Sept. 3, 1963 F. C. HAMSON 3,102,319

PIPE COATING MACHINE

Filed April 29, 1960 4 Sheets-Sheet 1

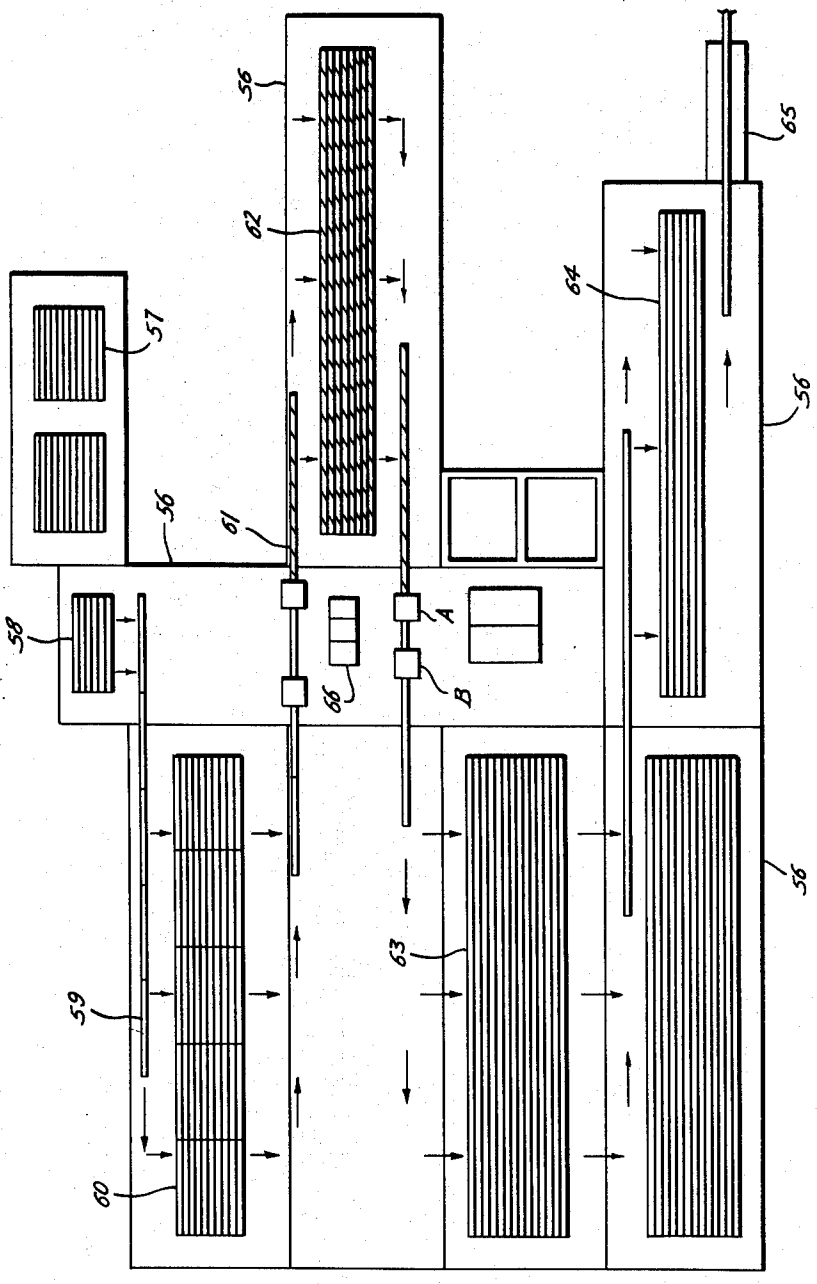


Fig. 1

Frank C. Hamson
