Sept. 18, 1934. F. D. FOWLER 1,974,209

METHOD OF FORMING ARTICLES OF RUBBER MATERIAL

Filed Nov. 8, 1932 3 Sheets-Sheet 1

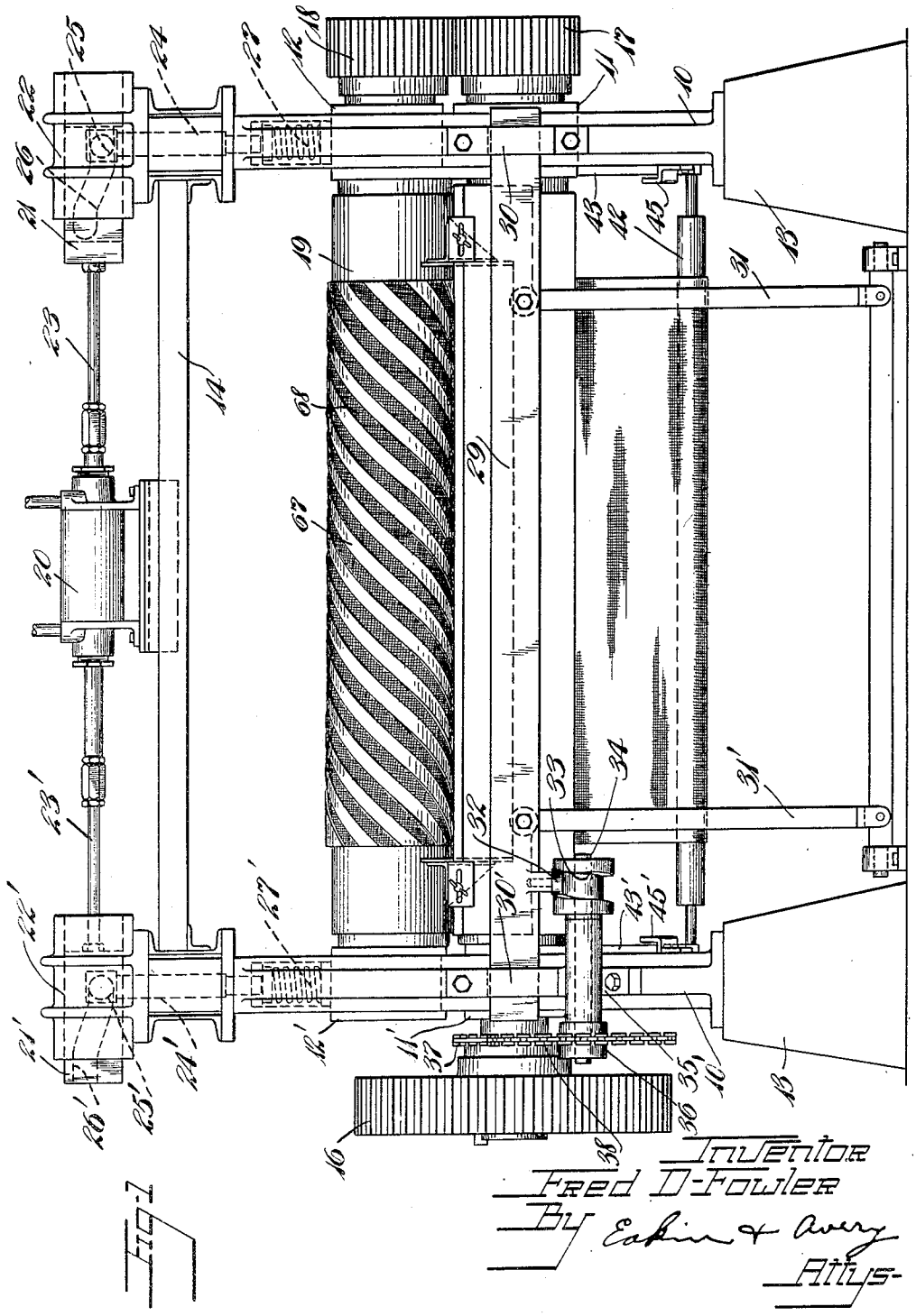


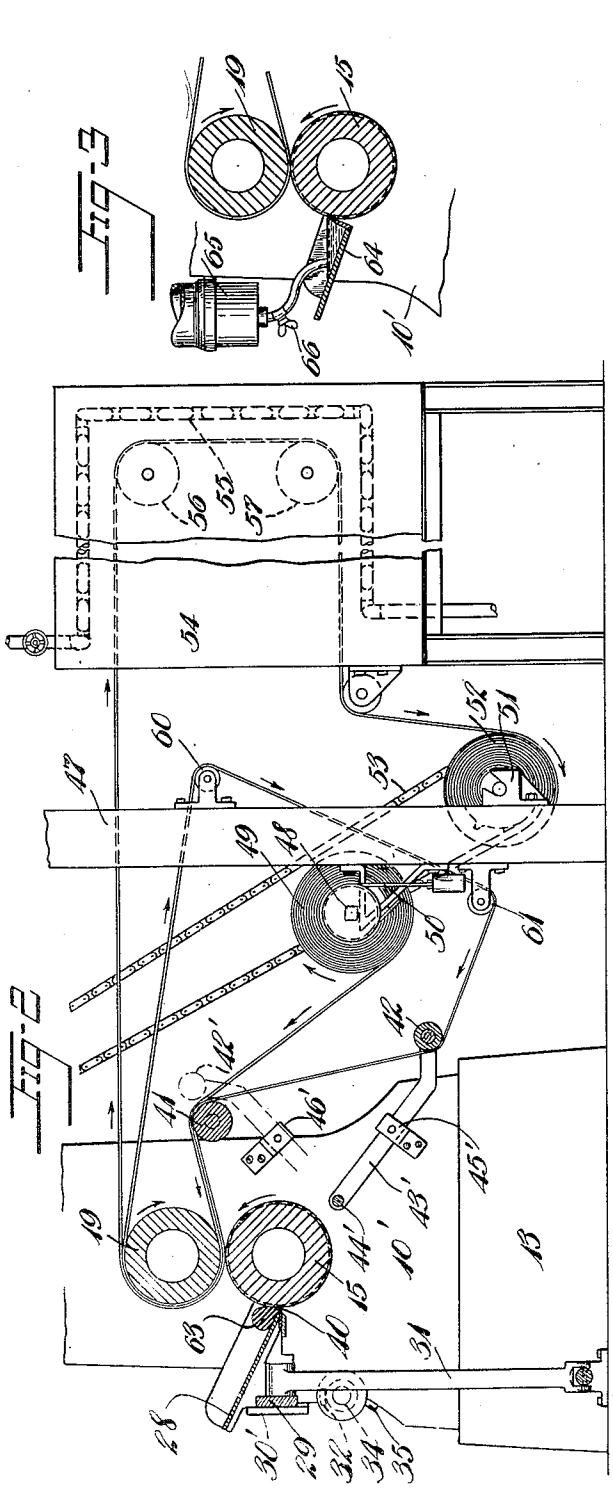
Fig. 1.

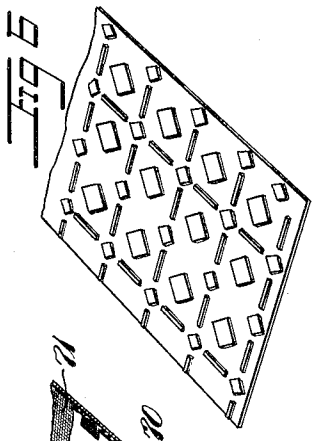
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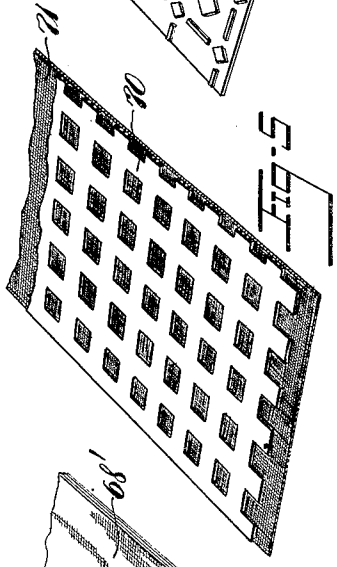
Sept. 18, 1934. F. D. FOWLER 1,974,209

