Sept. 12, 1933. E. JANSEN 1,926,387

PIPE COATING MACHINE

Filed Nov. 19, 1930 7 Sheets-Sheet 1

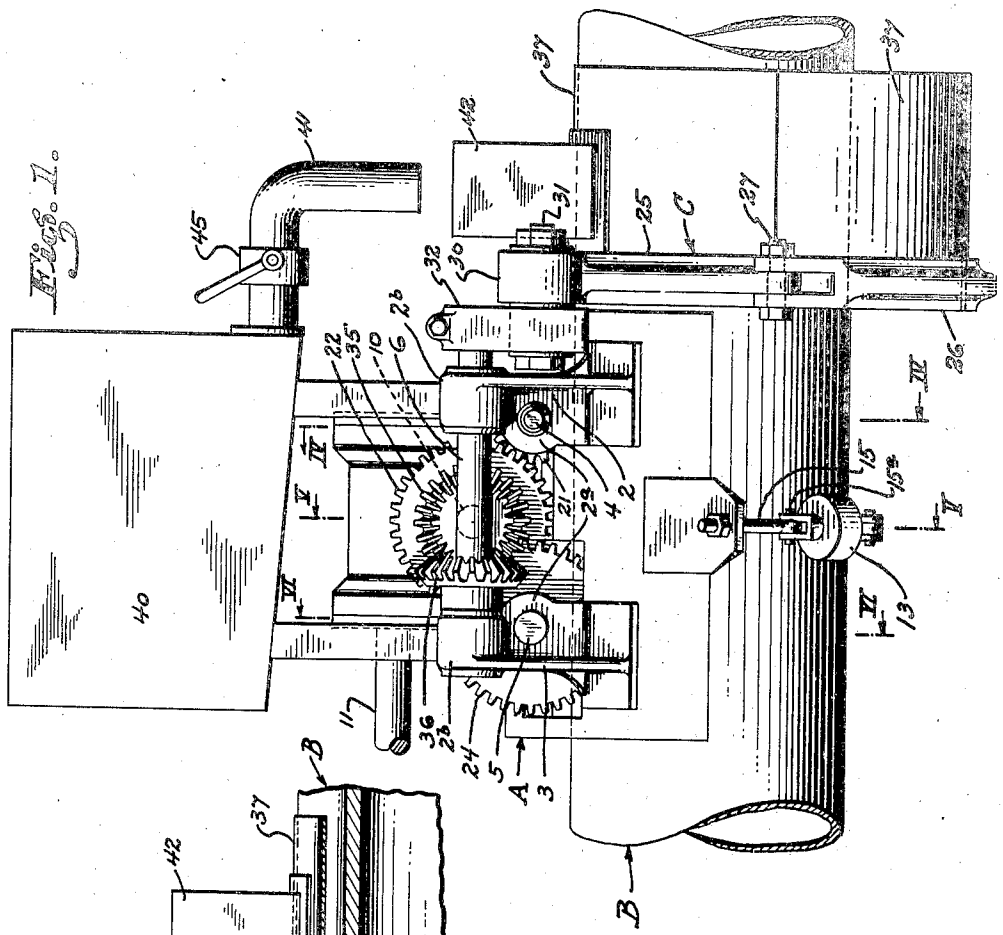


Fig. 1.

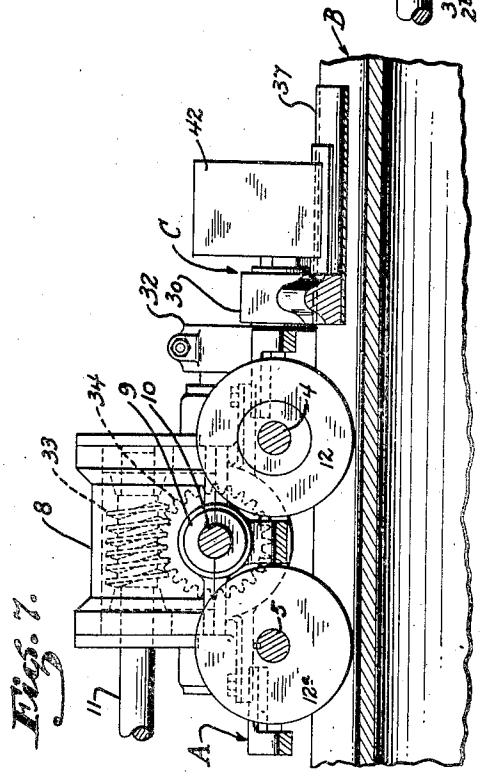


Fig. 7.

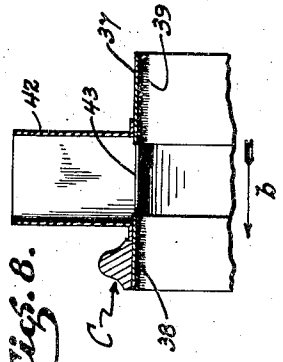


Fig. 8.

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Filed Nov. 19, 1930 7 Sheets-Sheet 2

