

June 30, 1936.

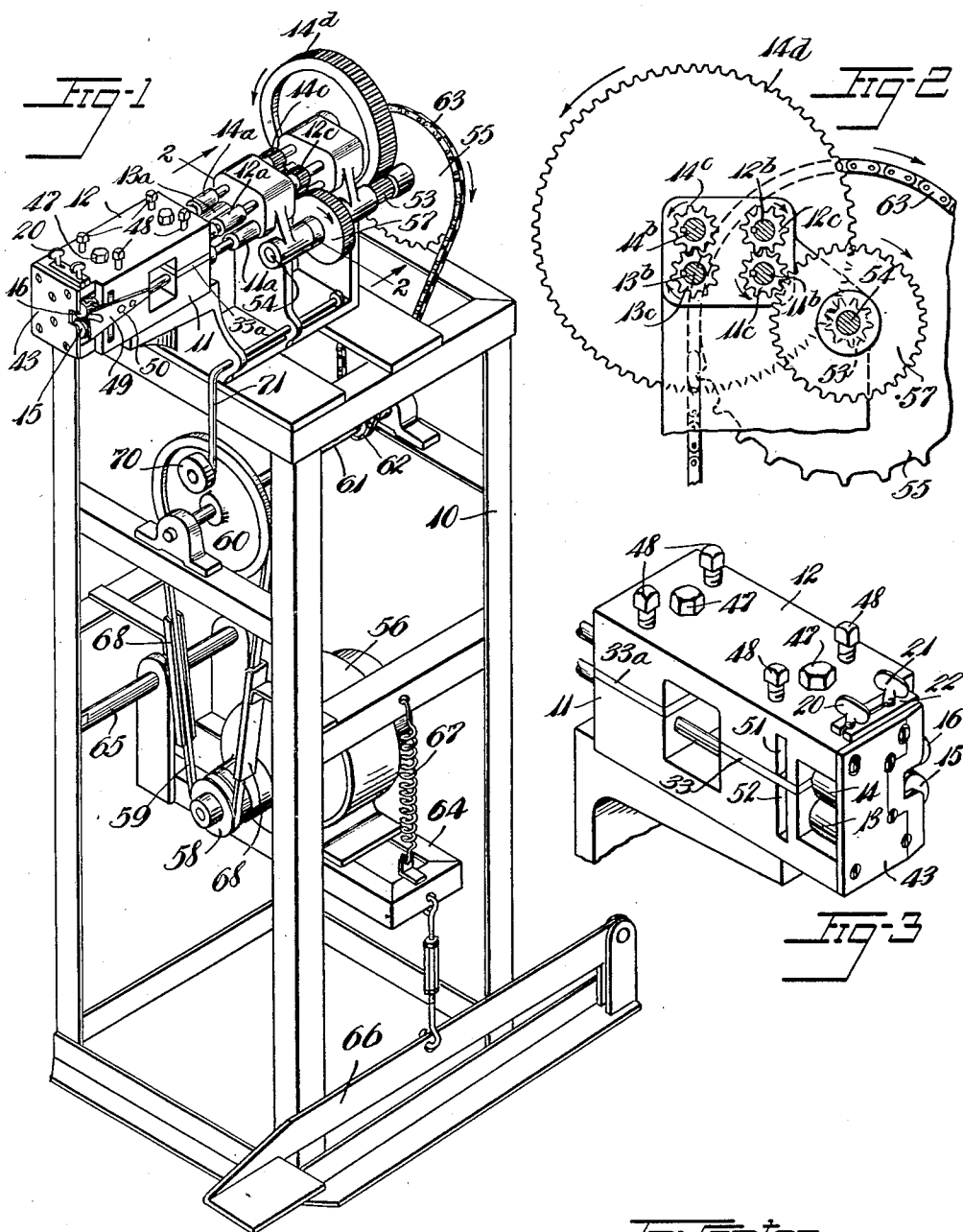
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MARGIN COATING METHOD AND APPARATUS

