Dec. 15, 1970 H. N. BEUTE 3,547,739

PERFORATED TAPE

Filed May 15, 1969

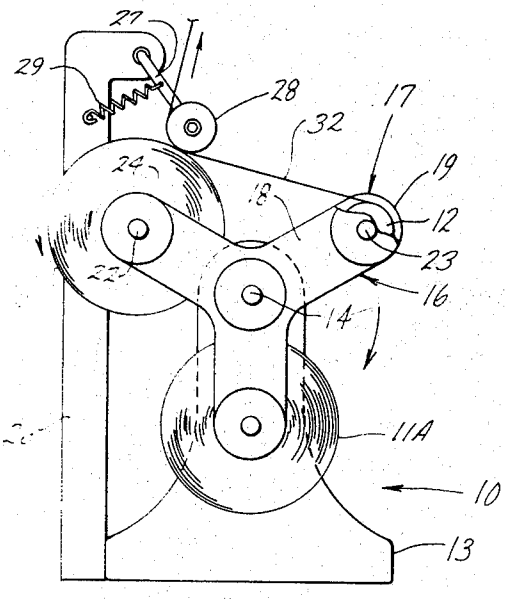


Fig. 1

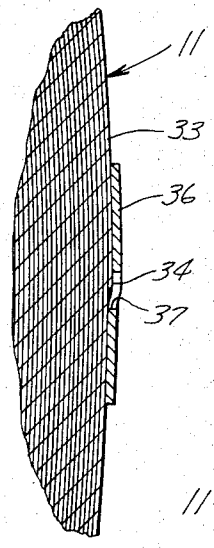


Fig. 3

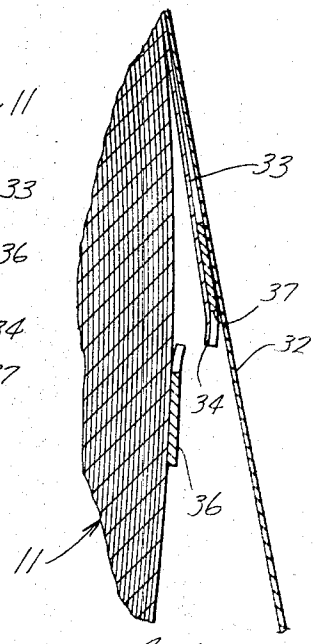
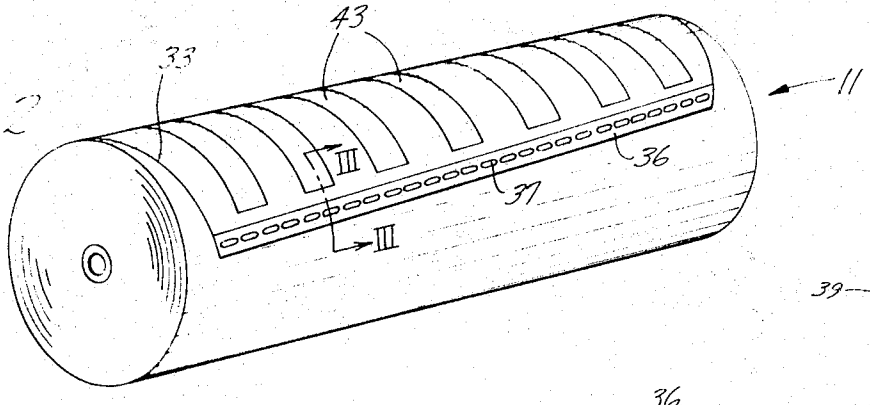


