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(54) **Apparatus for rotary die-cutting and stripping.**

(57) The invention provides for cardboard scrap cut from a travelling blank (34) or web to be impaled on a spike (20,22,24) carried by one roll (12), with an ejector plate (26) pivoted adjacent to that spike and cam operated so as to positively eject the scrap pieve from the spike at an angular position remote from the impaling position. Figure 1 shows the spike and plate ready to receive the scrap.

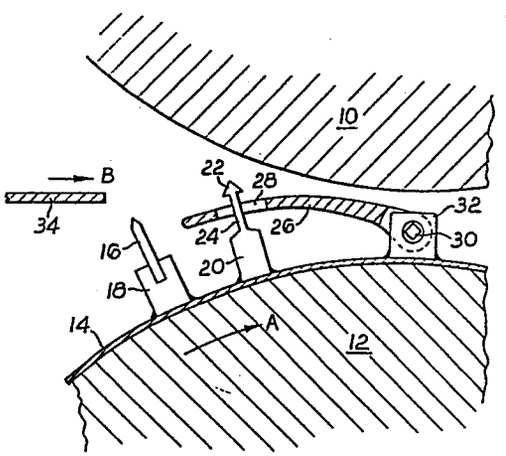

Fig. 1

EP 0 132 938 A1

DESCRIPTION

APPARATUS FOR ROTARY DIE-CUTTING AND STRIPPING

This invention relates to rotary die-cutting of card and like material from blanks or web. This die-cutting is used for example to produce blanks of complex shape which can be erected into cartons or boxes. A carton may have a base, sides and a lid, with flaps to interconnect the parts, and all the rest of the blank (or web portion) is scrap.

There is an inherent difficulty in dealing with the scrap. If the cut between the required material and the scrap material is continuous and complete, the scrap may almost immediately separate from the required blank and it may get into an undesired position. If the blank is to be printed subsequently, it may prevent the ink reaching the blank. If the blanks are stacked and some kind of feed mechanism moves the blanks one by one from the stack, it may be a piece of scrap which is fed instead of a blank. And so on.

On the other hand, if the cut is discontinuous so that the scrap is still connected to the blank at a number of points after the die-cutting, to keep the two parts together until a deliberate stripping operation is carried out to perform the separation, the act of separation becomes that more difficult. The more positive the connection between the parts so as to reduce the chance of premature separation, the more difficulty there is in the separating step.

Quite different problems are involved in dealing with scrap at different parts of the blank. The

object of the present invention is to provide improved means for dealing with the scrap capable of utilisation at different parts of the blank.

In accordance with the invention a rotary die-cutter comprises a roll pair and a stripping mechanism comprises a headed spike mounted on one roll of the pair and for impaling scrap, an ejector plate normally located between the head of the spike and the roll which supports the spike, the plate being associated with the spike and extending at least on two opposite lateral sides of the spike, and means for displacing the plate in the direction of the length of the spike so as to lift the scrap from impalement when so moved at a point displaced from the rolls nip.

Preferably the spike is mounted on the roll which carries the cutting knives. Preferably also the cutting knives are held to a forme mounted on the roll and the spike is mounted on the same forme closely adjacent to the knife. The knife may be arranged to cut onto a yielding anvil which may also serve to cause the scrap to be impaled by the spike, or alternatively the impression roll (the anvil) may have a hole to receive the spike to the same purpose.

The ejector plate may be mounted on a rod extending parallel to the roll surface and associated with lever means, for example cam operated, to cause it to be displaced in one or both directions. Where cam displaced in one direction, the plate may be spring displaced in the opposite direction.

The invention is more particularly described with reference to the accompanying drawing wherein:

Figure 1 is a fragmentary sectional elevation showing parts of a roll pair with a rotary die-cutter and stripper;

Figure 2 is a view similar to Figure 1 but showing the lower roll 12 in an angularly displaced position and with impaled scrap; and

Figure 3 is a view similar to Figure 2 but further angularly displaced and showing the scrap ejected.

Referring now to Figure 1 of the drawing, the upper roll 10 is provided with a yielding surface to act as an anvil, and the lower roll 12 carries a sheet metal forme 14 on its surface. The forme carries a pattern of cutting rule 16 held in place by studs 18 welded to the forme. The general construction and arrangement of forme with various kinds of studs is explained in our previous patent No. GB-1074291-A.

The rule is also provided with a number of stripping studs 20 each having a head 22 and a reduced dimension shank 24, and such stripping studs (as explained in said previous patent) are intended to impale the scrap and carry it about the axis of the roll for removal at an angularly spaced location. The problem is similar to that in connection with the actual severance of the scrap portion from the remaining portion as explained hereinbefore, in that the better is impaled on the spike 20 22 24, the more difficult it is to remove at the angularly spaced location. The present invention solves this problem by using the ejector plate such as 26 in the accompanying drawing.

