May 26, 1964 R. C. ALEXANDER 3,134,980

ROLLED PAPER AND METHOD OF SECURING THE FREE END THEREOF

Filed July 1, 1960 2 Sheets-Sheet 1

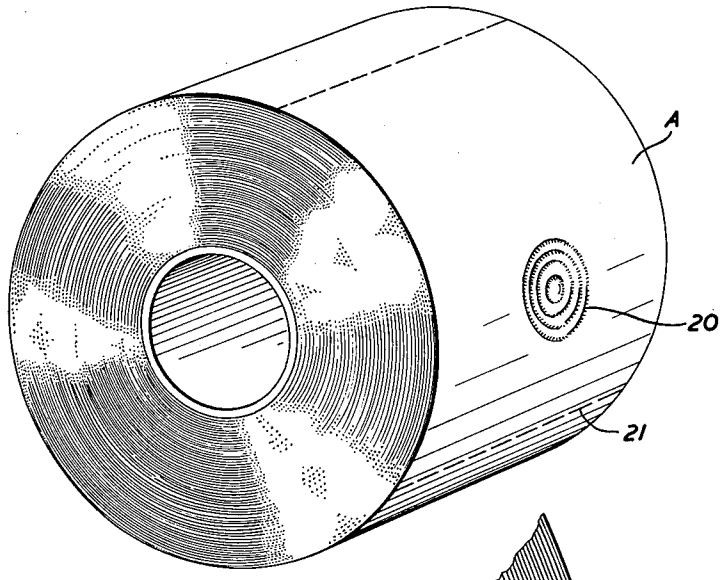


FIG. 1

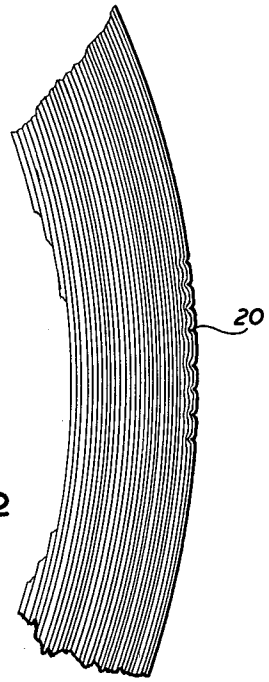


FIG. 2

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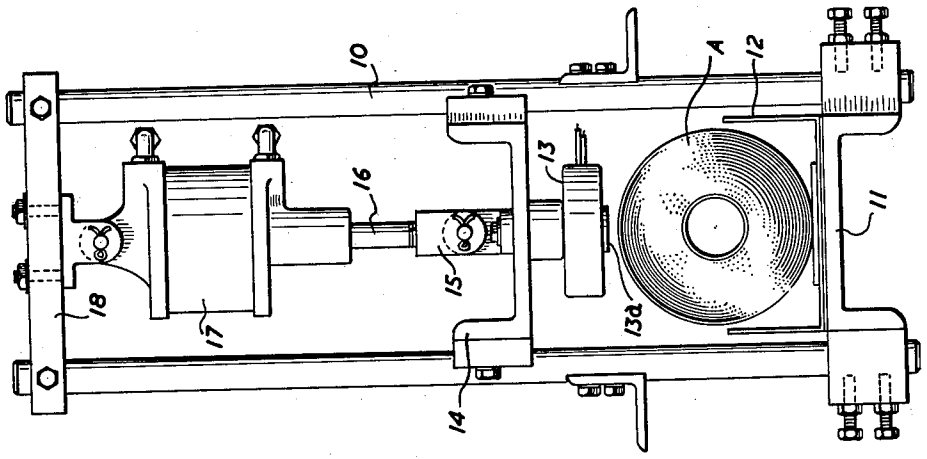