Fig. 4



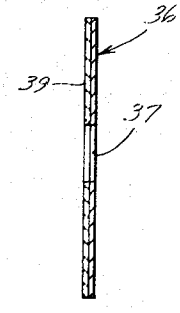


Fig. 7

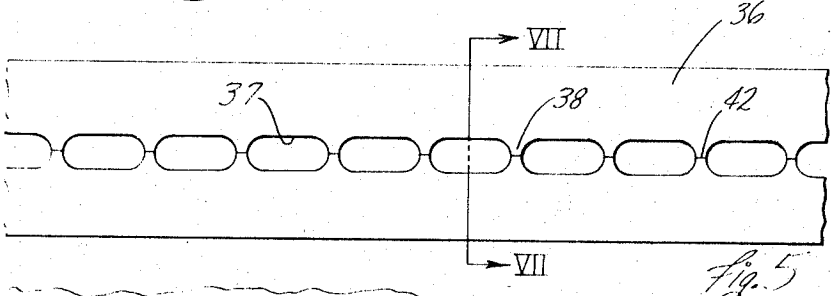


Fig. 5

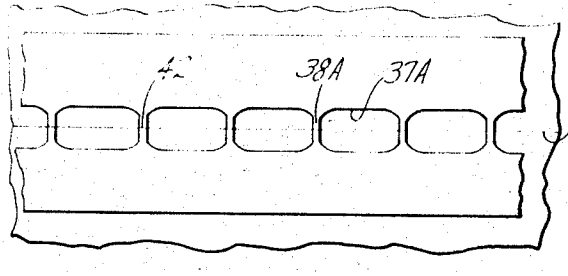


Fig. 6

INVENTOR.
HARVEY N. BEUTE
BY
Woodhams, Blanchard & Flynn.
ATTORNEYS

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PERFORATED TAPE

Harvey N. Beute, 1311 Stockbridge Ave., Kalamazoo, Mich. 49001

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ABSTRACT OF THE DISCLOSURE

An elongated strip of perforated sheet material having an adhesive on one side thereof for attaching the peripheral end or leading edge of a web of rolled sheet material to the remainder of the roll.

BACKGROUND OF THE INVENTION

This invention relates in general to a device for facilitating the attachment of a web on one roll of sheet material to the web being removed from another roll of sheet material which is moving at a relatively high rate of speed and, more particularly, to a strip of perforated sheet material for attaching the leading edge of the one web to the remainder of the roll, whereby said leading edge can be precisely attached to the second web.

FIELD OF THE INVENTION

It is common knowledge to use machines, sometimes referred to as "flying pasters," to attach the web of a first roll of sheet material to the web of a second roll of sheet material while the web of the second roll is moving at a relatively high rate of speed away from the second roll. This is normally performed by rotating the first roll so that its peripheral speed is approximately equal to the peripheral speed of the second roll and then bringing the first roll into engagement with the web of the second roll. An adhesive material is placed on the outer surface of the first roll adjacent its outer leading whereby the web of the first roll is attached to the web of the second roll. The web of the second roll then threads the web of the first roll through the machinery receiving the second web. This type of web-attaching arrangement is used especially in the paper-making or paper-printing or paper-treating industries wherein the paper web being removed from a roll is run through an intricate machine having, as a rule, a number of stages through which the web must pass. It has long since been found highly uneconomical to stop the machine each time a new roll is required and, in the modern high-speed machinery, it is frequently necessary to change rolls every 15 or 20 minutes. Each time the machine is stopped for a roll change or a roll repair, it can absorb as much as 15 minutes of downtime, which can be extremely costly to the manufacturer.

In recent years, manufacturers of machines for treating, printing or otherwise performing operations upon a web of paper coming from a roll have been able to increase the speed of such machines which, of course, means that a given size roll of paper is used in a shorter period of time. However, present methods of preparing the roll for the high-speed connection or pasting operation have not been adequate. In particular, it has been difficult to secure the leading or outer end of the new roll so that it could be quickly and easily removed when attached ot the previous web and, at the same time, would remain in a position closely adjacent the roll when rotating at a high rate of speed.

Previously it has been commonplace to apply a number of strips of adhesive or gummed tape to the leading end of the new roll at spaced intervals along the end to minimize resistance to detachment of the leading end from the roll. However, at high speeds the air tends to move

under the leading edge, which is rotating into the wind, and thereby rip the leading end loose. In order to overcome this problem, attempts have been made to cover the entire leading end with a solid strip of paper. However, if such paper is strong enough to resist the rather substantial centrifugal force which is generated in the end of the paper at high speeds, then it is too strong to break when the pasting or attaching operation is performed.

Thus, while using individual strips has proven to be the best method to date, such procedure has raised a further problem with respect to the newer high-speed machines. That is, substantial time is required by the machine operator to attach the individual strips to the roll which in many instances may be as much as six or eight feet in axial dimension. Thus, it has often become necessary to have some of the rolls taped down in advance of their use by someone other than the machine operator, and most machine operators prefer to do their own taping. Accordingly, it has become important to find a way of applying the hold-down strip or tape or individual tapes whereby the application can be accomplished in substantially less time than previously available.

Accordingly, a primary object of this invention is the provision of a device for holding or attaching the leading end of a relatively large roll of sheet material rotating at a relatively high speed so that the leading end can be removed from the rest of the roll when attached to another strip of sheet material moving at the same rate of speed, but which prevents the leading end of the roll from being torn loose by movement through the air at the high rate of speed.

A further object of this invention is the provision of a device, as aforesaid, which can be quickly applied by any person capable of operating a machine for performing a function upon a roll of sheet material.

A further object of the invention is the provision of a device, as aforesaid, which is applicable to sheet materials in a wide range of thicknesses, weights and strengths.

Other objects and purposes of this invention will become apparent to persons familiar with devices of this general type upon reading the following descriptive material and examining the accompanying drawings, in which:

FIG. 1 is a broken, schematic, side elevational view of a high-speed pasting machine.

FIG. 2 is a perspective view of a roll of sheet material embodying the invention.

FIG. 3 is a sectional view taken along the line III—III in FIG. 2.

FIG. 4 is a sectional view substantially as taken along the line IV—IV in FIG. 2 but showing the web after attachment to another web.

FIG. 5 is a side elevational view of a fragment of a strip embodying the invention.

FIG. 6 is a sectional view taken along the line VI—VI in FIG. 5.

FIG. 7 is a side elevational view of a modified strip as applied to a roll of sheet material.

For convenience in description, the terms "inner," "outer" and derivatives thereof will have reference to the geometric center of the roll appearing in FIG. 2 or the strip appearing in FIG. 5 and associated parts. The terms "leading edge," "peripheral end" or the like will have reference to the edge of the sheet material on the outside of the roll and extending substantially axially thereof.

SUMMARY OF THE INVENTION

The objects and purposes of the invention, including those set forth above, have been met by providing an elongated, perforated and rupturable strip having an adhesive material on one side thereof whereby the strip can be

applied to and along the leading edge of a roll of sheet material for securing said edge to the remainder of the roll. The strip is attached so that the leading edge of the web on the roll extends approximately along the center line of the openings in the strip.

DETAILED DESCRIPTION

The machine illustrated in FIG. 1 is one of several types frequently referred to as "pasters," by means of which the web of paper or other sheet material on the roll **11** (FIG. 2) is attached to the web of another roll, such as the roll **12** on the machine **10** of FIG. 1. More specifically, the machine **10** includes a pedestal **13** supporting a substantially horizontal shaft **14** upon which a pair of spaced spiders **16** and **17** are mounted. The spiders **16** and **17** have three uniformly radial arms **18** and **19**, respectively, which support shafts **21, 22, 23** extending therebetween parallel with the shaft **14**.

In this embodiment, motors **24** are mounted on the arms **18** of the spider **16** and directly connected to the shafts **21, 22** and **23** for rotating same. The spiders **16** and **17** can be rotated by means (not shown) to move the roll **11** into the position of roll **12** and, subsequently, move the roll **11A** into the position of roll **11**.

The machine **10** has an upright column **26** secured to the pedestal **13** and pivotally supporting an arm **27** on the upper end thereof. A cylinder **28**, which serves as an idler, is rotatably supported upon the arm **27** for rotation around an axis parallel with the shaft **14**. The cylinder **28** is urged against the peripheral surface of the roll **11** by a spring **29** connected to an dextending between the column **26** and the arm **27**. Thus, the web **32** of the sheet material from the roll **12** passes under the cylinder **28** and thence to some other machine, such as a printing machine, coating machine or the like. The cylinder **28** is arranged so that it will hold the web **32** against the peripheral surface of the roll **11** when said roll is moved by the machine **10** into the position thereof appearing in FIG. 1, such movement effecting the connection between the web **33** of the roll **11** and the web **32** of the roll **12**.

The foregoing description concerns a machine, the substance of which is part of the prior art. Also, the rolls **11, 11A** and **12** may be substantially conventional rolls of paper, for example, manufactured in a well-known manner by well-known procedures.

The web **33** of roll **11** (FIG. 2) has an outer edge **34** which is secured to the next adjacent layer of the web **33** by a strip **36** having a plurality of spaced openings or perforations **37** aligned lengthwise of the strip **36**. The perforations **37** preferably are uniformly spaced, of uniform length and aligned along the lengthwise center line of the strip **36**.

In one preferred embodiment of the invention, the strip **36** is fabricated from 50-pound paper of average strength, and each opening **37** is elongated lengthwise of the strip. Moreover, the length of each opening **37** is at least four times the distance between the two adjacent openings, hence, at least four times the width of the element **38** between two adjacent openings.

In FIG. 5, the ends of the openings **37** are shown as semicircular, but the openings may be substantially rectangular as shown at **37A** in FIG. 6. Accordingly, at least the central portions of elements **38A** between the openings **37A** are of substantially uniform width lengthwise thereof (transversely of the strip **36**), which facilitates attachment of the strip.

The strip **36** is coated on one side with an adhesive **39** (FIG. 7) whereby the strip is attached to the roll **11** so that it extends lengthwise along the outer edge **34** of the web **33**, half of the strip being connected to the portion of the web against the edge **34** and the other half being attached to the next layer of the web **32**.

The side of the strip **36**, opposite that containing the adhesive, is provided with a plurality of aligned lines **42** which are preferably coincident with the lengthwise axis

of the openings **37**, thereby bisecting each of the elements **38**. The lines assist the operator to align the openings **37** along the edge **34** of the web **33** when the strip **36** is being applied to the roll **11**. It is important that the elements **38** constitute the only portions of the strip **36** which bridge the edge **34** of the web **33**.

