Aug. 18, 1970 T. D. BISHOP 3,524,364

APPARATUS FOR STRIPPING WASTE FROM CARDBOARD AND LIKE BLANKS

Filed Feb. 7, 1968 3 Sheets-Sheet 1

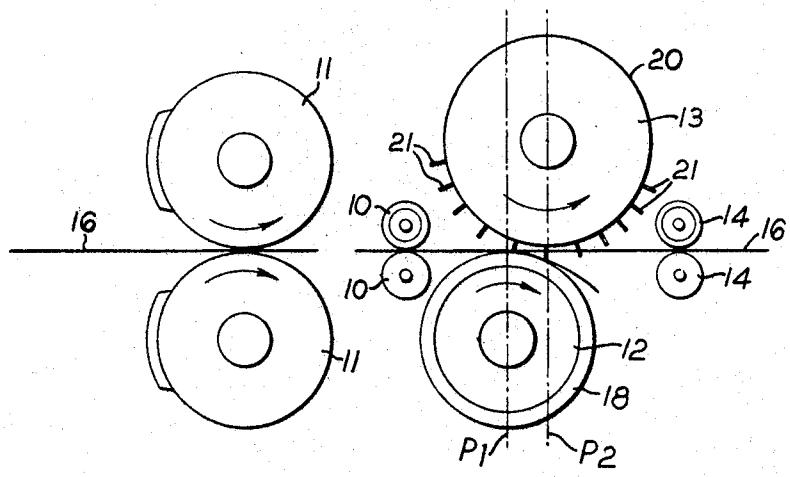


Fig. 1.

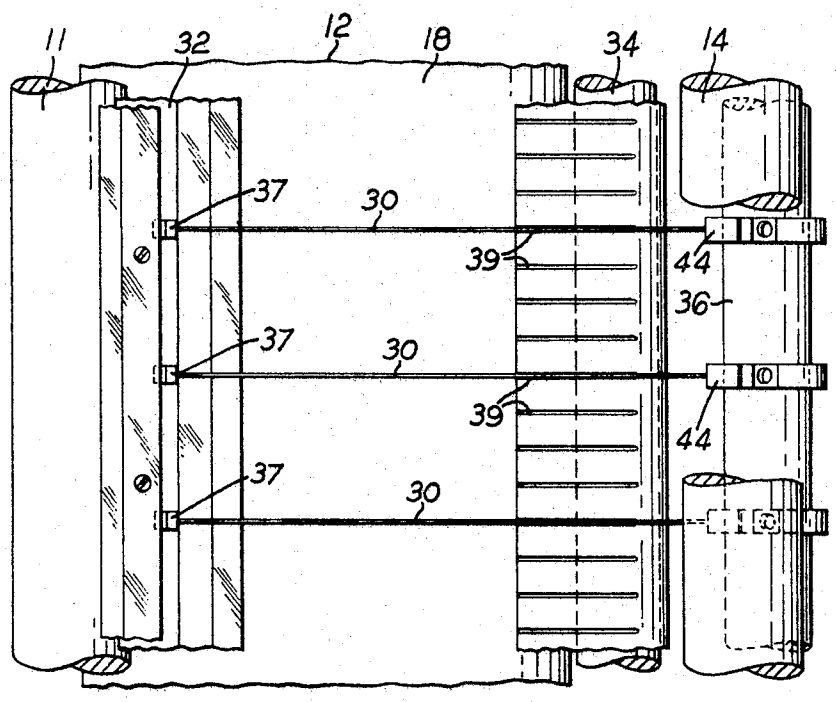


Fig. 3.

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Filed Feb. 7, 1968 3 Sheets-Sheet 2

