Sept. 8, 1964 H. S. BOYD 3,147,658

APPARATUS FOR PERFORATING SHEETS

Filed Nov. 29, 1961

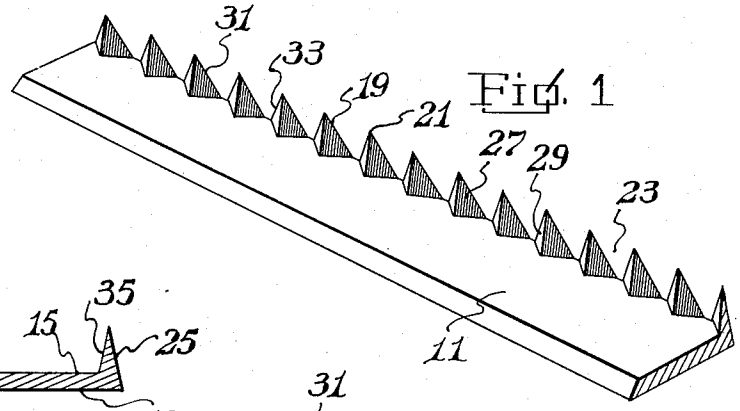


Fig. 1

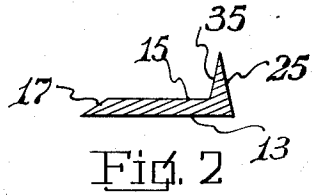
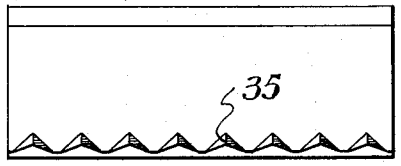


Fig. 2

Fig. 3



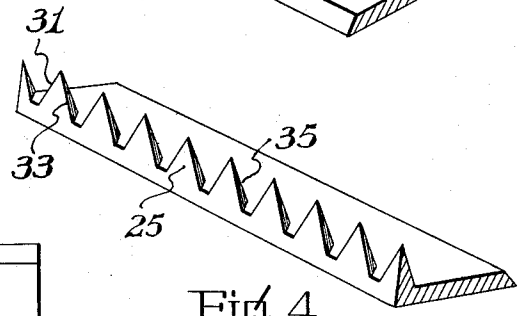


Fig. 4

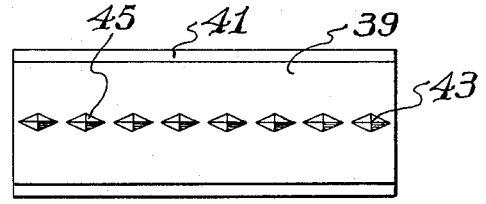


Fig. 7

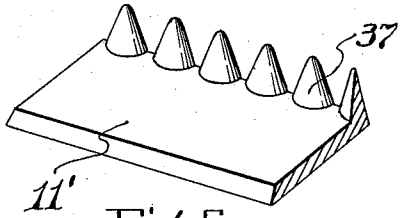


Fig. 5

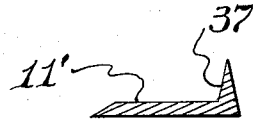


Fig. 6

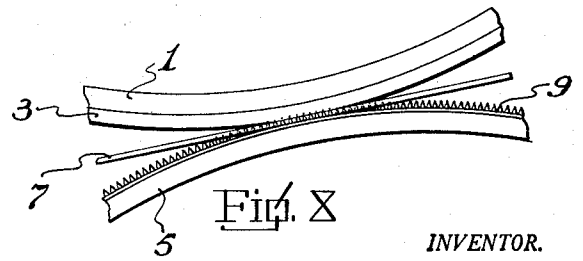


Fig. 8

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APPARATUS FOR PERFORATING SHEETS

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2 Claims. (Cl. 83—347)

The present invention relates to apparatus for perforating sheets, more particularly by means of a thin perforating strip attached to the cylinder of a rotary printing machine or the like.

