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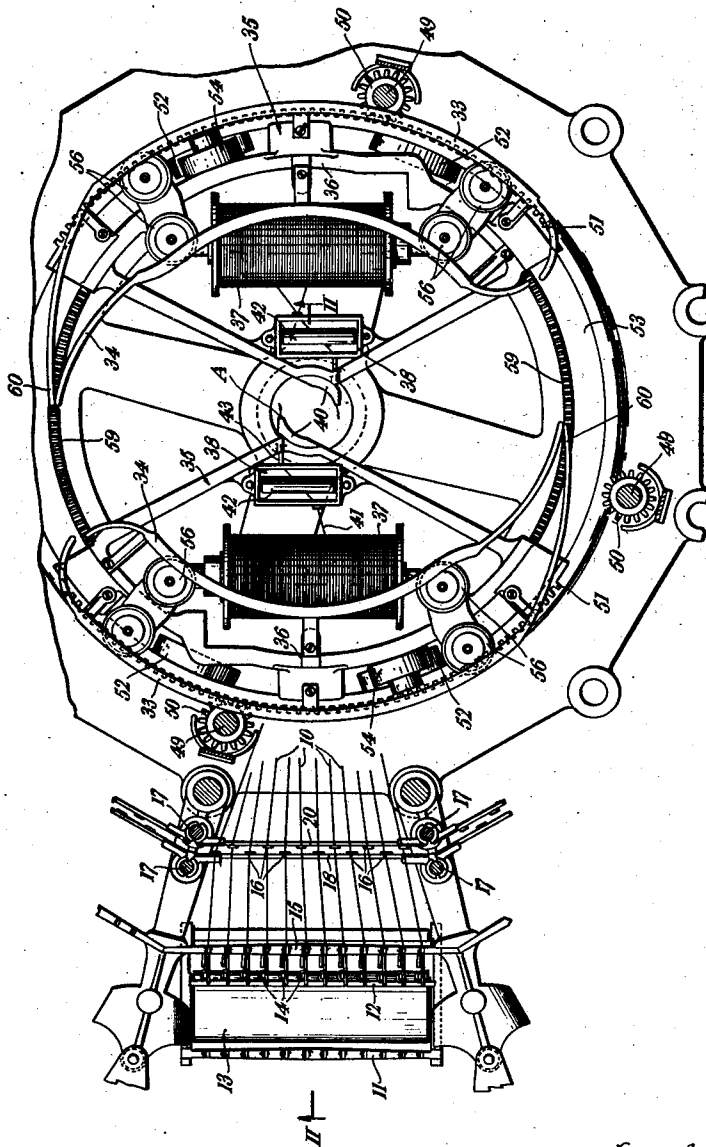
D. E. F. CANNEY
MANUFACTURE OF HOSE PIPES

2,353,387

Filed Dec. 12, 1940

2 Sheets-Sheet 1

Fig. 1.