FIG. 3

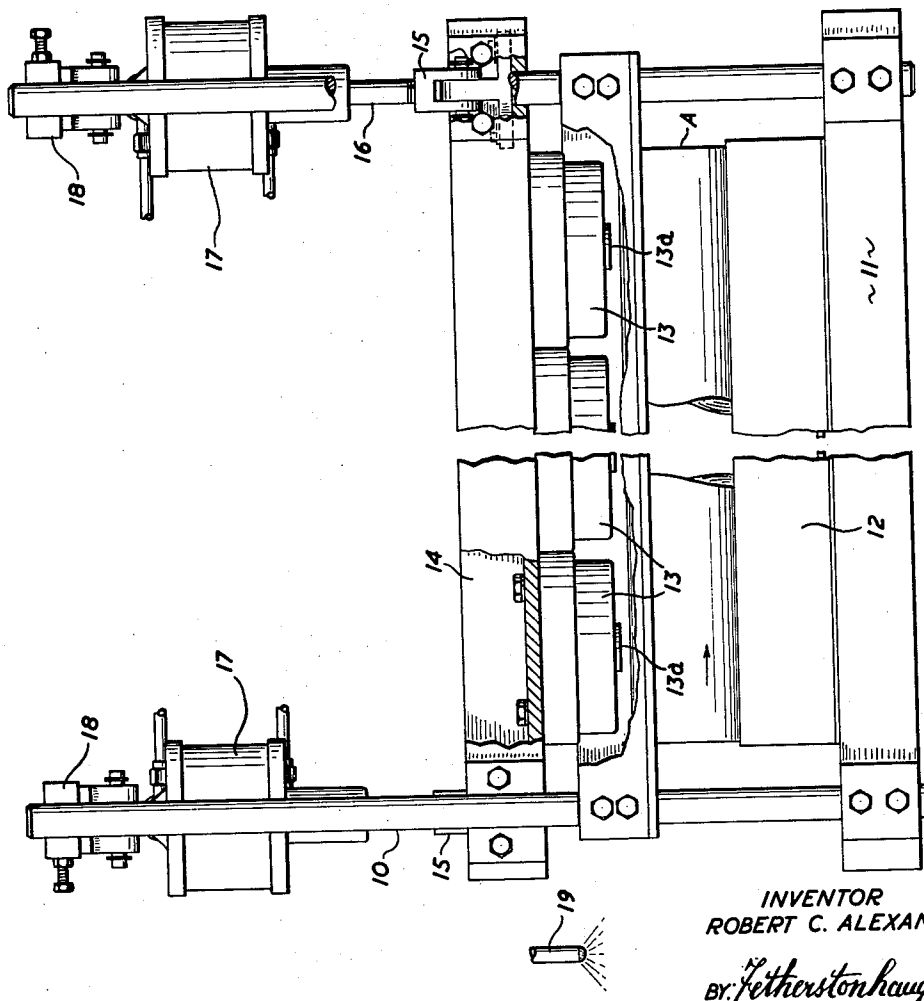


FIG. 4

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ROLLED PAPER AND METHOD OF SECURING THE FREE END THEREOF

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This invention relates to paper rolls and a method of securing the free end of a roll of rolled paper. The invention is particularly applicable to rolled toilet paper and rolled paper towels.

Over a period of many years, the manufacturers of rolled paper have experienced great difficulty in securing the free end of a roll of rolled paper so that when introduced to wrapping machines, it may be neatly wrapped and without creating rejects due to faulty wrapping mainly caused by the method of securement of the final sheet of the roll. Not only do rejects result in an economic loss, but faulty rolls of paper will often jam the wrapping machine which then creates loss in production time, etc.

Up to the present time, it has been the practice to apply across the roll adjacent to the outer free edge thereof a thin strip of adhesive or moisture so as to cause the free end sheet to adhere to the underlying surface of the roll. On the one hand, this tends to penetrate too deeply and to mat the fibers together in the underlying layers which creates an inferior roll. On the other hand, this moistening or application of adhesive requires drying time and in the travel of the roll or the log from which rolls are cut in a conveyor, the moistened area of the paper will often tend to stick so as to sometimes release the stuck end sheet or otherwise to malform the free end so that in subsequent wrapping, the displaced paper will stick out from the wrap or otherwise mar the wrapping step and make it necessary to reject imperfectly wrapped rolls.

