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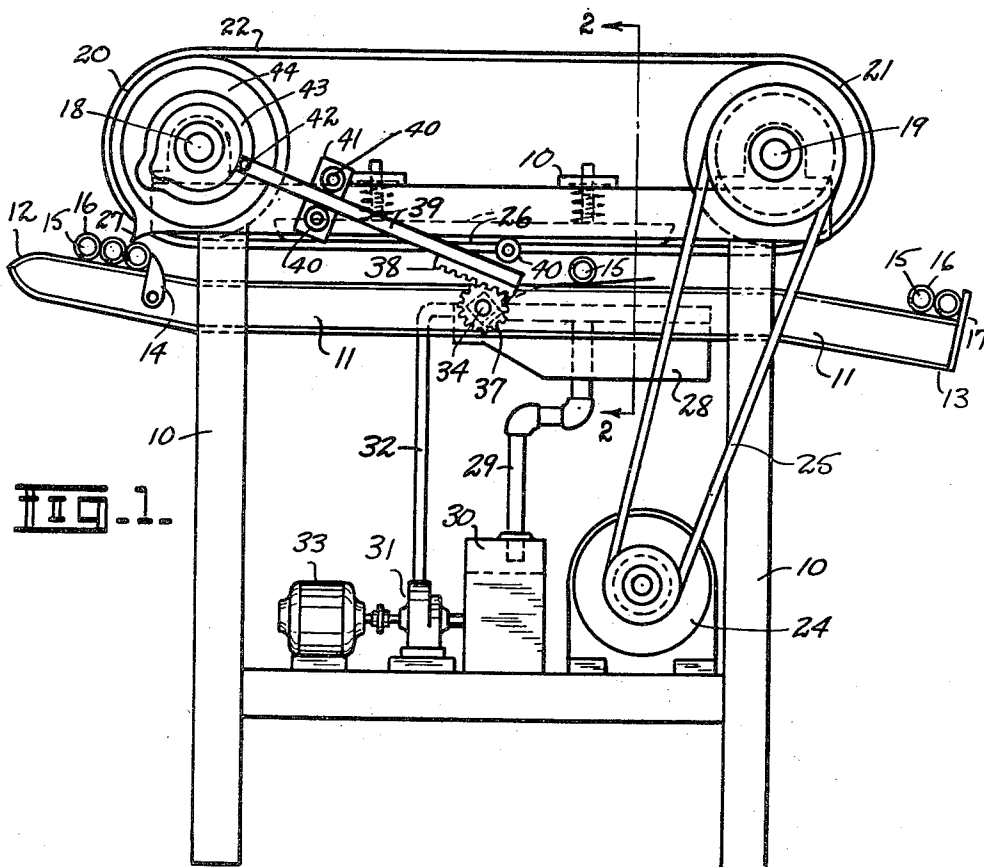
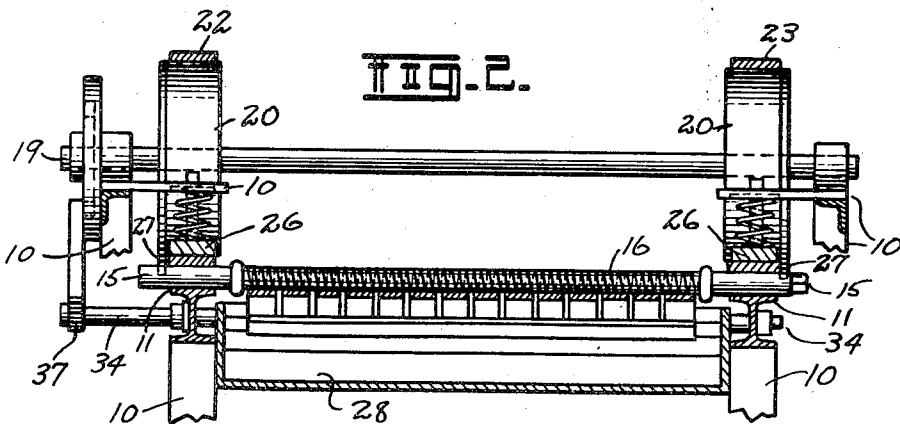
F. W. LOVE ET AL