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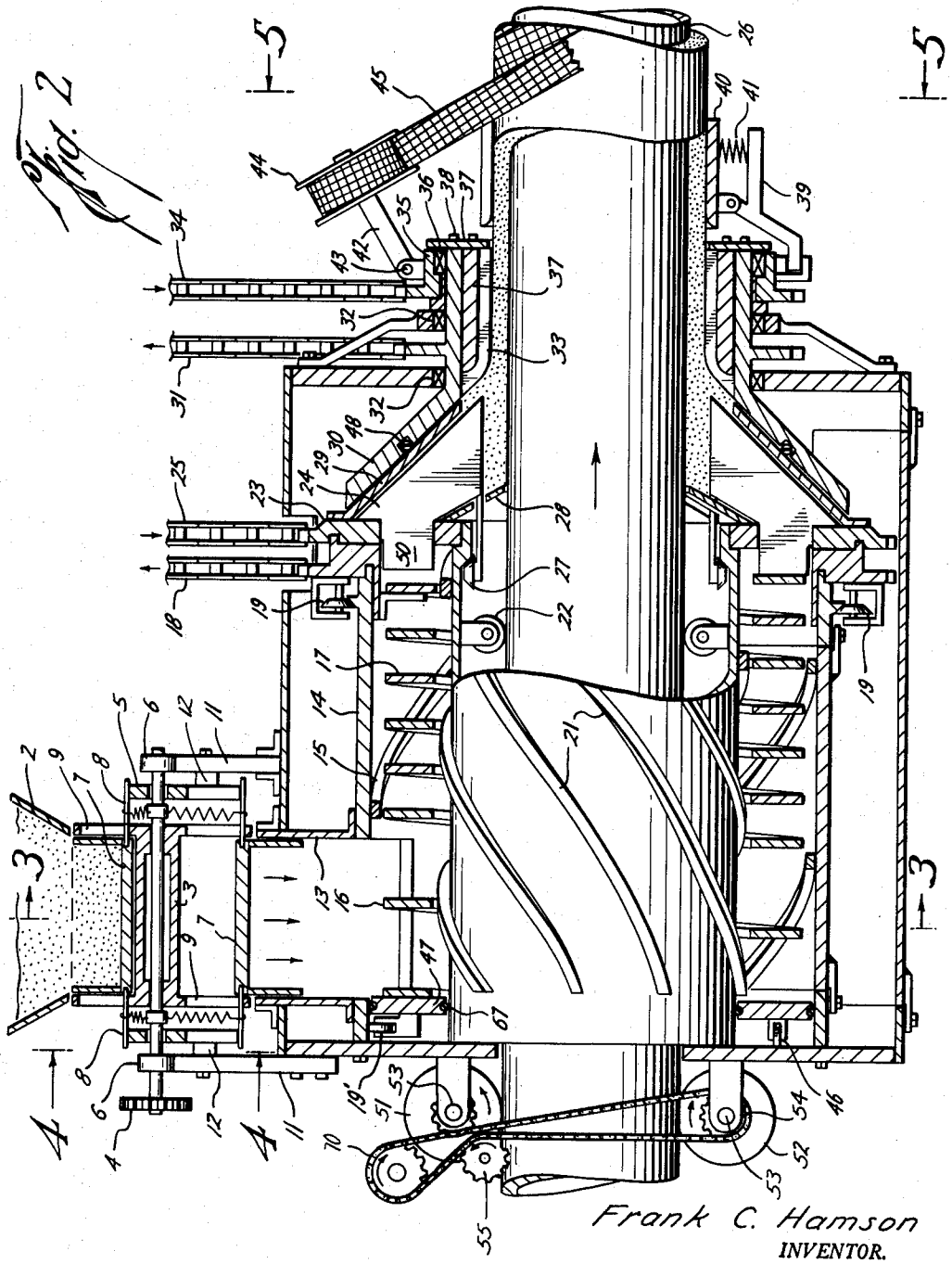
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Sept. 3, 1963 F. C. HAMSON 3,102,319

PIPE COATING MACHINE

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Fig. 2



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PIPE COATING MACHINE

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Fig. 3

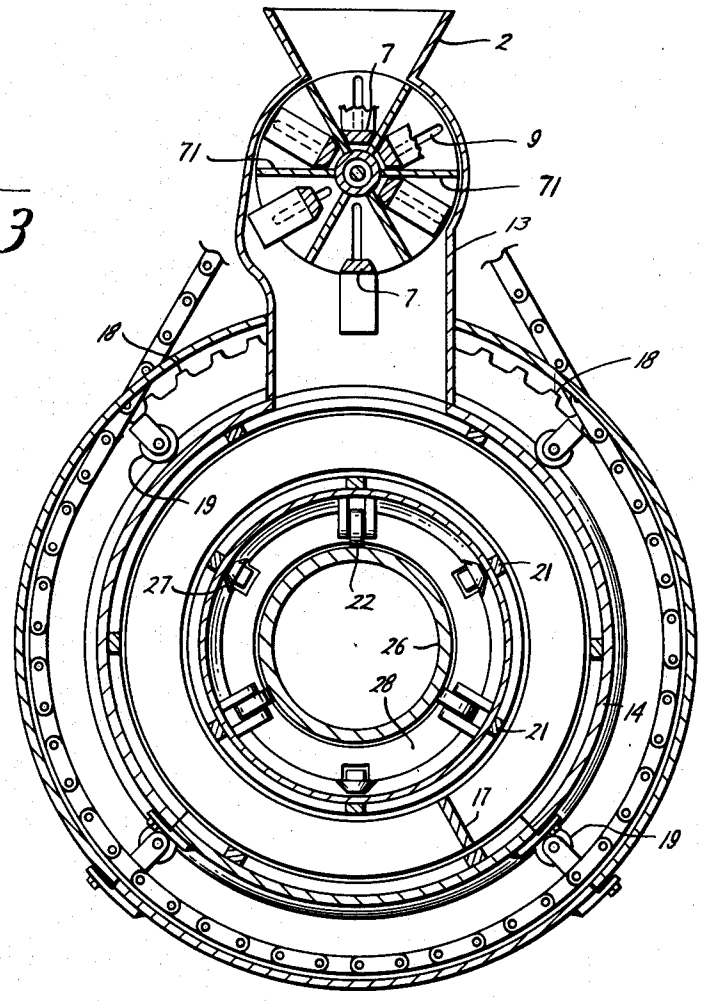
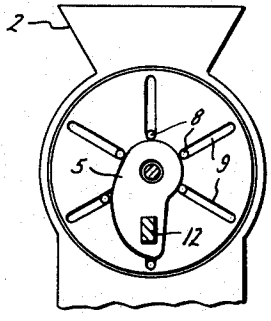


Fig. 4



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PIPE COATING MACHINE

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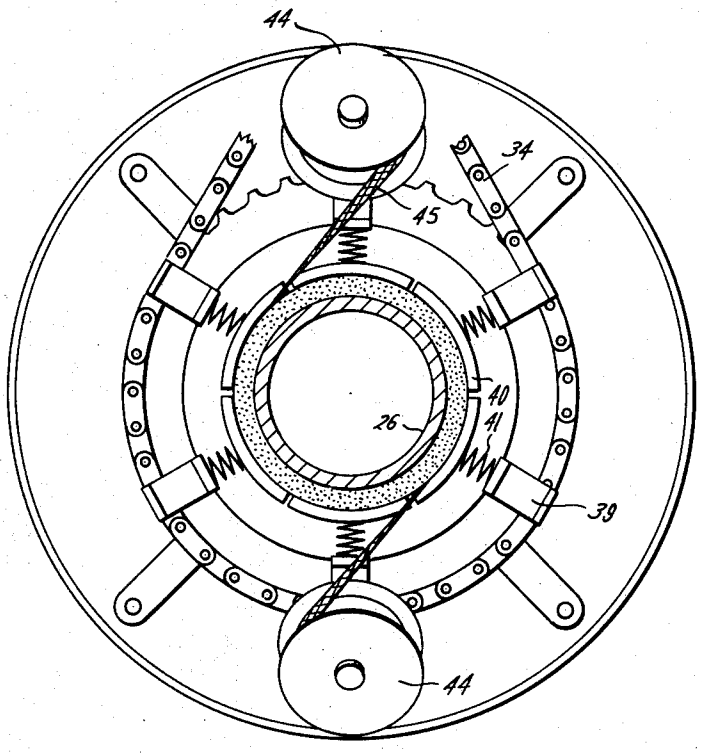


