

Nov. 16, 1937.

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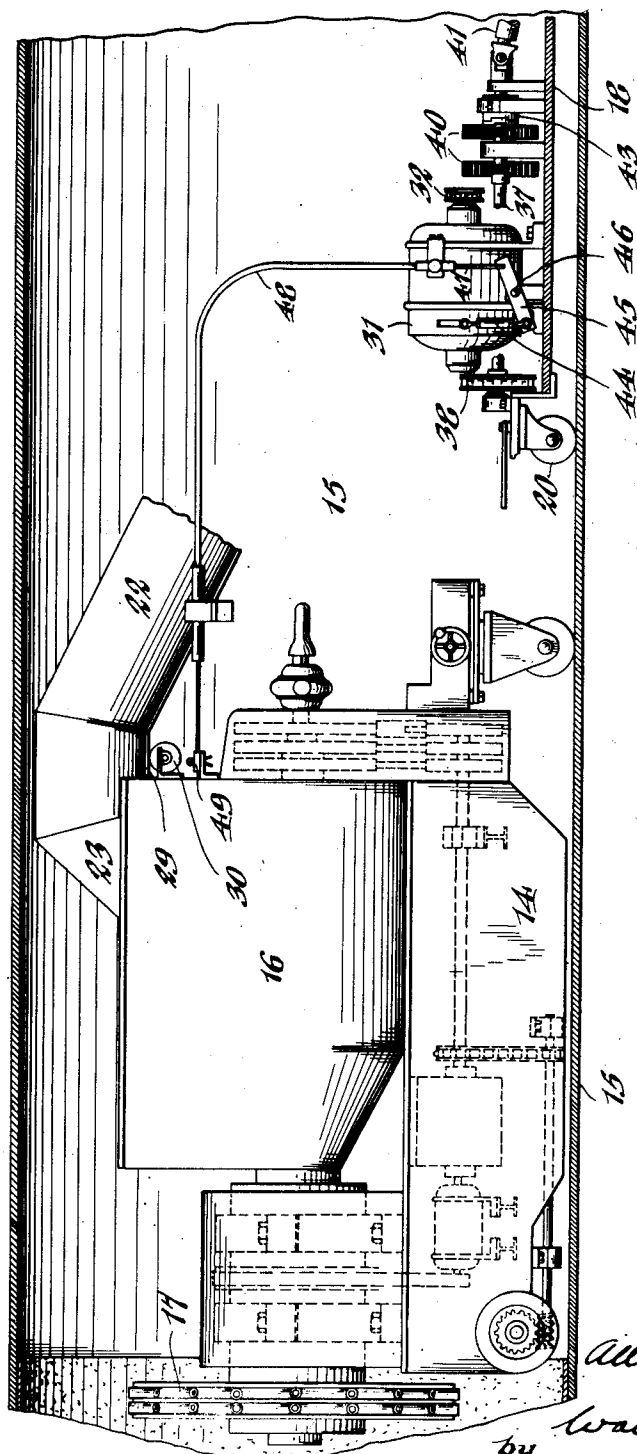
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FEED APPARATUS FOR PIPE COATING MACHINES AND THE LIKE

Filed July 10, 1935

6 Sheets-Sheet 1

Fig. 1.



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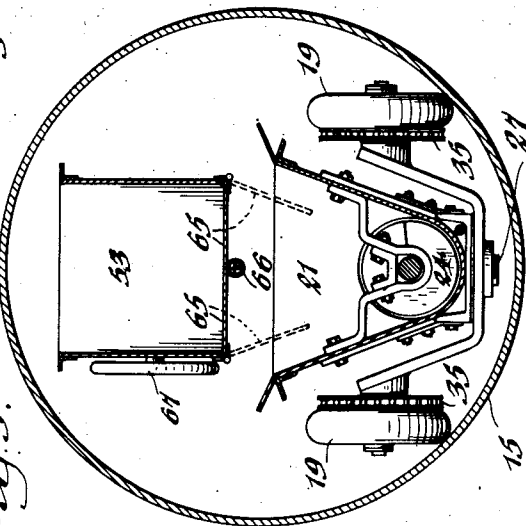
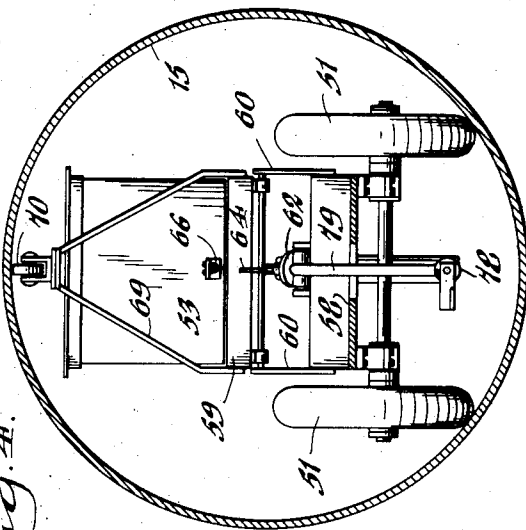
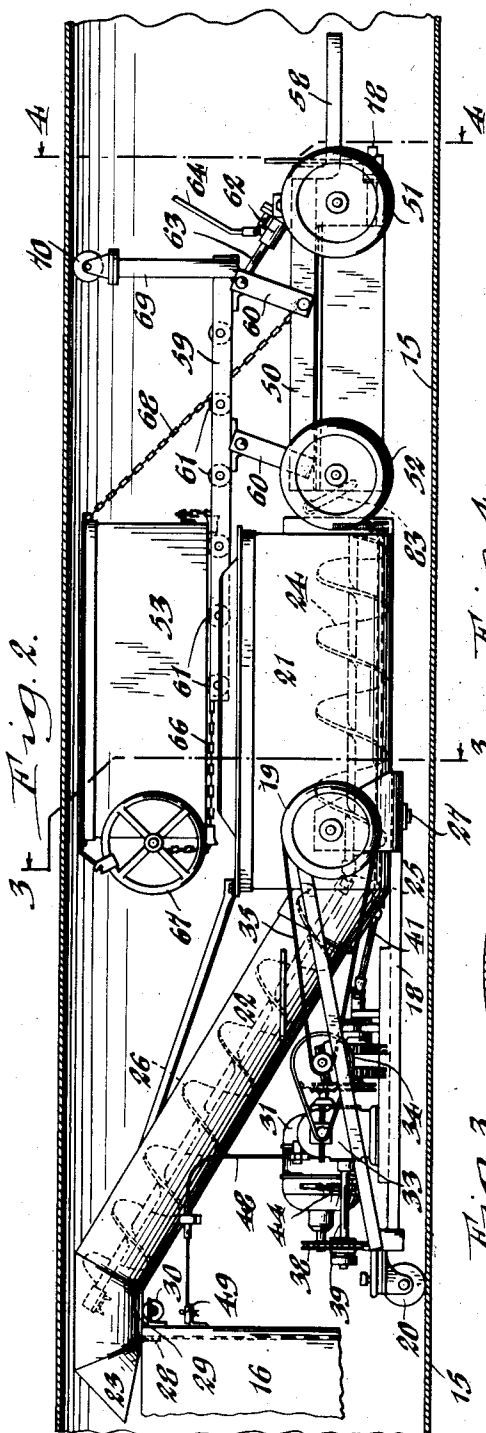
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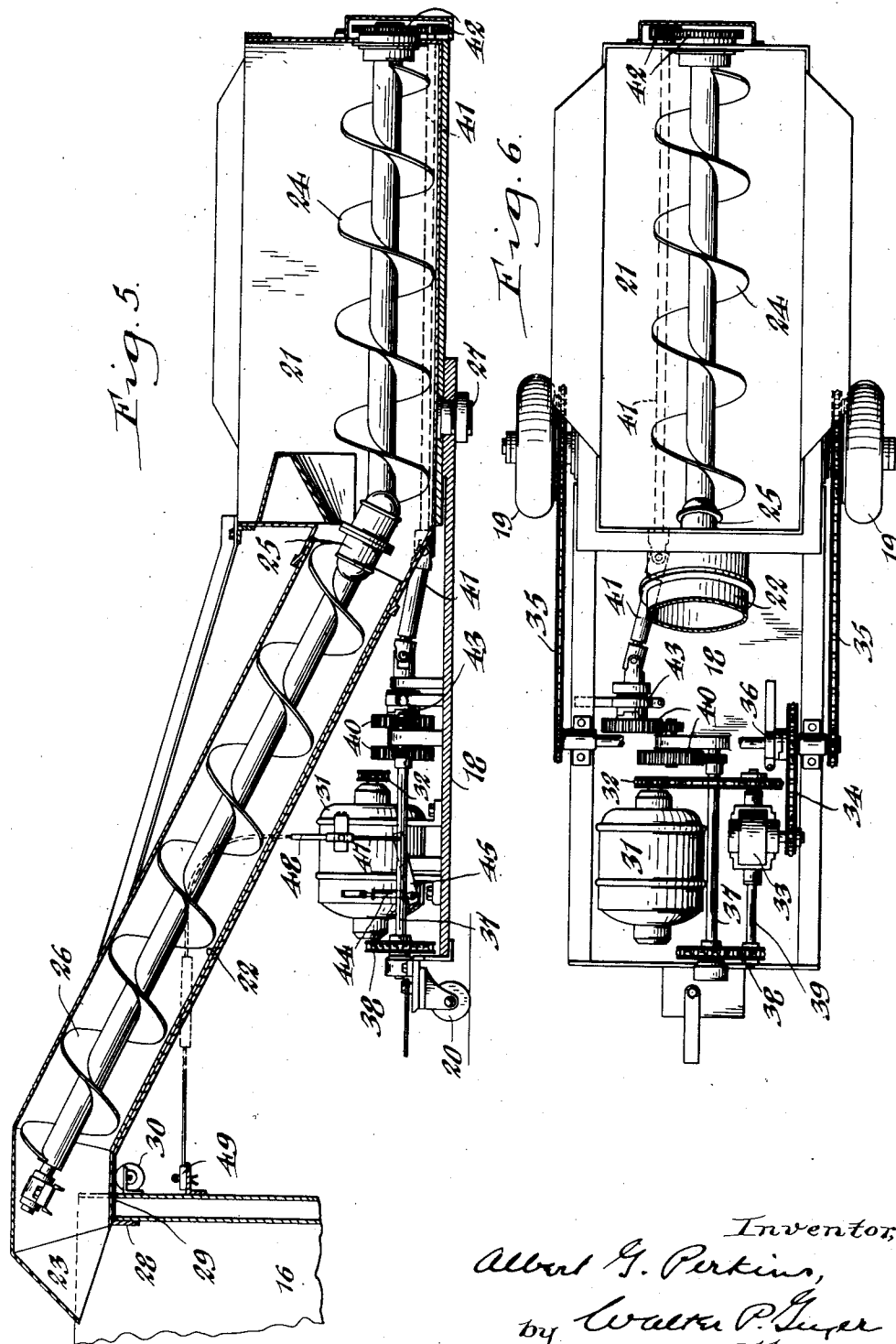
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Filed July 10, 1935

