Jan. 14, 1936. L. S. ROSENER 2,027,704

PIPE WRAPPING MACHINE

Filed Jan. 14, 1930 2 Sheets-Sheet 1

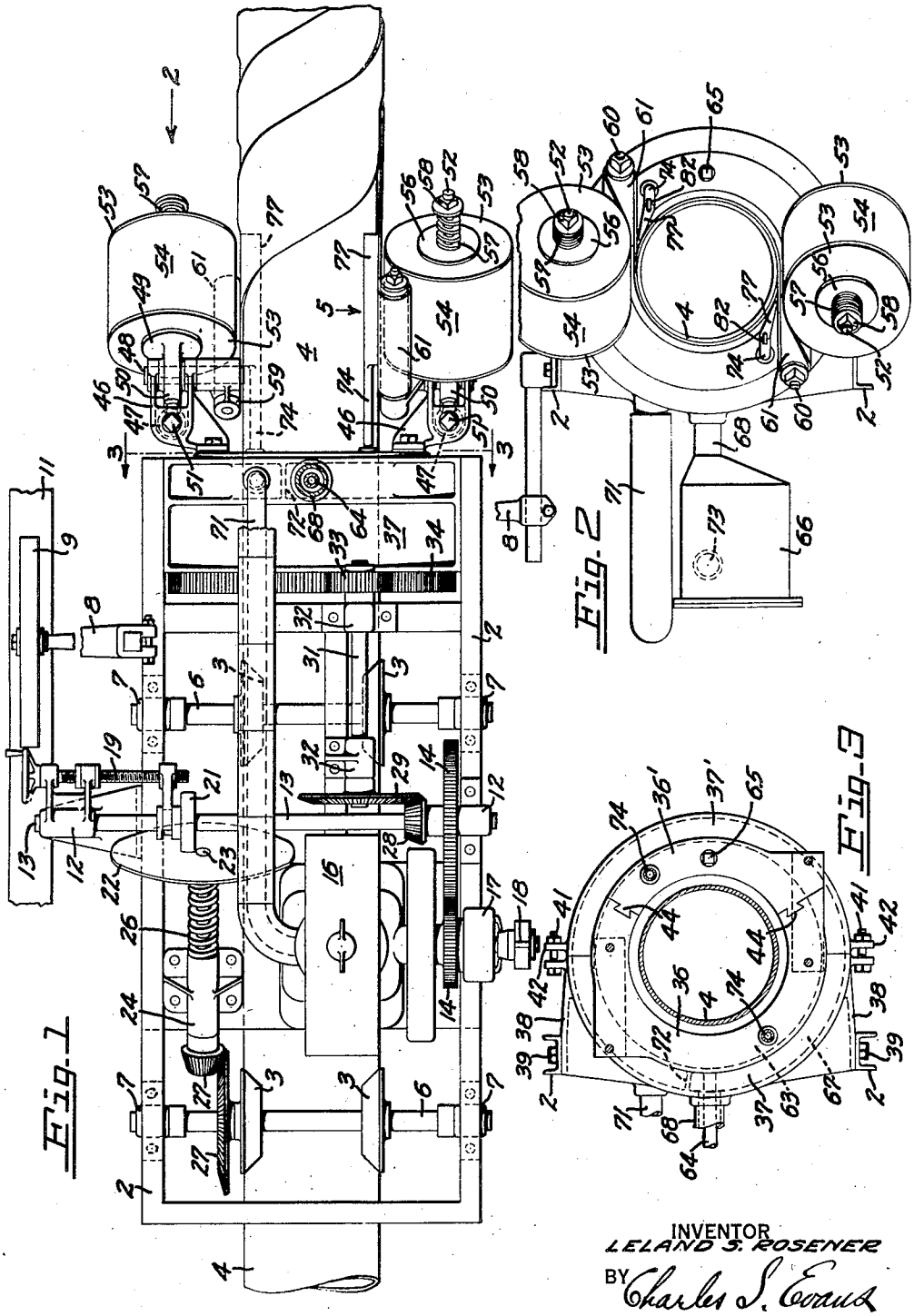


Fig. 1

Fig. 2

Fig. 3

INVENTOR
LELAND S. ROSENER
BY Charles S. Evans
HIS ATTORNEY

Jan. 14, 1936. L. S. ROSENER 2,027,704

PIPE WRAPPING MACHINE

Filed Jan. 14, 1930 2 Sheets-Sheet 2

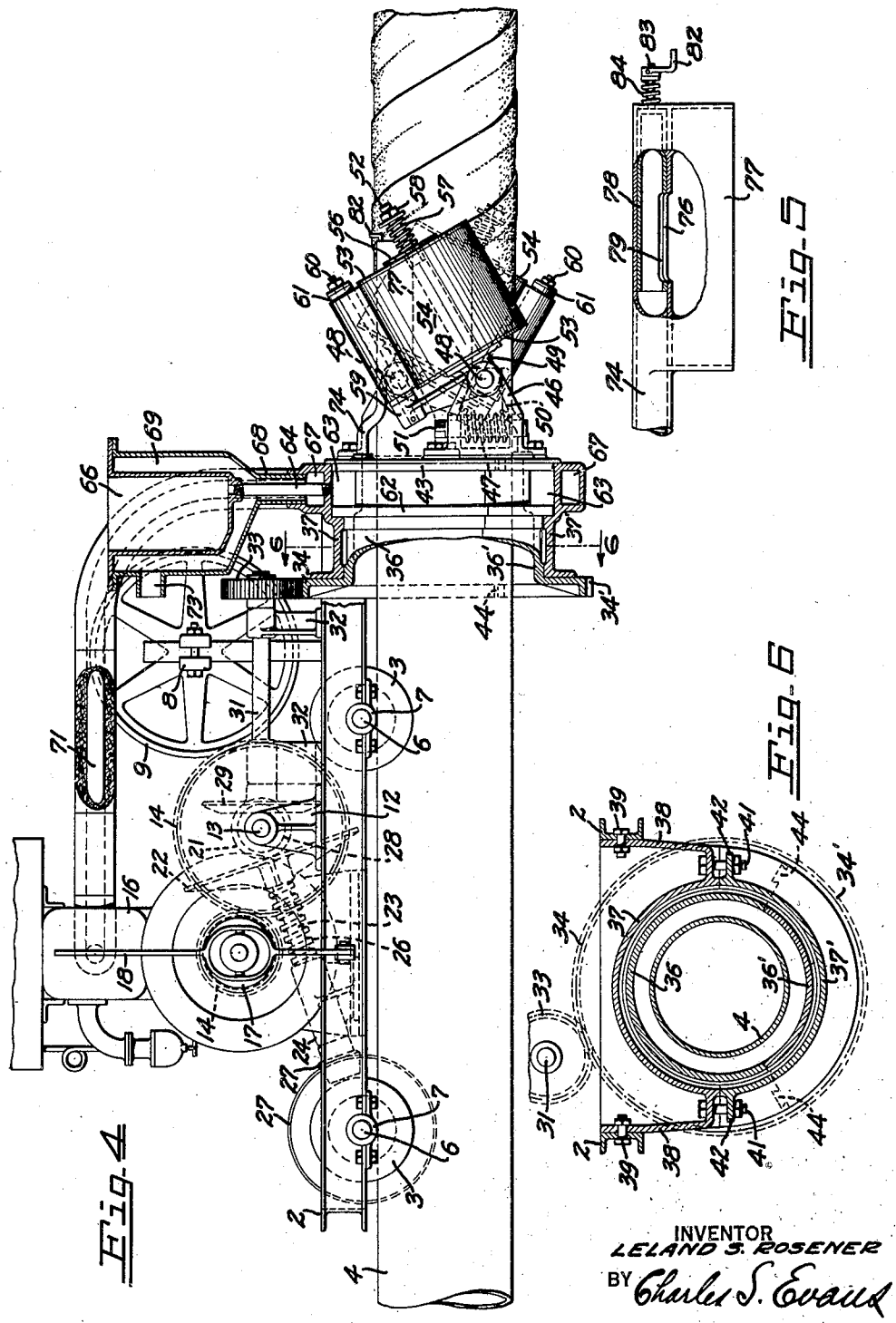


Fig. 4

Fig. 5

Fig. 6

INVENTOR
LELAND S. ROSENER
BY Charles S. Evans
HIS ATTORNEY

Patented Jan. 14, 1936 2,027,704

UNITED STATES PATENT OFFICE

2,027,704

PIPE WRAPPING MACHINE

Leland S. Rosener, San Francisco, Calif., assignor to The Paraffine Companies, Inc., San Francisco, Calif., a corporation of Delaware

Application January 14, 1930, Serial No. 420,711

1 Claim. (Cl. 242—11)

My invention relates to a machine for wrapping cylindrical bodies, and one of the objects of the invention is the provision of a machine for wrapping a protective strip of material about a pipe of a pipe line already laid or connected ready for laying.

Another object of the invention is the provision of a pipe wrapping machine by which a protective strip is wrapped about a fixed pipe; and embodying means for applying an adhesive and waterproof fluid to hold the latter in place, thus sealing the pipe with an impervious covering which is water and decay-proof.

Another object of the invention is the provision, in a machine of the character described, of improved winding means for wrapping a pipe, including a plurality of supply rolls of wrapping material so that several layers of the covering material may be applied in one operation.

Another object of the invention is the provision of a plurality of spaced wrapping supply rolls so positioned to counterbalance each other to effect smooth operation of the winding means.

Another object of the invention is the provision of a winding means having a plurality of wrapping supply rolls so that a comparatively large amount of pipe may be wrapped before replenishing the wrapping material.

Another object of the invention is the provision of improved means for holding the supply rolls of wrapping material during operation of the machine, so that the supply rolls may be quickly and conveniently placed on the machine.

Another object of the invention is the provision of improved means for applying fluid to the wrapping strips of each roll of material, to insure that the strips adhere to the pipe all the way around.

A further object of the invention is the provision of improved means for mounting the machine on the pipe to be wrapped.

A still further object of the invention is the provision of a wrapping machine in which the rolls of wrapping strip are rotated bodily about the pipe, requiring but a narrow space about the pipe in which to operate.

The invention possesses numerous other objects and features of advantage, some of which, with the foregoing, will be set forth in the following description of my invention. It is to be understood that I do not limit myself to this disclosure of species of my invention, as I may adopt variant embodiments thereof within the scope of the claims.

Referring to the drawings:

Figure 1 is a plan view showing the wrapping machine of my invention in position for applying a wrapping strip on a pipe line. Portions of the structure are omitted to show clearly the construction.

Figure 2 is an end elevation of the machine, the view being taken in the direction of arrow 2 of Figure 1. Portions of the structure are omitted to shorten the view.

Figure 3 is a sectional view taken in a plane indicated by line 3—3 of Figure 1. Portions of the structure are omitted to shorten the view.

Figure 4 is a side elevational view of the machine; portions are shown in section to disclose clearly the construction, and some of the structure is omitted to shorten the view.

Figure 5 is an elevational view, partially in section, showing one of the fluid distributor heads, the view being taken in the direction of arrow 5 of Figure 1.

Figure 6 is a sectional view taken in a plane indicated by line 6—6 of Figure 4.

The application of protective coverings to installed pipe lines presents many grave difficulties. The fact that the pipe is buried in the ground, and necessarily involves expensive excavation, invites a device for applying the covering that requires a minimum removal of earth. Since the wrapping material is passed around the pipe to effect the wrapping, it is obvious that the space required for the wrapping means should be kept within a small radius about the pipe.

On the other hand, the space reduction is duly limited, because it is desirable to carry an ample supply of the wrapping material on the wrapping means, so that the process of wrapping will be continuous as far as such is possible.

The device of the herein disclosed invention is operable in a small space about the pipe, and at the same time is able to carry a sufficient supply of wrapping material to wrap a comparatively long distance of pipe before having to replenish the supply. Furthermore, the device is capable of wrapping the pipe at a faster rate than heretofore possible.