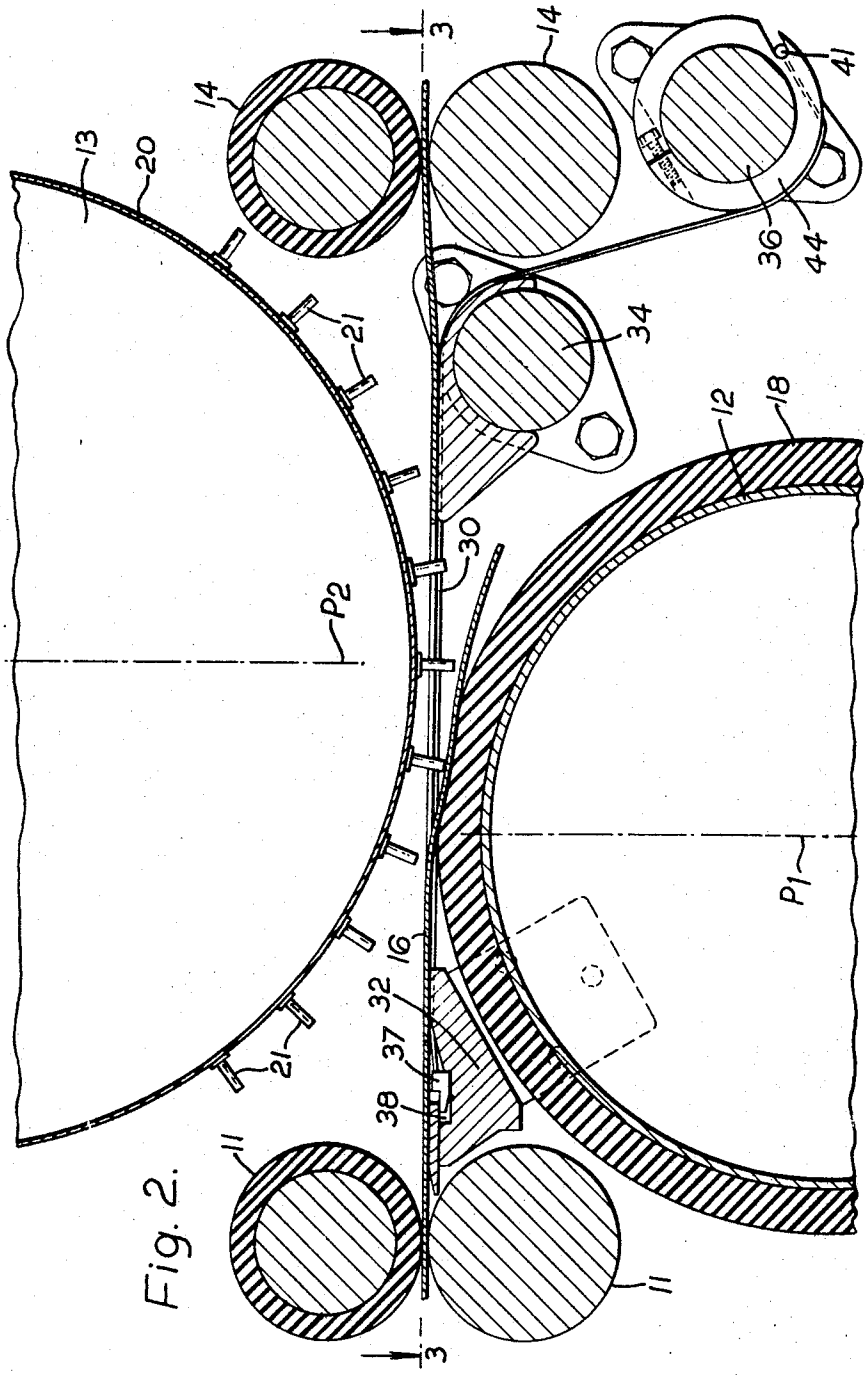


Fig. 2.