The present invention is an improvement over my invention set forth in United States Patent No. 2,842,202, July 8, 1958.

Although the invention of my above-identified earlier patent is a great improvement over the prior art, it nevertheless suffers from the disadvantage that the paper bridges between perforations sometimes tend to become packed between the teeth of the cutting strip. Also, when my earlier perforating strip was used to cut against a backing such as a rubber blanket on the platen of a printing machine, there was some tendency to carry loose paper fibers into the blanket where they became embedded and built up into lumps.

Accordingly, it is an object of the present invention to provide apparatus for perforating sheets, in which the bridges between perforations do not become jammed in the apparatus.

Another object of the present invention is the provision of apparatus for perforating sheets, in which paper fibers are not forced into the backup member.

Finally, it is an object of the present invention to provide apparatus for perforating sheets, which will be relatively simple and inexpensive to manufacture, easy to install and to clean and maintain, and rugged and durable in use.

Other objects and advantages of the present invention will become apparent from a consideration of the following description, taken in connection with the accompanying drawing, in which:

FIGURE 1 is a perspective view of a length of a perforating strip according to the present invention;

FIGURE 2 is a transverse cross-sectional view of the perforating strip of FIGURE 1;

FIGURE 3 is a plan view of the strip of FIGURE 1;

FIGURE 4 is a fragmentary perspective view of the other side of FIGURE 1;

FIGURE 5 is a view similar to FIGURE 1 but showing a modified form of the present invention;

FIGURE 6 is a transverse cross-sectional view of the structure of FIGURE 5;

FIGURE 7 is a view similar to FIGURE 3 but showing a still further modified form of the present invention; and

FIGURE 8 is a fragmentary elevational view of a perforating strip in its operative environment of the present invention.

Referring now to the drawings in greater detail, and first to the over-all combination of the invention shown in FIGURE 8, a cylindrical platen 1 of the usual lithographic rotary press carries an elastic deformable blanket 3 of rubber or the like which bears against and coacts with the usual rotatable impression cylinder 5 thereby to imprint a sheet 7 of paper or cardboard or the like.

A perforating strip 9 according to the present invention is provided which is secured as by gluing or the like to the periphery of cylinder 5. Strip 9 is of thin relatively flexible but resilient metal, and is bent about cylinder 5 in a circle that is coaxial with cylinder 5. Strip 9 is characterized by a thin flat base portion 11 which in its unbent condition is characterized by flat parallel closely spaced under surfaces 13 and upper surfaces 15. Under surface 13 is secured in area contact with the exposed

surface of cylinder 5 when strip 9 is bent about cylinder 5. Surfaces 13 and 15 are interconnected along one edge of strip 9 by a diagonal bevel 17 that defines an oblique angle with upper surface 15 and thereby avoids any sharp edges along that side of strip 9.

Strip 9 has a multiplicity of teeth 19 upstanding from the side edge thereof opposite bevel 17. Teeth 19 terminate outward in points 21 which are spaced apart by gaps 23. Points 21 are in alignment with each other in the unstressed condition of strip 9 and in any event are parallel to base portion 11 and to the length of strip 9. Teeth 19 are generally pyramidal and are defined on three sides by surfaces 25, 27 and 29. Surfaces 25 are in the form of a single uniplanar surface at an acute angle to flat base portion 11 and extending from under surface 13 to points 21. When strip 9 is disposed in circular fashion about a cylinder as in FIGURE 8, surfaces 25 define a single truncated conical surface. Surfaces 27 and 29 are flat, all surfaces 27 being parallel to each other and all surfaces 29 being parallel to each other. All of surfaces 25, 27 and 29 are disposed at acute angles to that plane which includes points 21 and is perpendicular to flat base portion 11. This last-mentioned plane is the only plane which is common to all points 21 when strip 9 is disposed as in FIGURE 8. Surfaces 25, 27 and 29 thus form dihedrals with each other, surfaces 25 and 27 forming sharp straight edges 31, surfaces 25 and 29 forming sharp straight edges 33, and surfaces 27 and 29 forming sharp straight edges 35. Edges 31 and 33 are in the plane of surface 25 and are thus coplanar in the unbent condition of strip 9. Edges 35 lay in those planes which are perpendicular both to flat base portion 11 and to the length of strip 9. These are the same planes that include the axis of the cylinder and points 21 when strip 9 is disposed in the fashion of FIGURE 8. Thus teeth 19 have sides 25, 27 and 29 of which substantially all lines normal to these sides are disposed at substantial angles to the plane which is perpendicular to flat base portion 11 and which includes points 21, that is, the plane of points 21 when strip 9 is disposed as in FIGURE 8. For example, in the case of surfaces 25, which are inclined perhaps about 15° from the vertical, the normals to these surfaces are at an angle of about 75° to that plane. Similarly, the normals to surfaces 27 and 29 are at substantial angles to that plane.

The strip thus far described may for example be made by the method of my copending application Serial No. 155,638, filed November 29, 1961, and entitled "Method for Making Perforating Strips."

A modified form of the present invention is shown in FIGURES 5 and 6, which is like the embodiment of FIGURES 1–4 except that the teeth are provided with rounded surfaces 37 of generally conical configuration. This is merely an alternative configuration of the teeth that replaces surfaces 27 and 29 with arcuate surfaces. Although these arcuate surfaces do not lie in individual planes as do surfaces 27 and 29, they nevertheless perform essentially the same function in that the normals to these arcuate surfaces are substantially all angularly related to that vertical plane which includes the points of the teeth as described above.

Still another form of the present invention is shown in FIGURE 7. In FIGURE 7, a perforating strip 39 of modified construction is shown, which has bevels 41 along both side edges thereof, the teeth 43 being centrally disposed along the longitudinal center line of the strip. Teeth 43 have surfaces 45 the normals to which are disposed at substantial angles to the plane which includes the points of teeth 43 and which is perpendicular to the plane of strip 39, these surfaces 45 being disposed on both sides of the teeth. The embodiment of FIGURE 7 is particularly useful when perforating a heavy material such

as cardboard, for the extent of strip 39 on both sides of teeth 43 prevents the strip from tipping over when acting on tough or heavy material.

In all the embodiments described thus far, it will be noted that the sides of the teeth are so angularly related to each other that they do not tend to press the bridges between perforations between the teeth when the teeth penetrate the material to be perforated. Instead, the sides of the teeth direct the material of the sheet adjacent the bridges to one side or the other but do not mash it together in that vertical plane that includes the points of the teeth.

It has also been found that the provision of sharp points on the teeth, as distinguished from straight edges or the like, greatly reduces the tendency of the teeth to carry fibers of the sheet with them and to force those fibers into the rubber blanket where they become embedded and build up accumulations of the fiber.

From a consideration of the foregoing disclosure, it will be obvious that all the initially recited objects of the present invention have been achieved.

Although the present invention has been described and illustrated in connection with preferred embodiments, it is understood that modifications and variations may be resorted to without departing from the spirit of the invention, as those skilled in this art will readily understand. Such modifications and variations are considered to be within the purview and scope of the present invention as defined by the appended claims.

What is claimed is:

1. Apparatus for perforating sheets, comprising a cylinder rotatable about its axis, a platen having an elastic deformable surface against which the cylinder bears, and an elongated perforating strip secured about at least a portion of the periphery of the cylinder, the strip comprising a thin flat base portion and a multiplicity of teeth upstanding from the base portion and extending lengthwise of the strip and pressing against and elastically deforming said platen surface, the teeth being pointed and the points being spaced apart and disposed in a circular line parallel to the length of the strip, said circular line lying in a plane perpendicular to the axis of the cylinder, all of the sides of the teeth being so disposed that substantially all lines normal to the sides are disposed at substantial angles to said plane.

2. Apparatus as claimed in claim 1, the teeth being spaced apart from each other at their bases.

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