In broadly descriptive terms, the wrapping machine of my invention comprises a frame, provided with means for supporting it upon a pipe to be wrapped. A rotor, upon which a quantity of wrapping material is held in rolls, is journaled on the frame. Preferably, the wrapping rolls are mounted for orbital rotation about the pipe; and means are provided for simultaneously rotating the rolls to wind the strip about the pipe and to advance the frame

along the pipe, so that the wrapping strips are applied to the pipe spirally with the convolutions overlapping.

Guide means are provided to guide the strips onto the pipe. To seal the wrapping strip to the pipe and at the same time waterproof the same, means are provided for applying a fluid such as hot bituminous substance. Preferably the fluid is applied by flooding the engaging surfaces of pipe and wrapping strips at the instant of their contact to insure that the strips adhere to the pipe. In order to maintain the bituminous compound in fluid condition, heating means are provided therefor.

In greater detail, the wrapping machine of my invention comprises a frame 2, provided with pairs beveled and spaced rollers 3 for supporting the frame on pipe 4 which is to be wrapped. Rollers 3 are fixedly mounted on shaft 6 which in turn are journaled on the frame in any suitable bearings 7. It is to be noted that rollers 3 are mounted so that their beveled faces are inwardly adjacent, and that the space between the rollers of each pair is substantially equal to the diameter of the pipe, thus permitting a stable support for the frame. Furthermore, as the frame rides on a pipe which is being wrapped, the rollers serve not only to support the frame, but also to prevent lateral displacement thereof. Extending laterally from the frame is a vertically adjustable arm 8 carrying a wheel 9 adapted to rest on planks 11, temporarily arranged at the side of the pipe line ditch. The dirt at the side of the ditch may be leveled off to provide an approximately true surface on which the planks 11 may be conveniently laid. This insures travel of the machine along the pipe without danger of tipping over.

Journaled in suitable bearings 12 on frame 2, is a shaft 13 driven through gears 14 by engine 16, which is mounted on the frame and is preferably an internal combustion engine of any known or suitable construction. The engine may be disconnected according to well known practice by means of the clutch 17, of any known or suitable construction, and which may be operated by the handle 18.

Splined on shaft 13 and movable therealong by means of the hand wheel operated feed screws 19 is a friction wheel 21 adapted to engage the friction disk 22. A shaft 23 journaled on the frame in a suitable bearing 24, and on one end of which is splined the friction disk, has positioned therearound a spring 26, compressed between bearing 24 and friction disk 22. The spring, thus, resiliently holds the friction disk against friction wheel 21.

Shaft 23 is connected by gears 27 with the forward roller shaft 6. Thus, it is seen that engine 16 will effect a rotation of the forward rollers to advance the machine along the pipe when clutch 17 is engaged. The speed of this movement, relative to the main shaft 13, is adjustably controlled by moving the friction wheel across the face of the friction disk.

Fixed for rotation on the main shaft 13 is a pinion 28 in mesh with the gear 29, carried by the shaft 31 journaled in bearings 32 on the frame. Shaft 31, at the end opposite to that adjacent the main shaft, carries a pinion 33 in mesh with an annular gear 34. This annular gear is formed as an end flange integral with the rotor 36, and is provided with a removable gear section 34' which is formed integral with the corresponding removable rotor section 36'.

The rotor is journaled in a bearing 37 comprising an upper section rigidly connected to the frame by means of integrally formed flanges 38 and suitable fasteners, such as bolts 39; and a removable lower bearing section 37' is secured to the upper section by bolts 41 passing through the abutting flanges 38' and 42. Rotor 36 is also provided with a flange 43 at the end opposite the gear 34; and the arcuate sections of the rotor are removably held together by dovetailed joints 44 in the end flanges thereof, as shown in Figures 3, 4 and 6. It is thus seen that both the rotor with its integrally formed gear, and the bearing are provided with removable sections, so that the machine may be let down over the pipe; and when the machine is on the pipe, these sections may be fixedly assembled.