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APPARATUS FOR STRIPPING WASTE FROM CARDBOARD AND LIKE BLANKS

Filed Feb. 7, 1968 3 Sheets-Sheet 3

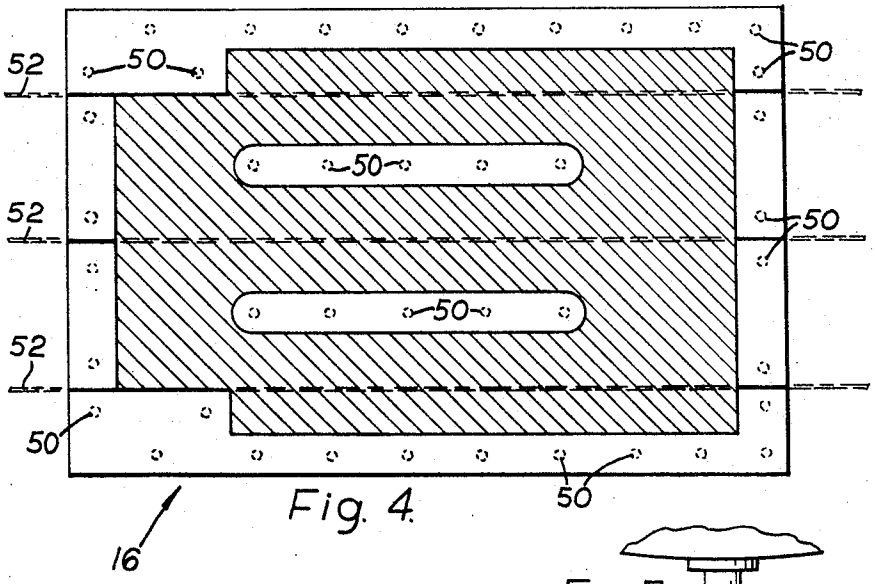


Fig. 4.

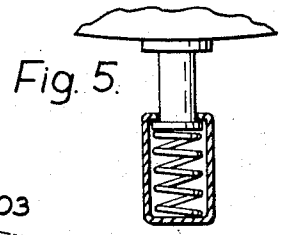


Fig. 5.

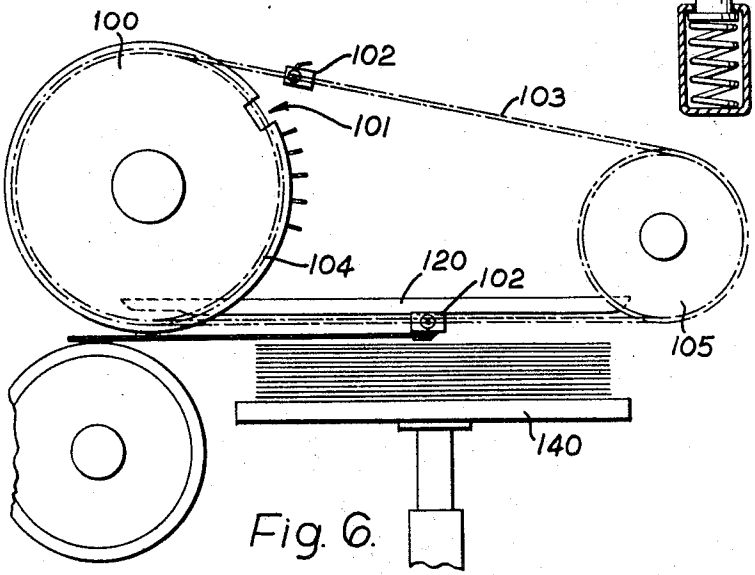


Fig. 6.

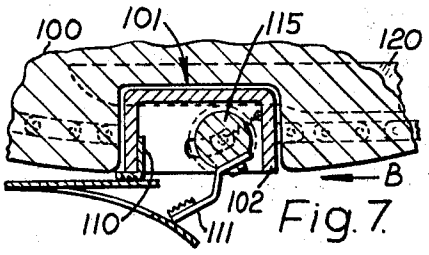


Fig. 7.

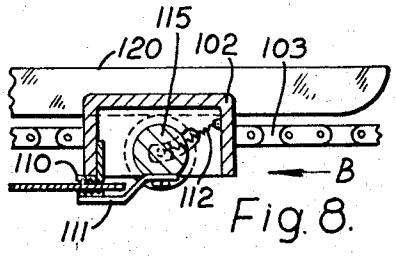


Fig. 8.

United States Patent Office 3,524,364 Patented Aug. 18, 1970

3,524,364

APPARATUS FOR STRIPPING WASTE FROM CARDBOARD AND LIKE BLANKS

Thomas Desmond Bishop, Solihull, England, assignor to The Deritend Engineering Company Limited, Birmingham, England, a British company

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Claims priority, application Great Britain, Feb. 21, 1967, 8,155/67
Int. Cl. B26d 7/18
U.S. Cl. 83—103 7 Claims

ABSTRACT OF THE DISCLOSURE

The apparatus comprises a pair of spaced rolls and is provided with guide means for maintaining the blanks substantially in a planar path tangent to both of the spaced rolls and extending substantially beyond the rolls in the direction of feed. A plurality of stripping members project from one of the rolls and pass through such planar path, for stripping the waste from the blanks by displacing it out of such path.