Fig. 5

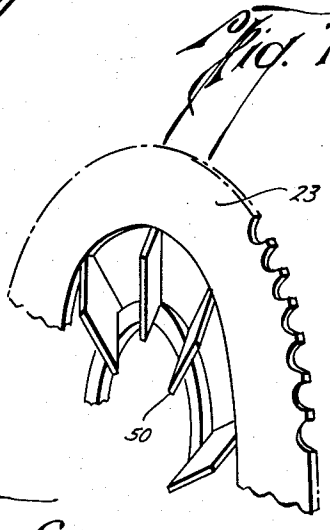


Fig. 7

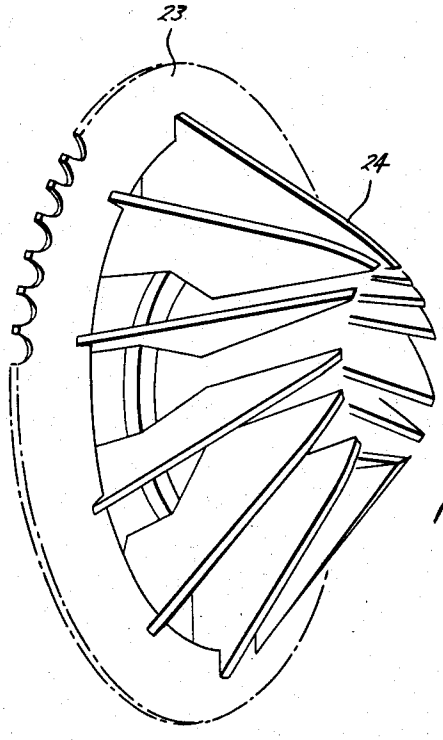


Fig. 6

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United States Patent Office 3,102,319
Patented Sept. 3, 1963

3,102,319

PIPE COATING MACHINE

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Filed Apr. 29, 1960, Ser. No. 25,777
6 Claims. (Cl. 25—38)

This invention relates to new and useful improvements in a pipe coating machine.

It is an object of this invention to provide a pipe coating machine for preparing pipe for underwater installation, and the like.

It is another object of the invention to provide a pipe coating device for use in underwater pipe line installation having means for receiving sections of pipe, forming an integral pipe line and wrapping and coating the pipe and launching the integral line preparatory to the final underwater installation.

It is still a further object of the invention to provide a device for coating pipe having novel means for applying a first coat of coating material to a length of wrapped pipe, applying a wrap of reinforcing material to said coat then applying another coat of coating material, all of which is accomplished as the pipe sections pass through the device in continuous motion.

It is another object of the invention to provide a pipe coating device having a pair of coating machines in longitudinal alignment through which the string to be coated moves continuously and each of said machines having novel means for extruding a coating material on the pipe and packing and troweling said material to provide a smooth and uniform coat of material on the pipe.

It is still a further object of the invention to provide a device for coating a string of pipe with concrete or the like having novel means for moving a semi-dry mix of coating material into the coat applying apparatus.

It is a further object of the invention to provide a device for coating a string of pipe with concrete or the like having a novel means for applying a coat of coating material in a uniformly packed manner preparatory to troweling.

It is another object of the invention to provide a device for applying a coat of concrete or the like to a string of pipe having novel means for troweling the coat of concrete to provide a smooth and even finish.