Filed Feb. 9, 1934

3 Sheets-Sheet 1



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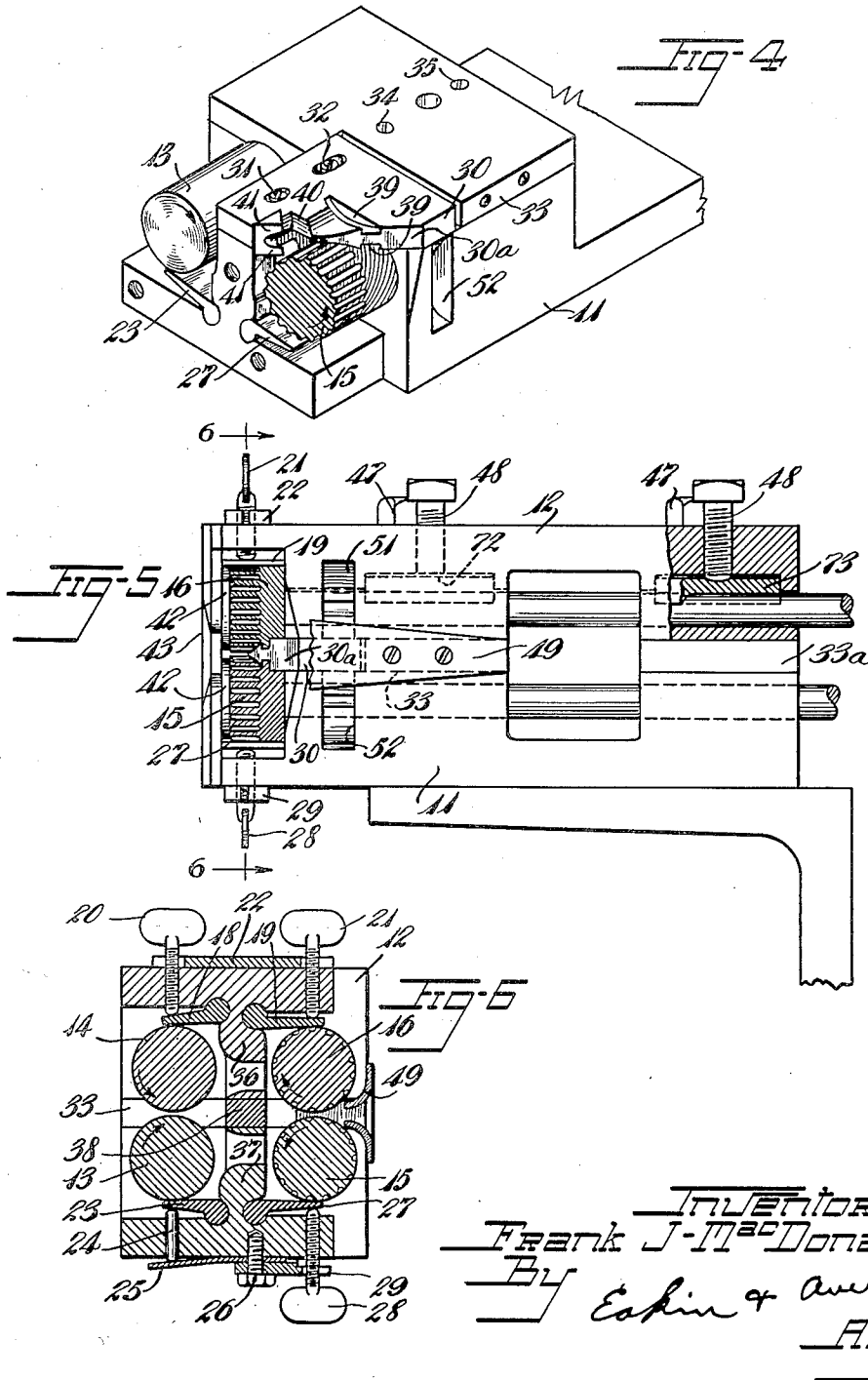
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MARGIN COATING METHOD AND APPARATUS