BACKGROUND OF THE INVENTION

This invention relates to the manufacture of blanks of cardboard and like material for use in the construction of boxes, cartons and the like.

It is usually necessary in such blanks to provide cut out holes, for example for hand holes or to make wide slits separating flaps or other purposes. The removal of the material from the holes or slits (which constitute unwanted parts of the blank) after cutting the edges of the holes and the like is known as stripping, and the design of satisfactory machinery for effecting stripping particularly at high speeds involves certain problems which are well-known in the art.

Previous solutions to these problems have involved providing a roll pair through the nip of which the blanks pass and having male projections or dies on one roll to push the unwanted pieces out of the plane of the blank and into female holes or die apertures in the other of the rolls.

It has also been suggested to provide the male projections with hooked or other shapes to engage with or impale the pieces so as to pull them out of the plane of the blank, and yet other proposals involve the use of suction to attempt to extract the pieces.

Depending upon the complexity of the blanks involved, the nature of the material varying from thick paper to very thick board, and also to some extent the speed of the machine, such proposals have been not entirely satisfactory.

In general it is found that the pieces cannot be completely cut from the blank in the manufacturing step immediately prior to stripping without a risk of such pieces being detached at this stage and possibly lying on the blank in which case they interfere with proper stacking or may interfere with subsequent cutting operations or printing operations.

It is generally necessary and sometimes unavoidable to arrange for the cut to be incomplete at least in one position and then it is found that during the stripping operation there is a possibility of the stripped pieces merely hinging about the uncut part or parts and moving through 180° so as to lie flat upon the blank immediately adjacent the hole.

This results in the disadvantages mentioned above. Nevertheless this hinging has been unavoidable because when the blanks pass through the nip they are effectively contacted by the projections at only a single point or

possibly a series of such points arranged in a single line parallel to the roll axes and lying within the nip. Even if the projections extend radially from the roll surface for a sufficient distance so that they first engage with the board shortly before the nip so as to press the parts wholly out of the plane of the blank, as the projections pass through the nip and continue, there is an unavoidable tendency for the pieces to be drawn back to the plane of the blank as the projections withdraw therefrom.

SUMMARY OF THE INVENTION

The objects of the present invention are primarily to provide more efficient stripping.

In accordance with the present invention cardboard and like material blank stripping apparatus comprises a roll pair having the axes of the rolls lying in planes parallel to one another and both normal to the feed path of blanks therebetween, whereby the nip between the rolls extends over a tangent common to both rolls and between said parallel planes.

By this means the pieces pressed or drawn out of the blanks may be contacted by successive projections or the like spaced apart in a direction circumferential of the rolls, i.e. along the feed path, at one and the same time.

Preferably one of the rolls is provided with projections for example in the form of studs and the other of the rolls has a yielding surface and preferably a resilient surface for engagement by the projections.

If desired the projections may themselves be yielding, in which case the resilient surface on the other of the rolls is no longer essential although it is still preferable.

The blanks may be supported during their travel through the roll nip upon parallel stationary support wires adjustable transversely of the rolls so as to enable projections at any point across the width to be used. However, a travelling support surface such as a plurality of endless belts may be employed.

Some of the projections are preferably carried on bars extending transversely of the roll pair, and parallel to the axes of the rolls, and mounted on endless chains, one chain being provided at each end of the roll pair. In this event the bar or one of the bars where a number is provided, may be provided with grippers arranged to perform a dual function; firstly the grippers may operate as stripping projections to strip that portion at the leading edge of the blank which is not required, and after such stripping to grip the edge of the required blank so as to draw the blank along the line of feed and deposit it upon stacking means.

To this end mechanism may be provided whereby a movable part of each gripper is held in an open position during the stripping action, and is then moved in the opposite direction to the feed of the blank so as to overlap the leading end of the useful portion of the blank before the gripper is closed to grip the blank.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a diagrammatic elevation of a machine embodying the invention;

FIG. 2 is an enlarged fragmentary sectional elevation of the machine;

FIG. 3 is a reduced scale plan on the line 3—3 FIG. 2;

FIG. 4 is a plan of a blank;

FIG. 5 shows a detail of a modification;

FIG. 6 is an elevation of another machine embodying the invention; and

FIGS. 7 and 8 are enlarged sectional fragmentary views of parts of the machine of FIG. 6.