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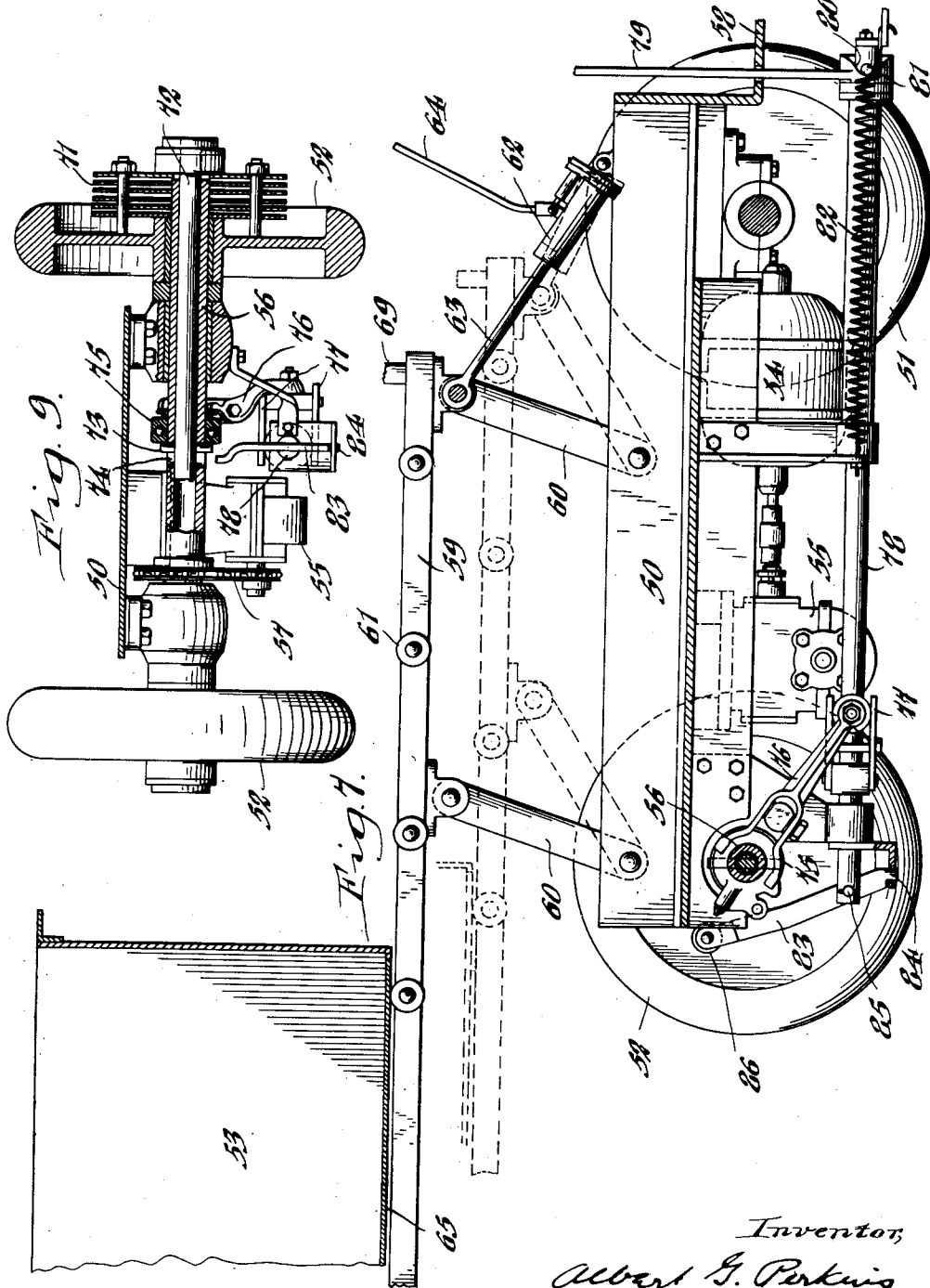
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2,099,346