The portion of the web **33** near the edge **34** thereof is coated on the exterior surface with a contact adhesive **43** which permits attachment of the web **33** to the web **32** when the roll **11** is moved by the machine **10** into the position thereof appearing in FIG. 1.

OPERATION

Under normal circumstances, each paper machine operator or printing machine operator prefers to prepare his own roll for the pasting or transfer operation whereby the web **33** of roll **11**, for example, is attached to the web **32** of roll **12**. Frequently, the operator prefers to have the edge **34** of the web **33** at a slight angle to the axis of the roll so that one end of the edge is pulled loose from the roll during the pasting operation before the other end is, thereby peeling the edge away from the roll. The operator then applies this strip either manually or by a tape dispenser starting at one end of the edge **34** and working along the edge and making such that the lines **42** across the elements **38** are substantially aligned with the edge **34**. Ordinarily, attachment of the strip **36** to the roll **11** can be accomplished in less than a minute. Moreover, such attachment can be effected either before or after the roll is mounted upon the machine **10**.

The roll to be pasted or transferred will occupy the position of roll **11A** in FIG. 1 just prior to the pasting operation. Accordingly, the motor **24** connected to the shaft **21** will be energized and the roll **11A** will be rotated in a counterclockwise direction, in this instance, and by appropriate synchronizing means (not shown) will be given a peripheral speed equal to the peripheral speed of the roll **12**. The roll **11A** will then be moved by the machine **10** into the position of roll **11** so that the peripheral surface of said roll engages the web **32**. The adhesive **39** on web **33** (FIG. 2) will cause the web **33** to adhere to the web **32** (FIG. 4) and thereby rupture the elements **38** of the strip **36**. As soon as the operator can see a successful pasting operation has been performed, and the web **33** is actually moving through the appropriate machinery, he can then break the web **32** and terminate the rotation of roll **12**.

In one successful embodiment, the openings **37** were approximately one inch long by three-eighths inch wide and the elements were approximately one-eighth inch wide. This arrangement of dimensions has been found satisfactory for use with paper stock ranging from 25 pounds to 100 pounds. That is, the elements **38** are of sufficient strength to resist rupture due to the centrifugal force applied to the edge of the web, and the elements **38** are sufficiently close together that the air does not lift the edge **34** away from the roll between a pair of adjacent elements. Moreover, even if the edge does lift slightly, the amount of air entrapment which can occur between a pair of elements **38** is insufficient to rupture them or interfere with the pasting operation. The strip **36** will normally be made of a cellulose fiber material, such as paper, but other materials might conceivably be used because of the special requirements of the material to which the strip is applied.

Although two specific forms or shapes of openings **37** have been disclosed herein for illustrative purposes, it will be recognized that other opening shapes may be used. Also, even though no particular advantage may be achieved by changing the relative sizes and dimensions of the openings in the elements from those suggested above, changes in such relative dimensions and sizes can be made without materially exceeding the scope of this invention. In fact, it will be seen that slight decreases in the weight of the paper being used in the strip could be expected

to justify a slight increase in the width of the elements **38** between the openings **37**, and the reverse results would be expected from an increase in the weight of the paper stock for the strip.

Although particular preferred embodiments of the invention have been disclosed above for illustrative purposes, it will be recognized that variations or modifications of the disclosed structure, including the rearrangement of parts, lie within the scope of the present invention.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A device for attaching the leading edge of one roll of sheet material to the web of another roll of sheet material wherein said rolls are being rotated at substantially equal peripheral speeds, comprising:

an elongated, relatively narrow strip of rupturable sheet material of substantially uniform thickness;

adhesive means substantially covering one side of said strip for securing said leading edge of said one roll to the remainder of said roll, said strip extending lengthwise of and laterally beyond said leading edge;

means defining a plurality of uniformly spaced openings through said strip along a line between and parallel with the lateral edges of said strip whereby an elongated, transverse element is provided between each pair of adjacent openings; and

the dimension of each said opening lengthwise of said strip being substantially greater than the corresponding dimension of each element, said elements being arranged to extend across the leading edge of said one roll.

2. A device according to claim **1**, wherein said openings are arranged along the lengthwise center line of said strip means; and

wherein said strip means is fabricated from paper stock in the range of from 25 to 75 pounds.

3. A device according to claim **1**, wherein said strip means is fabricated from paper stock; and

wherein said openings are elongated lengthwise of said strip means and said dimension thereof is at least four times the corresponding dimension of said elements.

4. A device according to claim **1**, including marks on said elements on the other side of said strip means, said marks being aligned lengthwise of said strip means and substantially bisecting said elements for aligning said strip means with said leading edge of said one roll.

5. A device according to claim **4**, wherein said elements have central portions with substantially parallel edges transversely of said strip means, said marks being on said central portions.

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BENJAMIN A. BORCHELT, Primary Examiner

D. A. HART, Assistant Examiner

U.S. Cl. X.R.

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