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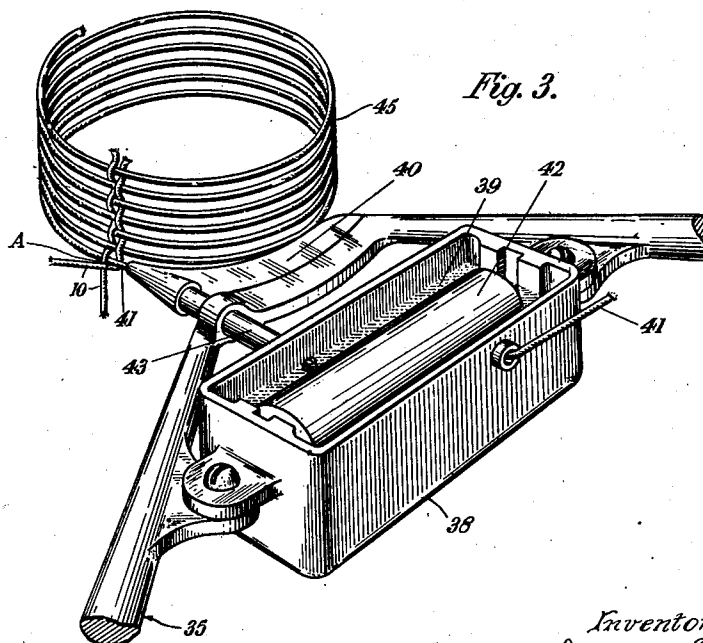
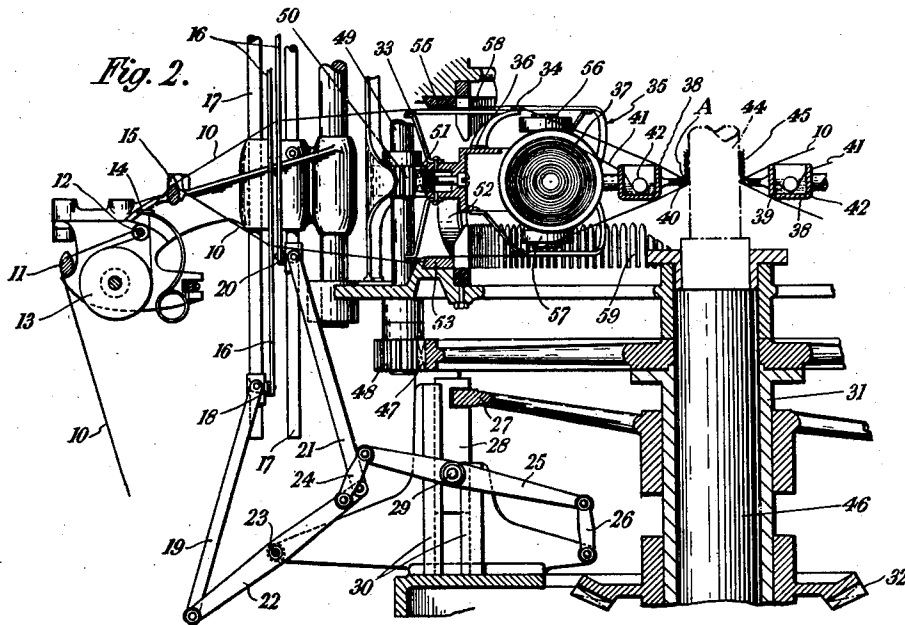
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UNITED STATES PATENT OFFICE

2,353,387

MANUFACTURE OF HOSE PIPES

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Application December 12, 1940, Serial No. 369,893
In Great Britain January 26, 1940

6 Claims. (Cl. 139—13)

This invention relates to the manufacture of seamless woven hose pipes, such as are used by fire brigades and on board ship, and has for its object to provide a hose pipe of this type which has the strength of normally woven hose but the additional advantage of reduced porosity.

The invention consists in modifying the normal process of weaving the hose on a circular loom by applying to the weft yarn, prior to its introduction into the fabric, a thin film of rubber latex or other sealing material in liquid form, so that the weft yarn is woven into the fabric in a wet condition. It is thought that it would not be convenient to apply rubber latex in this way when weaving on a flat loom, as little control would be exercised over it and the latex could not be confined adequately to those parts of the fabric where no immediate subsequent mechanical action has to be performed, which would tend to clogging of the essential parts of the loom. In the case of the circular loom, however, control of the rubber latex is easier owing to the absence of any beating up operation.

While it is preferred to employ rubber latex as the sealing agent, it is nevertheless within the invention to employ as the sealing agent any liquid material which will subsequently dry to a flexible solid and, when dry, reduce the porosity of the hose, for example solutions of rubber in organic solvents or cellulose compositions such as cellulose acetate compositions.

Moreover the invention is not confined to the manufacture of fire hose, but may also be used in the weaving of tubes of large diameter which are subsequently cut to form rubber-impregnated sheets. The invention may also be advantageously employed for the manufacture of garden hose.