The plate is normally located between the blank and the roll and may be apertured so that

the stripping spike extends through the aperture 28. The plate is fast with a shaft 30 journalled in further studs 32 welded to the forme. The shaft 30 can be turned angularly by means not shown in the figure so as to displace the plate clockwise and hence lift an impaled piece of scrap off the spike, allowing it to fall or be drawn by an air current for safe removal at a position well clear of the plane of the blank.

The figure shows the leading edge of the blank 34 approaching the nip travelling in the direction of the arrow B, but it shows it spaced from what would be its normal true position in relation to the rule 16 and spike, in the interests of clarity in the drawing.

Figure 2 shows the position after the nip (it is assumed that the roll is travelling in the direction of the arrow A in the figures) when a scrap piece 36 is impaled on the spike having been cut-off by the pattern of rule embedding on the impression roll 10, and impaled by the spike 22 also embedding in the surface of the roll 10 or perhaps engaging in an appropriate aperture provided in the surface for the purpose. It will be noted that the plates 26 is located between the scrap 36 and the forme 14.

The shaft 30 can be provided with a square end connected by a lever or link to a cam follower running in a simple cam track on the cylinder end, so that at a position further angularly displaced and preferably more than 90° spaced from the roll nip as illustrated in Figure 3, the shaft is turned angularly to displace scrap off the spike. At a further angularly spaced position (not shown) the

ejector plate is returned to the illustrated position in the drawing. However, the cam may be used for the ejection movement and spring return provided, or vice versa, as an alternative to using cam movement in both directions.

It will be appreciated that a plurality of plates will be provided at different locations to engage different areas of scrap. Various alternatives will now be described.

Where front edge stripping is involved, that is to say a strip along the leading edge of the blank or web is to be cut off, there may be a plurality of plates 26 mounted on a common shaft 30, all of the plates having the same length, and all engaging with the common scrap piece at regular intervals along its length parallel to the axis of the roll. This may be considered to be the simplest case.

In a more complex case, the leading edge is not straight but may comprise a series of straight portions lying on two or more parallel lines and connected by slots extending along the length of the blank, that is in the direction of the arrow B. In this case a series of plates 26 may be made of different lengths, but all be operated by the same shaft. Alternatively, two or more shafts may be provided at different angular locations each carrying its own set of plates to engage against the scrap at different positions.

The most difficult situation with leading edge scrap may be where "dead lay" cutting is involved, that is to say the front edge of the blank is not cut over the whole of its width, but there are merely a series of slot-like parts cut from the leading

edge, and in this case a separate plate may be provided for each such part.

Side edge scrap may be treated in generally the same way, possibly using relatively short shafts similar to 30 extending inwardly from opposite end portions of the roll towards the laterally located cutting edges provided on the roll.

In the case of trailing edge scrap, it may be required to mount the plates 26 in generally mirror image fashion, which may necessitate a separate cam track, and in this case it may be convenient to have one cam track at each end of the roll, one operating the plates which are turned clockwise for ejection, the other operating plates which are turned anticlockwise for ejection.

The invention can also be used to deal with what might be called internal scrap: that is to say hand-holes and the like which are located within the area of the blank rather than scrap portions located exterior to the area of the blank. In this case, it may be necessary for the equivalent of the shaft 30 to extend across the line of the rule, and the rule may bridge between a pair of studs so as to have a clearance between the inner and non-cutting edge of the rule and the adjacent area of the sheet metal forme to allow the shaft to pass through, or alternatively where the shaft extends parallel to the rule, to allow the plate 26 to pass below the rule into the hand-hole or like area. In another possibility the stud combines the features of the ones 18 and 32.

One of the particularly advantages of the present

invention is that each individual forme made to produce a particular shaped and sized blank requires a particular stripping pattern, and effectively the stripping may be built into the same forme, and attached to the die-cutting machine and removed from the same with the forme when the present invention is used. This is in distinction from other known stripping arrangements where after attaching a forme for a particular blank it is necessary to make adjustments to existing stripping apparatus to make it match the forme, and hence the invention provides particularly quick setting up times.

A very important advantage of the invention is that an area designated as scrap is impaled and fixed in position before it is cut out of the blank. Thus, any scrap piece must include a cut line behind the spike 22, for example cut by rule 16 in Figure 1. Consequently the cut around the scrap piece can be continuous and complete.

CLAIMS

1. A rotary die-cutter comprising a roll bar and a stripping mechanism including a headed spike mounted on one roll of the pair for impaling scrap, characterised in that an ejector plate is provided having a portion normally located between the head of the spike and the roll which supports the spike, the plate being associated with the spike and extending at least on two opposite lateral sides of the spike, and means being provided for displacing a plate in the direction of the length of the spike so as to lift the scrap from impalement when so moved at a point displaced from the nip of the roll.

2. A rotary die-cutter as claimed in Claim 1 comprising a pattern of cutting knives held to a forme mounted on the roll with the spike mounted on the same forme, and characterised in that the plate is mounted on said forme.

3. A rotary die-cutter as claimed in Claim 1 or Claim 2 wherein the ejector plate is mounted on a rod extending parallel to the roll surface and associated with lever means to cause it to be displaced in at least one direction.

4. A rotary die-cutter as claimed in Claim 3 wherein the rod is cam displaced in one direction and spring returned.

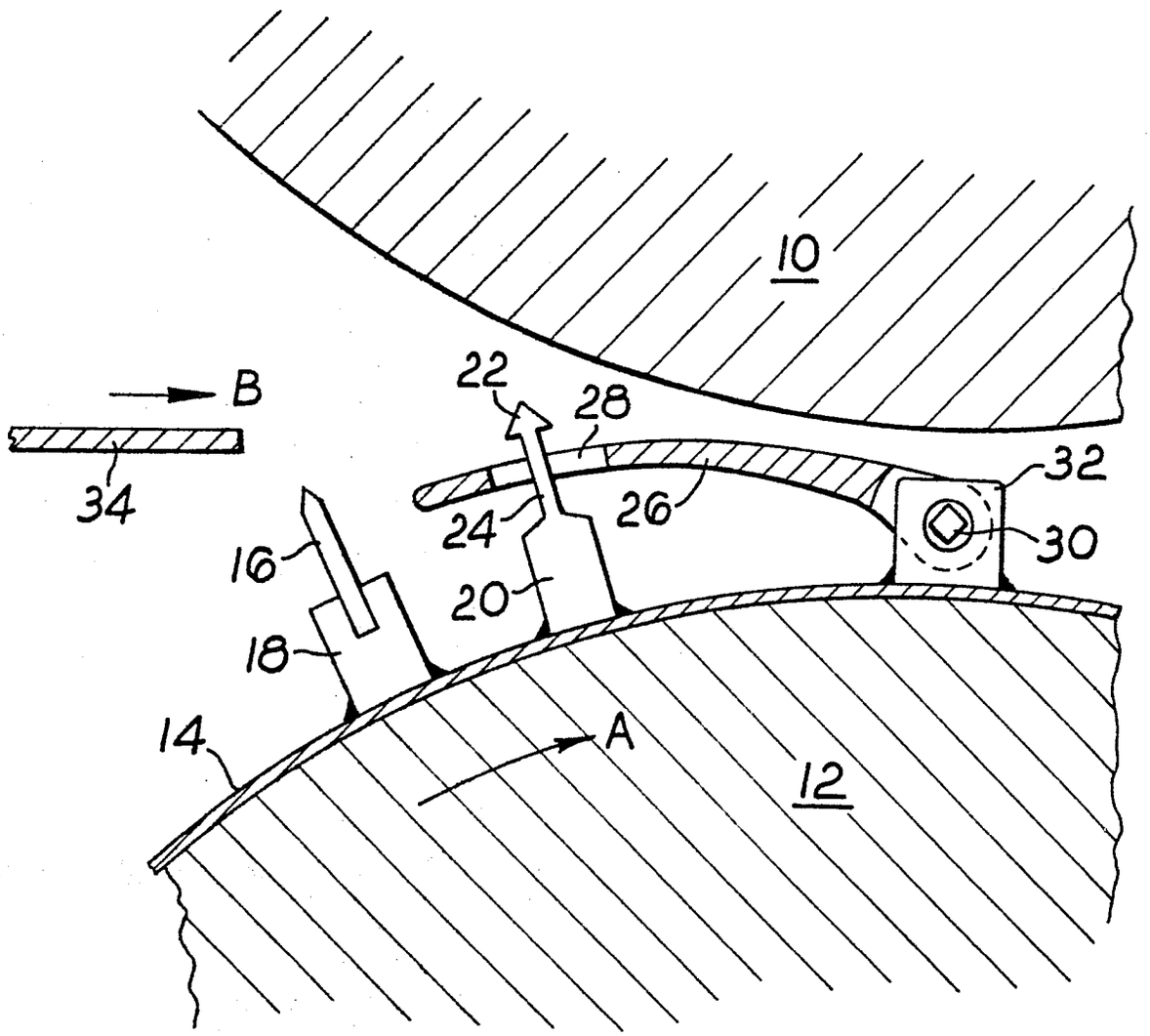

Fig. 1

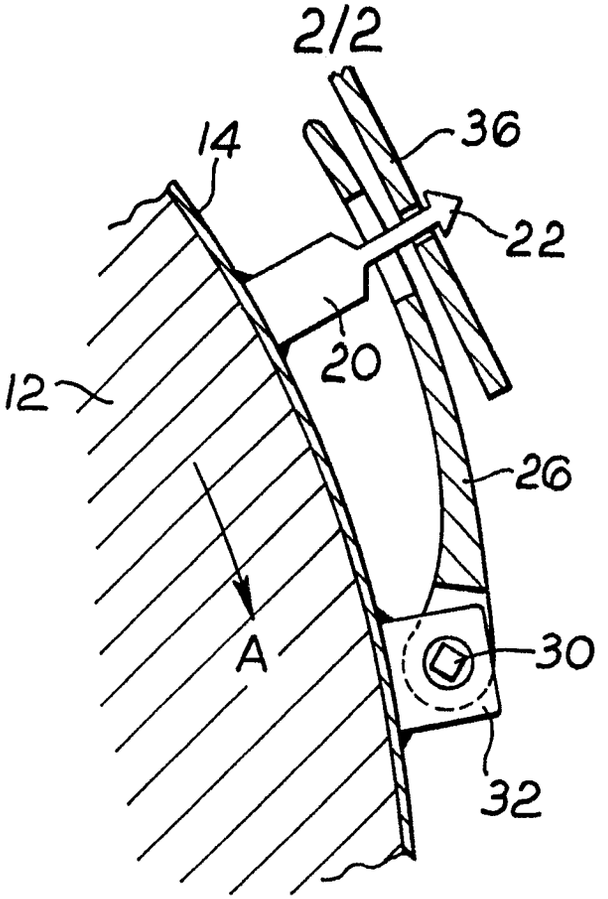

Fig. 2

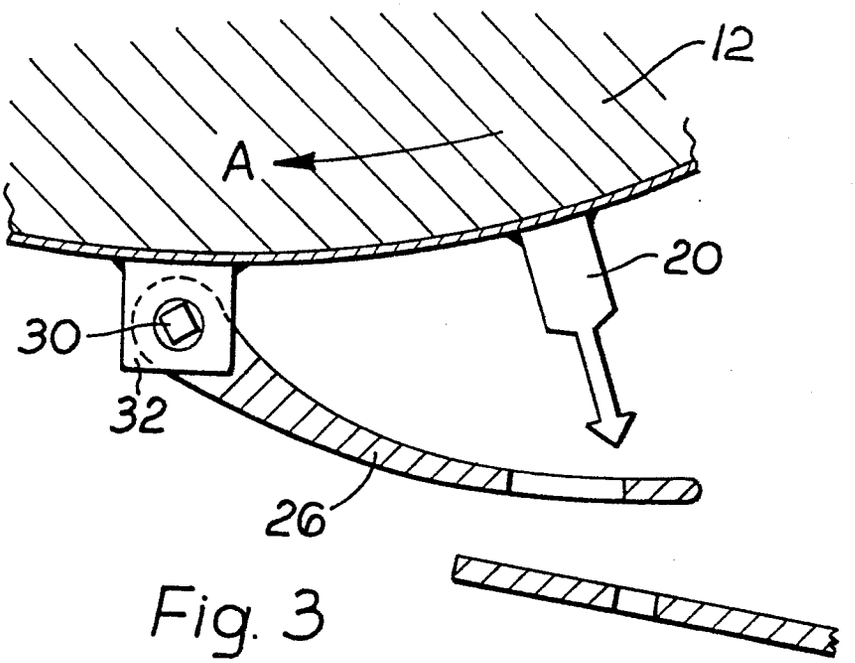

Fig. 3

European Patent Office

EUROPEAN SEARCH REPORT

0122838

Application number

EP 84303821.7

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int Cl 4)
X	DE - A1 - 3 045 095 (THE WARD MACH.COMP.) * Fig. 4,5; pages 1,2,14,15 * --	1-4	B 31 B 1/14 B 26 D 7/18
A	US - A - 4 331 053 (IMAI et al.) * Abstract; fig. 2,4 * --	1	
D,A	GB - A - 1 074 291 (THE DERI TEND ENG. COMP. LIM.) ----		

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

B 31 B
B 26 D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	09-10-1984	HABART

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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