

Aug. 25, 1936.

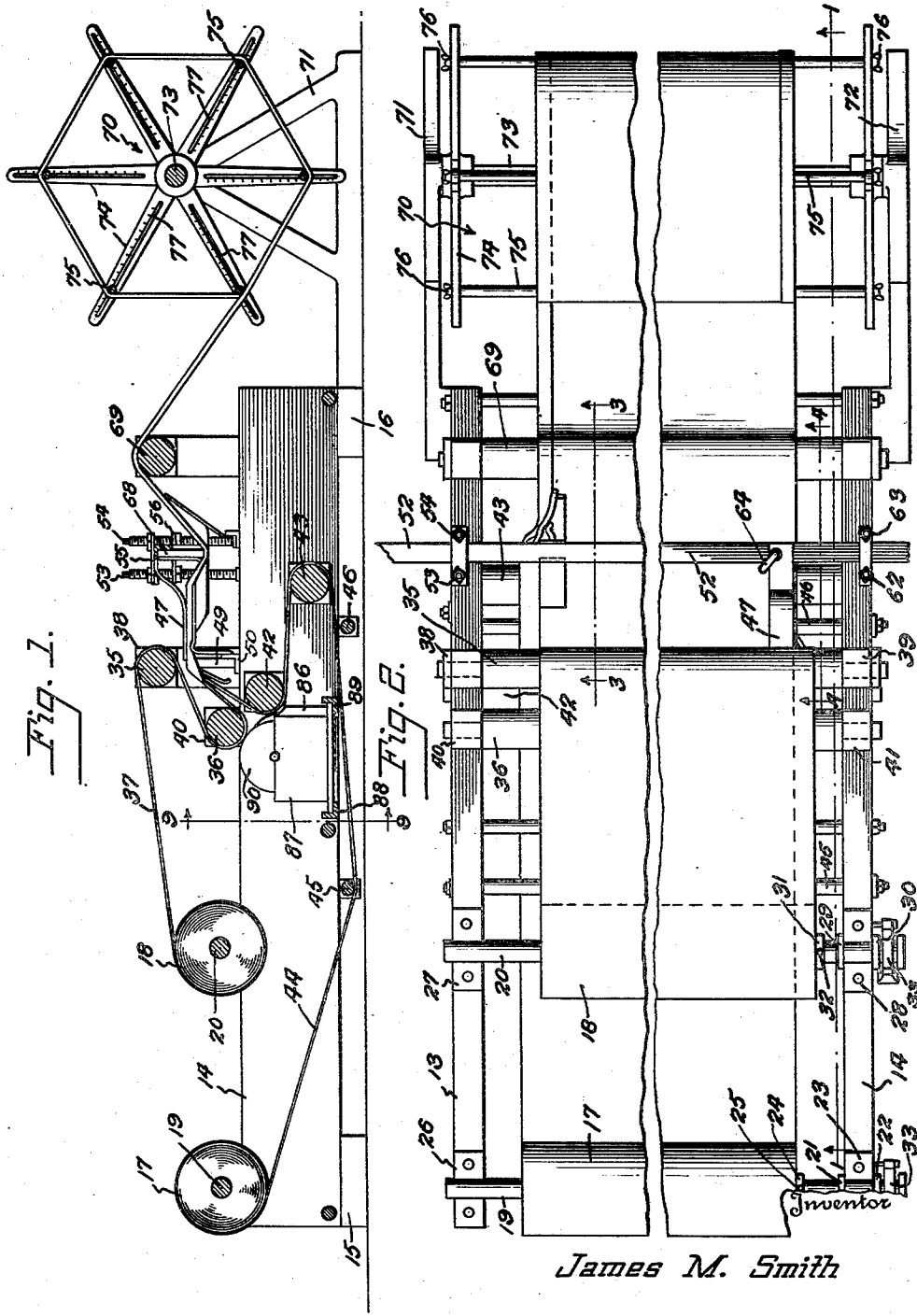
J. M. SMITH

2,052,494

APPARATUS FOR FORMING PAPER TUBING

Filed Dec. 9, 1935

4 Sheets-Sheet 1



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APPARATUS FOR FORMING PAPER TUBING