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Filed July 10, 1935

6 Sheets-Sheet 4



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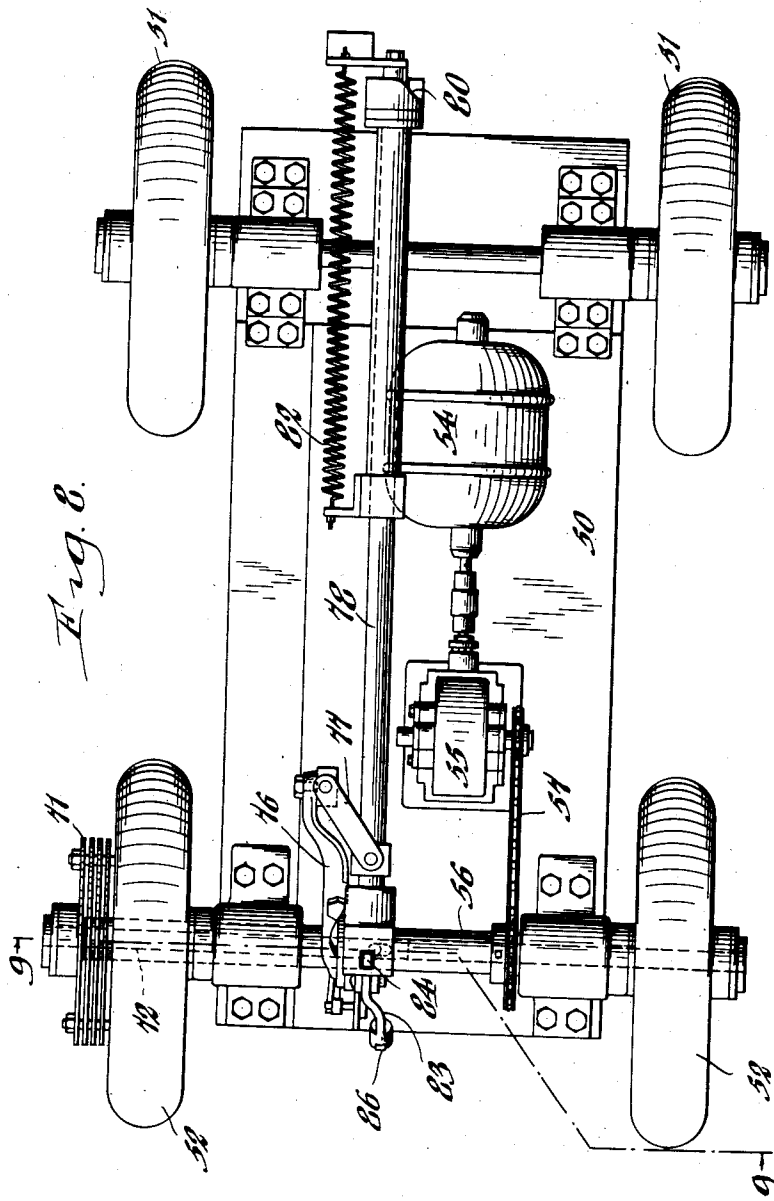
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Filed July 10, 1935

6 Sheets-Sheet 5



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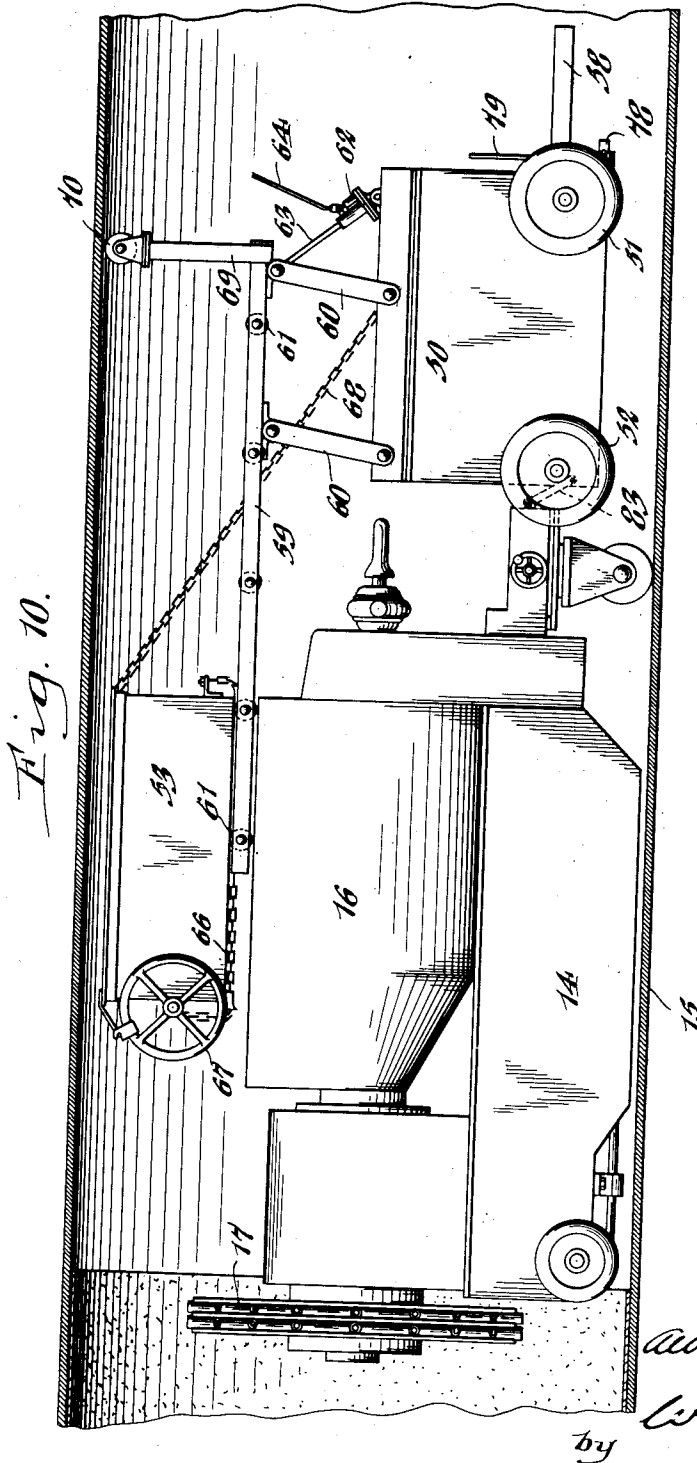
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FEED APPARATUS FOR PIPE COATING MACHINES AND THE LIKE