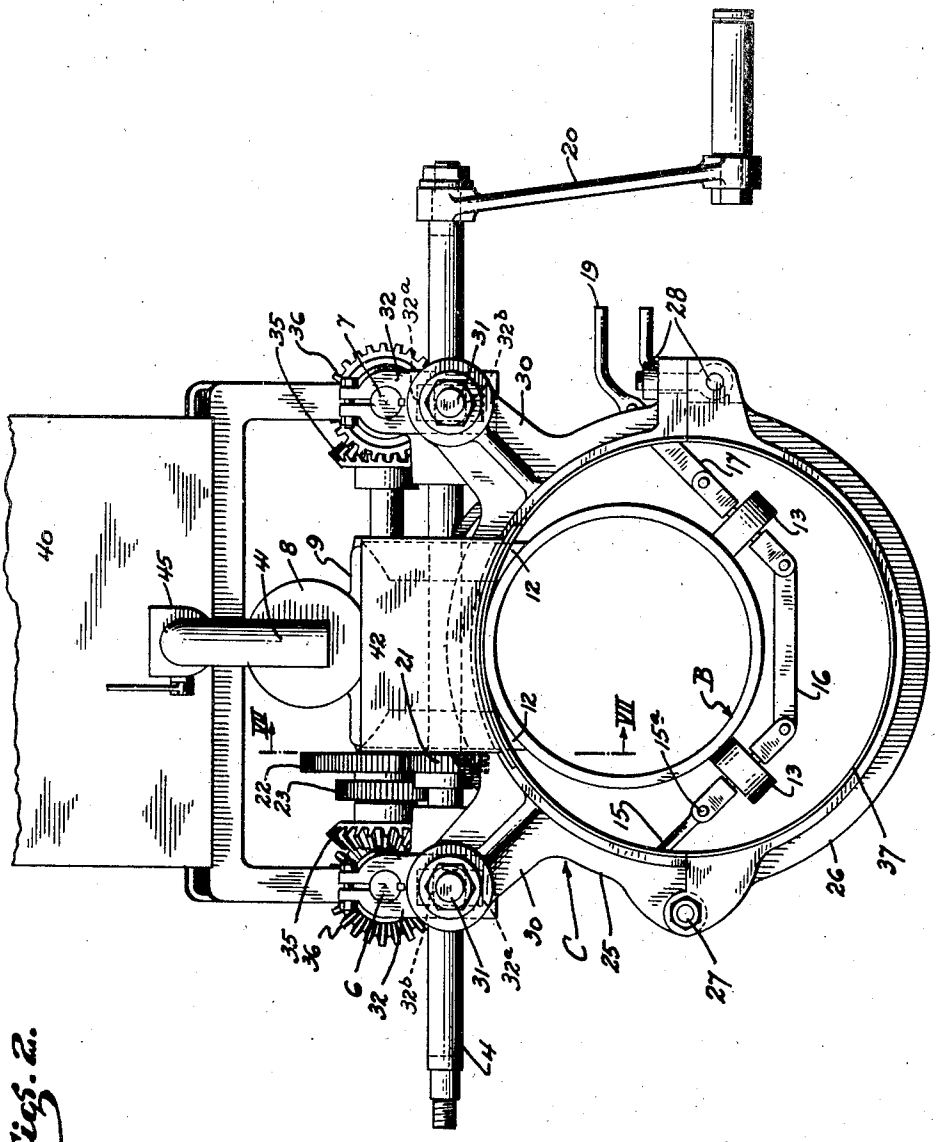


Fig. 2.

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Sept. 12, 1933. E. JANSEN 1,926,387

PIPE COATING MACHINE

Filed Nov. 19, 1930 7 Sheets-Sheet 3

Fig. 9.

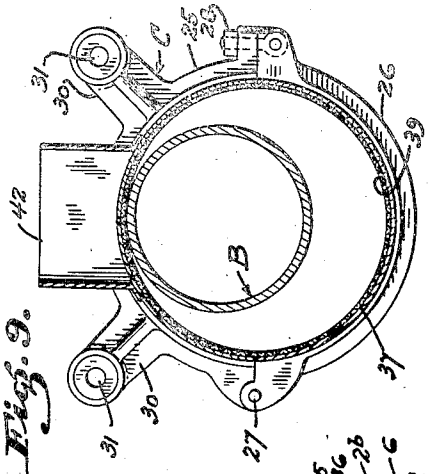
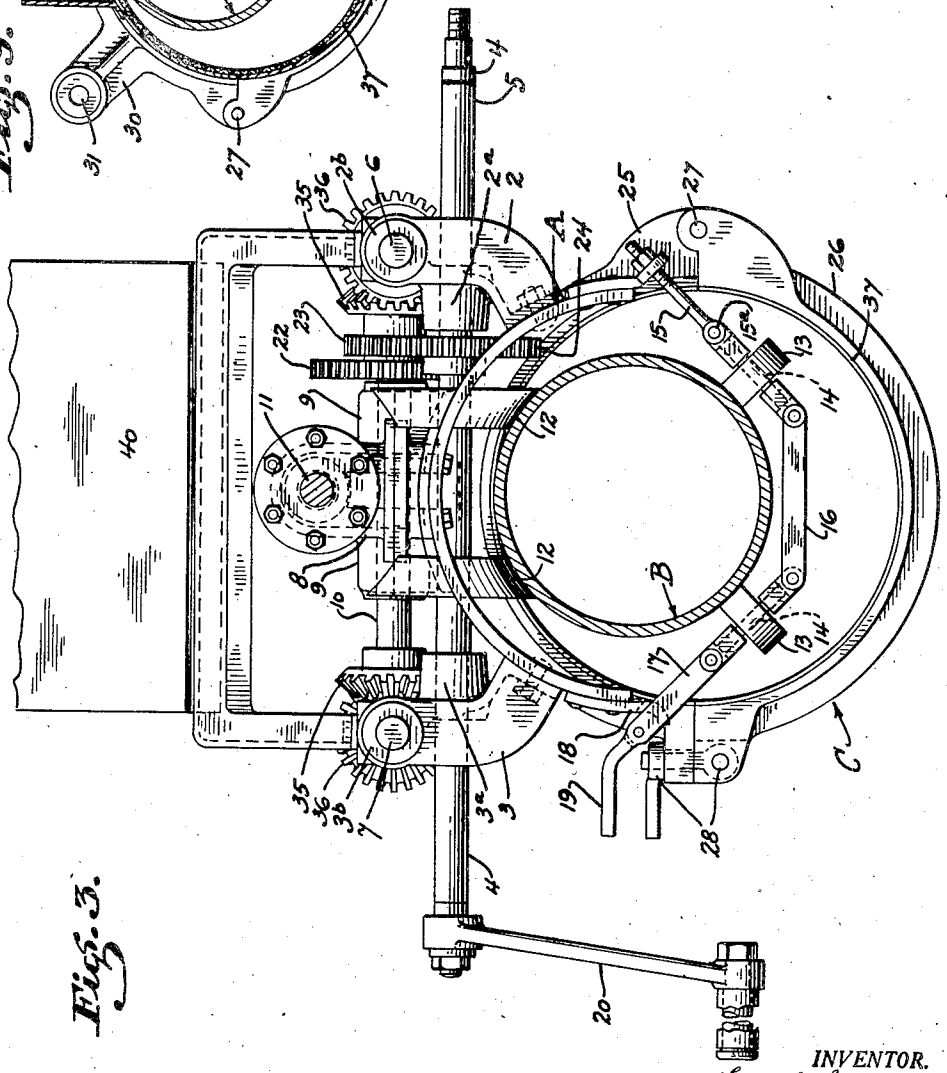


Fig. 3.