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4 Sheets-Sheet 2

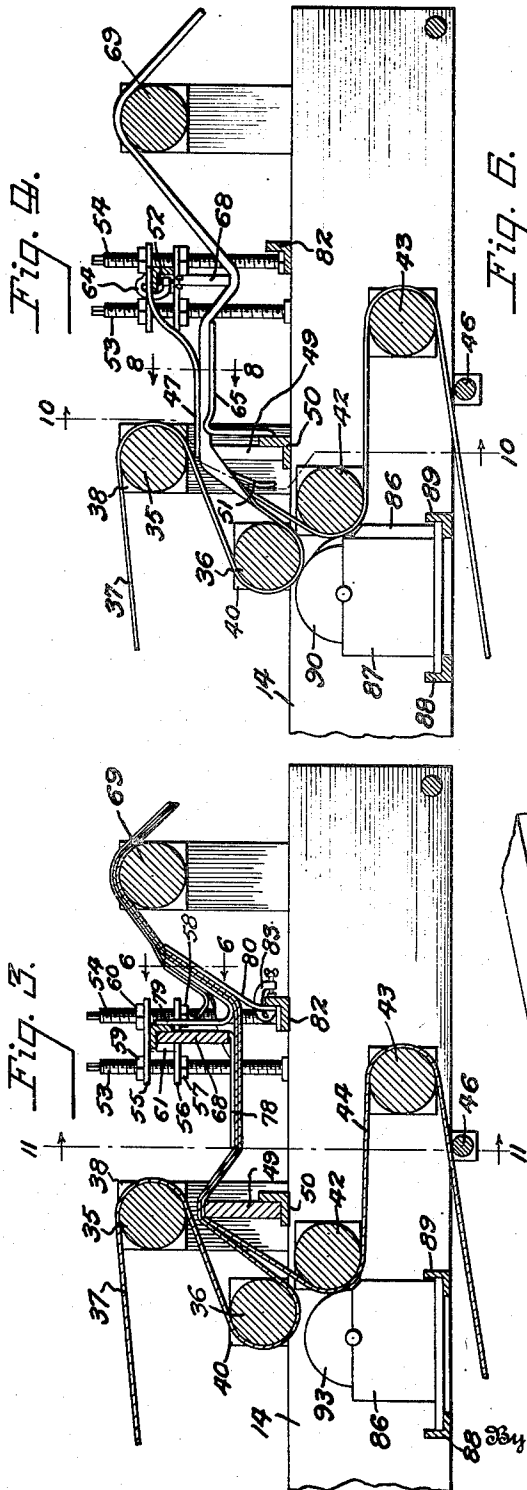
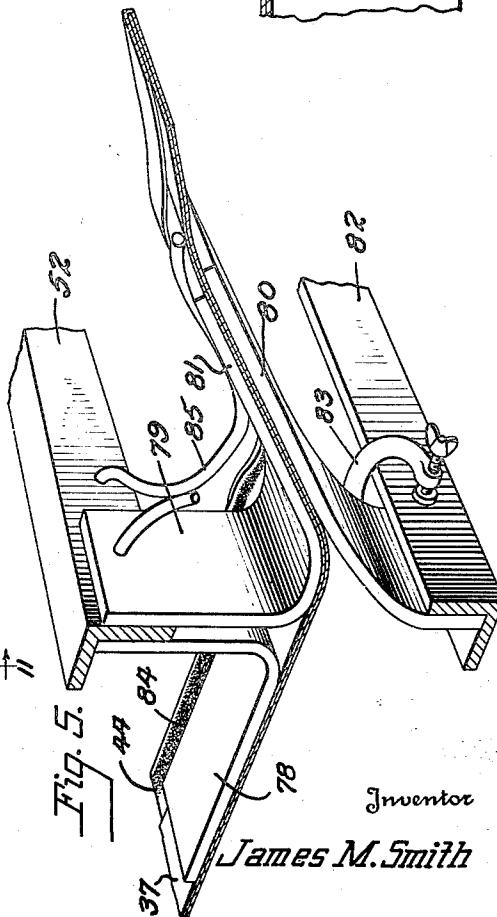


Fig. 5.



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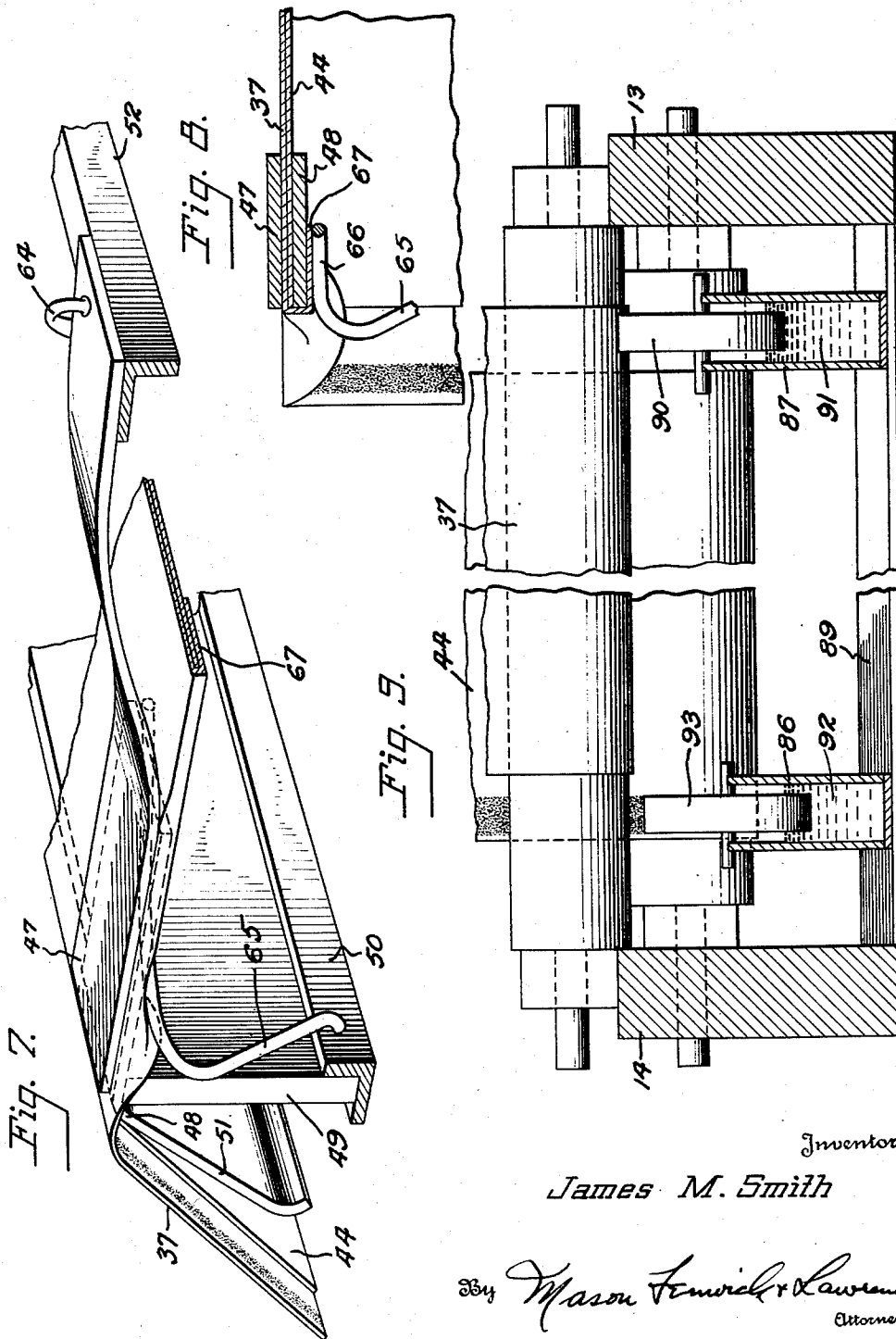
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APPARATUS FOR FORMING PAPER TUBING

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4 Sheets-Sheet 3



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4 Sheets-Sheet 4

Fig. 10.

