Dec. 5, 1967 L. L. KRASNOW ET AL 3,356,067

DOCTOR BLADES HAVING RELIEVED ENDS

Filed Sept. 14, 1966

Fig. 1

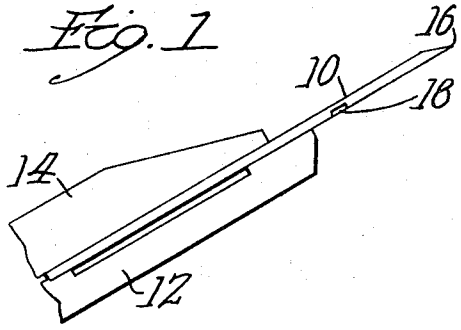


Fig. 2

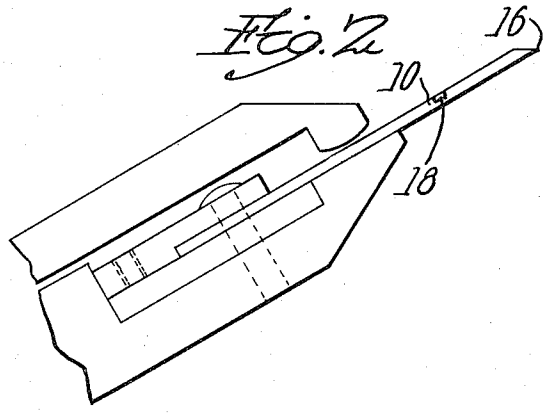


Fig. 3

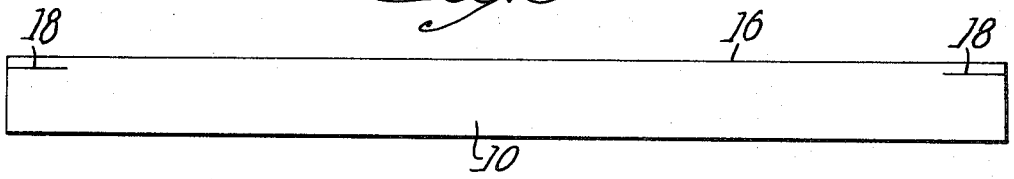


Fig. 4

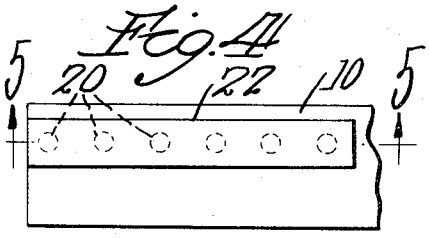


Fig. 5

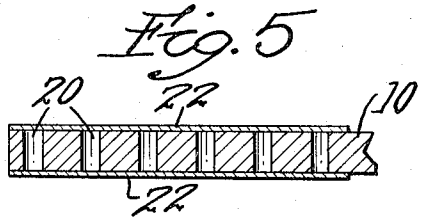


Fig. 6

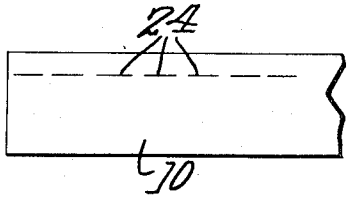


Fig. 7

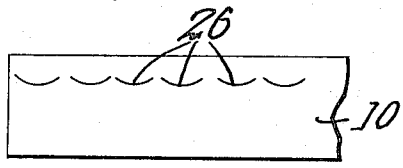
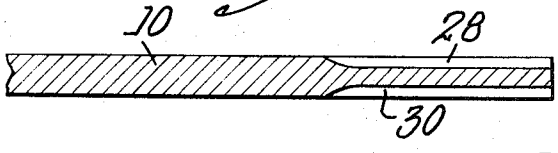


Fig. 8



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DOCTOR BLADES HAVING RELIEVED ENDS

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ABSTRACT OF THE DISCLOSURE

A doctor blade having greater flexibility in the end portions of the blade so that when the blade is moved against the surface to be doctored there is less pressure at these areas. The greater flexibility is achieved by slotting, punching or in general removing a part of the material or weakening the blade so that they can flex more in the treated areas than in the intermediate areas.

Uneven wear at the ends of doctor blades and particularly coating blades is a serious problem in the paper making industry. The extreme ends of the blades which overhang, i.e., are outside of the operating area do not wear as fast as the section which is doing the coating, i.e., the major central portion of the blade, and this causes the blades to wear to a substantial concave shape and this in turn causes the relatively unworn blade ends to press against the roll with increased force, wearing the roll ends and causing inferior coating, resulting in the necessity of great deal of down time changing rolls, changing blades, and repairing the rolls.

It is the general purpose of the present invention to provide a new blade which has areas of relieved pressure at the ends thereof, said areas corresponding in general to the overhang areas of the blades that are not operating but are bearing on the rolls. This is done by making the blades more flexible in these areas.

The areas of greater flexibility are made by reducing material by grinding a relief in the end portions of the blade to reduce the pressure at those points; slotting the blades, punching or in general removing material; or without removing material weakening the blades at these points in order to cause them to flex more greatly when in contact with the rolls. In cases where material is actually removed, it is a simple matter to coat or cover the removed areas or apertures with plastic, tape, rubber, etc. in order to prevent flow of liquids therethrough.