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PIPE COATING MACHINE

Filed Nov. 19, 1930 7 Sheets-Sheet 4

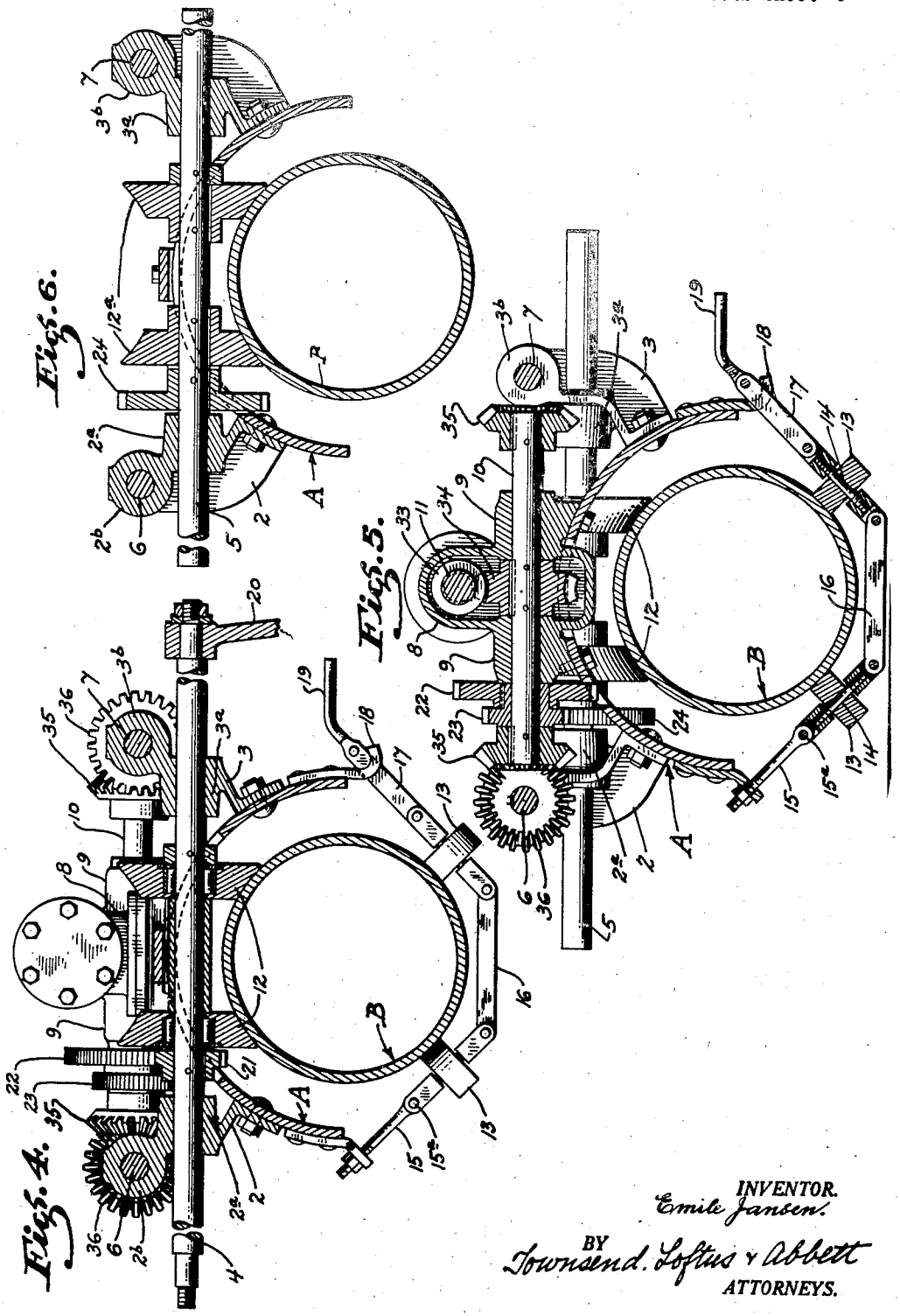


Fig. 6.

Fig. 5.

Fig. 4.

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Sept. 12, 1933. E. JANSEN 1,926,387

PIPE COATING MACHINE

Filed Nov. 19, 1930 7 Sheets-Sheet 5

Fig. 10.