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3 Sheets-Sheet 2



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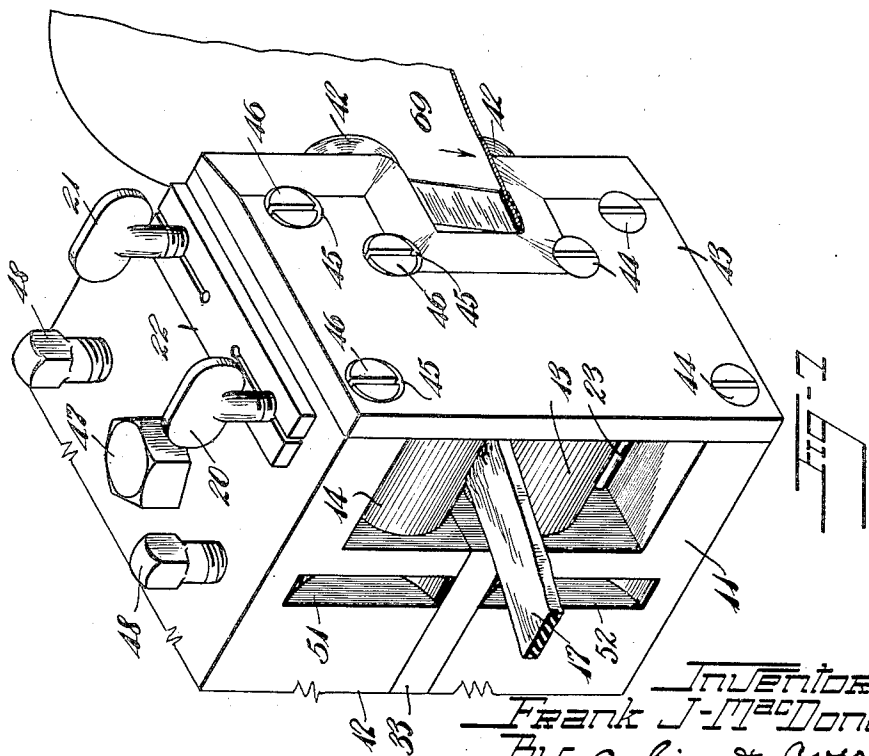
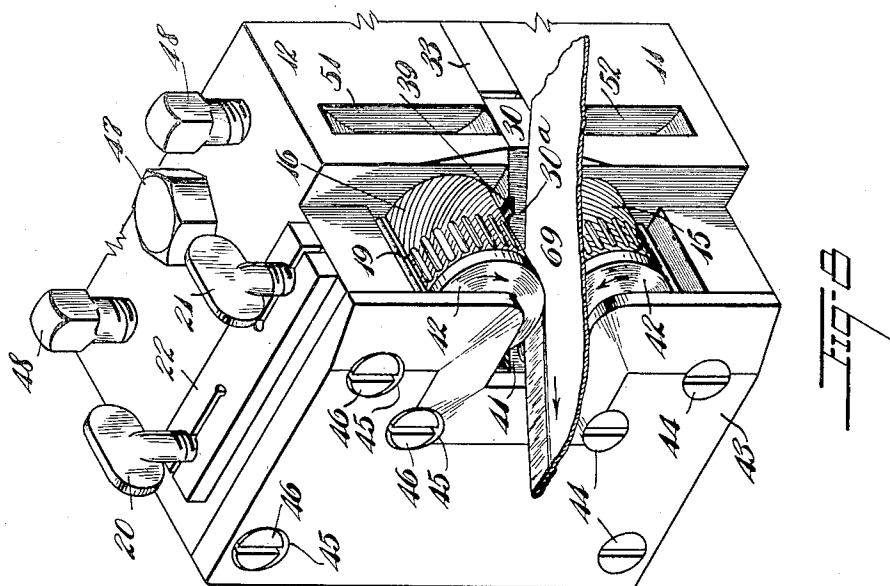
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MARGIN COATING METHOD AND APPARATUS

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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MARGIN-COATING METHOD AND APPARATUS

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11 Claims. (CL 91—48)

This invention relates to methods and apparatus for applying a coating of a plastic material such as an unvulcanized rubber composition to the margin of a piece or strip of sheet material such as fabric, as in the production of rubber footwear or the like.