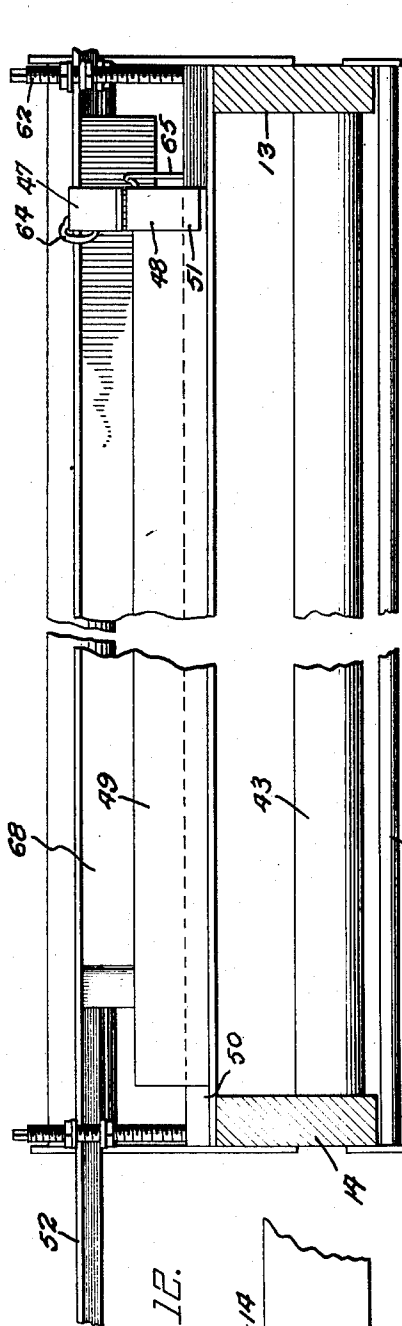


Fig. 12.

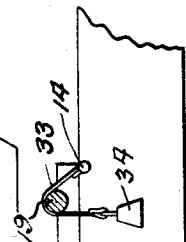
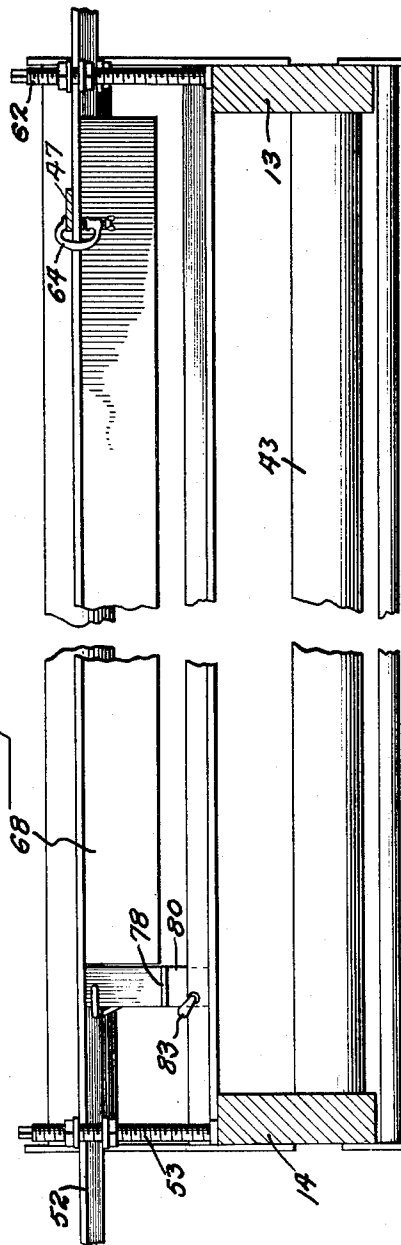


Fig. 11.



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UNITED STATES PATENT OFFICE

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APPARATUS FOR FORMING PAPER TUBING

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Application December 9, 1935, Serial No. 53,638

3 Claims. (Cl. 93—82)

This invention relates to an apparatus for manufacturing paper tubing in any desired lengths, and for measuring and separating any desired length of tubing into any number of smaller tubes of equal length.

The apparatus for carrying out the invention comprises a framework for rotatably supporting two laterally adjustable rolls of paper of equal width, along with mechanism for applying adhesive to the projecting edges of the paper forming the plies of the tubing.

The apparatus aforesaid also includes a measuring reel for drawing the tubing through the folding and pasting mechanism, whereby any desired length of tubing may be measured on the reel itself; and whereby any desired numbers of plies of the finished tubing may be wound on the reel and then cut or subdivided into smaller tubes of a predetermined length while mounted on the reel itself.

Other objects of the invention will become apparent as the detailed description thereof proceeds.