With the above and other objects in view, the invention has relation to certain novel features of construction, operation and arrangement of parts more particularly defined in the following specifications and illustrated in the accompanying drawings, wherein:

FIGURE 1 is a top plan view of a pipe string assembly and coating operation.

FIGURE 2 is a cross sectional elevational view of a coating unit.

FIGURE 3 is a cross sectional elevational end view taken on the line 3—3 of FIGURE 2.

FIGURE 4 is a cross sectional elevational view taken on the line 4—4 of FIGURE 2.

FIGURE 5 is a cross sectional end elevational view taken on the line 5—5 of FIGURE 2, and

FIGURE 6 is an elevational perspective view of the concrete applying and packing means employed, and

FIGURE 7 is a fragmentary view of the applicator, showing the means of feeding the extrusion impeller apparatus.

Referring now more particularly to the drawings, the numeral 1 is a fixed housing in which the coat applicator machine is mounted. A chute 2 from a suitable hopper assembly as 66 directs a semi-dry mix of concretous material into a receiver 3 which is rotated through the gear 4 which in turn is rotated by any suitable driving means (not shown). The receiver 3 is provided with a

series of partitions 71, 71, forming compartments and is supported by the axle 5 which is mounted in suitable bearings as 6, 6. A plurality of plates 7, 7 are mounted in the receiver 3 and have actuating pins 8, 8 extending outwardly from the respective ends thereof through suitable slots 9 in the receiver 3. The ends of the plates 7, 7 are upwardly turned to block the flow of concrete through the slots 9. A pair of cams 10, 10 are mounted on the bearing supports 11, 11 by means of suitable mounts as 12, 12. As the receiver 3 is rotated, the pins 8 will follow the contour of the cams 10, 10 and discharge the concrete into the conduit 13, in measured amounts.

The conduit 13 is mounted in the housing 1 and discharges into the tub 14. A spiralled guide 15 is mounted in the tub 14 on the inside wall thereof, and a spiralled concrete moving screw 47 is rotatably mounted in the tub 14, the moving screw 47 having a single spiral 16 at the concrete receiving end of the tub 14 and a second spiral 17 being added adjacent the concrete chute, or conduit, 13. The screw 47 is rotated through the gear 18 and suitable bearings as 19, 19′ may be provided to maintain the screw in alignment in the tub 14.

A cylindrical guide 20 is axially mounted in the housing 1 and has a spiralled guide vane 21 on the outside surface thereof and suitable guide bearings 22, 22 on the inside wall thereof.

Mounted in the housing 1 and adjacent the discharge end of the guide 20 is the applicator holder 23, having a plurality of applicator blades 24, 24 which are bent to provide an inwardly spiralled wiping action to the blades 24. The applicator holder 23 has a flanged base which is toothed to mesh with the driving gear 25. The wiping edge of the blades 24 are parallel with the axis of the cylinder 20 and with the surface of the pipe 26 being coated. Suitable bearings as 27 are provided to maintain the blades 24 in alignment with the guide 20. The applicator 23 has an inside shield 28 which is outwardly and downwardly inclined and mounted on the end of the guide 20 and acts as a baffle to prevent the concrete from passing into the guide 20 and mounted on the housing 1 is the outside outwardly and downwardly inclined shield 29, which is parallel with the outside margin of the applicator blades. A rotatable shoe holder 30 is mounted in the housing 1 adjacent the applicator 23 which forms a funnel in which the applicator blades rotate, and which is rotated by the gear 31 with suitable bearings as 32, 32 mounted between the housing 1 and the shoe holder 30. A series of packing shoes 33, 33 are mounted on the holder 30, and are downwardly and outwardly curved at one end to provide a gradual packing action to the concrete after it has been applied to the pipe by the applicator blades. The shoes 33 are mounted on the holder 30 by means of the annular shoe frame 37 which may be suitably anchored to the holder 30 as by the bolts 38, 38 and which extends upwardly to act as a retainer for the wrapping member 35 hereinafter described. The shoes 33 may be varied in wall thickness so that they may be readily exchanged for shoes of different sizes when a different thickness of coating is desired or where different sizes of pipe are to be coated.