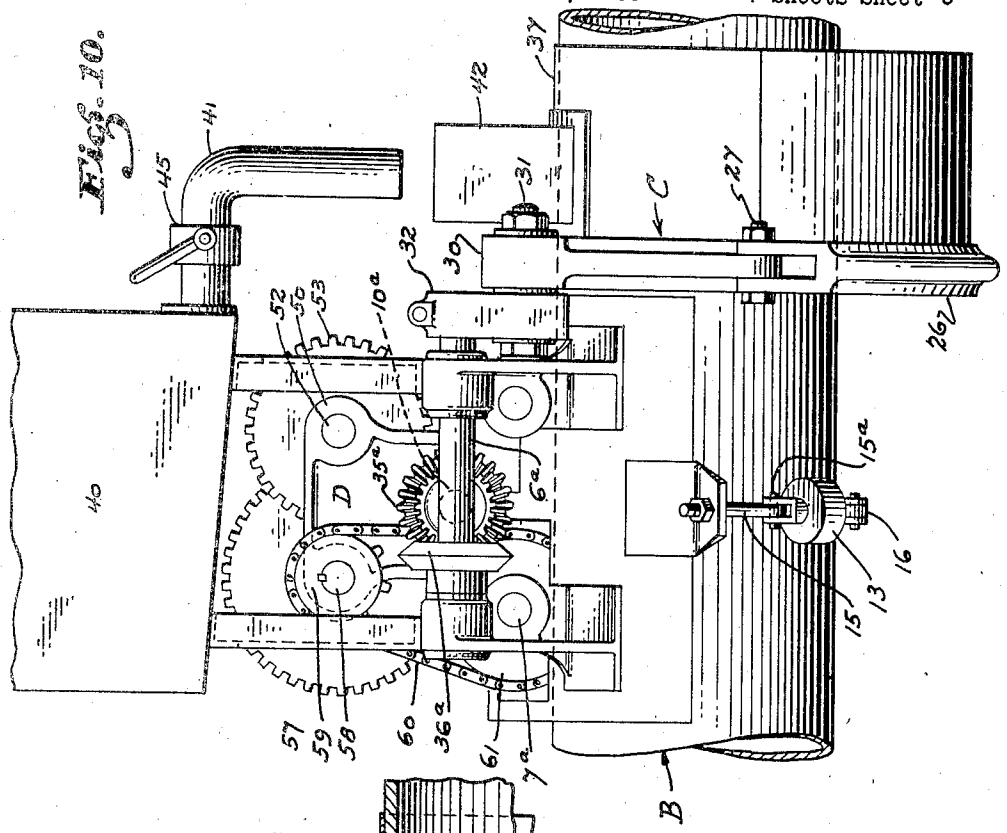
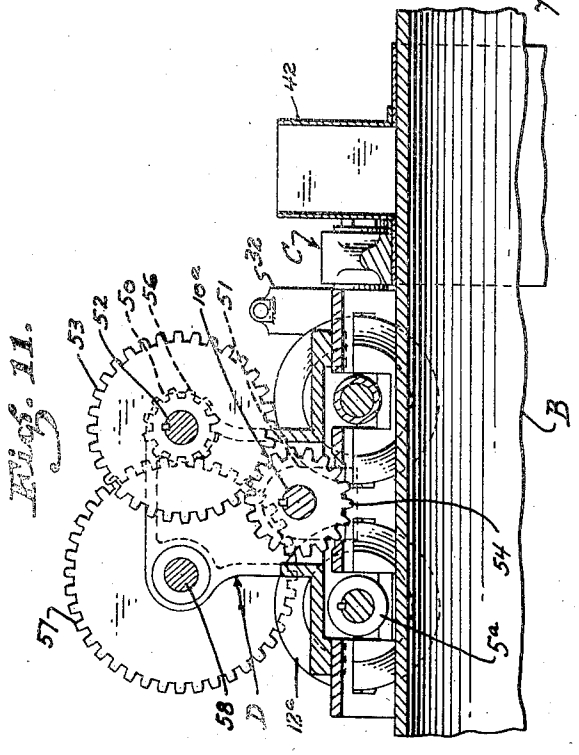


Fig. 11.



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Sept. 12, 1933. E. JANSEN 1,926,387

PIPE COATING MACHINE

Filed Nov. 19, 1930 7 Sheets-Sheet 6

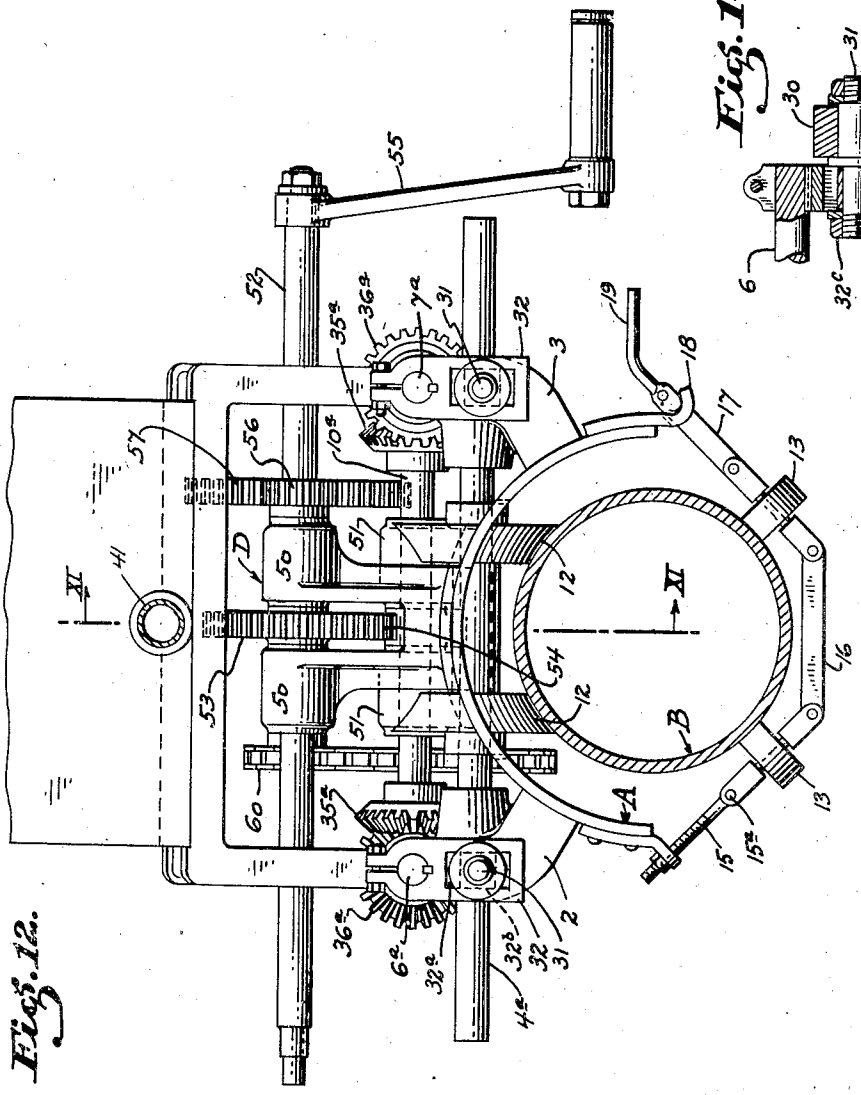


Fig. 12.

