

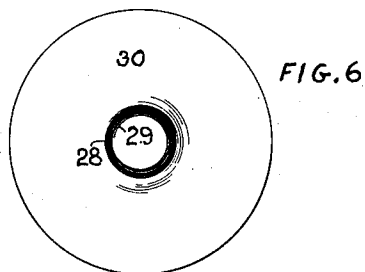
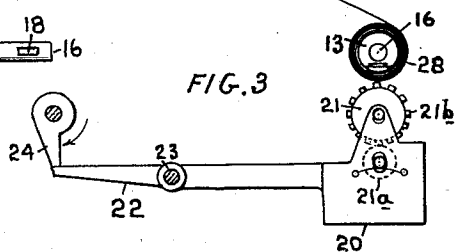
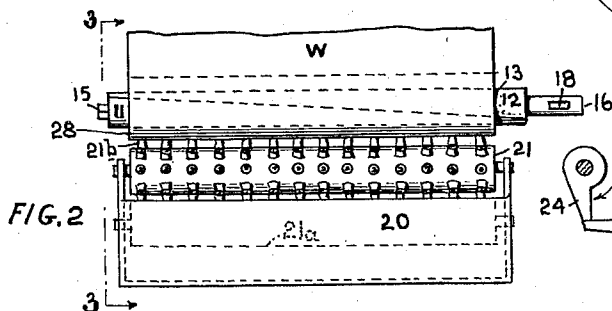
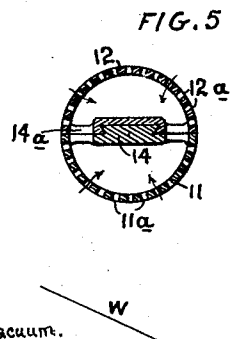
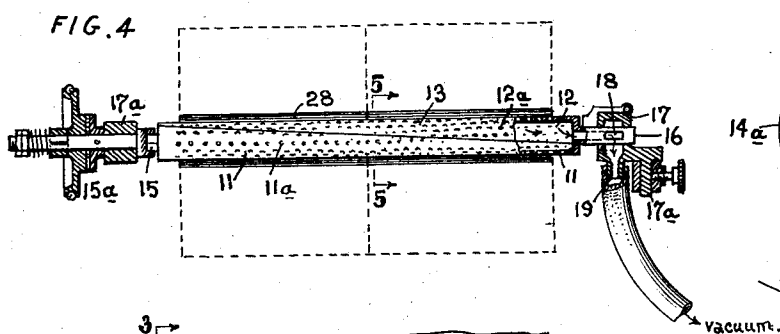
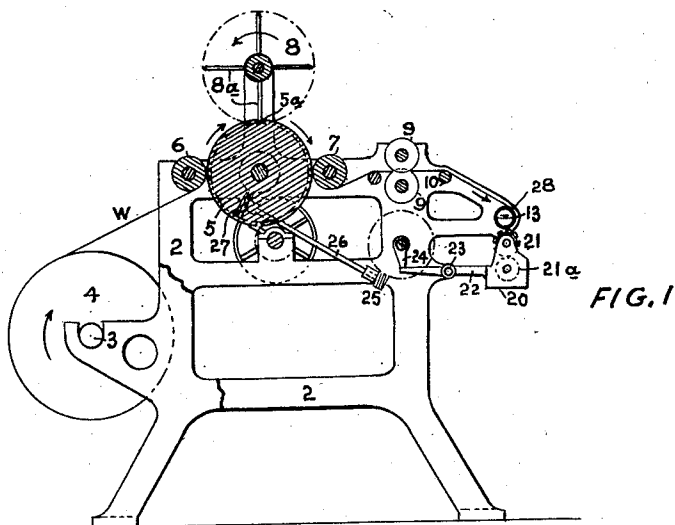
July 19, 1932.

P. J. MULLIGAN

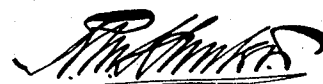
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MANUFACTURE OF PAPER ROLLS

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Inventor.
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By 
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UNITED STATES PATENT OFFICE

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MANUFACTURE OF PAPER ROLLS

Application filed November 17, 1928. Serial No. 320,045.

The object of my invention is to provide a method and means for the manufacture of paper rolls having a tubular core, wherein the latter is formed of an integral portion of the paper making up the roll.

Heretofore, rolls of toilet paper having tubular cores have been made by employing previously prepared cardboard tubes, placing the same upon the winding bar by hand, and then attaching the paper web to the core while being rotated. By my improvements, the employment of a cardboard tube or any previously constructed tubular core is entirely dispensed with; and for the purpose of providing a firm tubular center or core to the paper roll, I cause the initial portions of the roll adjacent to the winding bar or mandrel to be united, by the application of paste or glue, into a multi-ply tube and thereafter continuing to wind the paper web to the full size of the roll without the application of adhesive.

