July 1, 1952 B. HIRSZSON 2,601,853

METHOD OF REINFORCING PERFORATED SHEETS

Filed Nov. 2, 1948

Fig. 1.

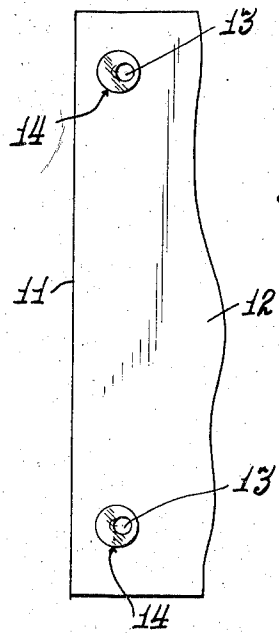



Fig. 2.

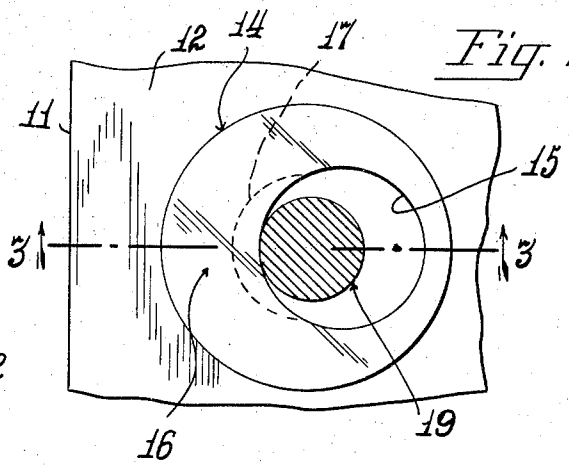



Fig. 3.

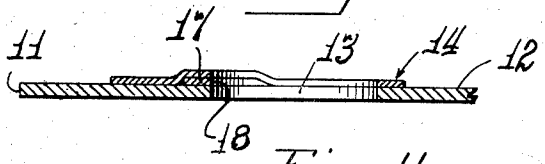



Fig. 4

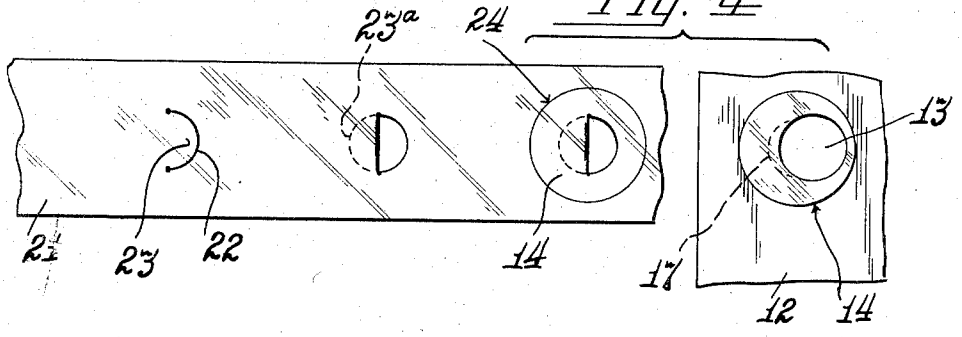
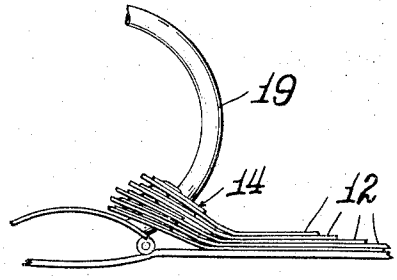



Fig. 5.



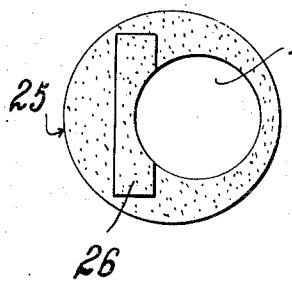




Fig. 6.

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## METHOD OF REINFORCING PERFORATED SHEETS

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Application November 2, 1948, Serial No. 57,993

4 Claims. (Cl. 129—1)

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The invention relates to a method of and means for reinforcing perforated sheets and is more particularly concerned with a novelly formed reinforcing patch adapted to be arranged on a sheet for reinforcing a perforation therein.

Sheets of paper frequently have holes punched along one edge, adapting the sheets to be mounted and bound in loose-leaf ring binders. Owing to the close proximity of the holes to one edge of the sheet, it frequently happens that the sheet is inadvertently torn out of the binder. Unintentional tearing has been minimized by providing each hole with a reinforcement in the form of a patch or ring of a kind shown and described in my co-pending application, Serial No. 51,786, filed September 29, 1948, now abandoned. The reinforcing element disclosed therein is fabricated from two thicknesses of adhesive-coated tape, securely joined together adhesively.

Reinforcement of sheets having perforations adjacent an edge thereof by the application of a reinforcing patch or ring of double material thickness requires the use of an excessive amount of material. It has been found that strain, resulting in tearing out the holes, is applied to but a small segment of the inside perimeter of the reinforcing patch; consequently, no useful purpose is served by providing a patch of double material thickness throughout its entire area. Sheets of paper having their perforations reinforced by patches of double thickness also tend to build up the thickness of a stack of sheets along the perforated edge when such sheets are bound in a loose-leaf ring binder. This building up of the thickness of the stack edge is objectionable only because the free portions of the sheets extending outwardly from the ring binder lie at an incline, which, in some cases, is so pronounced as to materially interfere with the practical use of the sheet area adjacent the binder rings. It is therefore an object of the present invention to provide a reinforcing patch or ring of a kind that will minimize the objectionable tendency of the sheets to build up excessive thickness in the area of the binder rings.

Another object of the invention is to provide a reinforcing patch of a kind having added reinforcement only in the area of greatest stress.

Another object of the invention is to provide a double strength reinforcing patch from a minimum amount of stock.

Another object of the invention is to provide a reinforcing patch of the character referred to with an eccentric hole therein.

Another object is to provide a transparent

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flexible patch having reinforcement in a critical area thereof.

Another object is to provide a ring-like adhesive-coated patch having added reinforcement in an area contiguous with a segment of the perimeter of its inside diameter.

Other and further objects of the present invention will be apparent from the following description and claims, and are illustrated in the accompanying drawing which, by way of illustration, shows an exemplary embodiment and the principles thereof. Other embodiments of the invention embodying the same principles may be used, and structural changes may be made as desired by those skilled in the art, without departing from the present invention and the purview of the appended claims.

In the drawing:

Fig. 1 is a view showing a fragment of a sheet having reinforcing rings embodying the present invention attached to one face thereof adjacent to one of its edges.

Fig. 2 is an enlarged plan view of a fragment of a sheet having a reinforcing patch thereon, showing a binder ring associated therewith.

Fig. 3 is a transverse sectional detail view taken substantially on line 3—3 of Fig. 2.

Fig. 4 is a view showing the steps taken in the method of forming and attaching a reinforcing patch.

Fig. 5 is a fragmentary end elevational view of a ring binder showing a stack of reinforced sheets mounted therein.

Fig. 6 is a view of a modified form of reinforcing patch, as viewed from its adhesive-coated surface.

Referring to the drawing in detail, Figs. 1, 2 and 3 illustrate the location of reinforcing pieces or patches, embodying the present invention, with relation to the edge 11 of a sheet of paper or the like 12. The sheet is provided in the present disclosure with two perforations 13 closely adjacent to the edge 11, each adapted to receive a ring of a loose-leaf binder when the sheet is bound. Owing to the close proximity of the holes 13 to the edge 11, a non-reinforced sheet is likely to be easily torn out of the binder; consequently, novel reinforcing patches of the kind generally indicated at 14 are applied to at least one face of said sheet in the area of and surrounding each hole 13.

In the present disclosure, the reinforcing pieces or patches 14 are severed from pressure-sensitive adhesive-coated cellophane sheets or strips, or like transparent tapes of a kind commonly

known as "Scotch" tape. Although other types of adhesive-coated tape may be used, cellophane material is highly suited for the present purpose owing to its transparency and flexibility. It has been found, however, that reinforcing pieces or patches consisting of a single thickness of such tape do not afford the desired reinforcement for the holes 13. As noted hereinabove, reinforcing pieces or patches consisting of two material thicknesses are objectionable from the standpoint of material required and subsequent excessive building up of the bound edges of a stack of such reinforced sheets.

The reinforcing pieces or patches 14 preferably are formed circular in outline, although it should be understood that they may be rectangular, square, or of any other configuration. Each reinforcing piece 14 is provided with a hole 15, formed in a manner to be described hereinafter, which hole preferably is eccentric to the perimeter of the patch so as to provide a relatively wide area 16 to be arranged in the area of the sheet between the perforation 13 and the edge 11. This disposition of the wide patch area 16 affords maximum reinforcement to the perforation obtainable from a single material thickness.

Mere reinforcement, even by a wide area of the patch obtained by the use of but a single material thickness, is not entirely satisfactory. Accordingly, means is provided to further reinforce the area 16. Such additional reinforcement is provided in the form of a crescent-shaped piece of adhesive-coated material 17, which has its inner edge 18 coincident with the perimeter of the hole 15. Upon referring to Fig. 2, it should be readily apparent that the sheet 11 is adequately reinforced in the area of greatest tearing stress by two thicknesses of material, and that remaining portion of the patch surrounding the hole is of single material thickness. Accordingly, any stress applied to the double reinforced segment of the hole perimeter 15 by the binder ring 19 is resisted.