Its chief object is to provide for coating the material without the several disadvantages such as expense, fire hazard, messiness, and discomfort to workmen which are inherent in the use of solvent rubber cements, or the expense, delay for drying, coagulation problems and other disadvantages incident to the use of an aqueous dispersion of rubber for the coating material.

Further objects are to provide for quick change from one type of coating composition to another in the same apparatus, to provide for quick and simple resumption of operation after a shut down, and to provide simplicity, economy and compactness of apparatus for performing the operation.

Of the accompanying drawings:

Fig. 1 is a perspective view of a machine embodying and adapted for the practice of my invention in its preferred form.

Fig. 2 is a diagram of certain elements of the gearing of the machine.

Fig. 3 is a perspective view of a portion of the machine as viewed from a position at the left of Fig. 1.

Fig. 4 is a perspective view of parts of the machine, exposed by removal of other parts, from the same viewpoint as that of Fig. 1, but on a somewhat larger scale.

Fig. 5 is a front elevation of a pair of miniature frictioning rolls and parts closely associated therewith.

Fig. 6 is a section of the work-manipulating elements and adjacent parts, on line 6—6 of Fig. 5.

Fig. 7 is a perspective view of parts of the machine from the same viewpoint as that of Fig. 3 but on a larger scale and with the work in place.

Fig. 8 is a perspective view from the same viewpoint as that of Fig. 1 but on a larger scale and with the work in place.

Referring to the drawings, the machine of the preferred embodiment here shown comprises a frame 10 upon which is mounted, in suitable journal blocks 11, 12, the trunnions or shafts of a pair of in-feeding rolls 13, 14, adapted to be driven in opposite directions as indicated by the arrows in Fig. 6, and a pair of oppositely rotating frictioning rolls 15, 16, which preferably have rough surfaces as shown, the four rolls and adjacent parts of the apparatus defining a pressure and

roll-coating chamber for a rubber composition 17 (Fig. 7) fed into it, in strip form, by the in-feeding rolls 13, 14. The adjacent parts for maintaining the chamber substantially closed comprise flap members 18, 19 pivoted in the upper journal block 12 and held in close association with the upper rolls 14 and 16 respectively by set-screws 20, 21 threaded through a slotted lock member 22 and through the upper journal member; a pair of flap members 23 pivoted in the lower journal block 11 and held yieldingly in close association with the lower infeeding roll 13 by a plunger 24 slidably mounted in a through guideway in the lower journal member and backed by a flat spring 25 (Fig. 6) attached to the journal member by a screw-bolt 26, so that excess pressure in the chamber will be relieved by stock passing entirely around the in-feeding roll 13 and back into the in-feeding bank of stock; a flap member 27 pivoted in the lower journal block 11 and held in close association with the lower frictioning roll 15 by a set-screw 28 threaded through a lock member 29 and through the lower journal member; a fabric guiding plate 30 fitted between the upper and lower journal blocks 12, 11 and secured to the latter by screws 31, 32 (Fig. 4); and spacer plates 33, 33^a mounted between the upper and lower journal blocks 12, 11 and secured to the latter by screws 34, 35 (Fig. 4).

The upper and lower journal blocks 12, 11 are formed with apertured flanges 36, 37 (Fig. 6) extending into the pressure chamber and together constituting a two-apertured extrusion nozzle within the chamber for effecting a desirable mixing and compacting of the stock in conducting it to the frictioning rolls 15, 16. Between the two adjacent faces of the apertured flanges 36, 37 is mounted the adjacent margin 38 of the fabric guiding plate 30, which is secured to the lower journal block 11 by screws 31, 32, (see Figs. 4 and 6), the screws being mounted in slots in the plate 30 for convenient sliding adjustment of the fabric-guiding plate lengthwise of the rolls for coating marginal zones of different widths.

