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[54] **PAPER SCORING APPARATUS**
4 Claims, 8 Drawing Figs.

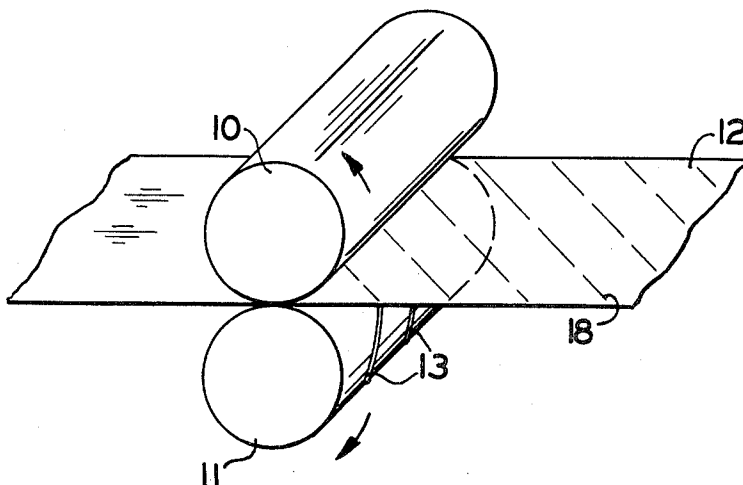
[52] U.S. Cl..... **83/12,**
83/342, 83/672, 83/678, 161/406, 225/96

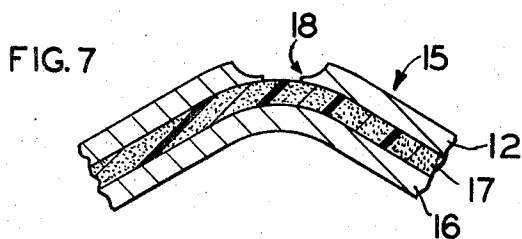
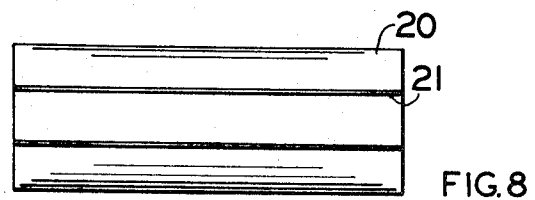
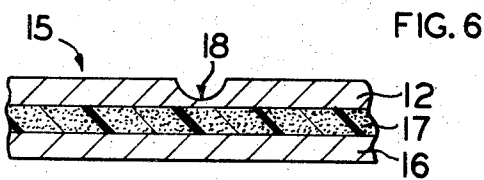
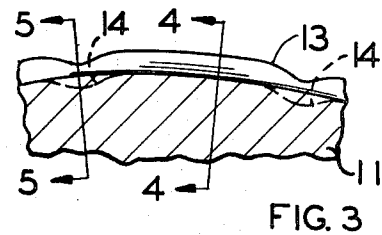
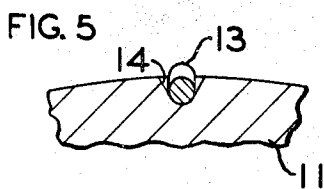
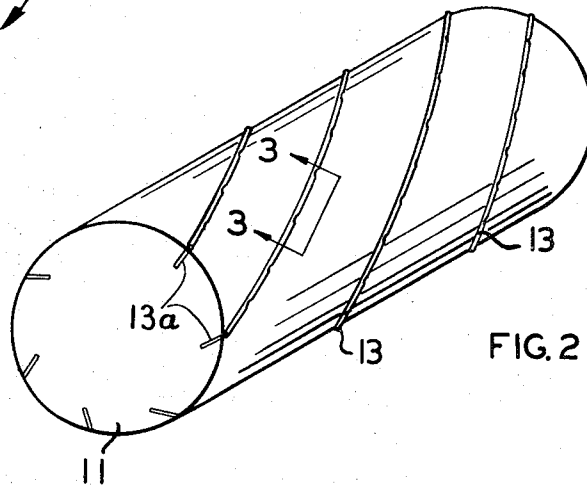
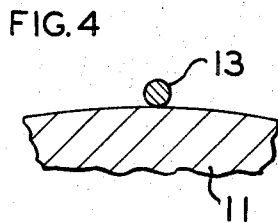
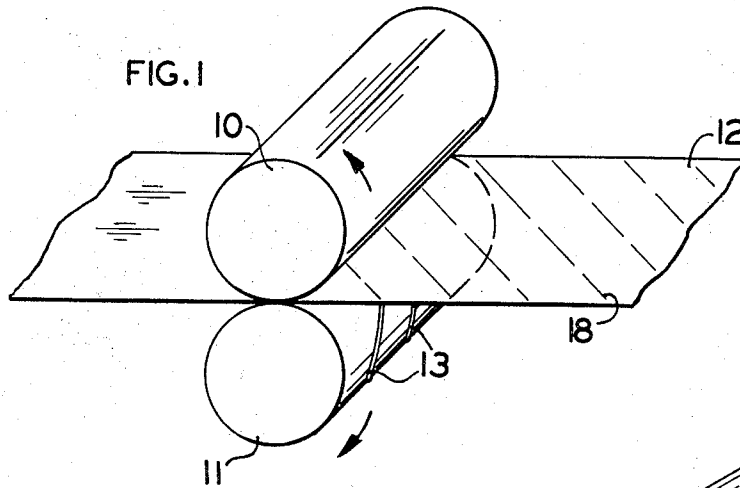
[51] Int. Cl..... **B26d 3/08**