Rotatably mounted on the holder 30 and rotated by the gear 34 is the troweling and wrapping member 35 and suitable bearings as 36, 36 are mounted between the member 35 and the holder 30. A plurality of trowels 39, 39 are mounted on the member 35, which have the trowel blades 40, 40 pivotally anchored thereto, with means for maintaining the blades 40 yieldably against the concrete coat, such as the springs 41, 41. Also mounted on the member 35 are the wrapping holders 42, which are adjustably mounted by suitable bolts 43 and which have

reels as 44 for applying a reinforcing material such as wire mesh 45.

A series of rollers as 46 are provdied at the receiving end of the screw 47 for maintaining the discharge end of the screw 47 and applicator blades 24 against the shield 29. Suitable sealing means as the O-ring 48 mounted in the groove as 49 of the shoe holder 30 and bearing against the shield 29 keeps the material being applied to the pipe from passing into the housing 1.

The spirals 16, 17 have their discharge terminals at diametrically opposite points, so that two separate points of discharge of material on the pipe are provided. The applicator 23 has the rearwardly projecting and vertically cupped intake members 50, 50 which pick up the material and direct the same inwardly on to the applicator blades. The spirals 16, 17 act as an extrusion screw to move the concrete on to the applicator blades and the applicator blades act as extrusion impellers to force the concrete on to the pipe in an even, packed coating.

The pipe to be coated, as 26, moves along a conveyor (not shown) into the receiving end of the guide 20. A pair of upper propellers 51, 51 in direct connection with a pair of lower propellers 52, 52 are mounted on the receiving end of the housing 1 and bear against the pipe being treated. Each pair of propellers are joined by a drive shaft 53 having a sprocket as 54 at one end thereof and an idler wheel as 55 is mounted adjacent the lower propeller drive shaft and a drive chain connects and rotates the sprockets 54, 55 and is in turn rotated by the sprocket 70 which in turn is rotated by the source of power (not shown) for rotating of the propellers to move the pipe in synchronization with the movement of the conveyor.

A suitable seal, such as the O-ring 67, is provided at the forward end of the screw 47, which bears against the tub 14 and the cylinder 20, to retain the concrete in the tub.

In operation, the gears 18, 25 rotate in opposite directions and the gears 31, 34 also rotate in opposite directions. Two units, as A and B, identical to the one shown in FIGURE 2, are mounted in axial alignment, the second unit being different from the first unit only in that the wrapping reel 44 is omitted. The pipe being coated passes through the first unit, A, and receives a coat of concrete, or the like, and is wrapped with reinforcing material and then passes through the second unit, B, and receives a second coat of concrete.

In operation, a series of barges 56, 56 are anchored together to form a working surface. Pipe as 57 to be treated and formed into a pipe line are brought to the point of start and unloaded as at 58 where they are welded into longer sections as 59 and stored as at 60. The welded sections as 60 are then treated by applying a suitable dope and wrapping in a conventional manner, as at 61, and are stored as at 62, where they are conveyed into the concrete coating machines A and B and stored for drying and curing as at 63 and the cured sections are then moved to the launching barge as at 64 where they are joined into an integral line and launched into the water preparatory to lowering to the bottom.

As the pipe enters the unit A, the propeller wheels 51, 52 continue to move the pipe through the unit and coating material from the hoppers 66 passes into the receiver 3 and is metered into the tub 14 where the screw 47 picks it up and moves it forwardly until the applicator intake members 50 rotating in an opposite direction of rotation to the direction of rotation of the screw, pick it up and deliver it to the blades 24 where it is spread on to the pipe 26, the shoes 33 packing it and smoothing it in place and the trowel blades 40 finishing the coat and the wrapping 45 then applied. The unit B, exactly the same as the unit A, operates in exactly the same manner, the pipe passing into the receiving end of the unit B as it is projected from the unit A, except that the wrapper may be omitted from the unit B.