Filed July 10, 1935

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UNITED STATES PATENT OFFICE

2,099,346

FEED APPARATUS FOR PIPE COATING
MACHINES AND THE LIKE

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Application July 10, 1935, Serial No. 30,751

13 Claims. (Cl. 91-44)

This invention relates generally to an apparatus for applying a protective coating or lining to the inner walls of pipe lines, conduits and the like, but more particularly to the means for feeding the coating material to the apparatus as it travels through the pipe line.

One of its objects is the provision of a feed apparatus for pipe coating machines which is so designed and constructed as to travel through the pipe in operative relation to the coating machine and thereby assure a constant supply of material for the machine.

Another object of the invention is to provide means for controlling and synchronizing the speed of the feeding means with that of the coating machine so as to maintain the former in tandem feed relation to the machine.

A further object is the provision of a feed apparatus of this character having a conveying unit in constant feed relation with the coating machine and a material supply unit movable in the pipe to and from the conveying unit.

A still further object of the invention is to provide a self-propelled supply unit which is so designed as to be automatically controlled when in operative dumping relation with the conveying unit to thereby insure the proper operative relation between these units at that time.

Other features of the invention reside in the construction and arrangement of parts hereinafter described and particularly pointed out in the appended claims.

In the accompanying drawings:—

Figure 1 is a side elevation of a pipe coating machine shown within a pipe line and with the discharge end of the feed apparatus operatively associated therewith. Figure 2 is a side elevation of the feed apparatus with its various parts in feeding position. Figures 3 and 4 are enlarged cross sectional views taken substantially in the planes of the correspondingly numbered lines in Figure 2. Figure 5 is an enlarged longitudinal section taken through the conveying unit of the feed apparatus. Figure 6 is a fragmentary top plan view of the same with a portion of the conveying tube removed. Figure 7 is an enlarged longitudinal section of the supply truck with its dump body in its elevated dumping position over the conveyor unit. Figure 8 is a bottom plan view of the supply truck. Figure 9 is a cross section thereof taken substantially in the plane of line 9-9, Figure 8. Figure 10 is a side elevation of the coating machine showing the material supply truck in operative relation thereto.

Similar characters of reference indicate corresponding parts throughout the several views.

By way of example, my improved feed apparatus has been shown in connection with a machine for applying a protective coating or lining of plastic material such as concrete to the inner walls of pipe lines, conduits and the like. The coating machine may be of any suitable and well known construction and as illustrated in Figures 1 and 10 consists of a wheeled carriage or frame 14 which is adapted to be propelled through the pipe line 15 and which is provided with a hopper or container 16 for the coating material, and a revolving dispensing or discharge head 17 disposed axially of the pipe and into which the material is delivered from the hopper and from which it is discharged by centrifugal force onto the pipe wall. My improved feed apparatus is adapted to keep the coating machine supplied with coating material as it travels through the pipe and in its general organization consists of a conveying unit which is disposed in tandem-like communicating relation with the machine hopper 16, and a supply unit which is likewise movable through the pipe to and from the conveying unit to bring the material from a predetermined supply source externally of the pipe to the conveying unit.

The conveying unit which is operatively coupled with the coating machine to continuously feed the material thereto as it travels through the pipe is preferably constructed as follows:

The working parts of this conveyor unit are mounted on a wheeled carriage or frame 18 provided at its front end with drive wheels 19 engaging the pipe wall at opposite sides of the center, and a rear steering wheel 20 which engages the bottom of the pipe wall. Mounted on the front end of the carriage 18 is a receiver or hopper 21 having a conveyor tube 22 extending in an inclined direction from its rear end and opening at its upper discharge end 23 into the companion hopper 16 of the coating machine, as seen in Figures 1, 2, and 5. In its bottom the conveying unit hopper 21 has a conveyor screw 24 and connected by a universal joint 25 with the latter is a similar feed screw 26 extending through the conveyor tube 22, whereby the material is conveyed from the hopper through the tube and thence discharged into the coating machine. The hopper 21 and its discharge tube 22 are so mounted as to have a movement laterally of the carriage 18 so as to permit a displacement of these parts relative to the coating machine in passing through curved portions of the pipe being coated.