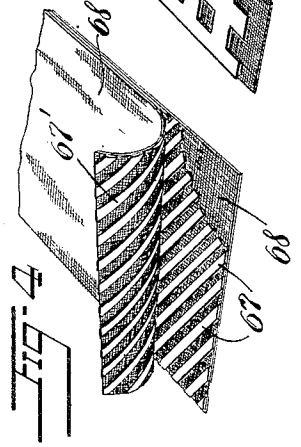
METHOD OF FORMING ARTICLES OF RUBBER MATERIAL

Filed Nov. 8, 1932 3 Sheets-Sheet 2









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Sept. 18, 1934. F. D. FOWLER 1,974,209

METHOD OF FORMING ARTICLES OF RUBBER MATERIAL

Filed Nov. 8, 1932 3 Sheets-Sheet 3

Fig-1

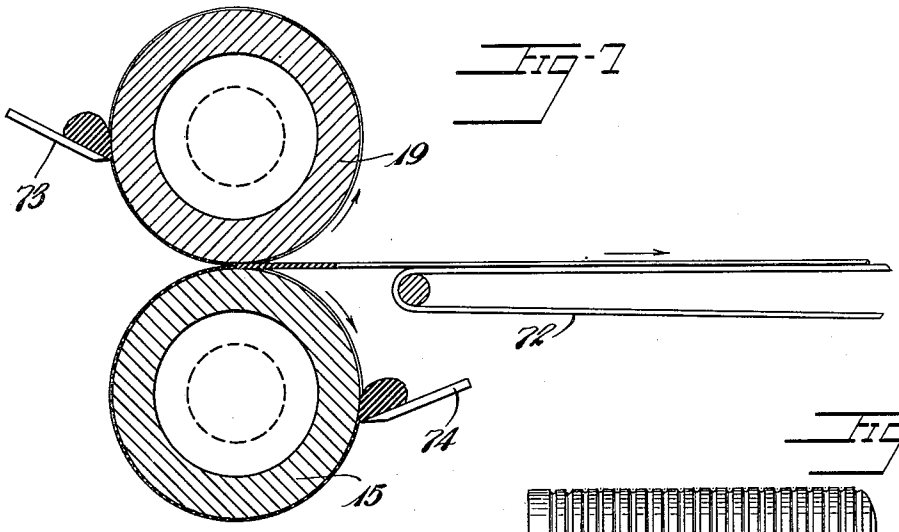


Fig-8

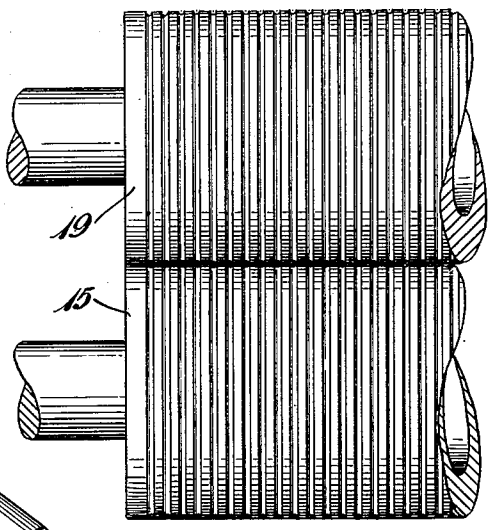
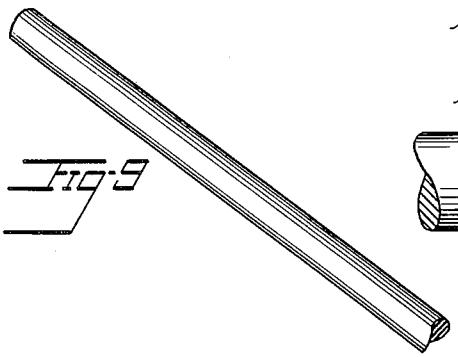


Fig-9



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UNITED STATES PATENT OFFICE

1,974,209

METHOD OF FORMING ARTICLES OF RUBBER MATERIAL

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Application November 8, 1932, Serial No. 641,702

2 Claims. (Cl. 154—2)

This invention relates to apparatus for and methods of forming articles of rubber, and is especially useful in the production of compound fabrics for use in the construction of garments and shoes and in the production of rubber thread.