As the pipe passes out of the unit B with the second coat of coating material, it is stored on the curing racks as at 63 and from this area is moved onto the storage barge 64 where it is joined to form the pipe line and may be launched from the ramp 5.

Where it is desired to form a continuous string of pipe on land, rather than on barges, the same arrangement may be made with stations established in place of the barges referred to.

The method taught herein includes the coating of pipe with a reinforced double layer of coating material by arranging a pair of extrusion machines in longitudinal alignment, moving pipe longitudinally through said machines, extruding, packing and finishing the first coat, wrapping same with reinforcing material as it leaves the first machine, then extruding, packing and finishing a second coat in a continuous operation, forming a coated section of pipe line ready for joinder to a string of pipe and launched for final installation in an integral line.

While the foregoing is considered a preferred form of the invention, it is by way of illustration only, the broad principle of the invention being defined by the appended claims.

What I claim is:

1. In a pipe coating device, a pair of units arranged in axial alignment, each of said units having a concrete receiving means in which measured concrete is received and dispensed, a housing having a concrete receiving tub therein, a revolving screw in said housing, a cylinder in the housing about which said screw revolves, and an axial passageway through said cylinder through which a pipe to be coated passes, said concrete receiving means depositing concrete in measured amounts into said tub and said screw having concrete moving means thereon for moving said concrete axially within the tub, an applicator blade holder mounted in said housing and on said screw adjacent one end of the tub having applicator blades opposite said end of the tub and in axial alignment therewith and having means for directing concrete onto said blades and to be spread onto the pipe to be coated, shoe holders rotatably mounted in said housing and in axial alignment with the tub adjacent said blades having a plurality of shoes thereon which rotate in a path in axial alignment with said tub and around the pipe to be coated and pack the concrete thereon, a plurality of trowels adjacent said shoes yieldingly maintained against the coated pipe and rotated about the pipe to apply a finish to said coat and wrapping means adjacent said trowels rotating about the pipe and applying a wrap of reinforcing material on the finished coat.

2. In a pipe coating machine, a housing, a tub within the housing, a rotatable screw within the tub, means on said screw for maintaining same in the desired horizontal position in the tub, spiralled vanes on the inside wall of the tub, a concrete inlet through said housing into said tub adjacent one end of said screw, a cylinder within the tub around which the screw rotates, a horizontal passageway through said cylinder through which a pipe to be coated passes, spiral vanes on said cylinder, said screw having a single spiral vane adjacent the concrete inlet and having another spiral vane from a point adjacent the forward edge of the concrete inlet to the end of the screw, each of said spiral vanes of said screw terminating at diametrically opposed positions on said cylinder to provide two points of discharge of concrete, a rotatable applicator blade holder mounted in said housing at the terminus of said screw and in axial alignment with said tub, said applicator blade holder having a plurality of applicator blades projecting forwardly therefrom and a plurality of intake members projecting rearwardly therefrom and directed toward and adjacent the interior of said tub, said intake members receiving con-

crete from said screw and directing same onto said blades which in turn spread the concrete onto the pipe, the direction of rotation of the applicator blade holder being opposite of the direction of rotation of said screw, means for blocking the flow of concrete vertically of said blades, a shoe holder rotatably mounted in said housing and in axial alignment with said tub, a plurality of packing shoes on said holder positioned adjacent said blades to form and pack the concrete after it has been applied to a pipe by said applicator blades as the pipe passes through said cylinder, a trowel holder rotatably mounted on said housing in axial alignment with said tub and adjacent said shoes and rotatable in the opposite direction of rotation to the direction of rotation of said shoe holder, a plurality of trowels mounted on said trowel holder and bearing against the concrete coat and adjacent said shoes and being yieldable outwardly and a wrapping reel mounted on said trowel holder from which reinforcing material may be applied to the coated pipe.