In addition, sometimes the free end of the roll adjacent to the moistened line of securement will tear off along such line, where the paper is thus weakened, and finally the customer is presented with a problem in unrolling the roll which, of course, again reacts to the paper manufacturer's disadvantage.

Apart from these difficulties, it has been found in some cases that the moistened line of securement, due to the weakening of the paper in this area, causes the paper to scuff as it proceeds on a conveyor with the result that it becomes unsightly as well as difficult to start to unroll when required and produces an imperfect product.

The present invention is designed to avoid all these difficulties so as to present a perfectly secured roll at the wrapping machine and to present to the customer a perfect product which is easily started in unrolling.

The method generally comprises moistening a small isolated area of the final layer of a roll of paper and a minimum number of layers therebelow, preferably by a finely atomized spray of moisture, and immediately thereafter impressing a hot embossing die over the moistened area to impress the paper and dry the moistened area whereby to cause the end sheet to lightly interlock and adhere to the underlying layer. This results in a perfectly completed roll of paper wherein the free end of the outer layer of the roll and a minimum number of layers thereunder are lightly interlocked as to adhere in an isolated area adjacent the free end of the roll, and preferably spaced inwardly from the ends of the roll as to provide such light interlocking of the outer layer over an area of a suitable size sufficient to cause adherence while permitting easy lifting of the outer layer when the roll is placed in use.

The invention will be clearly understood by reference to the following detailed specification taken in conjunction with the accompanying drawings, wherein

FIG. 1 is a perspective illustration of a roll of toilet paper illustrating the light interlocking of the final layer adjacent its free end by embossing in an isolated area thereof.

FIG. 2 is an enlarged fragmentary transverse section taken through a roll of paper to illustrate the manner of embossed interlocking between a minimum of the topmost layers of the roll.

FIG. 3 is an end elevation of suitable apparatus for carrying out the method; and

FIG. 4 is a partly sectional front elevation of said apparatus.

Referring first of all to FIGS. 3 and 4, the apparatus may consist of suitable framework **10** having a base **11** designed to support a suitable trough **12** over which is disposed an embossing die **13** which is heated preferably by an electrically operated heating cartridge therewithin. The trough is designed to be fed with a roll of paper A, as illustrated, so as to dispose it below and in spaced relation to the die or dies **13** having the embossing die portion **13A**. Merely a single die may be employed when operating with small rolls but more usually the embossing will be done in the case, for instance, of toilet paper when the roll is in the elongated log form prior to cutting into a series of small rolls. This is the manner it is effected in terms of the apparatus illustrated and wherein the necessary number of dies **13** corresponding to the number of rolls to be cut from the log are mounted on the machine and carried by a vertically slidable yoke **14**, to each end of which as at **15** the lower end of a pair of piston rods **16** is operatively secured, the piston rods being carried by a pair of pistons **17** mounted, as shown in FIG. 4, at each end of the frame from a top cross member **18** thereof. Consequently, when the cylinders are operated in normal manner at the appropriate time interval, the yoke **14** is caused to move vertically downward to engage the dies **13** with small areas of the rolls spaced apart longitudinally thereof.

The trough **12** is open at one end and adjacent that open end a small atomizing nozzle **19** is mounted in any suitable way, the valve of which is designed to be controlled by a limit switch which will act in well known manner to cause the spray to discharge until the switch is released. The log of rolled paper is conveyed into the open end of the trough **12** with the free end of the final layer on the roll being disposed in the path of the embossing dies disposed thereabove. As the roll moves longitudinally into the trough, it trips a switch which causes the nozzle **19** to spray the log in a narrow longitudinal path until the log is wholly received within the trough, when the switch is released and the spray is, therefore stopped. This is a quick movement and as a result, the final layer of the roll and a minimum number of layers thereunder are moistened in this narrow isolated path along the length of the roll adjacent the free end of the final layer. As the roll is wholly received in the trough, one end thereof is designed to engage a timing switch which causes the cylinders **17** to operate as to move the yoke **14** downwardly and cause the embossing dies to engage spaced apart isolated areas along the moisture path whereby immediately to dry the moistened layers of the roll and to emboss the final layer of the roll and such minimum number of layers thereunder as to cause them lightly to interlock and adhere in isolated areas. The dies **13** are, as shown in FIG. 4, of elongated character spaced apart slightly from one another and while the embossing portions **13A** thereof are comparatively small and adapted to emboss a small isolated area of the roll, the heated surface of the dies **13** will supply sufficient heat substantially throughout the narrow path of moistening of the log as to quickly dry this moistened area. When this has been properly accomplished over a very