According to a feature of the invention, instead of employing a solid guide for the weft as is customary in circular looms, a hollow guide may be used so that the weft yarn will be kept out of contact with the warp yarns until the moment at which it actually becomes part of the cloth, so that the rubber latex only meets the warp yarns at a stage when there is no further mechanical action on the fabric by parts likely to become contaminated with the rubber latex. The rubber latex is of course to some extent squeezed over the warp yarns as the weft yarn is introduced between them. As however the warp yarns are at this stage virtually part of the woven cloth, this will not result in any uncontrolled distribution of the rubber latex but only has the desirable consequence that the rubber latex will be caused to fill partially or completely the interstices in the fabric, thus, when dry, producing the required sealing effect and reducing the porosity of the hose. The amount of rubber latex applied to the yarn is controlled by the relation between the

diameter of the hole at the point of the guide from which the weft emerges and the diameter of the weft.

It is of course well known that rubber lined hose has no porosity. The manufacture of such hose entails a two stage process. The method according to the invention gives, in a single stage process, a hose which, despite the fact that its porosity is very materially reduced as compared with an unlined and unimpregnated hose, has very little additional weight.

The invention includes a hose made by the above mentioned process which is differentiated from a hose impregnated with rubber after weaving by reason of the fact that the rubber latex is applied around or between the yarns as distinct from application to or impregnation from one or other surface of the hose. It is however within the invention to apply a sufficiently thick film of rubber latex to the weft yarn to cause a portion of the latex to exude on to the inner or outer surface of the hose or both. Where the latex exudes to the outer surface of the hose it has the effect of increasing the resistance of the hose to abrasion.

The invention also includes a circular loom, having a device for applying to the weft yarn a film of rubber latex or other sealing agent in liquid form prior to its introduction into the fabric, and a hollow weft guide for maintaining the wet weft yarn out of contact with the warp yarns and loom parts until the moment of weaving.

It will be appreciated that the invention is distinguished from proposals to weave hose from yarn previously coated with rubber latex, for example during the spinning process, by reason of the fact that the latex is applied to the yarn immediately prior to weaving, for example, by drawing the weft yarn through a bath of rubber latex on its way to the point of weaving, so that the weft yarn is woven into the cloth in a wet condition. A hose woven from such previously coated yarn would not have the interstices between the yarns filled in the course of weaving.

The rubber latex may be compounded in such a way that it is already vulcanised, or alternatively so that it can be vulcanised after weaving. If desired the hose may be sold with the compounded latex in the unvulcanised condition.

The invention is particularly applicable to the manufacture of flax hose, but can also be used in the case of hose woven from almost any other type of yarn, for example cotton or hemp.

One method of carrying the invention into practical effect will now be described in greater detail, by way of example, with reference to the accompanying drawings, in which

Figure 1 is a diagrammatic plan view of a portion of a circular loom embodying apparatus for

applying rubber latex to the weft yarn in accordance with the invention.

Figure 2 is a section along the line II—II in Figure 1, and

Figure 3 is a diagrammatic perspective view showing the trough for applying the rubber latex to the weft and the hollow guide for the weft.

Like reference numerals indicate like parts throughout the drawings.

The warp yarns 10 pass from bobbins (not shown) over a comb bar 11, rollers 12, 13, a tensioning device 14 and a second comb bar 15, to the healds 16. There are twelve groups of healds disposed symmetrically around the machine, one group only being fully illustrated. The healds are slidably mounted on guide rods 17, and alternate healds are raised and lowered to form the shed by means of the cam controlled mechanism shown in Figure 2. All the "down" healds in the group are interconnected by a bar 18 pivotally connected to a link 19, and all the "up" healds are similarly interconnected by a bar 20 pivotally connected to a link 21. The links 19, 21 are pivoted to opposite ends of a rocking bar 22 which is pivoted centrally at 23 to the machine frame. This bar is rocked to and fro at the proper times by a system of links 24, 25, 26 controlled by a cam plate 27 keyed to a hollow shaft 31 driven by a bevel gear 32. As the cam plate 27 rotates it causes a slide 28 carrying the pivot 29 of the link 25 to travel up and down in guides 30 and thereby rock the bar 22 to and fro to change the shed at the proper time.

Two rotary shuttles 35 are provided for the weft yarn. These are located at diametrically opposite points and are of identical construction so that one only need be described.