Means are provided for journaling a plurality of rolls of wrapping material on rotor 36, so that when the frame is moved longitudinally of the pipe and the rotor revolved, the rolls are moved orbitally about the pipe to wrap the material thereon in spirals. Preferably there are two of these rolls mounted diammetrically opposite on the rotor, although it is obvious that more may be added thereby making it possible to wrap several layers of covering material on the pipe in one operation. The wrapping roll mounting means for each roll is the same, hence it is necessary only to describe one such mounting.

Extending from a section of the rotor is a forked bracket 46 in which is journaled a worm 47, and on which is journaled a pin 48 which carries for pivotal movement a spool bracket 49 including a worm gear segment 50 in mesh with worm 47. It is obvious, that by applying a suitable tool to the squared end 51 of worm 47 and turning it, the wrapping reel may be adjusted at any desired angle relative to the longitudinal axis of the pipe, in accordance with the desired spiral of the wrapping. Spool bracket 49 has a stud 52 formed thereon which provided a journal for the spool 53, upon which is wound a roll of wrapping material 54.

For applying tension to the spool in order that the roll may unwind evenly, a washer 56 is caused to bear against the spool by a spring 57 surrounding the stud and interposed between the washer and lock nut 58 threaded on the free end of stud 52.

A bracket 59 carrying a stud 60, mounted at right angles to the bracket and parallel to the stud 52, is fixed on the pin 48 for pivotal movement together with a spool bracket 49, so that it may be adjusted simultaneously with the spool. On the stud 60 is journaled a non-friction roller 61, providing a wrapping arm so as to guide the wrapping strip onto the pipe at the proper angle.

It is to be noted that the rolls of wrapping material extend outwardly from the rotor, and that the axes of the rolls are adjustable in planes tangent to a cylinder coaxial with the pipe. It is also to be noted that the wrapping arm of each roll is adjustable simultaneously with the roll, and is always parallel therewith. The above construction keeps the rolls within a minimum distance around the pipe, and hence reduces the excavation required for the operation of the machine. Furthermore, the relation between each roll and its wrapping arm is fixed and consequently is always maintained in proper operative alignment; and since the wrapping

arm is adjusted simultaneously with the roll, only one adjustment is necessary for each roll to accord with the winding pitch of the wrapping strips.

The wrapping arms are positioned closely adjacent the pipe, and advance, together with the rolls, with orbital movements about the pipe, so that the relation between each wrapping arm and the point of application of its wrapping strip does not change as the winding proceeds. The advantages of such construction are obvious, since it insures that each wrapping strip will be applied uniformly and evenly to produce a continuous covering for the pipe.

It is further to be noted that there is a specific cooperation between the rotation of the rolls about the pipe, and the rate of travel of the machine along the pipe. The orbital movement of the winding means is made up of these two movements; one of rotation, and the other of translation. The pitch of the winding is determined by the relation between these movements, and applicant has provided means for varying that relationship by changing the translational movement, viz changing the rate of travel of the machine. By increasing the speed of the machine, and properly adjusting the angle between the axes of the rolls and the pipe axis, the pitch of the wrapping is increased. The degree of pitch for any particular wrapping will depend upon three factors, viz the width of the winding strips, the number of wrapping rolls, and the amount of overlap of the adjacent spirals in the winding. Where two rolls are used, as shown in the preferred embodiment of the invention, each roll provides an alternate wrap in the winding; and it is to be noted that, for a given pitch, the two rolls double the speed of the machine over that of a single roll. Hence by adding one roll to the winding means, the time required to cover a given length of pipe would be halved. In a like manner, four rolls would reduce the time to one-quarter.

Furthermore, by properly adjusting the relation between the translational and rotational movements, viz by varying the speed of the machine along the pipe, one wrapping strip may be applied directly over the other to produce a double layer covering in one operation. In a like manner more layers may be applied to a pipe in one operation with a machine having a greater number of rolls.

