Sept. 29, 1953 E. ROBERTSON 2,653,720

PROPELLING MECHANISM

Filed Jan. 17, 1951 4 Sheets-Sheet 1

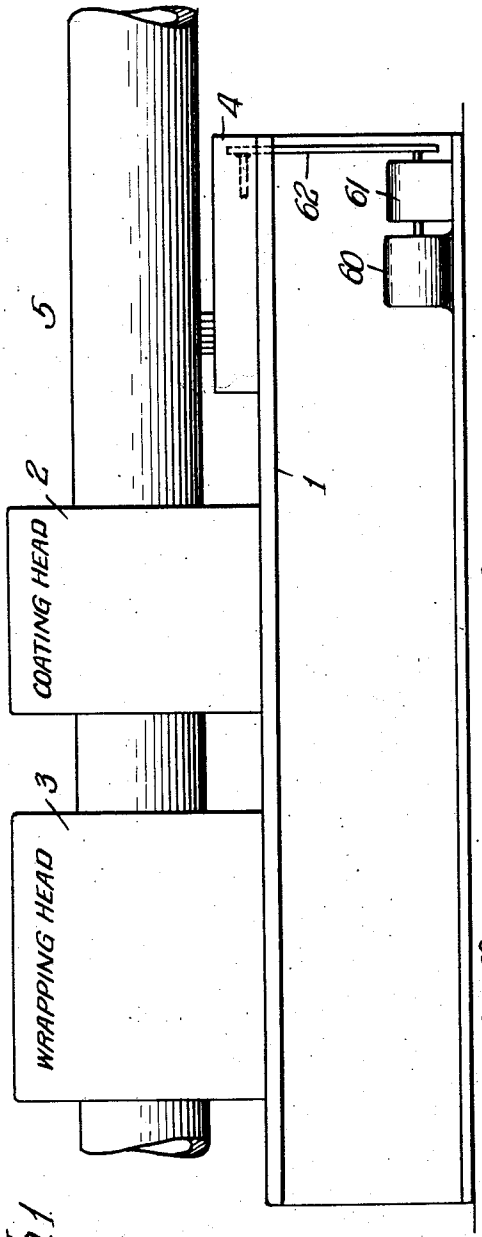

Fig. 1

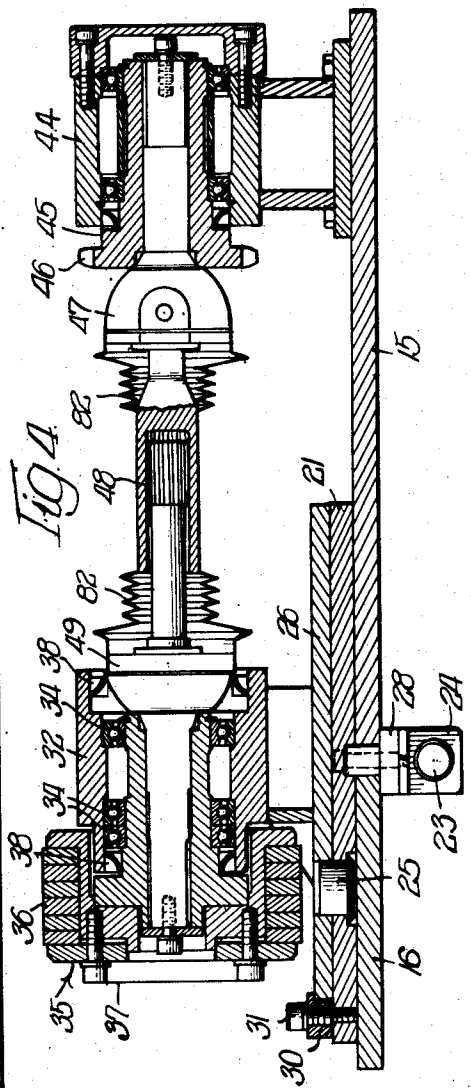