In putting my invention into practice, I may employ an ordinary slitting and perforating machine such as theretofore employed in connection with the making of rolls with cardboard tubular cores, but with certain changes comprising more particularly a cylindrical shaped mandrel or winding bar and adhesive applying means comprising a glue or paste pot, and a transfer roll for applying the adhesive from the pot to the surface of the paper web while being rolled upon the mandrel; and for limiting the action of the paste applying means, I provide automatic devices for bringing the paste applying means into action for a limited period of time during the initial winding and then removing the same out of contact with the paper.

As a further refinement of the means employed, I prefer to provide a collapsible winding bar or mandrel, the same being made hollow with radial perforations, and in communication with a source of vacuum during the initial rotary motion in the making of the paper roll, whereby at the start, the web of paper will be attached to the bar by suction and after one or more revolutions have been made, the adhesive applying means are

brought into action to insure the building up of the multi-ply tubular core.

My improvements will be better understood by reference to the drawing, in which: Fig. 1 is a vertical section of a roll making machine embodying my improvements; Fig. 2 is an elevation of the adhesive pot and rolls for applying the adhesive to the paper; Fig. 3 is a transverse section of the same on line 3—3 of Fig. 2; Fig. 4 is a vertical section showing the mandrel or winding bar with partly formed rolls thereon, together with the means for supporting the mandrel; Fig. 5 is a transverse section of the mandrel, taken on line 5—5 of Fig. 4; and Fig. 6 is an end view of one of the finished rolls of paper removed from the mandrel.

Describing the machine at present preferred in carrying my improved method into operation, the following are the more important features. 2 is the main frame and 3 is the supporting mandrel or shaft for the parent paper roll from which the commercial rolls are to be made. This parent roll may be of sufficient width to permit its web being slit longitudinally to provide a plurality of narrower webs to be simultaneously wound into commercial rolls, but my invention is also applicable to the making of commercial rolls from narrower webs and I, therefore, do not restrict myself to the slitting and perforating of the paper at the time it is being wound into the rolls. I, however, will describe the construction of the machine as commercially used in the practice of my invention.

The paper web W, after leaving the parent roll, passes under a guide roll 6, thence about a roll member 5 constituting a part of the transverse perforating means, and thence under the guide roll 7 to the slitter knives 9, thence over a guide roll 10, and finally to the winding mandrel. The perforator comprises a rotating shaft with four radially arranged blades, which shaft is geared to revolve at a definite speed, so that the perforating blades 8a enter transverse grooves 5a in the roll 5. These perforations do not sever the web, but simply weaken the same along

transverse lines uniformly spaced along the length of the web.

The mandrel or winding bar 13 comprises two parts 11 and 12, each having a diagonal surface which, when brought together, form a cylindrical mandrel as will be understood by reference to Figs. 4 and 5. These parts may be held together by a dove-tail tongue of one part fitting into a corresponding longitudinal recess in the other part, as is clearly shown at 14 in Fig. 5. This construction will permit the mandrel to be collapsed for disengagement after the winding operation. The part 11 is provided with a square head 15 at one end, which is adapted to engage a suitable driving means 15a usually of a character known as a frictional drive. The opposite end of the other member 12 of the mandrel is provided with a tubular journal 16, which may be journaled in a bearing 17 pivoted at or on a vertical axis at 17a. Furthermore, the members 11 and 12 of the mandrel are made hollow and provided with radial apertures 11a and 12a respectively. Furthermore, the communicating walls between the two parts 11 and 12 are also perforated at 14a.

It will be understood that the tubular shaft 16 of the mandrel part 12 is provided with a transverse aperture 18 opening into a hollow journal 17 providing a chamber about said opening 18 and having an extension 19 leading to a source of vacuum by which a suction may be exerted through the parts 11 and 12 of the mandrel for holding the free end of the paper web to the mandrel during the initial winding operation and preliminary to the application of the adhesive. To disengage the mandrel from the machine, it is only necessary to move it to the right (Fig. 4), to disengage the driving end 15 and swinging said mandrel clear of the driving means 15a, and thereafter withdrawing the mandrel longitudinally from the bearing 17. By employing a vacuum for initially holding the paper web to the mandrel, the adhesive or glue to be applied to the paper is prevented from getting upon the mandrel itself, and thereby attaching the paper roll to the mandrel; and this is quite important in commercial practice.

The cement or glue may be applied to the rotating paper web during the initial rotation of the mandrel, and as a convenient means for accomplishing this purpose, I have employed the following instrumentalities: 20 is a glue pot, 21 is an adhesive applying roll for directly applying adhesive to the paper web, and to prevent the adhesive spreading beyond the paper by an excess of the same, I prefer to form the applying roller 21 with points or projections 21b from its outer surface, so that the adhesive is applied to the paper at a large number of points, each of which is more or less isolated from the other,

whereby a minimum quantity of adhesive is applied while, at the same time insuring a thorough uniting of the preliminary layers or plies.