[50] Field of Search..... **156/257,**
268; 161/167, 406; 83/6—12, 342, 672, 678;
225/96

[56] **References Cited**
UNITED STATES PATENTS
936,383 10/1909 Thibodeau **83/12**

ABSTRACT: Apparatus for scoring paper and other sheet materials including a pair of cylindrical metal rolls associated for pressure engagement with a sheet passed between the roll bight. One of the rolls is smooth surfaced, but the other roll carries one or more small diameter metal wires thereon secured to the surface of the second roll whereby the material passed between the roll bight is scored and/or weakened in the area thereof contacting the wire to facilitate later tearing of the paper at the scored line.





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PAPER SCORING APPARATUS

Reference is made to my own prior Pat. No. 3,035,957, which discloses one type of an adhesive product with special embrittled tear zones provided therein.

This invention further relates to adhesive products such as labels, stickers, tapes and similar articles wherein the article comprises, normally, a surface sheet, a layer of adhesive secured to the back face of such surface sheet, and a removable paper backing sheet secured to the adhesive layer for ultimate removal when the label, sticker or the like is to be affixed to an article for end use purposes. It is difficult to strip labels, stickers and the like of their backing sheets to prepare them for use because no available edge of the backing sheet usually is exposed to facilitate grasping the backing sheet for its removal. U.S. Pat. No. 2,364,607 is on one adhesive tape or label of this same general type as made heretofore, but which label or laminate provided does not in many instances accept printing uniformly.

The general object of the present invention is to provide a novel and improved apparatus for scoring paper to facilitate the formation of an end product laminate including a surface sheet, an adhesive layer, and a scored paper backing sheet which can readily be removed.

Another object of the invention is to form relatively inexpensive, but mechanically sound apparatus which will have a long service life with a minimum of maintenance and provide an efficient low-cost system for scoring sheets of material, such as paper backing sheets, that are later to be used in forming adhesive laminates or the like and wherein the backing sheet of the laminate must be removed before use of the product.

The foregoing and other objects and advantages of the invention will be made apparent as the specification proceeds.

Reference now is made to the accompanying drawings in which:

FIG. 1 is a perspective view of apparatus which is diagrammatically shown and embodies the principles of the invention;

FIG. 2 is an enlarged elevation of one of the rolls of FIG. 1;

FIG. 3 is a fragmentary enlarged section taken on line 3-3 of FIG. 2;

FIG. 4 is a fragmentary enlarged vertical section taken on line 4-4 of FIG. 3;

FIG. 5 is a fragmentary enlarged vertical section taken on line 5-5 of FIG. 3;

FIG. 6 is a fragmentary enlarged section of an adhesive laminate made using a sheet processed by the apparatus of FIG. 1;

FIG. 7 shows the step of splitting the adhesive laminate of FIG. 6 along a weakened area provided in the backing sheet of the laminate; and

FIG. 8 is an elevation of a modified roll of the invention.

When referring to corresponding members shown in the drawings and referred to in the specification, corresponding numerals are used to facilitate comparison therebetween.

Attention now is directed to the details of the structure shown in the drawings, and a pair of rolls 10 and 11, which normally are cylindrical and are made from metal, are shown in operative association to form a roll bight therebetween. Normally, at least one of the rolls is driven whereby pressure engagement is provided at the roll bight for a sheet or strip of material 12 which will be drawn through the roll bight. Normally in the process of use of the apparatus of the invention, the sheet or strip 12 would be formed from a fibrous material, such as paper, of the type that conventionally is used for forming backing sheets in adhesive laminates. Adhesive laminates using the sheets 12 may be used for making stickers, labels or other articles therefrom. Normally the sheets 12 are quite thin such as in the range of from about 0.001 inch to about 0.005 inches in thickness.

It is an important feature of the present invention that the roll 11 has one or more metal wires 13 secured to the surface thereof. These wires 13 preferably would be made from spring steel and, for example, would have a diameter of approximately 0.010 inch but the wire thickness can be varied dependent

upon the thickness of the sheets 12 being processed and the desired amount of scoring to be provided thereon. The wire or wires 13 can be secured to the periphery of the roll 11 in any desired manner, as, by spot welding or otherwise securing at least the ends of the wire 13 to the metal roll 11. However, if desired, the wire 11 could be affixed to the roll by a suitable adhesive, such as a conventional epoxy type of an adhesive which will set up at room temperature or at slightly elevated temperatures to give a good bond of the wire 13 to the roll. The wires are helically positioned on the roll 11. Ends—a of the wire or wires 13 may extend over onto the ends of the roll 11 and be suitably secured thereto as indicated in FIG. 2.