Double reinforcement in the critical area only of the sheet also affords means whereby the sheets lie substantially flat when bound in a stack. Reference is accordingly directed to the Fig. 5 disclosure, where it is apparent that the build-up of a stack of sheets resulting from the presence of two material thicknesses of reinforcing material in a predetermined and limited area thereof occurs only in the sheet area located inside of the binder ring 19. Each sheet of the stack slopes downwardly at an accelerated angle because there is but a single thickness of reinforcing material in the areas adjacent the outside of the ring binder 19. Accordingly, the sheets in the stack lie substantially flat.

The reinforcing patches 14 preferably are fabricated from a strip of adhesive-coated material in such manner that the additional reinforcing piece is affixed thereto during the fabrication thereof and from portions of said strip which otherwise would constitute waste material. A preferred method of fabrication is best illustrated in Fig. 4. As there shown, the strip of pressure-sensitive adhesive-coated material 21 is initially die-cut to provide a semicircular slit 22. The tab 23 defined by the semi-circular slit 22 then is folded downwardly, out of the plane of the strip, and over against the adhesive-coated bottom face of said strip, as at 23*a*.

The next step in fabrication of the patch consists of die-cutting or otherwise severing the circular patch 14 from the strip, as generally indicated at 24 in Fig. 4. The severed patch then



is affixed, with its adhesive-coated surface disposed downwardly, to the sheet 11. A punch is then operated to perforate the hole 13 in the patch 14 and sheet 11. It should be observed that the hole 13 is eccentric of the perimeter of the patch in a direction away from the tab 23 and that it is of such diameter as to remove a greater portion of said folded-over tab. The removed portion of the tab 23 includes the area at the fold thereof, so as to leave affixed, between the patch 14 and the sheet 11, the crescent-shaped reinforcement 17.

Although a specific method of fabrication and the selected steps taken in such fabrication have been recited in detail, it should be understood that the final operations of severing the patch from the strip and the punching of the hole 13 may be accomplished in a sequence other than that recited. It has, however, been found that the sequence of steps herein recited is best suited to the purposes of the present invention and may be accomplished readily by the employment of a severing, attaching and perforating tool of the kind shown in my aforesaid co-pending application, Serial No. 51,786.

The patch 25 illustrated in Fig. 6 is somewhat like the patch previously described. In this disclosure, the patch is provided with an eccentric hole 13, suitably reinforced over a part of its perimeter by a strip 26 adhesively secured to the pressure-sensitive adhesive-coated surface of the patch material. The strip 26 may be fabricated from waste material remaining after the patches 25 have been removed from the supply tape; or the strips may be severed from a separate supply tape, either adhesive coated or uncoated, having a width corresponding substantially to the width of the strip 26. The strip 26 is, of course, affixed to the patch 25 prior to punching the hole 13 so as to provide an edge coincident with a segment of the hole perimeter.

Although exemplary embodiments of the present invention have been disclosed in the accompanying drawing and described in detail in the accompanying specification, it should be understood that the invention is capable of embodying a variety of modifications without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. The method of preforming and reinforcing a hole in a sheet which consists of cutting a tab in a strip of adhesive-coated material, folding said tab over against the adhesive-coated face of said strip, severing a patch from the section of the strip having the folded tab therein, adhesively securing the severed patch to a sheet and finally punching a hole in the sheet and patch so as to remove a substantial portion of the tab.

2. The method of preforming and reinforcing a hole in a sheet which consists of cutting a tab in a strip of adhesive-coated material, folding said tab over against the adhesive-coated face of said strip, severing a patch from the section of the strip having the folded tab therein, adhesively securing the severed patch to a sheet and finally punching a hole in the sheet and patch so as to remove a substantial portion of the tab, including the fold connection with the patch.

3. The method of preforming and reinforcing a hole in a sheet which consists of cutting a tab in a strip of adhesive-coated material, folding said tab over against the adhesive-coated face of said strip, severing a patch from the section of the strip having the folded tab therein, pressing

the adhesive-coated face of the patch against a sheet to secure it thereto, and finally punching a hole in the sheet and patch so as to remove a substantial portion of the tab.

4. The method of fabricating a reinforcing patch which consists of cutting a tab in a strip having a pressure-sensitive adhesive on one face, folding the tab over against the adhesive-coated face of said strip, severing a patch from the section of the strip having the folded tab therein and finally punching a hole in said patch so as to remove a substantial portion of the tab.

BENIAMIN HIRSZSON.




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