21a is a transfer roller which extends into the pot 20 and transfers adhesive from the pot to the points or projections on the roll 21 and which prints the adhesive in points or spots upon the paper web. The pot 20 is arranged to be moved toward and from the mandrel 13, and to accomplish this, I support the pot upon a lever 22 having a pivot or fulcrum point 23. The opposite end of the lever 22 is actuated by a cam 24 which, when in contact with the lever, causes the pot to be raised and the adhesive applied to the paper web about the mandrel.

The cam 24 is of such shape that it will hold the adhesive applying means in operative relation to the mandrel and the paper web being acted on thereby during a given number of preliminary rotating movements of the mandrel, and thereafter cause said means to remain out of action during the completion of the roll. The cam 24 may be rotated by a worm and worm wheel gearing 25 which, in turn, may be driven by a shaft 26, and said shaft driven from the shaft of cylinder 5 by suitable worm and worm wheel gearing 27. In this manner, the roll 21 is moved to apply adhesive to the web for a definite number of revolutions of the mandrel 13, (by way of example, thirty revolutions), and then be moved out of contact with the web for the remainder of the winding operation.

Referring to Fig. 6, showing an end view of the finished roll embodying my invention, 29 is the inner paper wrappings first formed on the mandrel by its rotation and suction and without the application of adhesive, 28 represents the core formed of the multiply wrappings in adhering association by the application of the adhesive, and 30 represents the outer wrappings of the web without the application of the adhesive and forming the roll of toilet paper proper.

As the core is formed from the web itself, there is no uncertainty as to its location, as is the case where the tubular cores previously made have to be positioned upon the mandrel, and, therefore, my invention lends itself excellently to the manufacture of commercial rolls where a number of said rolls are simultaneously wound upon the same mandrel after the parent web has been split into a plurality of webs of lesser width.

The character of the adhesive employed should be a quick drying one, and the amount of paper required to make the tubular structure is about one hundred and twenty-five inches and the core may be thirty ply or thereabout, but I do not limit myself to these proportions.

Considering my invention from the stand-

point of economy in the manufacture of roll toilet paper, the making of the core in the manner herein described eliminates the following costly and troublesome features heretofore existing; namely, the costly tube making machinery, the cost of special tube board, excessive quantities of glue and glue preparing apparatus, tube choppers, tube board slitters, intricate tube conveyors to roll machines, tube hoppers for containing the tubes for roll machines, and elimination of the operation of putting tubes on winding bars by the roll machine operators. My invention further causes less wear and tear on the winding bars or mandrels by eliminating the necessity of placing the bars on end into supporting sockets extending below the floor, and the elimination of the steel supporting floor sockets, also of the entire tube making and operating labor force, and in addition to the foregoing, the gain of the additional and cleaner factory floor space due to the elimination of all machinery connected with the making and handling of the tube elements.

Furthermore, it will be manifest that the simplicity of the above described method forming the subject matter of this application enables the commercial production of roll toilet paper at a considerably reduced cost and with a greater production.

No claim is made in this application to a roll of paper of the character herein described as an article of manufacture, as the said invention forms subject matter of a divisional application Serial No. 618,481, and filed June 21, 1932.

I have described my improved method and the article of manufacture produced thereby in connection with apparatus which I deem to be best suited to the requirements of the invention and on account of economy is preferred in commercial practice, but I do not restrict or confine myself to the minor or secondary details either as to the method of procedure or the means employed in putting it into effect, as variations therein may be resorted to as matters for the skilled artisan without a departure from the spirit of the invention.

Having now described my invention, what I claim and desire to secure by Letters Patent is:

1. In means for forming an integral core and roll of paper, the combination of a mandrel upon which a web of paper is wound into a roll, with adhesive applying means movable toward and from the mandrel and having means for holding the said adhesive applying means in position for applying adhesive to the web of paper being wound upon the mandrel, whereby a limited quantity of the web may be wound upon itself in adhering relation to form a multiply core and the remainder of the web continued to be wound without adhesive about the said core,

and wherein further, the mandrel is provided with means for holding the beginning of the web to itself during the initial rotation movement prior to the application of the adhesive, whereby the mandrel is protected against being cemented to the paper.

2. In means for forming an integral core and roll of paper, the combination of a mandrel upon which a web of paper is wound into a roll, with adhesive applying means movable toward and from the mandrel and having means for holding the said adhesive applying means in position for applying adhesive to the web of paper being wound upon the mandrel, whereby a limited quantity of the web may be wound upon itself in adhering relation to form a multiply core and the remainder of the web continued to be wound without adhesive about the said core, and wherein the mandrel is made collapsible whereby it may be readily withdrawn from the finished paper roll, said mandrel provided with suction apertures about its circumference so that the paper web may be initially attached to the mandrel to enclose the same before the adhesive is applied to the paper web.

In testimony of which invention, I hereto set my hand.

PATRICK J. MULLIGAN.