Fig. 4

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PROPELLING MECHANISM

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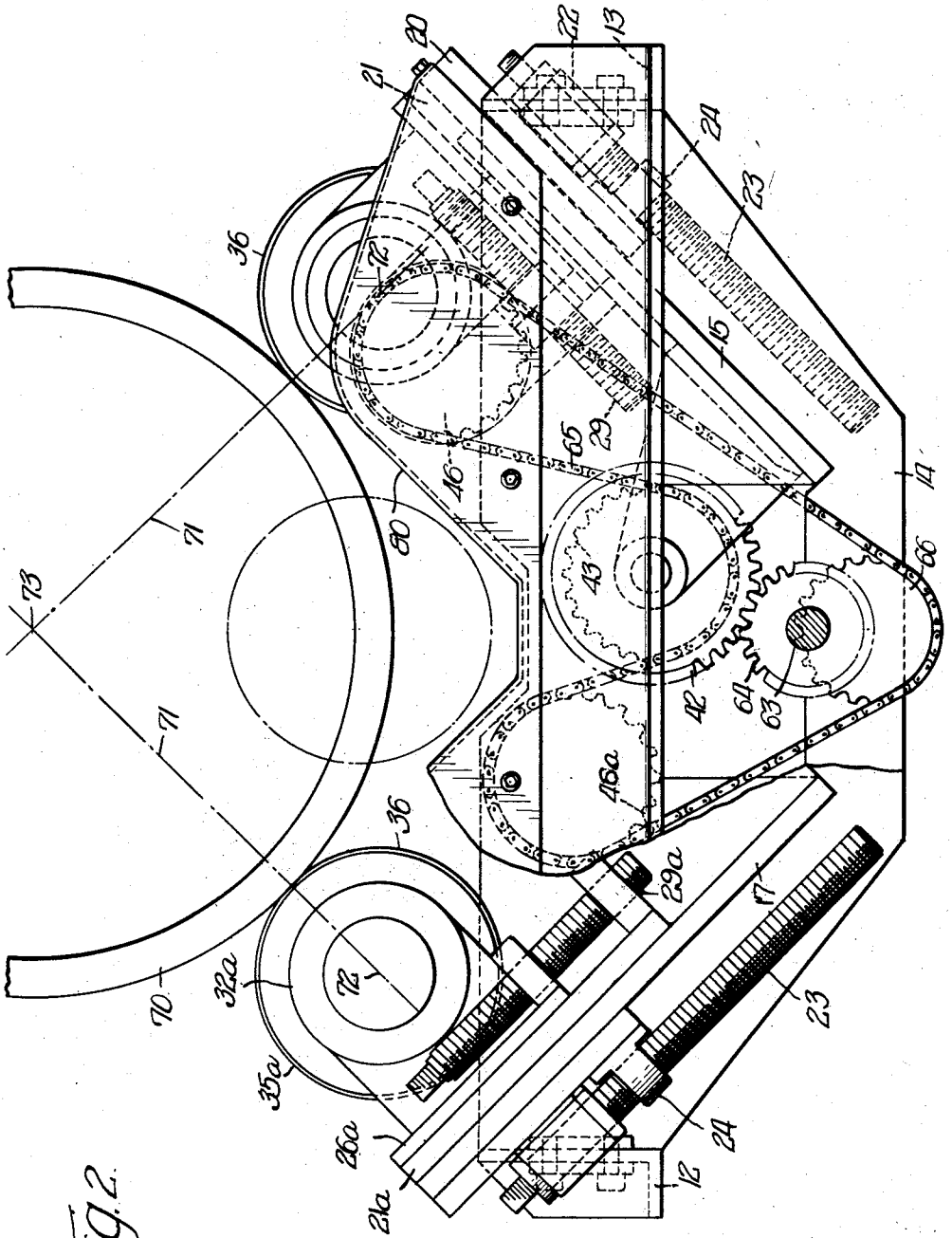

Fig. 2.