For this purpose the hopper 21 is pivoted at 27 to the front end of the carriage 18. The discharge end 23 of the conveyor tube rests on the top front edge of the coating machine hopper 16, and, as shown in Figure 5, may have a depending flange 28 thereon which hooks behind the front wall of such hopper to normally maintain the conveyor unit in coupled engagement with the coating machine and yet permits a limited longitudinal relative displacement between them. It will also be noted that the bottom side of the conveyor tube 22 has a horizontally-disposed portion 29 adjacent its discharge end which is supported on a guide roller 30 mounted on the front end of the coating machine.

The conveying unit is provided with its own drive or propelling means which preferably consists of an electric motor 31 of the reversible type and which is mounted on the rear end of the conveyor carriage 18 and connected by a sprocket and chain drive 32 with a speed-reducing unit 33 and thence by sprocket and chain drives 34 and 35 with the drive wheels 19 of the carriage, as seen in Figure 6. A suitable clutch 36 is provided for controlling the transmission of power from the motor to the drive wheels. This motor also serves to operate the conveyor screws 24 and 26 and for this purpose a driven shaft 37 is provided which is connected by sprocket and chain drive 38 with a shaft 39 connected to the speed-reducing unit 33. Said shaft 37 is connected by reduction gearing 40 with a propeller shaft 41 which is in turn connected by gears 42 with the conveyor screw 24. A suitable clutch 43 is likewise interposed between the shaft 41 and the reduction gearing 40 for controlling the transmission of motion to the feed screws.

For the purpose of maintaining the conveying unit in operative tandem relation to the coating machine, it is desirable to maintain the speed of travel of the conveying unit the same as that of the coating machine, and for this purpose means are provided for automatically controlling the motor 31 to synchronize the speed of travel of the conveying unit with that of the coating machine. To this end, the motor 31 is of the variable speed type and is provided with a brush-shifting lever 44 connected to one end of a vertically swinging rock lever 45 fulcrumed intermediate its ends at 46 alongside the motor and having its other end connected to an actuating element 47 which may be in the form of a wire or cable housed and guided within a flexible hose or tubing 48. At its opposite end this actuating element is connected at 49 to the front end of the coating machine, as shown in Figures 1, 2, and 5, to exert a push or a pull thereon. Should the coating machine assume a speed faster than that of the conveyor unit, a forward push will be exerted on the actuating element 47 and effect a corresponding movement of the brush-shifting lever 44 to accordingly increase the speed of the motor 31 to propel the conveyor unit at substantially the same speed as the coating machine. Conversely, when the speed of the coating machine is slowed down relatively to that of such machine, a rearward pull is exerted on the actuating element 47 to correspondingly shift the lever 44 in a direction to reduce the speed of the conveyor unit motor 31 to substantially that of the coating machine. During the automatic control of the motor 31 to govern its speed to accordingly propel the conveyor unit simultaneously with that of the coating machine, a relative longitudinal displacement is permitted

between the discharge end of the conveyor tube 22 and the coating machine, such displacement being afforded by the sliding contact between the portion 29 of the conveyor tube and the contiguous portion of the coating machine hopper 16, whereby a certain amount of lost motion between these parts is permitted during the synchronization of the speeds of the conveyor unit and the coating machine.

The supply unit for furnishing the coating material to the conveyor unit hopper 21 is adapted to travel back and forth through the pipe being coated to receive a charge of material from a point externally of the pipe, say through a man-hole opening in the pipe, and thereupon return to a position in tandem relation to the conveyor unit and dump the material into its hopper. This supply unit preferably consists of a truck frame 50 mounted on front and rear wheels 51 and 52, respectively, and having a material receiver or dump body 53 which is so mounted as to be projected to an elevated dump position overhanging the conveyor unit hopper 21, as shown in Figure 2. The truck may be propelled by a reversible electric motor 54 mounted on the under side of the truck frame and connected by a speed-reducing unit 55 with the rear axle 56 through the medium of a sprocket and chain drive 57. At its front end the truck body has an operator's platform 58 from which point the truck is manually controlled. The dump body 53 is supported for longitudinal movement on an elevating platform 59 connected by vertically-swinging parallel links 60 with the opposite sides of the truck frame. Rollers 61 are applied to this platform to support the dump body in rolling contact therewith and thereby facilitate its movement longitudinally into and out of a dumping position. This elevating platform may be actuated in any suitable manner and I have shown, by way of example, a pneumatic lifting device indicated generally by the numeral 62 and including a plunger 63 operatively connected to the platform to control its elevating movements, and a hand lever 64 for governing the movement of the lift plunger. As shown in Figure 3, the dump body has displaceable bottom walls 65 which may be controlled in the usual manner, as by a chain 66 and actuating wheel 67. For the purpose of limiting the rearward movement of the dump body 53 on its elevating platform to the dumping position shown in Figure 2, I provide a holding chain 68. To prevent any tendency of the dump body to tilt downwardly when in its dumping position shown in Figure 2, a stabilizer is applied to the front end of the elevating platform 59, such stabilizer consisting of a yoke 69 rising from the platform and having a roller or like element 70 at its upper end which is adapted to contact with the pipe wall. In the lowered position of the dump body platform shown by dotted lines in Figure 7, the stabilizer is out of contact with the pipe.