2,455,428

COATING MACHINE

Filed June 25, 1946

2 Sheets-Sheet 1



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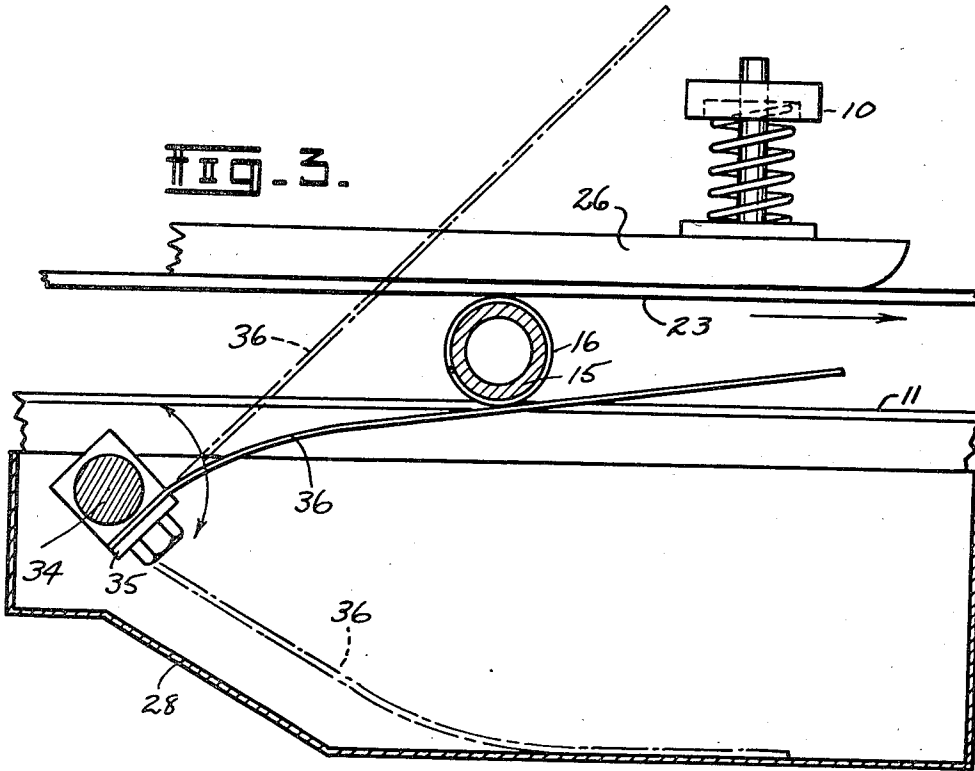
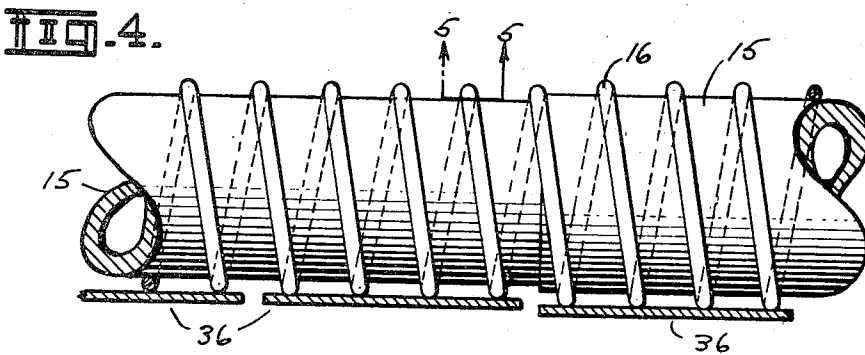
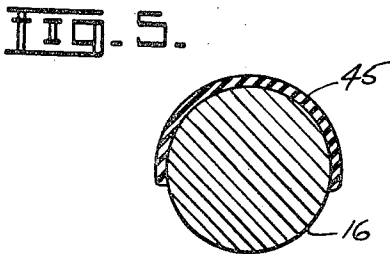
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2 Sheets-Sheet 2



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COATING MACHINE

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3 Claims. (Cl. 91—18)

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This invention relates to a coating machine and more particularly to a machine for applying a coating of liquid cement to the outermost edges of a wire coiled about a mandrel.