Referring now to the drawings, and particularly FIG. 1 thereof, a combined stripper/stacker machine is provided with a pair of small diameter feed rolls **10** to deliver blanks from the cutter machine **11** into the nip between

the main stripper pairs **12, 13** and the feed rolls **10** are positioned as close to the stripper roll pair as is possible. Further feed rolls **14** are also provided. The stripper roll pair comprises a pair of rolls of substantial diameter so that the circumferential length of at least the upper roll **13** is equal to the feed length of the largest blank **16** envisaged, and the stripper rolls are staggered along the path of the blanks so that for example the plane P1 containing the axis of roll **12** and normal to the blank **16** is spaced from the like plane P2 containing the axis of the other roll **13.** Typically, the top roll of the pair is located some three or four inches forward of the lower roll of the pair.

Conveniently the lower support roll **12** of the pair is plain and its outer surface is provided with a blank **18** of yielding material for example polyurethane. The upper stripping roll may be provided with a forme **20** of sheet metal bolted or otherwise secured in position and provided on its surface with a pattern of studs **21** individually welded in place for example in the manner more particularly described and illustrated in my Pat. No. 3,479,-931.

As the leading end of a cut-out piece lying within the plane of the blank and contained within the periphery of the hole in the blank enters the nip, it is in timed relation to the arrival of one of the studs or stripping members **21** at the nip, this particular stud also being aligned across the roll with the blank. Hence, the stud contacts the piece near the plane P1, and as rotation continues, passes through the plane of the blank and displaces the leading end of the cut-out below the blank. A further stud **21** is arranged to contact the piece behind the first-mentioned stud **21,** before the said first-mentioned stud reaches the plane P2, and so on, so that each piece is contacted and displaced by two or more studs which lie in the nip, i.e. the space between planes P1 and P2 and hence the piece is firmly displaced out of the plane of the blank to fall below the blank.

If, instead of using planes P1 and P2, the two rolls were on a common plane, as is conventional, only one stud **21** could lie in the nip at any one instant.

The above description with reference to FIG. 1 explains the operation in general terms. FIGS. 2 and 3 disclose further details of a preferred embodiment, and the action may be further elucidated by reference to FIG. 2. This embodiment also utilises guide means for maintaining the blanks substantially in a planar path tangent to both of the spaced rolls **12, 13** and extending substantially beyond the rolls in the direction of feed. In this embodiment, guide means consist in support wires **30** which extend from clamp block **32,** behind the nip and over block **34** in front of the nip, to a tensioning shaft **36** below feed rolls **14.** Wires **30** (see FIG. 3) are parallel and serve to support the blank between the two sets of feed rolls.

Each wire has a nipple **37** located in a groove **38** in block **32,** allowing lateral adjustment, and block **34** is grooved at **39** to locate the adjusted wires. The latter also have nipples **41** at their other ends, and engaged in split rings **44** which can be clamped to the shaft **36** to tension the wires.

The wires are located at positions on the blank where no pieces are to be removed, so as to support the blank **16,** but if a piece to be removed extends unavoidably across the wires, the piece is cut along the lines of the wires in machine **11.** FIG. 4 illustrates the blank and also the positions **50** of the studs as they contact the latter during stripping. The lines of the wires are shown in FIG. 4 in chain dot lines at **52.** The required blank is shaded on FIG. 4, and the pieces to be removed are not shaded thereon.

In the detail modification shown in FIG. 5, the stud **211** is resilient, and comprises a headed portion **212** with the head trapped in a hollow end part **213,** and with a compression spring **214** interposed, so that the end face **215** can be deflected upwards. This may allow the stud as a whole to contract lengthwise in passing through the minimum nip zone, and then extend to push the unwanted piece out of the plane of the blank.

FIGS. 6 to 8 show a further machine in which the upper roll **100** is provided at at least one position with a groove or channel **101** extending across the width of the roll to accommodate a guide means consisting of a gripper bar **102** and the ends of the bar are secured to a pair of parallel roller chains **103** running on sprockets **104** or on other guides at the ends of the upper roll, and the chains extend forwardly in the direction of travel of the blanks towards the delivery end of the machine where they extend around further sprockets or guide means **105.**

The bar is provided with a series of grippers for example spaced at one inch or two inch intervals along its length, thus across the width of the roll. Each gripper comprises a fixed finger **110** and a movable finger **111** and the movable fingers are individually spring urged at **112** to an open position in which they lie spaced from the fixed fingers. Cam means are provided on a shaft **115** extending along the bar for angular turning movement so as to lift the finger against the springs, after the fingers have acted as stripper studs, and hold the pairs of fingers closed receiving the leading edge of a blank therebetween. The shaft is not only angularly movable but also rearwardly displaceable in direction B, FIGS. 6 and 7 so as to displace the movable fingers between the first position displaced relative to the fixed fingers, and a second position substantially overlying the fixed fingers.