For the purpose of controlling the transmission of motion from the motor 54 to the drive wheels 52 of the supply truck, both manually and automatically, a clutch mechanism is provided which is preferably constructed as follows:

Associated with one end of the axle 56, which is hollow, is a disc clutch 71 actuated into and out of its released position by an axially-movable thrust rod or shaft 72 extending through the axle and provided at its inner end with a cotter pin 73 engaging a longitudinal slot 74 in the axle, as shown in Figure 9. A thrust collar 75 is slidably

mounted on the axle for abutting engagement with the cotter pin 73 to effect the shifting of the thrust rod in a direction to engage the clutch. The shifting of the collar 75 to effect the engagement and disengagement of the clutch 71 is effected by a swinging yoke lever 76 engageable at one end with the thrust collar 75 and connected at its opposite end by links 77 with a shiftable clutch-controlling shaft 78. This shaft is disposed lengthwise of the truck frame for axially shiftable movement, having an operating lever 79 at its front end which has a cam face 80 on its hub portion for contacting with a pin 81 on the shaft, so that upon rocking the lever 79 in one direction or the other, the shaft 78 is axially shifted to accordingly actuate the yoke lever 76 to engage or disengage the clutch. A spring 82 constantly urges the control shaft 78 in a rearward direction to engage the pipe.

At its rear end, the clutch-controlling shaft 78 is provided with an automatically-actuated lever 83 which is fulcrumed at its lower end at 84 for a swinging movement fore and aft of the supply truck and which is connected at 85 to the shaft 78, as shown in Figures 7 and 9. At its upper end this lever is preferably provided with an anti-friction roller 86 which is adapted to abutting engagement with the adjoining end of the conveyor unit in the manner shown by dotted lines in Figure 2. By the provision of this lever, when the supply truck is in operative relation to the conveyor unit, its roller-end contacts the adjoining end wall of the conveyor unit and is held thereby in a clutch-releasing position, the movement of the conveyor unit in reality pushing the supply truck with it. Should the supply truck for any reason become out of abutting engagement with the conveyor unit, then the spring 82 shifts the clutch control shaft 78 rearwardly and likewise the automatically-actuated lever 83 to clutch-engaging positions, so that motion is transmitted to the supply truck in a direction to bring it in proper dumping relation with the conveyor unit. By the provision of the lever 83, furthermore, the supply truck is always maintained automatically in an operative tandem relation to the conveyor unit. The manual control lever 79, when operating the supply truck, is in its engaged position, so that when the automatic action is brought into play, the automatic lever 83 actuates the clutch accordingly and the hand lever, while engaged, is unaffected and the control of the clutch is by the automatic clutch releasing lever.

There is sufficient drag on the discs of the clutch 71 so that when the supply truck motor 54 is reversed to propel the truck back to the source of material supply, the truck will move away from the conveyor unit, even though there is contact between the automatic clutch control lever 83 and the conveyor unit.

In Figure 10 I have shown the supply truck 50 in direct dumping relation with the coating machine. Such an arrangement may be used in pipes of very large diameters and thereby dispense with the intermediate conveying unit. In this case the automatic clutch control lever 83 of the supply truck is adapted to contact with the front end of the coating machine carriage.

I claim as my invention:—

1. In a machine for lining pipe walls having a carriage adapted to travel through the pipe, means applied thereto for receiving a supply of coating material, and a revolving dispensing head communicating with said receiving means for

projecting the material onto the pipe wall, and a feed device for delivering the material to the machine comprising a carriage adapted to travel through the pipe in tandem relation to the machine, means for propelling said last-named carriage, and control means for said propelling means disposed in contacting relation with the machine-carriage for causing said last-named carriage to travel at the same speed as the machine-carriage.

2. In a machine for lining pipe walls having a carriage adapted to travel through the pipe, means for propelling the carriage, means applied thereto for receiving a supply of coating material and a revolving dispensing head communicating with said receiving means for projecting the material onto the pipe wall, and a feed device for delivering the material to the machine comprising a carriage adapted to travel through the pipe in tandem relation to the machine, means for propelling said feed device carriage, and means for synchronizing both of said propelling means to cause their respective carriages to travel in predetermined relation through the pipe while lining its walls.

3. An apparatus for feeding material to a portable machine for treating pipe walls and the like, comprising a carriage movable through the pipe in tandem relation to the machine and having a receiver for the material including a feed conduit for operative connection to the machine to deliver the material thereto, propelling means for the carriage, and control means for said propelling means including a member disposed for contact with and actuated by the machine to govern said control means and synchronize the speed of said carriage with that of the machine.