The principal object of the invention is the provision of a coating machine for applying an adhesive to the outermost surface of a wire spirally wound on a mandrel.

A further object of the invention is the provision of a machine for applying an adhesive to a selected portion of a wire spirally wound on a mandrel to avoid the application of the adhesive to facilitate the subsequent adhesion thereto of a sheet of material.

A still further object of the invention is the provision of a machine for applying adhesive to only the outermost edges of a wire spirally wound on a mandrel to avoid the application of the adhesive to the mandrel or the mandrel engaging portions of the wire and thereby prevent the adhesion of the wire to the mandrel and the undesirable coating of the mandrel.

A still further object of the invention is the provision of a machine for applying an adhesive to the outer edge of a wire spirally wound on a mandrel to form an adhesive coating only on the outermost portion of the said wire and covering only a portion of the periphery thereof.

The coating machine shown and described herein has been designed to facilitate the construction of so-called rough bore hose which is commonly used in smaller sizes in connection with vacuum cleaner attachments. As is known, this rough bore hose includes in its construction a spirally wound wire which prevents the hose structure from collapsing when air pressures lower than atmospheric are created in the hose. The wire also enables the hose to resist external forces which might otherwise cause its collapse. Similar types of hose in various sizes are also employed for handling various materials.

In several of the types of rough bore hose in commercial demand, the spirally wound wire is exposed on the interior of the hose in its finished state and it is in the construction of this type of hose that the machine disclosed herein is utilized.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed can be made within the scope of what is claimed without departing from the spirit of the invention.

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The invention is illustrated in the accompanying drawing, wherein:

Figure 1 is a side elevation of a coating machine.

Figure 2 is a cross section taken on line 2—2 of Figure 1.

Figure 3 is an enlarged detail with parts broken away and parts in cross section illustrating a portion of the machine shown in Figures 1 and 2.

Figure 4 is an enlarged side elevation of a portion of a mandrel and spirally wound wire thereon and illustrates the relative positioning of the adhesive applying portions of the machine.

Figure 5 is an enlarged cross section of the wire spirally wound on the mandrel shown in Figure 4 and illustrating an exaggerated detail of the adhesive coating applied to the outer edge of the periphery of the wire.

By referring to the drawings and Figures 1 and 2 in particular, it will be seen that the coating machine comprises a supporting frame generally indicated by the numeral 10 and includes a pair of track members 11 spaced apart on the frame 10. The track members 11 are elevated at one end as indicated by the numeral 12 and depressed at the other end as indicated by the numeral 13. A pair of spring pressed pawls 14 are affixed adjacent the ends 12 of the tracks 11 and serve to normally retain a plurality of mandrels 15, each of which has a wire 16 spirally wound thereabout. A stop member 17 is provided at the extreme outer end 13 of the tracks 11 against which the mandrels 15 may rest.

Means is provided for moving the mandrels 15 and their spirally wound wire 16 thereon through the machine on the tracks 11 and comprises a pair of shafts 18 and 19 positioned on upward extensions of the frame 10 which are spaced apart a distance sufficient to clear the ends of the mandrel 15. Each of the shafts 18 and 19 carry a pair of pulleys 20 and 21, respectively, over which a pair of endless belts 22 and 23, respectively, are trained. The lowermost faces of the belts 22 and 23 are spaced above the tracks 11 a distance equal to the diameter of the mandrels 15 so that the mandrels 15 may be rolled along the tracks 11 by frictional engagement with the under surfaces of the belts 22 and 23.