The fabric-guiding plate 30, extending between the frictioning rolls 15, 16, is formed with a fabric-guiding face 30^a disposed obliquely, at about 45°, to the axis of the rolls, in position to contact the edge of a piece of fabric presented to the rolls, to divert the fabric and compel it to move in a course along the said face, the roughening of the surfaces of the frictioning rolls preferably being in the form of helical corrugations so disposed as to have a component of force upon the fabric lengthwise of the rolls by reason of the

resistance of the guiding face 30^a to movement of the fabric at right angles to the axes of the rolls, directly into their bight, and the outer end portions of the rolls are formed with lengthwise corrugations for spreading and compacting the ridges of stock which are frictioned onto the fabric by the helical corrugations.

To permit excess of stock on the surfaces of the frictioning rolls to be carried back into the pressure chamber by the force of the rotating rolls the fabric-guiding plate 30, elsewhere closely fitting the surfaces of the rolls, is grooved as at 39, 39 and vertically slotted at 40 (Fig. 4) and beyond the slot 40 is provided with upper and lower guide-projections 41, 41 defining between them a guide groove the floor of which is in effect an extension of the fabric-guiding surface 30^a of the plate.

Discs 42, 42 are provided upon the ends of the frictioning rolls for wiping back into the pressure chamber excess gum passing off the ends of the frictioning faces of the rolls and a closure plate 43 is secured firmly to the lower journal block 11 by screws 44, 44 and formed with adjustment slots 45, 45 (Figs. 7 and 8) for screws 46, 46 mounted in the slots and threaded into the upper journal block 12, the slots permitting the use of spacer plates 33 of different thicknesses, the upper journal blocks being held down upon the lower by screw bolts 47, 47.

The shafts or trunnions of the in-feeding rolls and the frictioning rolls are journaled with substantial tolerance in the journal blocks and for adjusting the distance between each upper roll and its lower roll screw-bolt 48, 48 are threaded through the upper journal block to bear against the upper roll's shaft or trunnion, preferably through the medium of the upper halves of split bushings or journal blocks 72; 73.

A slotted guide plate 49 (Figs. 1 and 6) may be secured to the front edge face of the spacer plate 33 by screws 50, 50 (Fig. 1) for guiding the fabric to the frictioning rolls.

To permit the escape of such stock as works into the bearings of the rolls the upper journal block is slotted from its exterior to its bearing apertures as at 51, 51 and the lower journal block is similarly slotted at 52, 52.

The shafts of the in-feeding rolls 13, 14 are connected by universal joint couplings 13^a, 14^a with respective shafts 13^b, 14^b (Figs. 1 and 2) and the upper shaft, 14^b, has secured thereon a drive pinion 14^c meshed with a driven pinion 13^c on the shaft 13^b, the shaft 14^b being adapted to be driven by a gear 14^d mounted on its far end and meshed with a pinion 53 which is secured on the same shaft 54 with a sprocket 55 which has drive connection with a motor 56. Also secured upon the shaft 54 is a gear 57 adapted to drive the lower frictioning roll 11 through a pinion 11^c secured upon a shaft 11^b connected by a universal joint coupling 11^a with the trunnion of the frictioning roll, and the pinion 11^c is meshed with a pinion 12^c secured upon a shaft 12^b connected by a universal joint coupling 12^a with the trunnion of the upper frictioning roll 16. The gear ratios, as shown, are such that the frictioning rolls run at much higher speed than the in-feeding rolls, for rapid coating of the fabric, a relatively slow rotation of the in-feeding rolls being sufficient to maintain a suitable pressure of the stock in the chamber. The frictioning effect of the rolls 15 and 16, of equal size and rotating at equal speed, is the result of the retarding and diverting effect of the guiding face 30^a of the

plate 30 and the wiping effect of the helical and longitudinal corrugations on the rolls, but the rolls are found to be highly effective for wiping the stock into the fabric with uniformity of gauge and good adhesion as well as rapid operation.