The principal objects of the invention are to provide simplicity, economy and efficiency in apparatus and methods for the production of ornamented and reinforced webs of sheet material and to provide a novel method and apparatus for producing rubber thread and other articles.

Other objects will appear from the following description and the accompanying drawings.

In the drawings:

Fig. 1 is a front elevation of a deposit forming apparatus.

Fig. 2 is an end elevation showing the deposit forming and drying apparatus, the deposit forming apparatus being shown in section and part of the drier being broken away.

Fig. 3 is a sectional elevation of a portion of the deposit forming apparatus, showing a modified form of the device.

Fig. 4 is a perspective view showing a doubled sheet formed by uniting two webs face to face after rubber deposits have been formed thereon, the webs being shown as partly assembled and partly separated.

Fig. 5 is a perspective view showing a portion of a web having one type of deposit formed thereon.

Fig. 6 is a similar view showing a different form of deposit.

Fig. 7 is a sectional elevation showing a modified form of the apparatus as used in the production of rubber thread.

Fig. 8 is a front elevation of the forming rolls of the modified form shown in Fig. 7, parts being broken away.

Fig. 9 is a perspective view of a rubber thread.

Referring to the drawings, the numerals 10, 10' designate the frame members of a two roll calender device which are slotted vertically to receive the journal boxes 11, 11', keyed in place therein and the slidable journal boxes 12, 12'. Frames 10, 10' are mounted on a bed plate 13 and are also held in spaced relation by a tie-rod 14. Rotatably mounted in boxes 11, 11' is a hard metal roll 15 having its face recessed to provide cavities of the desired conformation. A driving gear 16 keyed to one projecting end of the roll 15, may be driven from any source of power (not shown) and a pinion 17 is fixed to the other projecting end to engage and drive a similar pinion 18 mounted on the projecting end of a second roll 19 journaled in boxes 12, 12'. Roll 19 has a smooth surface and may be either of hard material such as metal or may have a soft rubber or other resilient face.

A double acting fluid pressure cylinder 20 is mounted horizontally in tie-rod 14 and plate cams 21, 21', slidably mounted in horizontal bearings 22, 22' on frame members 10, 10', are connected to the piston thereof by rods 23, 23'. Vertically slidable plungers 24, 24', operating through frame members 10, 10', are provided with rollers 25, 25' which engage cam slots 26, 26' in cams 21, 21'. The lower ends of plungers 24, 24' impinge against coil springs 27, 27' which in turn rest upon boxes 12, 12', the arrangement being such that when fluid under pressure is admitted to one end of cylinder 20 pressure is applied to force roll 19 against roll 15, and when fluid is admitted under pressure to the other end of the cylinder the roll pressure is released.

A feed board 28 is mounted adjacent roll 15 at such an angle thereto as to form an acute angle with the face thereof. It is supported by a bar 29 which has its ends slidably retained by straps 30, 30' to frame members 10, 10' and is pivotally supported by links 31, 31'. A roller 32 carried by bar 29 engages in a cam groove 33 in a cam shaft 34. Cam shaft 34 is rotatably mounted in a bearing 35 on frame member 10' and has a sprocket 36 adapted to be driven from a sprocket 37 in roll 15 by a chain 38. An adjustable doctor blade 40 carried by the feed board 28 bears against roll 15. The construction is such that during rotation of roll 15 the feed board and doctor blade are oscillated across the face of the roll.

Frames 10, 10' are also provided with an idler roll 41 mounted in fixed bearings and an idler roll 42 mounted in swing frame members 43, 43' pivoted at 44, 44' and adapted to be locked to the frame members by pins entering brackets 45, 45' or brackets 46, 46' as desired. When locked in brackets 46, 46' the roll 42 will assume the dot and dash line position 42'.

Mounted on columns such as 47 near the rubber depositing device are a pair of roll-chucks 48, for supporting a roll of web material 49 and equipped with a brake 50. A pair of chucks 51 also mounted on columns 47 are adapted to support a roll 52 of web material and are adapted to be driven by a chain 53 from a suitable source of power (not shown). Idler rolls 60 and 61 are also supported by the columns.