minute controlled time, the timing switch again operates to cause the cylinders to return the embossing dies to their normal position whereupon by suitable ejecting means the roll is ejected and preferably onto an inclined table which then causes the log to roll under its own momentum into a carrier, preferably of an intermittent moving type, which will longitudinally move the roll at intervals in the path of a saw which cuts it into the number of uniform rolls designed to be made from the log in question.

As shown in FIG. 1, a roll of toilet paper is embossed as at **20** in an isolated area adjacent to the free end **21** of the final layer thereof, it being preferred under the present invention to employ a small isolated island-like area as to achieve the lightly interlocked adherence of the final layers, such as shown in FIG. 2, in such a manner that the final layer and directly adjacent underlying layers may be readily disengaged merely by a light lifting of the layer in question from the roll. However, due to the fact that the moistening is achieved in an isolated area of the roll and is permitted to penetrate only to a minimum depth and is immediately dried simultaneously with the embossing operation, a light interlocking of such layers in a narrow path substantially across the length of the roll will still provide a practical answer to the problem since such light interlocking will, as contrasted to past practice, still permit removal of the lightly interlocked layers very readily. However, when employing a small isolated area such as **20**, it will be apparent of course that the corners of the free edge of the final layer are more readily grasped when it is desired to remove the layer from the roll.

It should be realized that the invention as above described achieves a number of advantages. Not only does it provide a preferred roll from the point of view of final utility, but it overcomes the disadvantage of imperfect wrapping and reject cost caused by unravelling ends and scuffed rolls in their passage to the sawing machine and wrapping machines. By reason of immediately providing a dry roll with the final layer or layers lightly interlocked, it is possible to use the inclined table described above as to permit the rolls to move to the cutting carriage under their own momentum, thus eliminating the necessity of employing an attendant for taking the roll and positioning it on the cutting carriage and which was previously necessary due to the fact that moistened rolls under the prior practice would stick and unravel if otherwise treated. Consequently, the invention not only is economic in avoiding imperfectly wrapped rolls but it will also require less personnel to process.

Any suitable moistening agent may be used which will readily volatilize with the application of heat and while it is preferred to moisten the roll by very finely atomized spray, it will be obvious that moistening could be achieved in other manners and which are intended to be encompassed by the present invention, viz. any means which will readily apply a moistening of the roll in a predetermined isolated area to achieve the purposes above described.

What I claim as my invention is:

1. An improved method for securing the free end of toilet paper rolls and paper towel rolls which comprises the steps of lightly moistening a small isolated area on the surface of one of said rolls by applying a finely atomized spray of moisture in said area adjacent the free end of said roll, immediately thereafter applying pressure against said moistened area to impress said surface layer into the body of said roll in said area, and simultaneously applying heat in the area of pressure whereby said area is embossed and dried, causing a light interlocking of the surface layer and one or more directly underlying layers of said roll in the embossed area.

2. The method of claim 1 in which the embossed area is of isolated island-like character disposed inwardly of the ends of said roll and inwardly of said free end.

3. An improved method for securing the free end of toilet paper rolls and paper towel rolls formed from a rolled paper log which comprises the steps of lightly moistening the surface of said rolled paper log at least in a plurality of small equally spaced areas along the length of said log by applying a finely atomized spray of moisture in said areas adjacent the free end of said log, immediately thereafter applying pressure against said moistened areas to impress said surface layer into the body of said log in said areas, simultaneously applying heat in said impressed areas whereby said areas are embossed and dried causing a light interlocking of said surface layer and one or more directly underlying layers of said log in said areas, and then cutting the log into a plurality of small rolls each having at least one of said impressed areas.

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