Fig. 14.

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Sept. 12, 1933. E. JANSEN 1,926,387

PIPE COATING MACHINE

Filed Nov. 19, 1930 7 Sheets-Sheet 7

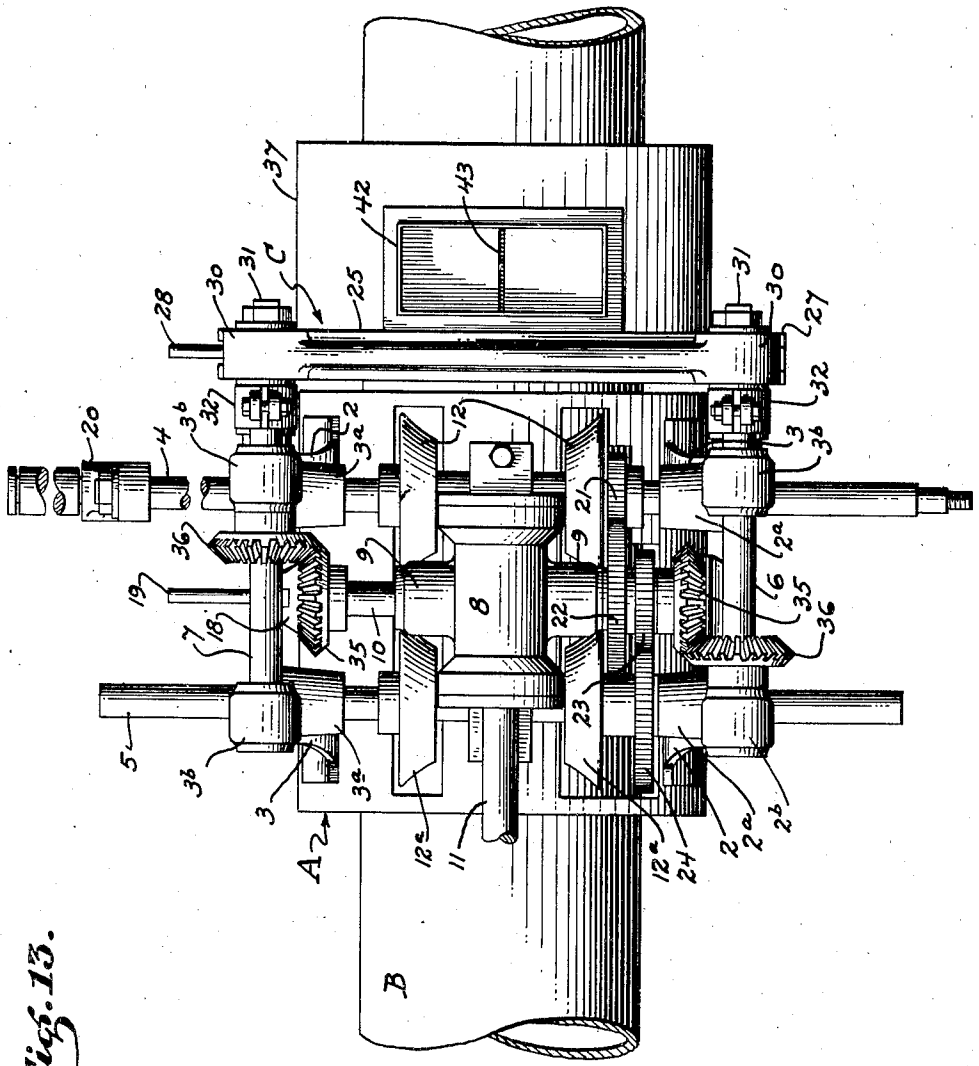


Fig. 13.

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Patented Sept. 12, 1933

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UNITED STATES PATENT OFFICE

1,926,387

PIPE COATING MACHINE

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Application November 19, 1930
Serial No. 496,754

12 Claims. (Cl. 91—43)

This invention relates to a machine for applying a coating compound to the exterior surface of a pipe after it has been welded or coupled into a line, and particularly to a machine which is adapted to be supported upon the pipe as upon a track so as to travel longitudinally thereon and which will automatically apply the coating compound as the machine is propelled along the pipe.

Pipe coating machines adapted to travel on a pipe line for the purpose of applying a coating compound to the exterior surface thereof have been used but have proven more or less unsatisfactory as they have depended upon revolving rings or the like carrying brushes to apply the coating compound. In machines of this character the coating compound is supplied to the brushes by directing the compound in a hot fluid condition longitudinally of the pipe under or in front of the brushes, or by dipping the brushes in the material, and in some instances, the compound has been applied by spraying. These methods of delivering the compound to the brushes or spray nozzles are not practical as cooling of the compound causes clogging of the brushes and nozzles and this clogging action is further increased by the fillers employed, such as silicate or the like, which are mixed with the compound.

The object of the present invention is to generally improve and simplify the construction and operation of machines of the character described; to provide a machine in which the objections above specified are entirely eliminated; to provide a machine which is adapted to travel on the pipe to be coated as on a track and while so traveling to automatically and uniformly apply a coating compound to the exterior surface of the pipe; to provide a machine of this character which is adapted to be manually or power driven; to provide a machine which supports a sleeve shaped wiping mechanism capable of completely surrounding the pipe to be coated and to which the coating compound is delivered centrally of the sleeve or wiper and directly on top of the pipe; to provide manually or power driven means whereby an oscillating movement is transmitted to the wiper sleeve so that the compound will be applied by rubbing or wiping action; to provide a machine in which the thickness of the coat applied may be determined and pressure applied, if required; and, further, to provide a wiping mechanism which is equally efficient whether the machine is traveling in one direction or another.