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PROPELLING MECHANISM

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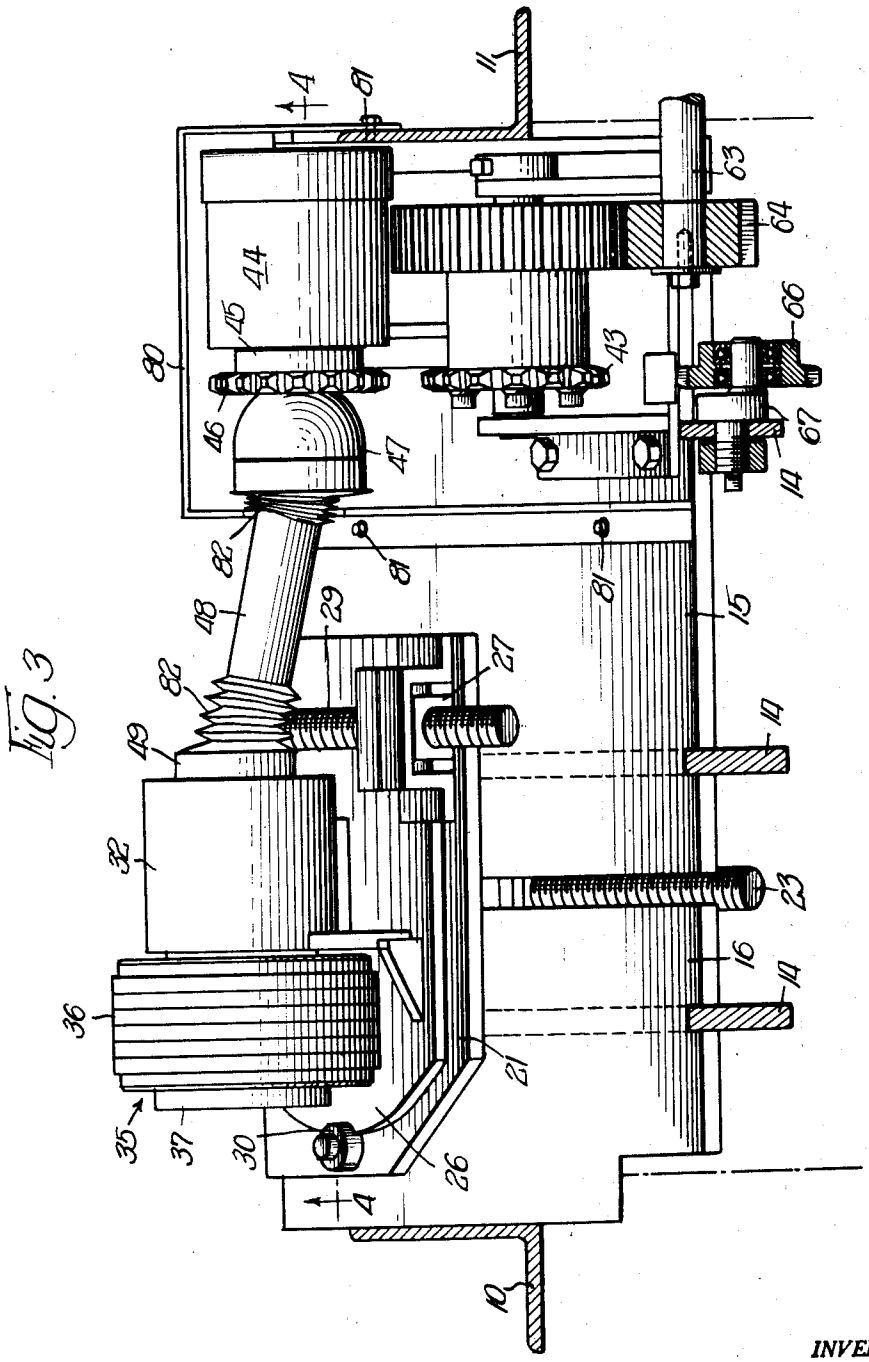