3. In a pipe coating device, a housing, a tub mounted in said housing, a cylinder mounted in said tub having a horizontal passageway therethrough through which pipe to be coated may be passed, a concrete receiving means on said housing and a passageway for concrete through said housing into one end of said tub, said concrete receiving means having means for controlling the amount of concrete passing therethrough comprising a plurality of partitions in said receiver dividing said receiver into a plurality of chambers, concrete discharge plates mounted on the bottom of said chambers, slots in the side of said receiver, guide pins extending from the inwardly extended ends of said plates through said slots, cams mounted on the housing adjacent said receiver, yieldable means maintaining said pins in contact with said cams and means for rotating said receiver to receive concrete in one position and move said plates outwardly to discharge said concrete when in another position and means for applying said concrete to a pipe after it passes through said cylinder.

4. In a pipe coating device, a housing, a tub within said housing, a cylinder within said tub, a passageway through said cylinder for the passage of a pipe to be coated, a rotatable screw around said cylinder, a passageway through said housing and tub for the introduction of concrete to be applied to said pipe, said screw having a pair of spiralled vanes thereon, said vanes having diametrically opposed points of discharge of concrete carried thereby, an applicator blade holder rotatably mounted in said housing in axial alignment with said tub and adjacent the discharge end of said screw, said holder having applicator blades projecting forwardly therefrom and twisted to impart a spreading action, the lower edge of said blades being parallel with the pipe being passed through said cylinder, rearwardly projecting intake members on said applicator blade holder, said intake members being cupped to pick up and force concrete onto said applicator blades from the discharge end of said screw, means for preventing backflow of said concrete from said applicator blades, a rotatable shoe holder mounted in said housing adjacent said blade holder and in axial alignment with said tub, a plurality of shoes mounted

on said shoe holder adjacent said blades in position to pack the concrete coat after it has been applied to the pipe, and a rotatable trowel holder having a plurality of trowels yieldably maintained in position adjacent said shoes to smooth and finish the concrete coat as the pipe passes through said cylinder.

5. In a pipe coating device, a housing, a tub within said housing, a cylindrical guide in said tub, a screw rotatable around said guide, spiralled vanes on the inside wall of said tub and the outside wall of said cylinder, said screw having spiralled vanes with diametrically opposed discharge terminals, a horizontal passageway through said guide, pipe aligning means in said passageway, a rotatable applicator blade holder in axial alignment with said tub having applicator blades thereon mounted in said housing adjacent said discharge terminals of said screw, bearings in said guide in connection with said applicator blade holder maintaining said applicator blades in alignment with said guide, means on said screw for maintaining said screw in position on said guide as the screw rotates and means rotatably mounted on said housing adjacent said blades and in axial alignment with said tub for packing and finishing a coat of concretous material applied to a pipe passing through said guide.

6. In pipe coating devices, a housing, a tub within said housing, a guide in said tub through which a pipe to be coated passes, means for introducing concrete into said tub in equal measured amounts, rotatable means in said tub for moving said concrete therethrough and discharging same therefrom, independently rotatable applicator blades rotatably mounted in said housing at the discharge end of said tub, one end of said blades receiving said concrete and the other end of said blades being shaped to spread said concrete on a pipe passing through said tub, independently rotatable means mounted in said housing adjacent said blades in axial alignment with the discharge end of said tub for packing said concrete after it has been spread on said pipe and a backflow barrier between said packing means and said spreading means, independently rotatable troweling means mounted on said tub and adjacent said packing means, said troweling means having pivotally mounted trowel blades adjacent said packing means and in axial alignment with the discharge end of said tub, said blades being yieldably urged inwardly adjacent the outer edges thereof.

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