The machine is shown by way of illustration in the accompanying drawings, in which—

Fig. 1 is a side elevation of the machine showing it supported by a pipe line,

Fig. 2 is a front view of the machine supported on the pipe line,

Fig. 3 is a rear view of the machine showing it supported on the pipe line,

Fig. 4 is a cross section of the machine taken on line IV—IV of Fig. 1,

Fig. 5 is a cross section taken on line V—V of Fig. 1,

Fig. 6 is a cross section taken on line VI—VI of Fig. 1,

Fig. 7 is a longitudinal detail section taken on line VII—VII of Fig. 2,

Fig. 8 is a detail section of the wiper frame and the sleeve and funnel supported thereby,

Fig. 9 is a cross section of the wiper frame and sleeve,

Fig. 10 is a side elevation showing a modified form of the machine,

Fig. 11 is a longitudinal section taken on line XI—XI of Fig. 12,

Fig. 12 is an end view of the machine shown in Fig. 10,

Fig. 13 is a plan view of the machine showing the supply hopper removed,

Fig. 14 is a detail section view showing the adjustable crank throw.

Referring to the drawings in detail and particularly Figs. 1 to 3, inclusive, A indicates a main frame which is substantially semi-circular shaped in cross section. Suitably secured to each side of this frame are pairs of bearing brackets such as indicated at 2 and 3. Each bracket is provided with transverse bearings 2*a* and 3*a* to support cross shafts 4 and 5 and the brackets are also provided with longitudinally disposed bearings 2*b* and 3*b* in which are journaled longitudinally disposed shafts 6 and 7. Centrally disposed on the main frame A and suitably secured thereto is a housing 8. Journaled crosswise of the housing in bearings 9 is a cross-shaft 10 and journaled longitudinally of the housing in the upper part thereof is a driving shaft 11.

The machine is particularly intended for applying a coating compound to a pipe line such as indicated at B and it is accordingly essential to support the main frame or the machine as a whole on the pipe so that it may be propelled longitudinally thereof and it is also essential to secure the machine against accidental displacement or upward movement. The cross-shafts 4 and 5 are each provided with supporting rollers

such as indicated at 12, there being one pair of rollers on each shaft. The rollers carried by the shaft 4 are freely rotatable on the shaft while the rollers carried on the shaft 5 are keyed, or otherwise secured, thereto. These last named rollers serving an additional function to wit, that of propelling or driving the machine longitudinally of the pipe line to be coated.

Inasmuch as the surface of the pipe line is circular the peripheral surfaces of the supporting rollers 12 are substantially cone-shaped and slightly concave so as to provide the best supporting and driving surfaces, this being clearly shown in Fig. 3. In order to secure the machine against vertical movement with relation to the pipe line a pair of rollers such as indicated at 13 are employed. These rollers are journaled as at 14 between links such as indicated at 15, 16 and 17, and as such are free to rotate as the machine advances along the pipe line, but as it is necessary to apply the machine to the pipe line and to remove it from time to time it is essential that the rollers 13 may be lowered or swung to one side. This is accomplished by providing a hook-shaped support 18 at one side of the main frame to receive a securing lever 19. This lever is pivoted on the upper end of the link 17 and by pressing it in a downward direction the lower end of the lever is swung out of engagement with the hook-shaped support 18 and the rollers 13 supported by the connected links may thus be swung about the pivot 15*a* so as to assume a position at one side of the machine and thereby permit the machine to be lifted off the pipe or to be applied thereto.

Propulsion or movement of the machine longitudinally of the pipe is accomplished as follows: The cross-shaft 4 is extended outwardly to one side of the machine as shown in Fig. 3 and a crank 20 is secured thereto. In fact, both ends of the shaft are extended as shown in this figure and the crank may accordingly be applied to either end as conditions may demand. Secured on the shaft intermediate the bearing 2*a* and one of the supporting rollers 12 is a spur gear pinion 21. This pinion meshes with spur gear 22 which is freely rotatably on the cross-shaft 10. A second spur gear 23 is connected with the gear 22 and is rotatable in unison therewith. This gear is also freely rotatable on shaft 10 and it intermeshes with a larger spur gear 24 which is secured on the cross-shaft 5. These gears are best illustrated in Figs. 3 to 6, inclusive. The connected gears constitute a reduction gear train and when the crank 20 is rotated by an operator walking along the pipe line a slow forward motion is transmitted to the machine. A reverse movement may be transmitted by merely rotating the hand crank 20 in an opposite direction. The supporting rollers 12 which are mounted on shaft 4 are freely rotatable thereon as previously stated but the rollers 12*a* which are carried by shaft 5 are secured to said shaft and so is the final gear 24 of the reduction gear train, hence the supporting rollers 12 merely act as supporting idler rollers while the rollers 12*a* are the driving rollers whereby the machine is propelled longitudinally on the pipe.

The wiping mechanism whereby the pipe coating compound is applied to the exterior surface of the pipe line is best illustrated in Figs. 1, 2, 3, and 9. The mechanism employed for this purpose comprises a wiper frame generally indicated at C. This frame is made in two sections, an upper section 25 and a lower section 26, the section 26 being pivotally attached to the section 25 as shown at 27 and the opposite side being secured to the upper section 25 by a pivoted bolt and nut such as shown at 28. The reason for splitting or dividing the wiper frame into two sections is the same as that described in connection with the pivoted links supporting the lower bearing rollers 13. That is, the wiper frame must be opened in order to permit removal or application of the machine to a pipe line and this is quickly and readily accomplished by merely releasing the nut 28 and swinging the bolt about its pivot, thus freeing the lower section so that it may swing downwardly and outwardly about its pivot 27. The upper frame section 25 is provided with two hanger arms such as shown at 30, and these are pivotally attached as at 31 to a pair of crank arms 32, the crank arms being secured on the respective longitudinal shafts indicated at 6 and 7. These shafts are rotated in unison and in the same direction and as such transmit a circular or oscillating movement to the wiper frame without rotating the same.