Fig. 3

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PROPELLING MECHANISM

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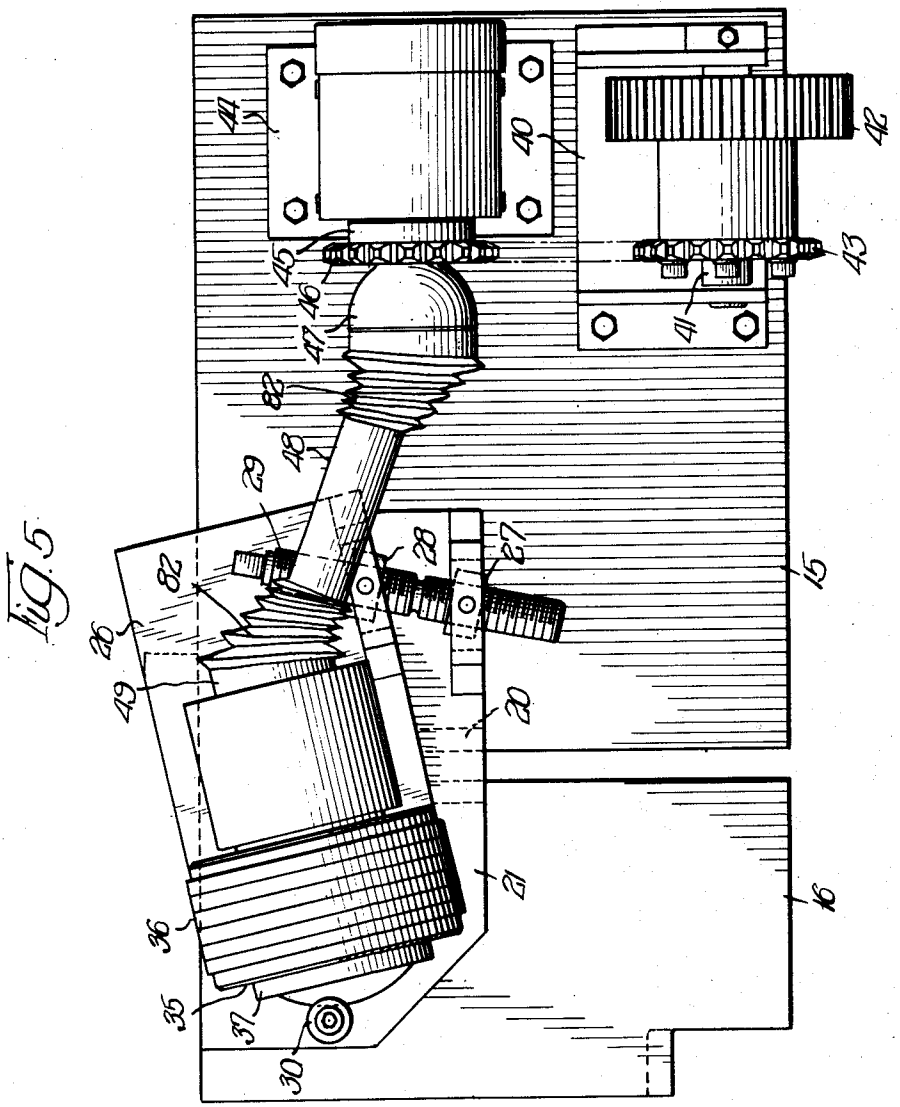

Fig. 5

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UNITED STATES PATENT OFFICE

2,653,720

PROPELLING MECHANISM

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Application January 17, 1951, Serial No. 206,403

6 Claims. (Cl. 214—1)

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This invention relates to propelling mechanism for supporting, rotating, and simultaneously advancing longitudinally, cylindrical objects such as pipes, and has for its principal object the provision of a new and improved device of this kind.