In the drawings:

Figure 1 is a vertical section taken on the line 1—1 of Figure 2;

Figure 2 is a plan view of the apparatus embodying this invention, and illustrated in vertical section in Figure 1;

Figure 3 is a fragmentary vertical section to an enlarged scale, taken on the line 3—3 of Figure 2;

Figure 4 is a fragmentary vertical section to an enlarged scale, taken on the line 4—4 of Figure 2;

Figure 5 is a fragmentary perspective illustrating details of the apparatus designed to turn one edge of a ply of paper over the edge of a superposed ply;

Figure 6 is a vertical transverse section taken on the line 6—6 of Figure 3;

Figure 7 is a fragmentary perspective to an enlarged scale, illustrating mechanism for turning one edge of an upper layer of paper under the edge of the lower ply;

Figure 8 is a fragmentary vertical section taken on the line 8—8 of Figure 4;

Figure 9 is a vertical transverse section taken on the line 9—9 of Figure 1;

Figure 10 is a vertical transverse section taken on the line 10—10 of Figure 4;

Figure 11 is a vertical transverse section taken on the line 11—11 of Figure 3; and

Figure 12 is a fragmentary detail of a brake

for retarding the rotation of the shafts supporting the paper rolls.

Referring to the drawings, in which similar parts are designated by like numerals:

The reference numerals 13 and 14 designate parallel runners which form the main supports for the various shafts and other mechanism constituting this invention. These runners are supported at their opposite ends upon the cross members 15 and 16. The paper rolls 17 and 18 are mounted on shafts 19 and 20, respectively. The shaft 19 is provided with a pair of flanges 21 and 22, spaced apart at a distance equal to the width of the bearing block 23, which is suitably supported on the upper edge of the runner 14.

The flanges 21 and 22 engage the opposite side of the bearing block 23 to prevent axial movement of the shaft 19 with respect to the runners 13 and 14. A flange 24 is formed on the shaft 19 at a suitable distance from the flange 21 and forms a stop for the roll of paper 17. This flange 24 may be in the form of a collar adjustable lengthwise of the shaft 19, and adapted to be locked in position thereon by means of a set-screw 25. The shaft 19 from the collar 24 is free of obstruction in order to adapt the shaft to receive rolls of paper of different widths; and the free end of the shaft is mounted to rotate in a bearing block 26 suitably secured to the upper edge of the runner 13.

The shaft 20 is substantially the same as the shaft 19 and is mounted to rotate in bearing blocks 27 and 28, suitably secured to the upper edges of the runners 13 and 14, respectively. Flanges 29 and 30 cooperate with the opposite sides of the bearing block 28 to prevent axial movement of the shaft 20 with respect to the runners 13 and 14. A collar 31 adjustable on the shaft 20 and adapted to be locked in adjusted position by means of the set-screw 32 is used to position the roll 18 with respect to the roll 20 for the purpose of determining the width of the overlap of the opposite edges of the said rolls 17 and 18. In order to prevent continued rotation of the shafts 19 and 20 in the event of a break in the tube under construction, each of the said shafts is retarded by means of a belt 33 (see Figure 12) one end of which is suitably secured to a side of the runner 14. The belt is provided at its free end with a weight 34, and extends over the shaft 19, or 20 as the case may be, and operates to slow down rotation of said shaft to prevent overrunning thereof.

Guide rollers 35 and 36 for the upper ply of

paper 37 are mounted to rotate in standards 38, 39, 40 and 41, which extend up from the runners 13 and 14. Guide rollers 42 and 43 are suitably journaled for rotation in the runners 13 and 14 and below the upper edges thereof, to receive the ply 44 of paper from the roll 17. Idler rollers 45 and 46 are mounted for rotation in brackets secured to the lower edges of the runners 13 and 14 to direct the ply 44 clear of intervening mechanism onto the roller 43.

The plies of paper 37 and 44 extend around the rollers 36 and 42, respectively, and are brought into contact (see Figure 4) between plates 47 and 48 extending lengthwise of the machine. The plate 48 is suitably secured intermediate its ends to a cross bar 49, which in turn is suitably secured to an angle iron 50, the opposite ends of which are fixed to the upper edges of the runners 13 and 14. Part of the plate 48 extending rearwardly of the cross bar 49 is bent at an angle to the horizontal part thereof in order to form a guide for the ply 44 of the paper tube. This part, designated by the reference numeral 51, is further curved at its lower edge to form an arcuate guide surface for the ply 44.