A drying oven 54 is provided with steam pipes 55 and guide rollers 56, 57 and 58 for guiding the web therethrough.

The operation of the device is as follows: A

roll 49 of web material such as fabric is placed in the roll-chucks 48. The leading end of the web is passed over rollers 42 and 41 and between rolls 15 and 19, the tension on roll 19 being released. The end is then passed around roll 19 and over idler rolls 60 and 61, under idler 42, over roll 41 and again between rolls 19 and 15, overlying the web on roll 19 which acts as a cushion. The end of the roll is then passed through the drying oven 54 over idler rolls 56, 57 and 58 to roll 52 where it is rewound. As soon as the leading end of the web has entered the bight of rolls 15 and 19 the second time, the tension is applied to roll 19 by admitting pressure fluid to cylinder 20. A bank of plastic rubber dough 63, either a rubber compound plasticized by the addition of rubber solvents or a semi-fluid aqueous dispersion of rubber composition, is placed on feed board 28 where the inclination of the board and the downward motion of the face of roll 15 causes the plastic material to be fed between the roll 15 and the doctor blade 40, filling the recesses in the roll 15.

The doctor blade 40 prevents deposit of rubber on the face of the roll between the recesses and the oscillation of the blade distributes the plastic bank 63, smooths the deposit in the recesses, and prevents scoring of the roll by the holding of any foreign particles of grit in one position in relation to the roll.

As the deposited plastic reaches the bight of rolls 15 and 19, the web of sheet material is pressed into intimate engagement therewith and on continued rotation the deposited rubber compound is lifted from the recesses and remains attached to the face of the web.

As the web passes through the drier the deposited compound may be simply dried or vulcanized as desired. The web is then wound up on the roll 52.

Where it is desired to apply only a thin deposit from a more fluid composition the feed board 28 may be replaced by a trough 64, as shown in Fig. 3, having one edge lower than the others and in contact with roll 15. A tank 65, having a regulating valve 66, may be used to supply the fluid material to the trough. Otherwise the operation is as previously described.

The roll 15 may be engraved to provide a deposit of any desired design either to decorate the web of material or to build up structural elements thereon. As shown in Fig. 1 the device is being used for applying diagonal spaced bands 67 of rubber compound to a fabric web 68. Two such webs 68 and 68' may be adhesively united face to face with their deposited bands 67, 67' crossing each other to provide a doubled fabric having a reticulated reinforcement of elastic material therebetween as shown in Fig. 4.

By grooving roll 15 both longitudinally and circumferentially, a reticulated deposit 70 of rubber compound on a layer of fabric or other web material 71 may be produced as shown in Fig. 5. Ornamental designs such as shown in Fig. 6 may also be made by providing a roll having the desired design.

Where one or both of the rolls are grooved circumferentially as illustrated in Figs. 7 and 8 a plurality of spaced rubber bands may be produced having a cross section defined by the meeting faces. These bands or threads of rubber may be applied to a web as hereinbefore described or may be drawn from the rolls onto a conveyor belt such as 72 (see Fig. 7) and carried through the drier thereon. Where it is desired to make rubber thread of round cross-section, each of the rolls 15 and 19 may be grooved and provided with feed boards and doctor knives 73 and 74 and the two halves of the thread formed in companion grooves and united at the bight of the rolls as illustrated in Figs. 7 and 8. Where both rolls are provided with recessed surfaces as shown in Fig. 7 the material deposited in the recesses may be simultaneously applied to opposite surfaces of a travelling web in the manner illustrated in Fig. 2.

I claim:

1. The method of forming articles of plastic material which comprises filling recesses in a travelling mold surface with plastic material while preventing deposit thereof on said surface, transferring the deposits to a travelling web, similarly forming deposited plastic material on a second web, and uniting the deposits on the two webs face to face.

2. The method of forming articles of plastic material which comprises filling grooves in a travelling mold surface with plastic material while preventing deposit on the mold surface between the grooves, transferring the deposits to a travelling web, similarly forming deposited plastic material on a second web, and uniting the deposits on the two webs face to face in crossed relation.

FRED D. FOWLER.