It is a main object of the invention to provide a rolling rig for propelling, through cleaning machines and coating and wrapping machines, pipes of diameters varying from 8 to 24 inches.

An other object of the invention is to provide a rolling rig which is adjustable not only to accommodate the rig to pipes of various sizes, but also to varying the longitudinal advance of the pipes per degree of revolution.

Another object of the invention is to provide a rolling rig for large diameter pipes capable of being fitted on existing cleaning or coating and wrapping machines.

Another object of the invention is to provide a rolling rig which is strong enough to support heavy pipes and which is capable of being maintained in proper working condition economically.

Another object of the invention is to provide a rolling rig which can be manufactured economically without sacrificing quality.

Further objects of the invention, not specifically mentioned here, will be apparent from the detailed description and claims which follow, reference being had to the accompanying drawings in which a preferred embodiment of the invention is shown by way of example and in which:

Fig. 1 is a diagrammatic view illustrating the environment in which the invention is used;

Fig. 2 is an end view of the propelling rig, with parts broken away the better to show the construction;

Fig. 3 is a cross sectional view taken along the longitudinal median line of the machine;

Fig. 4 is a fragmentary cross sectional view taken in a vertical plane through the axes of the articulated shaft and driving unit therefor; and

Fig. 5 is a view similar to Fig. 3, illustrating particularly the adjustment for longitudinal advance of a pipe.

In the cleaning and coating and wrapping of pipes, it is common practice to rotate and simultaneously advance the pipe longitudinally of its axis, thereby to move it through the mechanisms which clean the pipe or apply one or more layers of protective material thereto. In Patent 2,048,557, issued to Mickelson et al., July 21, 1936, there is shown a propelling head for use in a mechanism of this kind. The present invention, broadly speaking, may be termed an improvement on this prior patent.

The propelling mechanism of the above Mickelson patent is particularly suitable for smaller diameter pipes, say from one-half to

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twelve inch pipes, but when applied to larger diameter pipes the mechanism becomes so bulky that it cannot be fitted upon standard machines, and the present invention overcomes this difficulty by providing a propelling mechanism in the form of a rolling rig which is capable of fitting upon existing cleaning and coating and wrapping machines and is capable of adjustment to accommodate pipes of from 8 to 24 inches in diameter. In addition, the rolling rig of the present invention is capable of adjustment to vary the longitudinal advance of the pipe, thereby enabling the coating and wrapping mechanism to apply protective coatings to pipes in accordance with specifications which vary over a wide range.

In its preferred form, the rolling rig of the present invention consists of a frame, generally rectangular in shape and of such size as to enable it to be registered with and secured to existing cleaning and coating and wrapping machines in lieu of the Mickelson et al. propelling mechanism with which such machines are ordinarily equipped. Mounted upon this framework are a pair of rollers movable with respect to the median line of the machine and framework so as to accommodate different sizes of pipes. These rollers are also rotatable to position them at an angle with respect to the axis of the pipe, thereby to impart to the pipe the desired longitudinal movement per revolution. Drive mechanism is provided to rotate the two pipe-supporting rollers simultaneously and at the same speed, power being furnished by existing power equipment of the machines.

With mechanism of this type, pipes are registered with the rollers and held thereagainst by the weight of the pipe, and as the rollers are rotated the pipe is rotated and advanced longitudinally through the coating and wrapping mechanism.

The rolling rig of the present invention also provides suitable protective devices preventing the entry of dust and dirt into the bearings and other working parts of the mechanism, thereby particularly adapting the rig to cleaning machines through which pipes are run to remove rust, scale and the like, preparatory to application of protective coatings thereto.

As will be seen in the drawings, particularly Fig. 1, a coating and wrapping machine consists of a main framework 1, upon which is supported a coating head 2, a wrapping head 3, and a propelling mechanism 4 for supporting and propelling the pipe 5 through the coating and wrapping heads.