The shuttle is supported by a frame 36, carrying a weft package or cop 37, a trough 38 containing a supply of rubber latex 39, and a hollow guide 40 from which the weft yarn 41 emerges at the point of weave A. The weft yarn 41 leaving the cop 37 passes over tensioning devices (not shown) under a roller 42 in the trough 38 and through a tube 43 leading from the trough into the hollow guide 40. As explained above, the function of the hollow guide 40 is to maintain the wet weft yarn out of contact with the warp yarns until it is actually woven into the fabric at the point A, which of course travels circumferentially around the core 44 on which the hose 45 is woven as the shuttle travels round the machine. The hose 45 is withdrawn in an upward direction by the usual rollers (not shown).

Rotary movement in a counter-clockwise direction as seen in Figure 1 is communicated to the shuttle from a shaft 46 carrying a gear wheel 47 meshing with a number of pinions 48 mounted on the lower ends of shafts 49 journaled in the machine frame. On the upper ends of the shafts 49 are mounted pinions 50 which mesh with rack teeth 51 on the shuttle frame 36. The shuttle is therefore caused to revolve around the vertical axis of the machine taking the drive from the pinions 50 in turn.

The shuttle frame carries spreaders 33, 34 for the warp yarns and is supported by two lower vertical rollers 52 running on a track 53 and by an upper vertical roller 54 running on a track 55. It is also supported by pairs of upper and lower horizontal rollers 56, 57 which run respectively on tracks 58, 59 which are slotted to permit of the passage of the warp yarns.

It will be understood that the healds are operated in proper timed relationship to the shuttles, so that each shed is being opened as the nose 60 at the leading edge of the shuttle frame enters it, is fully open as the deepest part of the shuttle passes through and is thereafter closed, the change in the shed having taken place before the passage of the hollow guide 40, the end of which constitutes the trailing edge of the shuttle.

What I claim as my invention and desire to secure by Letters Patent is:

1. A method of manufacturing a fabric hose by weaving on a circular loom, which is characterized by the steps of applying a film of sealing agent in liquid form to the weft yarn prior to its meeting the warp yarns, which are woven dry in the ordinary way, maintaining the wet weft yarn out of contact with the dry warp yarns until the moment of weaving and then weaving it into the fabric in the wet condition, the sealing agent subsequently drying and serving to reduce the porosity of the hose.

2. A method of manufacturing a fabric hose by weaving on a circular loom, which is characterized by the steps of applying a film of rubber latex to the weft yarn prior to its meeting the warp yarns, which are woven dry in the ordinary way, maintaining the wet weft yarn out of contact with the dry warp yarns until the moment of weaving and then weaving it into the fabric in a wet condition, the rubber latex subsequently drying and serving to reduce the porosity of the hose.

3. In a circular loom, the combination of a device for applying to the weft yarn a film of sealing agent in liquid form prior to its introduction into the fabric and a hollow weft guide for maintaining the wet weft yarn out of contact with the warp yarns until the moment of weaving.

4. In a shuttle for a circular loom carrying a weft package, the combination with the weft package of a bath to contain a liquid sealing agent, means for guiding the weft yarn through the bath on its passage from the package to the point of weave, and a hollow weft guide disposed between the bath and the point of weave and serving to maintain the wet weft yarn out of contact with the warp yarns until it reaches the point of weave.

5. The method of manufacturing a fabric hose by weaving on a circular loom which comprises applying to the weft yarn, before the weft and warp yarns are interwoven, a sealing agent which is in liquid form at the time of such application but which will dry upon exposure and become solid and, while the sealing agent is in liquid condition, interweaving the weft yarn with warp yarn which has not been so treated, to form fabric, the sealing agent being thereafter permitted to solidify, the porosity of the fabric being thereby reduced.

6. The method of manufacturing a fabric hose by weaving on a circular loom which comprises applying to the weft yarn, before the weft and warp yarns are interwoven, a film or coating of rubber latex in liquid form and, while such latex is in liquid form, interweaving the weft yarn with dry warp yarn to form fabric, the latex being thereafter permitted to solidify, the porosity of the fabric being thereby greatly reduced.

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