4. An apparatus for feeding material to a portable machine for treating pipe walls and the like, comprising a carriage movable through the pipe and having a receiver for the material, a conveying means mounted on said carriage and communicating at one end with said receiver and adapted for operative engagement at its discharge end with the portable machine to deliver the material thereto, a variable speed motor for propelling said carriage in tandem relation to the treating machine, a control member therefor, and an actuating member operatively connected to the machine and said control member for governing the latter to synchronize the speed of the carriage with that of the machine.

5. An apparatus for feeding material to a portable machine for treating pipe walls and the like, comprising a carriage movable through the pipe and having a receiver for the material, a conveying means mounted on said carriage and communicating at one end with said receiver and adapted for operative engagement at its discharge end with the portable machine to deliver the material thereto, means constituting a limited axially displaceable connection between said conveying means and the treating machine, a variable speed motor for propelling said carriage in tandem relation to such machine, and an operative connection between said motor and said machine for synchronizing the speed of the carriage with that of the machine.

6. An apparatus for feeding material to a portable machine for treating pipe walls and the like, comprising a carriage movable through the pipe in tandem relation to the machine, a receiving hopper for the material mounted on said carriage to swivel laterally of the pipe and having a conduit-like extension for coupling engagement

at its discharge end with the treating machine, and means in said hopper and its extension for conveying the material from the hopper to the machine.

5 7. In a machine for lining pipe walls having a carriage adapted to travel through the pipe, means applied thereto for receiving a supply of coating material, and a revolving dispensing head communicating with said receiving means for
10 projecting the material onto the pipe wall, and a feed device for delivering the material to the machine comprising a conveying carriage adapted to travel through the pipe in tandem relation to the machine and including a material-receiving
15 hopper communicating with the receiving means of the machine, a material supply truck movable through the pipe in endwise relation to the conveying carriage and adapted to receive the material from a point externally of the pipe
20 and deliver it to the carriage-hopper, clutch-controlled drive means for propelling the truck, and means for automatically controlling said drive means when said truck is brought into operative relation with said conveying carriage.

25 8. In a machine for lining pipe walls having a carriage adapted to travel through the pipe, means applied thereto for receiving a supply of coating material, and a revolving dispensing head communicating with said receiving means for
30 projecting the material onto the pipe wall, and a feed device for delivering the material to the machine comprising a conveying carriage adapted to travel through the pipe in tandem relation to the machine and including a material-receiving
35 hopper communicating with the receiving means of the machine, a material supply truck movable through the pipe in endwise relation to the conveying carriage and adapted to receive the material from a point externally of the pipe and
40 deliver it to the carriage-hopper, clutch-controlled drive means for propelling the truck, manual means for controlling said drive means, and means engageable with the conveying carriage for automatically controlling said drive
45 means when the truck is brought into operative relation with said conveying carriage and to maintain such relation when delivering the material to such carriage.

9. The combination with a machine for lining
50 pipe walls including a carriage adapted to travel through the pipe, of a supply truck for delivering material to the machine while treating the pipe comprising a body having drive means for propelling it through the pipe, a material receiver
55 mounted on said body for movement to and from a dumping position, a clutch for said drive means, and a clutch control lever normally urging said clutch to an engaged position, said lever being automatically movable to a released position when said truck is in its operative dumping
60 position.

10. The combination with a machine for lining

pipe walls including a carriage adapted to travel through the pipe, of a supply truck for delivering material to the machine while treating the pipe comprising a body having drive means for propelling it through the pipe, a material receiver mounted on said body for movement to and from a dumping position, a clutch for said drive means, and a clutch control lever normally urging said clutch to an engaged position, said lever projecting forwardly from the truck for contacting engagement with the machine to automatically release the clutch when the truck is in operative dumping position and to effect the engagement of the clutch should the truck reach a position out of its dumping position.

11. An apparatus for feeding material to a portable machine for treating the inner walls of pipe lines and the like, comprising a wheeled support movable through the pipe and having a means thereon for conveying material to the treating machine, a drive means for propelling the wheeled support in tandem relation to the treating machine, a control member therefor, and an actuating member operatively connected to the machine and said control member for governing the latter to synchronize the speed of said wheeled support with that of the machine.

12. An apparatus for feeding material to a portable machine for treating the inner walls of pipe lines and the like, comprising a wheeled support movable through the pipe to and from a dumping position, a dump receiver for the material applied to said support and projectable to and from an elevated dumping position in overhanging relation to the support, and a stabilizing member on said receiver for contact with the pipe wall in the elevated dumping position of the receiver.

13. In an apparatus for treating the inner walls of pipe lines and the like, in combination, a carriage adapted to travel through the pipe and having a hopper thereon terminating below the top wall of the pipe for receiving a supply of material to treat the pipe and a revolving dispensing head communicating with said hopper for directing the material onto the pipe wall, a second carriage adapted to travel through the pipe in tandem relation to the first-named carriage to move in operative relation therewith during the treatment of the pipe line and having a receiving hopper and a discharge communicating with the hopper of said first-named carriage, and a material-supply-device movable independently through the pipe line toward and from said second carriage and source of supply, respectively, and having a discharge element thereon adapted to project over the hopper of said second carriage, the supply device being adapted to abut the second carriage to move simultaneously and in tandem relation therewith and with the first-named carriage during its supplying position.

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