The upper plate 47 extends over and parallel to the plate 48, and is curved upwardly at its forward end to rest upon and be clamped to the horizontal flange of an angle iron 52. The angle iron 52 is supported above the runner 13 by means of screwthreaded standards 53 and 54, extending through clamping plates 55 and 56. The standards are provided with nuts 57, 58, 59, and 60 adjustable to force the plates 55 and 56 into clamping engagement with the angle iron 52, a square block 61 being arranged in the angle between the flanges of the angle iron 52 and the lower plate 56 to prevent turning of the angle iron from proper position.

Above the runner 14, the other end of the angle iron 52 is supported by screwthreaded standards 62 and 63 on clamping plates similar in every respect to the clamping plate arrangement illustrated in Figures 3 and 4. The upper plate 47 is detachably secured to the angle iron 52 by means of the clamp 64. It will be noted that the angle iron 52 may be adjusted transversely of the machine and between the clamping plates on the screwthreaded standards. In this case the plate 47 must be brought back into position over the plate 48, and this can be done only by providing some sort of detachable clamping means, such as the clamp 64.

In order to turn the edge of the upper ply 37 around the edge of the lower ply 44, a suitably shaped rod 65 of spring material is secured to the angle iron 50. The upper part of the spring 65 extends diagonally across and under the plate 48. This upper part 66 holds the turned under part 67 of the ply 37 against the lower face of the plate 48. When the ply 37 and ply 44, in contact with each other, emerge from contact with the plate 48 and spring 67, they pass together under a cross bar 68 which is suitably secured at its upper edge to the vertical flange of the angle iron 52.

As shown in Figure 4 of the drawings, the plies 37 and 44 with the turned under edge 67 are drawn under the lower edge of the cross bar 68. From the cross bar 68 the plies of paper forming the tube are drawn over a roller 69 rotatably mounted on standards extending upwardly from the runners 13 and 14. The finished tube is drawn through the apparatus just described by means of the adjustable reel 70, mounted to ro-

tate in standards 71 and 72, suitably secured to the floor or platform adjacent the tube-forming mechanism. The reel may be driven by any suitable source of power (not shown herein).

The reel comprises a shaft 73 mounted for rotation in the standards 71 and 72. At opposite ends of the shaft 73 the slotted radial arms 74 extend, and are each provided with scales extending along the slot to facilitate the adjustment of the cross bars 75 which form the supporting bars for the finished paper tube. The opposite ends of each of the bars 75 are screw threaded to receive wing nuts 76 for the purpose of securing said cross bars in adjusted position in the slots 77 of the radial bar.

The reel 70 forms in effect a measuring device for determining the length of the separate tubes into which the longer tube may be divided. For example, if all the cross bars 75 be adjusted to the same distance in their respective radial bars 20 relative to the shaft 73, a complete rotation of the reel will determine the length of the tube wound thereon. In the operation of the machine it is customary to wind any desired number of layers of tubing on the reel, and then cut through all the layers along one of the cross bars to divide the tubing into any desired number of shorter lengths.

So far the description has taken care of the turning of one edge of the upper layer 37 around the adjacent edge of the lower layer 44. It will be apparent from an inspection of Figure 2 of the drawings that the roll 17 has been displaced axially with respect to the roll 18 in order to provide the turned under portion 67 of the upper layer 37.

Where the rolls are of the same width, the lateral displacement of the roll 17 with respect to the roll 18 also provides the overlap for the other edge of the ply 37. Figure 4 of the drawings shows the mechanism for turning the edge of the ply 37 over the adjacent edge of the ply 44, while Figure 3 illustrates the mechanism for turning the edge of the lower ply 44 over the adjacent edge of the upper ply 37. The superposed plies 37 and 44 pass over the upper edge of the cross bar 49 and under the horizontal flange 78 of an angle plate suitably secured to the vertical flange of the angle iron 52. It will be noted from Figure 3 of the drawings that the lower edge of the cross bar 68 is out of contact with the paper tube at that part thereof where the ply 44 projects beyond the edge of the ply 37.