As will be seen best in Figs. 2 and 3, the rolling rig of the present invention comprises a main frame having end members 10 and 11, preferably angles, and side members 12 and 13, also preferably angles. Extending between the side mem-

bers 12 and 13 are cross bars 14 which, in the embodiment shown, are three in number. Mounted upon the frame so formed are plates 15, 16 and 17, and an additional plate similar to 16 not shown in the drawings as illustrated. These plates are fixed to the side channels 12 and 13 and the cross bars 14, and are disposed in V-like configuration with the apex of the V on the longitudinal median line of the framework and therebelow. The plates serve as mounting plates for the equipment.

As will be seen in Figs. 3, 4 and 5, plates 15 and 16 are spaced apart and form between them a slot extending transversely of the longitudinal median line of the machine. Extending through this slot is a T-bar 20 fixed to a sub-base 21 that rests upon the upper surface of the plate 15. The T-bar 20 extends completely across the plate 21. Fixed to the side frame member 13 is a collar 22 which supports a screw 23 that is threaded through a nut 24 fixed upon the T-bar 20. Rotation of the screw 23 slides the bar 21 transversely of the longitudinal median line of the machine to adjust for pipes of various diameters, as will presently appear.

Fixed in sub-base 21 is a pivot 25 that extends into a mounting base 26 to pivotally fix the base 26 on the sub-base for rotation around the axis of the pivot. Fixed upon the sub-base 20 is a threaded collar 27, and fixed upon the base 26 is a similar collar 28, in engagement with which collars a right-left adjusting screw 29 is registered. Rotation of the screw 29 rotates the base 26 about the axis of pivot 25, thereby to adjust the helix angle of the machine, as will presently appear. The sub-base 21 carries a clamping collar 30 that has a lip portion overhanging the base 26 and through which a stud bolt 31 is projected to draw the collar onto the sub-base and thereby lock the base in an adjusted position.

Fixed upon base 26 is a journal housing 32 in which a shaft 33 is supported by anti-friction bearings 34. Shaft 33 carries a roller 35 which has a pipe-engaging member 36 composed of a high friction material such as a rubberized fabric. The end plate 37 of the roller is readily removable so that the member 36 can be renewed readily when required. Journal 32 is filled with lubricant and sealed by seals 38 to prevent escape of the lubricant and also to prevent entry of dust and dirt.

Fixed upon the mounting plate 15, near the front end thereof, is a bracket 40 that supports a stationary shaft 41 upon which is mounted a gear 42 and a sprocket wheel 43 by suitable low friction bearings, such as ball bearings, that are completely encased to confine a suitable lubricant and to prevent entry of dirt therein.

Also mounted upon the plate 15 is a journal assembly 44 supporting a driving axle 45 that carries a sprocket 46 and the driving unit 47 of a constant velocity universal joint. The axle 45 is supported in the journal 44 by suitable anti-friction bearings such as ball bearings, also completely encased with a proper lubricant.

The driving unit 47 of the universal joint is connected by a splined telescoping shaft 48 to a driven unit 49 carried upon the roller shaft. Power placed upon the driving unit 47 is thus transmitted to the roller 35, regardless of the angular position of the axis of rotation of that roller, as will presently appear.

As will be seen in Fig. 2, the plate 17 and its companion located on the other side of the longitudinal median line of the machine, carry a sub-base 21*a* upon which is mounted a base 26*a* and adjusting screw 29*a* and journal 32*a* for supporting a second roller 35*a*. Also mounted upon the plate 17 is a journal 44*a* supporting a driving shaft and sprocket 46*a*, thereby to transmit power through a second articulated shaft assembly to the second roller 35*a*.

As will be seen in Fig. 2, the journal 44*a* is located nearer to the median line of the machine than is the journal 44. As will be seen in Fig. 5, when the roller 35 is set at the desired helix angle its axis slopes away from the median line at the driving end of the shaft. Roller 35*a* is set to the same helix angle, that is with its axis of rotation parallel to the axis of roller 35, and the drivng end of roller 35*a* is nearer to the median line of the machine. By placing the journal 44*a* nearer to the median line than journal 44, the angularity of the universal joints can be equalized and kept within the permissive limits of these devices as set by the manufacturer thereof.