It is another portion of the present invention that parts of the wires 13, at longitudinally spaced sections of the wire would have complementary shaped recesses 14 formed in the surface of the roll 11 for receiving a length of the wire 13 when the rolls 10 and 11 operatively engage whereby the wire 13 will not form a continuous scored or weakened area, zone or line in the sheet 12 being processed. Intermittent lengths of the sheet 12 would not be effected at all because the wire 13 would have sufficient resilience or stretch, and would have no backing provided therefor at the longitudinally spaced portions of the wires lying over the recesses 14 so that portions of the will just be pushed into the recesses 14 when the rolls engage. This particular construction of the wires and rolls leaves sufficient strength in the sheet 12 whereby it can be readily further processed without any danger of splitting or tearing while being processed or prepared for use. At the same time, the recesses 14 would only be provided at, for example, intervals of 1 or 2 inches along the periphery of the roll 11, and such recesses 14 necessarily could be quite short, such as approximately one-fourth to one-half inch or so.

By passing the sheet 12 through the roll bight, the fibrous material forming the sheet 12 will be crushed or weakened in lineal zones or lines 18 of the sheet where the wire 13 contacts it and where the wire is backed up by the surface of the roll 11.

FIG. 3 shows how a plurality of the small recesses 14 could be formed in the periphery of the roll for receiving longitudinally spaced portions of the wire 13 therein when the roll 11 is operative. FIG. 5 in turn indicates how this wire can be received in the recess for passing portions of the sheet 12 through the roll bight without any scoring action on spaced areas of the sheet 12.

After the sheet 12 has been processed by being fed through the roll bight between the rolls 10 and 11, then it can be thereafter treated in any conventional manner. Thus, for example, a layer of a release material of a conventional nature, such as a silicone base composition, can be applied to one surface of the sheet 12 and thereafter a laminate 15 can be made in a conventional manner and which laminate could, for example, include a surface layer 16, a layer of a conventional adhesive composition 17 attached to the layer 16, and then the release coated surface of the sheet 12 would be releasably affixed to the opposite face of the adhesive layer 17. Any desired pressure sensitive or other adhesives can be forming the laminate 15 and such adhesives may, for example, be of the compositions described on Page 586 of "Handbook of Adhesives" by Skeist.

After the laminate 15 has been fully prepared for use as by printing any desired data thereon after the laminate is made, or before the components thereof are assembled, as desired, then the laminate 15 can be cut to a desired shape, or otherwise be prepared for use. When the laminate is to be used, it is a relatively simple matter to fold or bend the laminate 15 in a direction as shown in FIG. 7 so as to tension the weakened zone or line 18 provided on the sheet 12 whereby such backing paper will split or tear along this line 18 and the adhesive layer 17 can be exposed for securing the end product to a carrier surface for use. Thus, it is believed that the objects of the invention have been achieved and that a new and improved apparatus has been provided for scoring or weakening ultimate tear lines or zones in sheet material, such as paper and the like.

In some instances, it may be desirable to use a roll such as a roll 20 shown in FIG. 8, rather than the roll 11 in combination with the roll 10 for forming weakened zones, areas or lines in a processed sheet of material. The roll 20 has wires 21 secured thereto similar to the wires 13. In this instance, however, the wires 21 may extend axially of the roll 20 inasmuch as the sheet material processed between the rolls 20 and 21 will still have sufficient strength for processing and handling even though spaced score lines or zones are provided in sheets of material processed between the rolls.

While several complete embodiments of the invention have been disclosed herein, it will be appreciated that modification of these particular embodiments of the invention may be resorted to without departing from the scope of the invention as defined in the appended claims.

I claim:

1. Apparatus for scoring paper and other sheet materials including a pair of cylindrical metal rolls operatively positioned to form a bight therebetween for pressure engagement with a sheet passed therebetween and characterized by:

one of said rolls being smooth surfaced, and
a small diameter metal wire secured to the second of said rolls and extending from the surface thereof whereby the

material in a sheet of material passed through said roll bight is weakened by such wire in the area thereof contacting said wire to form a potential tear line in the processed material, said second roll having small recesses formed therein under longitudinally spaced portions of said wire for receiving such spaced portions of said wire to prevent said wire from weakening a sheet in a continuous line therein when the sheet is passed between said rolls.

2. Apparatus as in claim 1 where a plurality of said wires are secured to said second roll and all of said wires extend the length of said roll and said wires are of helical shape on said second roll.

3. Apparatus for scoring fibrous sheets, such as paper, as in claim 1 where said wire extends from end to end of said second roll, said wire being suitably secured to such roll at the roll ends by portions of the wire that extend onto the end surfaces of such roll, said wire also being suitably secured to such roll at longitudinally spaced portions of the wire.

4. Apparatus as in claim 1 where said recesses are of a depth and size as to receive said portions of said wire therein within the periphery of said second roll.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,570,337 Dated March 16, 1971

Inventor(s) Burton D. Morgan

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 2, line 10, change "Ends ____a" to --Ends 13a--.

Column 2, line 24, take out first "will" and insert --wire--.

Signed and sealed this 22nd day of June 1971.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents