter sheets.

As heretofore mentioned, the slats or supporting bars 16 are employed for carrying slitting knives and as best shown in Figures 2 and 4, slitting knives 32 are employed in pairs and each pair of slitting knives 32 is carried by and is firmly mounted on blocks 33. The knives have flat lower edges which rest upon the blocks and sharpened upper cutting edges 34. The blocks 33 include outwardly extending arms 35, and one knife of each pair rests against an arm and the knives of each pair are separated a desired distance apart by a spacer 36. Machine bolts 37 are inserted through the knives of each pair, the separator 36 and into an arm 35. By using separators of different widths, the knives of each pair can be spaced different distances apart and it is to be understood that the knives of each pair are spaced according to the width of the slots to be made in the inner face strip of the cushioning and packaging member being fabricated. The blocks 33 are clamped to the slats or supporting bars 16 by the use of clamping screws 38 and these screws extend through the blocks themselves and into clamping plates 39 which embrace the inner faces of the slats or bars 16. This arrangement allows the blocks to be moved relative to one another desired distances apart and any desired number of blocks can be clamped to the slats or supporting bars.

Arranged directly above the upper stretch of the conveyor 14, adjacent to the front part of the machine, is a bed roll 40 and this bed roll extends transversely across the machine and is rotatably supported in bearings 41 which are bolted or otherwise secured to the top beams 13. The bed roll 40 is provided with a series of equidistantly spaced grooves 42, and during the slitting of a paper sheet, as will later appear, the slitting knives enter the grooves. The grooves are of such a depth that the cutting edges 34 of the knives do not strike the roots or inner walls of the grooves during the slitting process, and consequently the dulling of the knives is prevented.

The knives of each pair of slitting knives are always spaced a distance apart so as to insure the entrance of their cutting edge in the bed roll.

The sheet to be treated is indicated by the reference character S and the sheet is fed into the machine between the conveyor 14 and the bed roll 40, so that as the knives pass under the bed roll, the knives will effectively engage and slit the sheet. The sheet is guided into the machine by idle guide rolls 43 and 44 and these rolls are rotatably mounted on supporting bracket arms 45 carried by the frame 10 of the machine. The sheet is held taut against the lower surface of the bed roll 40 by an elevated guide roll 46 located directly in rear and above the bed roll 40. This elevated roll 46 is rotatably mounted in suitable bearing blocks 47 carried by bracket arms 48 secured to the upper end of the frame 10. The sheet S is pulled into the machine in any desired way, and the conveyor 14 with its slitting knives also tends to move and pull the sheet through the machine.

In Figure 5 one example of the slitting of a sheet S is shown, and after the fabrication of the cushioning and packaging member being made the fabricated cushioning member can be slit longitudinally along the dotted line 49 to form two strips and the sheet is also cut transversely, as indicated by the dotted line 50 to provide strips of different lengths. In Figure 5, the strips being fabricated have slits of different distances apart and the parallel slits are disposed in a sinuous formation. This provides slots of different widths with slots arranged to receive a curved edge such as a wrap around windshield, as best set forth in the pending application heretofore mentioned. It is essential that the bars or slats 16 be firmly supported during the slitting of the sheet and that the knives be accurately positioned relative to the grooves 42 in the bed roll 40, and in order to accomplish this, spaced longitudinally extending guide rails 51 are provided. These rails are securely bolted to the upper face of a transversely extending brace beam 52 which forms a part of the frame of the machine and this beam 52 is securely bolted, or otherwise rigidly fastened to the upper longitudinal beams 13. The upper faces of the guide rails are provided with outer grooves 53 and these outer grooves 53 form upstanding longitudinally extending ribs 54 on which the chains 15 of the conveyor 14 ride. Inner longitudinally extending grooves 55 are also formed in the upper faces of the guide rails 51 and the forward ends of the grooves 55 are flared as at 56 to form entrance mouths. Each slat or supporting bar 16 carries depending locating pins 57 and these pins ride into the guide grooves 55 and accurately dispose the slats with the slitting knives relative to the bed roll 40, it being understood that some play takes place, in the conveyor 14.

To further aid in holding a slat or supporting bar 16 solid as a slat or supporting bar rides under the roll 40, supporting idle wheels 58 are located directly under the bed roll and as a slat or supporting bar reaches the bed roll, such slat will ride upon the wheels 58. These wheels 58 can be carried by bearing blocks 59 and the blocks in turn can be rigidly secured by bolts or the like 60 to the transversely extending frame bar 52.

From the foregoing, it is obvious that as the sheet S is fed through the machine M and the conveyor is driven, the pairs of slitting knives 34, as they meet the bed roll 40, will effectively form parallel slits in the sheet in a desired and selected pattern according to the arrangement of the slitting knives on the slats or supporting bars 16.

Various changes in details may be made without departing from the spirit or the scope of the invention, but what we claim as new is:

1. In a machine for producing parallel slits in a desired pattern in a sheet, a supporting frame, an endless conveyor carried by said supporting frame including, side sprocket chains, transversely extending bars connecting said chains, spaced sprocket wheels carried by the upper end of the frame for the sprocket chains defining an upper horizontally disposed stretch, a bed roll rotatably mounted upon said frame and extending transversely across and above the conveyor intermediate said horizontal stretch thereof and in close proximity to the bars thereof, said roll having a plurality of equidistantly spaced annular grooves, means for driving the conveyor, pairs of slitting knives secured to the bars and extending outwardly and upwardly from the horizontal stretch for passage past the bed roll with the knives positioned for

entrance into the grooves of the bed roll, spaced longitudinally extending guide rails secured to the frame and extending under the bed roll, said guide rails having guide grooves, and locating pins on the bars for movement into said grooves for holding the bars against lateral shifting movement.

2. In a machine for producing parallel slits in a desired pattern in a sheet as defined in claim 1, and means for supporting each bar against downward movement as the respective bar passes beneath the bed roll.

3. In a machine for producing parallel slits in a desired pattern in a sheet, a supporting frame, an endless conveyor carried by said supporting frame including, side sprocket chains, transversely extending bars connecting said chains, spaced sprocket wheels carried by the upper end of the frame for the sprocket chains defining a horizontally disposed stretch, a bed roll rotatably mounted upon said frame and extending transversely across the conveyor at a point intermediate the horizontal stretch

thereof and in close proximity to the respective bars thereof, said roll having a plurality of equidistantly spaced annular grooves, means for driving the conveyor, pairs of slitting knives secured to each bar and extending outwardly therefrom when said bar is in alignment with said bed roll, said knives of said bar extending into the grooves of the bed roll, spaced longitudinally extending guide rails secured to the frame and extending under the bell roll, said guide rails having guide grooves, and locating pins on the bars for movement into said grooves for holding the bars against lateral shifting movement.

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