The drive from the motor 56 to the sprocket 55 preferably comprises a V grooved pulley 58 on the motor shaft, a V belt 59 connecting it with a V grooved pulley 60 secured upon a shaft 61, a sprocket 62 upon the shaft, and a sprocket chain 63 running therefrom to the sprocket 55. The motor is mounted upon a base 64 which is hinged upon a shaft 65 and adapted to be depressed by a treadle 66, against the force of a pull spring 67, for driving the machine, and adapted to be raised by the spring, upon release of the treadle, for slacking the belt and thereby stopping the drive. Belt guides 68, 68 are provided for controlling the behavior of the belt when it is running slack so as not to drive the machine.

As the mode of operation of the machine has been brought out in the foregoing description, it is believed that it will be sufficient to say that successive pieces of the fabric, one of which is shown at 69 in the process of being coated along its margin, are presented to the rolls by the operator, permissibly while the machine is continuously driven, and that the coaction of the frictioning rolls and the guide face 30^a causes the fabric margin to be fed obliquely of the rolls' axes, along the face 30^a and to be given a friction coating of the rubber composition on both of its faces, with very gratifying attainment of the objects above set out.

A rubber cleaner roll 70 (Fig. 1) is loose-journaled upon a crank arm portion of a bent rod 71 which is rotatably mounted in the framing of the machine, so that the cleaner roll can be readily brought into engagement with either one of the frictioning rolls for cleaning them at the end of a run or in preparation for changing from one rubber composition to another.

The coaction of the frictioning rolls 15, 16 and the fabric-guiding member 30 is such that the fabric margin is automatically guided as well as driven in proper relation to them and the margin is coated throughout a zone of uniform width even though the margin be of very irregular curvilinear shape, it being necessary for the operator only to start the fabric between the rolls.

Modifications are possible within the scope of the invention as defined in the appended claims.

I claim:

1. The method of progressively applying a coating to a piece of sheet material which comprises feeding the piece in a determinate direction while frictioning the coating material onto the piece simultaneously across a zone of substantial width by a wiping action transverse to the direction of the feeding movement of the piece and utilizing the resistance of the piece to the wiping action to maintain the piece in its path of movement.

2. The method of progressively applying a coating to a piece of sheet material which comprises progressively applying to the piece forces so directed at an angle to each other and in the plane of the piece as to have as their resultant a forward feeding force upon the piece, while frictioning the coating material onto the piece in the application thereto of one, at least, of the said forces.

3. Apparatus for applying a coating to a piece of sheet material, said apparatus comprising an

abutment for an edge face of the piece and means for propelling the piece past the said abutment by a wiping action transverse to the movement of the strip, said propelling means being adapted to friction the coating material onto the piece.

4. Apparatus for applying a coating to a piece of sheet material, said apparatus comprising an abutment for an edge face of the piece, means for propelling the piece past the said abutment by a wiping action transverse to the movement of the strip, and means for applying the coating material to the said propelling means.

5. Apparatus for applying a coating to a piece of sheet material, said apparatus comprising means for applying to the piece forces so directed at an angle to each other in the plane of the piece as to have as their resultant a forward feeding force upon the piece, and pressure means for supplying coating material to at least one of the said force applying means.

6. Apparatus for applying a coating to a piece of sheet material, said apparatus comprising a pair of rolls and means for compelling a piece of the material passed between the rolls to have a component of motion lengthwise of the rolls.

7. Apparatus for applying a coating to a piece

of sheet material, said apparatus comprising a pair of rolls, means for compelling a piece of the material passed between the rolls to have a component of motion parallel to the rolls, and means for supplying a plastic rubber composition to at least one of the rolls.

8. Apparatus for applying a coating to a piece of sheet material, said apparatus comprising a chamber having a pair of rolls constituting in effect a wall thereof, a guide member so disposed between the rolls as to compel a piece of material fed between them to have a component of motion lengthwise of the rolls, and means for maintaining under pressure a mass of coating material in said chamber.

9. Apparatus as defined in claim 8 in which at least one of the rolls is formed with helical corrugations.

10. Apparatus as defined in claim 8 in which at least one of the rolls is formed with helical corrugations in a part of its length and with longitudinal corrugations in another part of its length.

11. Apparatus as defined in claim 8 in which the means for maintaining the mass under pressure is a pair of in-feeding rolls.

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