Means for energizing the pulleys 20 and 21 and hence the belts 22 and 23 is provided and comprises an electric motor 24 connected to one of the pairs of pulleys 21 by means of a belt 25. Springboards 26 are positioned one above each of the lower portions of the belts 22 and 23 to prevent them from moving upwardly and out of engagement with the mandrels 15 being moved

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along the tracks 11. Each of the pairs of pulleys 20 has fingers 27 affixed thereto, which fingers 27 extend beyond the peripheries of the pulleys 20 and beyond the outer surfaces of the belts 22 and 23 trained thereover and are adapted to selectively engage one of the mandrels 15 with the spirally wound wire 16 thereon and move it past the spring pressed pawls 14 and into engagement with the lower surfaces of the belts 22 and 23 so that the mandrel 15 will be rolled thereby through the machine on the tracks 11. It will be observed that the fingers 27 will move a mandrel 15 into position for travel through the machine on the tracks 11 only once in each revolution of the pulleys 20, thereby causing the effective spacings of the mandrels 15 and their spirally wound wire 16 with respect to one another. The spacing interval of the progressive motion of the mandrels 15 carrying the spirally wound wire 16 through the coating machine is utilized to suitably prepare the portions of the machine performing the actual coating operation with respect to the spirally wound wire 16 on the mandrels 15.

By referring to Figures 1, 2 and 3 of the drawings it will be seen that there is a relatively wide, shallow pan 28 supported by the frame 10 and positioned between the tracks 11 in which a supply of liquid adhesive is maintained, the adhesive being a rubber cement. Alternate adhesives may obviously be employed which would include various synthetic rubber cements and natural and synthetic resins suitable for the indicated use.

Means for circulating the adhesive in the pan 28 is provided and comprises a piping connection 29 communicating with a receptacle 30 which also is in communication with a pump 31 and a pipe 32. The pump 31 is driven by an electric motor such as indicated by the numeral 33. It will be obvious that means may be employed for maintaining a given level of the adhesive in the pan 28. Positioned in the pan 28 above the liquid level therein and supported by the frame 10 there is a shaft 34, the end sections of which are round so as to enable the shaft 34 to be revolved in suitable journals in the frame 10 and the remainder of which is provided with a flat surface and an associated clamping bar 35 between which a plurality of reeds 36 are positioned. The reeds 36 are relatively long, thin, flexible sections of metal such as stainless steel or the like, and, as best shown in Figures 3 and 4 of the drawings, are adapted to be dipped into the pan 28 and the adhesive therein, elevated by a partial revolution of the shaft 34 and subsequently contact the outermost edge of the spirally wound wire 16 on the mandrel 15 as it rolls along the track 11 and beneath the belts 22 and 23.

Means is provided for causing the shaft 34 to partially revolve in alternate back and forth movements (as indicated by the arrow in Figure 3) so as to cause the reeds 36 to move from lower position to upper position as shown in dotted lines in Figure 3, and comprises a gear 37 positioned on one end of the shaft 34 and a rack 38 in engagement with the gear 37 and positioned on one end of an arm 39. The arm 39 is reciprocally mounted by the rollers 40 positioned on a bracket 41 which is in turn affixed to and comprises part of the frame 10. The other end of the arm 39 is provided with a cam engaging a finger 42 and is adapted to engage a cam track 43 formed in a disc 44 affixed to one of the pulleys 20. As is best illustrated in Figure 1 of the drawings, this mechanism, including the cam track 43, will impart reciprocating motion to the arm 39

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once with each revolution of the pulleys 20 carrying the disc 44. Such reciprocating motion moves the rack 38 with respect to the gear 37 and thereby partially rotates the shaft 34 which carries the plurality of thin, flexible reeds 36 with the result that the reeds 36 are alternately dipped into the adhesive of the pan 28 and moved upwardly thereof to permit a draining cycle and held in that position while the mandrel 15 with the spirally wound wire 16 thereon is rolled over the reeds 36 thereby causing the adhesive on the uppermost surface of the reeds 36 to be applied to the outermost edge of the periphery of the wire 16 spirally wound on the mandrel 15. This action is illustrated in Figures 3 and 4 of the drawings.

In Figure 3 of the drawings, one of the mandrels 15 with its spirally wound wires 16 wound thereon is shown depressing the plurality of reeds 36 as the mandrel 15 rolls along the tracks 11 under the engagement of the belt 23 which engages only the outermost ends of the mandrel 15 and not the center portion thereof upon which the wire 16 is spirally wound.