The projecting part of the ply 44 is turned over the adjacent edge of the upper ply 37 by means of the mechanism illustrated particularly in Figures 5 and 6. In these figures the rear face of the vertical flange of the angle iron 52 is shown as supporting a plate 79 which extends downwardly to contact with the upper face of the upper ply 37. The plate 79 is then bent upwardly at an angle to direct the tubing onto the roller 69. The plies 37 and 44 are held in contact with each other during this movement toward the roller 69 by means of a plate 80, which for the greater part of its length is parallel with the upwardly inclined part 81 of the plate 79.

The lower end of the plate 80 is curved downwardly to rest against the vertical flange of an angle iron 82 which extends across the runners 13 and 14 and is suitably secured thereto at its opposite end. Since this plate 80 may require adjustment lengthwise of the angle iron 82, its connection with the vertical flange of the angle iron must be capable of adjustment. Therefore, a 75

clamp 83 is used to connect the plate 80 detachably and adjustably to the vertical flange of the angle iron 82.

The pasted projecting edge 84 of the lower ply 44 is turned over the plate 81 by means of the springy rod 85 suitably shaped and secured to the flange of the angle iron 52 to perform this function. As the superposed layers or plies 37 and 44 emerge from the space between the plates 80 and 81, the edge 67 of the upper ply 37 has been turned under the adjacent edge of the lower ply 44, and the other edge of the ply 44 has been turned over the adjacent edge of the upper ply 37. The final pressure for causing these turned edges to adhere to the adjacent plies is effected by the passage of the tubing over the roller 69.

As shown in Figure 9 of the drawings, the adhesive for the tubing is provided by means of containers 86 and 87 which are suitably supported by angle irons 88 and 89, extending between the runners 13 and 14. The container 87 is provided with a disc 90 rotatably mounted on the upper edge of the container and dipping into the adhesive 91 in the container 37. The edge of the disc 90 is maintained in contact with the roll 36, or rather the ply 37 coming from the roll 18. The adhesive 92 from the container 86 is applied to the projecting edge of the ply 44 by means of a disc 93 rotatably mounted on the upper edges of the container 86, and dipping into the said adhesive 92. This arrangement is fully shown in Figure 9 of the drawings and its operation will be obvious from inspection thereof.

Numerous variations may doubtless be devised by persons skilled in the art without departing from the principles of my invention. I, therefore, desire no limitations to be imposed on my invention, except such as are indicated in the appended claims.

What I claim is:

1. In a paper tube making machine, a supporting frame, a pair of shafts mounted to rotate about parallel axes on said frame, stops adjustable axially on said shafts and adapted to position rolls of paper substantially of equal width relatively on said shafts to provide overlapping edges, means for moving the sheets of paper

along said frame from said rolls in superposed relation to each other, and means for lapping and securing one edge of each sheet around the adjacent edge of the other sheet during their movement along the frame.

2. In a paper tube making machine, a supporting frame, a pair of shafts spaced apart and mounted to rotate about parallel axes on said frame, stops adjustable axially on said shafts, and adapted to position rolls of paper of substantially equal widths relatively displaced on said shafts to provide one edge of each roll overhanging the edge of the other roll, means for moving the sheets of paper along said frame from said rolls in superposed relation to each other, means for applying adhesive to the overhanging parts of said sheets during the movement thereof along said frame, means for turning the overhanging edge of each sheet around the adjacent edge of the other sheet after the application of adhesive, and means for pressing the overturned edge of each sheet against the obverse face of the other sheet.

3. In a paper tube making machine, a supporting frame, a pair of shafts spaced apart and mounted to rotate about parallel axes on said frame, stops adjustable axially on said shafts, and adapted to position rolls of paper of substantially equal widths relatively displaced on said shafts to provide one edge of each roll overhanging the edge of the other roll, means for moving the sheets of paper along said frame from said rolls in superposed relation to each other, means for applying adhesive to the overhanging parts of said sheets during the movement thereof along said frame, means for turning the overhanging edge of each sheet around the adjacent edge of the other sheet after the application of adhesive, means for pressing the overturned edge of each sheet against the obverse face of the other sheet, said turning means comprising a pair of plates spaced apart parallel to each other to receive and press between them the superposed sheets, and means in contact with one of said plates for turning the overhanging edge of one of said sheets around the adjacent edge of the other sheet.

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