Power is transmitted to the shafts 6 and 7 and the crank carried thereby in the following manner: Shaft 11 was previously referred to as a power shaft. It is connected with a driving motor of any suitable character, not here shown. Secured on the shaft within the housing 8 is a worm pinion 33 and secured on the cross-shaft 10 and intermeshing therewith is a worm gear 34. Secured on opposite ends of the shaft 10 are bevel gears 35 and secured on the longitudinal shafts 6 and 7 and on opposite sides of the gears 35 are intermeshing bevel gears 36, hence when power is transmitted to the shaft 11 it will cause rotation of the worm gear train indicated at 33 and 34 to rotate shaft 10 and this rotation is in turn transmitted through the bevel gears 35 and 36 to rotate the shafts 6 and 7, these shafts rotating in the same direction due to the fact that the bevel gears 36 are placed on opposite sides of the gears 35. The rotary motion transmitted to the shafts 6 and 7 causes rotation of the crank arms 32 as they are secured to said shafts and as the wiper frame is pivotally attached to the respective crank arms as shown at 31 a true circular or oscillating motion is transmitted to the wiper frame C in a vertical plane but without transmitting rotation motion to the wiper frame C about its central axis, or about the pipe. The wiper frame forms a support for an elongated sleeve such as shown at 37, see Figs. 1, 2 and 9. This sleeve is split in a manner similar to the wiper frame C so as to permit it to be opened in unison therewith when the machine is to be lifted off the pipe line. The inner surface of the sleeve is covered with a wiping material such as a carpet fabric, brushes, or the like, the material being arranged in two sections as shown in Fig. 8 and indicated at 38 and 39. The machine normally travels in the direction of arrow *b* when in operation. The coating compound to be applied to the surface of the pipe is carried in a tank such as shown at 40. A pipe 41 conveys this material to funnel 42 supported by the sleeve 37. The bottom portion of the funnel is slotted longitudinally as shown at 43 and the coating compound is thus deposited on the upper surface of the pipe between the fabric or wiper sections 38 and 39 and as the wiper frame is oscillated in a vertical plane about the pipe the compound is spread and evenly distributed over the entire surface of the pipe; the compound being applied with a wiping action as the wiper frame oscillates with relation to the

surface thereof. The operator tending the machine is walking at one side of the pipe line and rotates the hand crank 20, hence as the power driven wiper is applying the coating compound the operator is rotating the crank 20 and thereby advancing the machine longitudinally of the line as the coating compound is being applied, and at the same time maintaining the machine in a vertical position on the pipe. The sleeve 37 to which the coating compound is delivered is open at both ends and if the machine is traveling in the direction of arrow *b*, see Fig. 8, the wiping material indicated at 38 retains the liquid like compound from flowing out of that end of the sleeve while the fabric section shown at 39 receives the overflow and applies the compound to the surface of the pipe, the flow of compound to the funnel 42 being regulated by the operator through means of a valve 45.

In Figs. 1 to 9, inclusive, a machine is shown in which the wiping mechanism is power driven while the propelling mechanism is hand driven and controlled by the operator. In Figs. 10 to 12, inclusive, a hand driven machine is disclosed, that is, the machine is propelled longitudinally by hand and the wiping mechanism is also propelled by hand. This is accomplished as follows:

The housing 8 employed by the power driven machine is in this instance replaced by a fork-shaped bearing bracket generally indicated at D, see Fig. 12. Two sets of bearings are formed in this bracket, the upper bearings indicated at 50 and the lower bearings indicated at 51. A cross-shaft 10*a* equivalent to the cross-shaft 10 is journaled in the lower bearings 51 of the bracket and a second cross-shaft 52 is journaled in the upper bearings indicated at 50. Secured on the shaft 52 between the bearings 50 is a spur gear 53 which meshes with a spur gear pinion 54 secured on the cross-shaft 10*a*. This shaft carries bevel gears 35*a* which transmit rotary motion to bevel gears 36*a*. These in turn rotate longitudinal shafts 6*a* and 7*a* and these carry crank arms similar to the crank arms 32. Oscillating movement is transmitted to the wiper frame through means of the hand drive, to-wit, the crank 55 secured on shaft 52. Power is also transmitted from this shaft to propel the machine longitudinally of the pipe. This is accomplished through a spur gear pinion 56 which is keyed, or otherwise secured, to the shaft 52. This gear meshes with a large spur gear 57 secured on a second cross-shaft 58, see Fig. 11. A sprocket gear 59 is also secured on this shaft. This is connected through means of a chain 60 with a similar sprocket gear 61 secured on cross-shaft 5*a*. This shaft has bearing rollers 12*a* secured thereto and the machine is accordingly propelled along the pipe line by hand power and the wiping machine is simultaneously operated by hand power.

The present machine is intended for applying a coating material to practically any type of pipe line that may be encountered. For instance, some pipe lines are butt-welded and present a continuous smooth surface over which the machine can travel, and other pipe lines are provided with flanged couplings. Where a pipe line of this type is encountered it is necessary to lift the machine over each set of coupling flanges. This can be quickly and readily accomplished due to the sectional construction of the wiping frame as this may be quickly opened and spread apart to permit the machine to be lifted over the coupling, the bearing rollers 13 being released at the same time. The construction of the machine also permits the coating material to be applied to the exterior surface of the pipe to a point fairly close to the couplings. The coating material is efficiently and uniformly applied due to the wiping action produced and as pressure may be applied a uniform coat of a definite thickness can also be obtained. The amount of pressure applied is determined by the thickness of the wiping members 38 and 39 or by slightly varying the effective length of the crank arms 32, i. e., each crank arm is slotted longitudinally as shown at 32*a* to support a bearing block 32*b*. The blocks are adjustable inwardly or outwardly in the slotted cranks and are secured when adjusted by the clamping nuts 32*c*. The bearing blocks carry the crank pins 31 from which the hangers 30 are suspended and it is thus possible to vary the effective throw of the cranks, or in other words, to increase or decrease the clearance between the wipers and the pipe, thereby varying the thickness of the coat applied and also the amount of pressure exerted.