Means are provided for example in the form of cam plates **120** fixed relative to the roll pair for tripping the mechanism so as to cause the movement of the movable fingers so as to grip a blank edge located therebetween, when located appropriately at the nip, and open them later.

The operation of this portion of the machine is that as the blanks are fed in timed relation into the nip, the bar enters the nip in the FIG. 7 position so that the movable fingers held in a first position engage the portion of the blank extending across the width of the blank, and which is to be removed as scrap, so as to displace that portion through the plane of the blank relative to the guide wires or guide supports and hence effect stripping, the stripped portion being allowed to fall or being extracted by suction means located immediately forwards of the nip.

After the first stripping has been effected by the fingers, the movable fingers lie immediately in front of the edge of the blank, and the mechanism is tripped or operated to displace the movable fingers rearwardly and then upwardly to the FIG. 8 position so that the leading edge of the blank is gripped thereby and as the bar complete with grippers leaves the roll pair and travels on the chains towards the delivery end of the machine the blank is drawn thereby along its feed path.

The subsequent projections or studs carried on the forme individually engage with pieces to be cut out or removed and strip them as previously described.

With cut-outs of any substantial size it will be possible to arrange pairs of projections so that each piece is held down by at least three or preferably four such projections and it is envisaged that efficient and thorough stripping will be effected thereby.

Such stripped pieces will be allowed to fall or be removed by extraction means as previously mentioned.

The mechanism thus so far described may be adapted for double feed, that is utilising successive 180° portions of the roll each for treating alternate blanks, by providing a further groove or channel for a further gfripper bar, and if desired more than one such further groove and gripper bar.

At the delivery end of the stripper mechanism previously described, the blanks will be released by the gripper means by mechanism provided at or in the vicinity of the sprockets or guide means remote from the roll pair or, in the case of the illustrated mechanism, the movement of the bar past the end of the cam plates **120** will

allow the springs **112** to re-open the fingers, and the released blanks may be dropped on to a stack forming table **140** which may be lowered from time to time as the blank stack builds up and any conventional intermittently operable release gates including adjustably positioned gates may be provided where the table has a conveyor for carrying the batches away.

Alternately the blanks may be dropped on for example a transversely extending table or conveyor for batch forming.

It is believed that the use of grippers to deliver blanks may facilitate forming batches in which the individual blanks are accurately aligned with one another.

I claim:

1. Apparatus for stripping waste from cardboard and like blanks, comprising a horizontal stripper roll having a plurality of stripping members projecting therefrom, guide means for maintaining the blanks substantially in a horizontal planar path that is tangent to the bottom of the stripper roll and extends substantially beyond the stripper roll in the direction of feed, wherein the improvement comprises a support roll which is located below such planar path and is tangent to such planar path along a line that is located substantially in advance of the line of tangency of the stripper roll to such planar path, so that the support roll assists in maintaining the blanks tangent to the stripper roll while permitting the stripping members to project freely through the planar path of blanks beyond the support roll in order to displace the waste away from the stripper roll and completely out of such planar path.

2. Apparatus according to claim **1** wherein the guide means for maintaining the blanks substantially in a planar path comprises support wires extending between the rolls.

3. Apparatus according to claim **1** wherein the guide means for maintaining the blanks substantially in a planar path comprises grippers carried on chains extending around one roll and arranged to draw blanks between and beyond the rolls along such planar path.

4. Apparatus according to claim **1** wherein the two rolls are of different diameters.

5. Apparatus according to claim **4** wherein the larger roll carries a sheet metal forme with a pattern of stripping members.

6. Apparatus according to claim **5** wherein the smaller roll has a plain outer surface of yielding material.

7. Apparatus according to claim **6** wherein the stripping members are resiliently contractible studs.

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WILLIAM S. LAWSON, Primary Examiner

U.S. Cl. X.R.

93—36