Means are provided for applying a fluid material to cement the wrappings to the pipe. Preferably, the means are arranged to apply the fluid between each strip of wrapping and the pipe adjacent the point of contact of the wrapping and the pipe, so that the engaging surfaces of pipe and wrapping are flooded with fluid at the instant of their contact.

This mode of applying the fluid insures that the wrapping and pipe are thoroughly covered with fluid and that the wrapping adheres to the pipe all the way around. Any cementitious fluid may be used but a bituminous or asphaltic composition, of suitable grade and melting point, and heated to give fluidity, is preferred because asphalt is highly resistant to decay, is water and acid-proof and is extremely durable.

The rotor **36** is provided with a flange **62** spaced inwardly of flange **43** to form an annular U-shaped trough **63** closed at its outer periphery by bearing **37**. A pipe **64** leading from a tank **66**, in which the fluid is held, terminates in bearing **37**, so that fluid may flow through the pipe to fill the trough **63**. A suitable drain plug **65** is provided in the side of trough **63**, to permit draining thereof when necessary.

It is desirable to heat the fluid so that it may flow freely; and for this purpose, it is preferred to utilize the exhaust gases from the internal combustion engine **16**. Surrounding the fluid trough **63** and formed in bearing **37** is an annular passage **67**, through which pipe **64** passes, and which communicates with conduit **68**, surrounding pipe **64** and leading into tank jacket **69**. Hot exhaust gases from the engine are led, by means of the insulated pipe **71**, into passage **67** which is divided by baffle **72**; hence, the gases are caused to flow completely around passage **67**, out through conduit **68** on the other side of the baffle, into jacket **69**, and then through outlet **73** which communicates with the atmosphere.

For discharging the fluid to cement together the pipe and wrapping, a distributor pipe **74**, extending from the end of rotor **36** and communicating with fluid trough **63**, is provided for each roll of wrapping. As shown most clearly in Figures 2 and 5, the free end of the distributor is positioned between the pipe and wrapping, and is provided with a slot **76** communicating with the substantially flat distributor head **77** formed on the end of the distributor pipe.

The distributor rotates with a lunar or orbital motion about the pipe; and the mouth of the distributor head is positioned closely adjacent the line of contact of pipe and wrapping, so that the wrapping is drawn over the edge of the distributor head adjacent its mouth just before engagement with the pipe.

By this means, the difficulty of getting the sealing fluid upon the bottom of the pipe is obviated. No matter at what point in its revolution the distributor head may be, the wedge shaped space between pipe and wrapping material, adjacent the mouth of the distributor is filled with fluid, which a fraction of a second later is caught under the wrapping strip as it is pulled tightly about the pipe.

For controlling the flow of fluid into the distributor head, a cylindrical gate **78** having a slot **79** adapted to register with the slot **76**, is provided. The gate may be opened or closed by means of a handle **82** on the stem **83**, fixed to the end of the gate and projecting through the end of the distributor pipe. A spring **84**, surrounding the stem and interposed between the handle **82** and the distributor pipe, is provided to hold the gate in the desired position.

If the machine is to be used at such temperatures that cooling of the bituminous compound occurs in the feed pipe and distributor head, it may be desirable to heat these parts with a torch prior to starting operations. In a similar manner, the distributor head valve may be made operative if clogged with cold material.

In starting the wrapping operation after the machine is assembled on the pipe, the ends of rolls of material are cemented on the pipe by a small quantity of the fluid and wound around the pipe a few convolutions; each roll making an alternate wrap in the winding. The rolls are then placed on their respective journals and the machine started. When a roll of material is almost completely unwound, the free end thereof is cemented to the end of a fresh roll and the latter is placed on the journal, with

only a momentary interruption of the operation.

I claim:

A pipe wrapping machine having in combination a frame, mounted to travel along a pipe, traction wheels engaging said pipe to propel said frame, a motor on said frame, a drum rotatable about said pipe, a spool of wrapping material on said drum at one side thereof, operative connections to actuate said wheels and said drum from said motor, and means carried by the frame for applying a liquid coating to said pipe prior to the wrapping material being applied to said pipe.

LELAND S. ROSENER.