While certain features of the present invention are more or less specifically described, I wish it understood that various changes may be resorted to within the scope of the appended claims. Similarly, that the materials and finish of the several parts employed may be such as the manufacturer may decide, or varying conditions or uses may demand.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. In a pipe coating machine of the character described, a frame, rollers journaled on the frame and adapted to support the frame on a pipe, a pair of shafts extending longitudinally of the frame and journaled thereon, a pair of crank arms secured one on each shaft, a ring-shaped wiper frame suspended from said cranks and surrounding the pipe, means for transmitting power to drive said shafts in unison and in the same direction to transmit an oscillating movement to the wiper frame, wiper members carried by the wiper frame, and means for delivering a coating compound to the wiping members so that it may be applied thereby to the exterior surface of the pipe.

2. In a pipe coating machine of the character described, a frame, rollers journaled on the frame and adapted to support the frame on a pipe, a pair of shafts extending longitudinally of the frame and journaled thereon, a pair of crank arms secured one on each shaft, a ring-shaped wiper frame suspended from said cranks and surrounding the pipe, means for transmitting power to drive said shafts in unison and in the same direction to transmit an oscillating movement to the wiper frame, wiper members carried by the wiper frame, means for delivering a coating compound to the wiper members so that it may be applied thereby to the exterior surface of the pipe, said wiper frame being divided into two sections, an upper and a lower section, and said sections being pivotally connected to permit the wiper frame to be opened and to permit the machine to be lifted off the pipe.

3. In a pipe coating machine of the character described, a frame, rollers journaled on the frame and adapted to support the frame on a pipe, a pair of shafts extending longitudinally of the frame and journaled thereon, a pair of crank arms secured one on each shaft, a ring-shaped wiper frame suspended from said cranks and surrounding the pipe, means for transmitting power to drive said shafts in unison and in the

same direction to transmit an oscillating movement to the wiper frame, wiper members carried by the wiper frame, means for delivering a coating compound to the wiping members so that it may be applied thereby to the exterior surface of the pipe, and means for transmitting power to the rollers to propel the frame longitudinally on the pipe.

4. In a pipe coating machine of the character described, a frame, rollers journaled on the frame and adapted to support the frame on a pipe, a pair of shafts extending longitudinally of the frame and journaled thereon, a pair of crank arms secured one on each shaft, a ring-shaped wiper frame suspended from said cranks and surrounding the pipe, means for transmitting power to drive said shafts in unison and in the same direction to transmit an oscillating movement to the wiper frame, wiper members carried by the wiper frame, means for delivering a coating compound to the wiping members so that it may be applied thereby to the exterior surface of the pipe, means for transmitting power to the rollers to propel the frame longitudinally on the pipe, and detachable bearing rollers carried by the frame and engaging the lower surface of the pipe to secure the frame against vertical movement on the pipe.

5. In a pipe coating machine of the character described, a wiping mechanism comprising an elongated cylindrical shaped sleeve adapted to surround a pipe to be coated, means for delivering a coating compound to the interior surface of the sleeve, and means for transmitting an oscillating movement to the sleeve whereby the coating compound is spread over the exterior surface of the pipe with a wiping action.

6. In a pipe coating machine of the character described, a wiping mechanism comprising an elongated cylindrical shaped sleeve adapted to surround a pipe to be coated, a pair of spaced wiping members secured to the inner surface of the sleeve, means for delivering a coating compound to the interior surface of the sleeve in the space formed between the wipers and on top of the pipe to be coated, and means for transmitting an oscillating movement to the sleeve whereby the coating compound is spread over the exterior surface of the pipe with a wiping action.

7. In a pipe coating machine of the character described a wiping mechanism comprising an elongated cylindrical shaped sleeve adapted to surround a pipe to be coated, said sleeve having an opening formed therein through which a coating compound is delivered to the interior surface of the sleeve and on top of the pipe to be coated, a funnel secured to the sleeve whereby the coating compound is directed through the opening onto the pipe, a pair of wiping members secured to the inner surface of the sleeve and spaced apart, one on each side of the opening, and means for transmitting an oscillating movement to the sleeve whereby the coating compound is spread over the exterior surface of the pipe with a wiping action.

8. In a pipe coating machine of the character described, a wiping mechanism comprising an elongated cylindrical shaped sleeve adapted to surround a pipe to be coated, means for delivering a coating compound to the interior surface of the sleeve, means for transmitting an oscillating movement to the sleeve whereby the coating compound is spread over the exterior surface of the pipe with a wiping action, said sleeve being divided into an upper and a lower section and said sections being pivotally connected at one side, and detachable means connecting the opposite sides of the sleeve sections to permit the lower sleeve to be swung about its pivot so that the wiping mechanism may be lifted off the pipe.

9. In a pipe coating machine of the character described, a frame, rollers journaled on the frame and adapted to support the frame on a pipe, a wiping mechanism carried by the frame and adapted to apply a coating compound to the exterior surface of the pipe, means for transmitting an oscillating movement to the wiping mechanism, and means for varying the clearance between the wiping mechanism and the pipe to vary the thickness of coating compound applied.

10. In a pipe coating machine of the character described, a frame, rollers journaled on the frame and adapted to support the frame on a pipe, a pair of shafts extending longitudinally of the frame and journaled thereon, a pair of crank arms secured one on each shaft, a ring-shaped wiper frame suspended from said cranks and surrounding the pipe, means for transmitting power to drive said shafts in unison and in the same direction to transmit an oscillating movement to the wiper frame, wiper members carried by the wiper, means for delivering a coating compound to the wiping members so that it may be applied thereby to the exterior surface of the pipe, and means for varying the effective length of the crank arms to vary the thickness of coating compound applied.

11. In a pipe coating machine including means for delivering fluid to the pipe, a ring shaped wiping element surrounding the pipe and eccentrically positioned with relation thereto, and means for moving said wiping element to cause the inner surface thereof to wipe the surface of the pipe with a motion transverse to the length of the pipe.

12. In a pipe coating machine including means for delivering fluid to the surface of the pipe, a wiping element comprising a ring of greater diameter than the pipe and surrounding the pipe, and means to transmit oscillatory movement to the wiping element.

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