In Figure 4 of the drawings an enlarged detail of a portion of one of the mandrels 15 is shown and it will be seen that the right hand portion of the mandrel 15 (in Figure 4) is of a larger diameter than the left hand portion thereof, and, as a result of this difference in diameter of the mandrel, the spirally wound wire 16 is of a greater diameter over this enlarged section of the mandrel 15 than over the other section of the mandrel 15. The plurality of reeds 36, which are shown in cross section in Figure 4, provide for this irregularity in the longitudinal plane of the mandrel 15 as upon adjusting themselves to the particular section of the mandrel and the wire they engage. Thus, in Figure 4, the reed 36, to the right of the figure, is depressed to a greater degree by the enlarged section of the mandrel 15 than the other reeds 36 shown to the left in Figure 4. This action of automatically compensating for irregularities in the mandrel 15 itself is desirable as the irregularities may be accidental due to the misshaping of the mandrel through accident or handling or may be deliberate, as indicated in Figure 4, to provide an enlarged end section of a hose.

In Figure 5 of the drawings an enlarged cross section of one portion of the wire 16 is illustrated and an exaggerated coating of adhesive thereon is indicated by the numeral 45 thus demonstrating the characteristic of the machine in applying the adhesive to only approximately one-half of the diameter of the wire 16 and avoiding coating the other half of the wire which lies adjacent the mandrel 15, which coating is undesirable as it causes the wire 16 to adhere to the mandrel and makes it difficult to subsequently strip the completed hose from the mandrel.

It will thus be seen that a simple and efficient coating machine has been disclosed which is particularly useful in applying adhesive coating to the outermost edges of a spirally wound wire positioned on a mandrel and which spirally wound wire ultimately becomes an integral portion of a rough bore or vacuum hose. It will be obvious that the machine meets the several objects of the invention by coating only the outer edges of the periphery of the spirally wound wire 16 and that it will readily adapt itself to irregularities on the mandrels on which the wire 16 is wound, and, due to its dipping, draining and coating cycles, it will apply only the proper amount of adhesive to the wire thereby avoiding the adhesion of the wire

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to the mandrel. There is an additional benefit of the partial coating of the wire 16 in that the partial coating is able to resist the tendency to dislodge the same or crack off from the wire to a greater degree than the complete coating which must ordinarily be applied before winding on the mandrel.

Having thus described our invention, what we claim is:

1. In a device for applying an adhesive coating to the outer edge of a wire wound on a mandrel and including tracks over which the mandrel may be rolled, a pan disposed between the tracks and at least one pair of pulleys and a belt trained thereover for engaging the said mandrel and rolling it along said tracks, a supply of adhesive in the said pan and a rotatable shaft positioned transversely of said pan, a plurality of relatively long thin flexible reeds affixed to said shaft and extending outwardly therefrom and means for rotating the said shaft first in one direction and then the other so as to move the reeds into the said adhesive for coating the same and for elevating the said coated reeds for partial draining and maintaining the said flexible reeds in elevated position while the wire wound mandrel is moved thereover by the said track and belt.

2. In a device for applying a coating material to a portion of the periphery of a wire spirally wound on a mandrel, the device including tracks over which the mandrel may be rolled, an open receptacle having a supply of coating material therein, a rotatable shaft positioned transversely of the said receptacle, at least one thin flexible, flat surfaced member positioned between the said tracks and affixed at one end to said shaft, means for moving the flat surfaced member into the

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coating material and outwardly therefrom to an elevated position for partially draining the same and means for rolling the mandrel carrying the spirally wound wire over the flat surface of the flexible member to transfer the remaining coating material to the outermost portion of the periphery of the wire.

3. In a device for applying a coating material to the outermost portion of the periphery of a wire spirally wound upon a mandrel, a receptacle comprising a source of coating material, a transverse member adjacent said receptacle, several flat surfaced members each affixed at one end to said transverse member and means for dipping the said flat surfaced member into the coating material and elevating the same, and means for engaging the spirally wound wire on the said mandrel with the said elevated flat surfaced members to cause the transference of the coating material to the outermost portion of the periphery of the wire.

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