Other objects and advantages of the invention will appear hereinafter.

Reference is to be had to the accompanying drawings in which:

FIG. 1 is a view in section illustrating a ground relife at the compression side of the blade;

FIG. 2 is a similar view illustrating a ground relief at the tension side of the blade;

FIG. 3 is a view on an enlarged scale illustrating the areas of the ground reliefs;

FIG. 4 shows a modification;

FIG. 5 is a section on line 5—5 of FIG. 4;

FIGS. 6 and 7 show other forms of the new blade, and

FIG. 8 is a section through a blade having reliefs at both sides.

Referring now to FIG. 1 there is shown a type of blade holder well known in the art as a "Beloit" type holder. This holder holds the doctor blade **10** in position between the jaws **12** and **14**. The blade of course is provided with a beveled edge **16** and the present invention envisions a reduction of blade material by a score or ground relief in the area at **18** which provides that in this area of the blade the beveled edge portion thereof

will flex more readily. The areas of greater flexibility are arranged in the overhang, i.e., the non-operating area of the blade, and therefore it does not pass with as much force against the roll in those areas. Therefore the roll will not wear to an appreciable extent in those areas. Also, the areas of reduced material and increase flexibility are adjacent the beveled edge, in the area of the blade which is not held in the blade holder.

This blade is also shown on a reduced scale in FIG. 3 illustrating the approximate positions of the reliefs or scores in the areas at **18**. The part of the blade between these areas is the operating portion of the blade where the web is located.

The depth of the score will depend upon the degree of flex which is desired and may vary from a thousandth of an inch to several thousandths. Of course it also depends upon the thickness of the blade, etc. In most cases it will be positioned parallel to and adjacent to the beveled edge **16** but this is not necessarily the case, as in most instances the blade must be designed for the particular job it is to accomplish. Also, by properly tapering the score, so as to remove less and less material from the blade end to the operating section, a transitional change in pressure is provided in this direction.

By providing the score mark which does not extend all the way through the blade, it will be seen that there will be no fluid flow through the blade. This invention by making the end areas of the blade more flexible, reduces wear on the roll and reduces roll regrinds; prevents variation in coat weight as the blade wears in the sheet run area, by reducing the tendency of the blade at the ends thereof to lift the blade off of the sheet when it has been worn to some extent. This extends blade life as well as roll life and avoids a great deal of extremely expensive down time on the machines.

In FIG. 1 the relief **18** is illustrated as at the compression side of the blade, but in some cases it is desirable to place the relief at the tension side, as in FIG. 2, which illustrates the blade in a different type of holder.

There are of course may ways to provide for reducing blade material to obtain the increased flexibility of the end portions of the blades. Holes can be punched out in a line as indicated at **20** in FIG. 4 and then the holes may be covered with tape, plastic or rubber in order to prevent fluid flow, see particularly FIG. 5, the tape or plastic, etc. being indicated at **22**.

FIGS. 6 and 7 show mere slits provided in the blade. For instance in FIG. 6 the straight slit at **24** can be provided to weaken the area of the blade under consideration; or as in FIG. 7, the tabs **26** may be actually punched and then moved back into the plane of the blade and in this way even though the slits are present, there are no openings for the passage of fluids therethrough, the tabs completely closing these areas.

Also of course the scores or relief grinds can be applied at both sides of the blades as indicated at **28** and **30** in FIG. 8.

However, regardless of in what manner the blade ends are provided with greater flexibility, it will be seen that it is accomplished by reducing in some way the material at the pertinent points or areas as disclosed in the drawings and described above, so that the end portions of the blade at the working edge will bear with less pressure upon the ends of the roll and therefore the advantages described above are achieved.

Having thus described our invention and the advantages thereof, we do not wish to be limited to the details herein disclosed, otherwise than as set forth in the claims, but what we claim is:

1. An elongated doctor blade of generally uniform thickness having a length many times its thickness and a

width several times its thickness, one of the elongated edges of the blade being a working edge adapted to engage a coating material to smooth it over a surface, the opposite edge portion of the blade being adapted to be held in a doctor blade holder, thus providing a generally free working portion of the blade which extends beyond the holder, the latter being generally parallel with respect to said blade,

said doctor blade having areas of reduced material adjacent the opposite end portions and in the free working portion thereof increasing the flexibility of the blade in generally restricted areas adjacent the free working edge portion, at said end portions.

2. The elongated doctor blade of claim 1 wherein the reduced material comprises slits adjacent the working edge.

3. The elongated doctor blade of claim 1 wherein the reduced material comprises inwardly directed slits adjacent the working edge.

4. The elongated doctor blade of claim 2 wherein said slits are parallel to each other.

5. The elongated doctor blade of claim 1 wherein said reduced material includes a series of through openings.

6. The doctor blade of claim 1 wherein said reduced material includes scalloped slits extending through the blade.

7. The doctor blade of claim 1 wherein said reduced material is in the form of scores.

8. The doctor blade of claim 1 wherein said reduced material is in the form of scores parallel to said working edge.

9. The doctor blade of claim 1 wherein said reduced material is in the form of scores appearing at opposite sides of the blade in the same general area.

10. The elongated doctor blade of claim 1 wherein said reduced material includes a series of through openings and a covering for the openings.

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