As will be seen in Figs. 1 and 2, the motor 60 of the coating machine transmits power through a suitable gear box 61 and driving chain 62 to a jack shaft 63 which carries a gear 64 that meshes with the gear 42 to drive that gear and with it the sprocket 43. A driving chain 65 engages the sprocket 43 and sprockets 46 and 46*a* and an idler sprocket 66 that is mounted upon the cross bar 14 by an eccentric mounting 67, best seen in Fig. 3. Power thus supplied to the machine will rotate the rollers 35 and 35*a* at uniform speed and in the same direction.

As will be seen in Figs. 2 and 4, rollers 35 and 35*a* are positioned by journals 32 and 32*a*, so that the axis of the pivot 25 intersects the axis of rotation of the roller at a point midway between the ends of the roller. The sub-bases 21 and 21*a* are moved so that the rollers engage a pipe 70 at points located on lines 71 that extend between the axis of rotation 72 of the rollers and the axis 73 of the pipe. These lines 71 are located 90° apart. The axis 73 of the pipe is located in a vertical plane through the longitudinal median line of the machine. For pipes smaller than the pipe shown in Fig. 2, the sub-bases 21 and 21*a* are moved toward the median line of the machine so as to bring the rollers into engagement with the smaller diameter pipe, also at points disclosed on a line between the axes of the roller and pipe. With this arrangement, pipes of from minimum to maximum diameter that the rig is built to handle, will be supported firmly by the rollers, and the use of side guides or other instrumentalities for maintaining the pipe in proper engagement with the supporting rollers is not necessary. In certain instances, if desired, hold-down rollers of the usual type may be employed; however, it has been found that with the arrangement shown, the employment of such hold-down rollers is seldom if ever necessary.

Adjustment of the rollers by rotation around the axis of pivot 25 to set them at a desired helix angle does not change the point of engagement of the roller with the pipe, as above explained, since this rotation of the roller is around an axis located midway between the ends of the roller. This adjustment of the helix angle enables the rolling rig to vary the longitudinal advance of the pipe per revolution, thereby enabling the coating and wrapping machine to meet a wide variety of specifications relative to the width of the wrapper, degree of overlap, etc. These adjustments can be quickly made, even with a pipe supported

upon the rollers, and when once made can be locked securely so that a large number of pipes can be fed through the machine without danger of variation in the helix angle of the pipe movement.

As will be seen in Figs. 2 and 3, the journals, sprockets, gears and driving chain are encased in a suitable housing **80** that is fixed to the mounting plates and framework of the machine by suitable means such as cap screws **81**, and serves to protect these mechanisms from dust and dirt such as is apt to be prevalent in a cleaning machine and to a lesser extent in a coating and wrapping machine. The articulated shaft is similarly protected by boots **82**, thereby rendering the machine capable of operation under most adverse conditions without undue wear and tear thereon. When composed of suitable materials, the machine is capable of being maintained in satisfactory operating condition economically.

While I have chosen to illustrate my invention by showing and describing a preferred embodiment of it, I have done so by way of example only, as there are many modifications and adaptations which can be made by one skilled in the art within the teachings of the invention.

Having thus complied with the statutes and shown and described a preferred embodiment of my invention, what I consider new and desire to have protected by Letters Patent is pointed out in the appended claims.

What is claimed is:

1. A rig for supporting and rotating large pipes of various diameters and simultaneously advancing the pipe longitudinally of its axis a definite distance per revolution, which distance may be varied, comprising: a framework, a pair of pipe supporting rollers each journaled for rotation about its own axis; means for supporting said rollers upon said framework, said means permitting the roller to be turned around an axis extending through the axis of rotation of the roller at right angles thereto midway between the ends of the roller, said axes of turning being disposed at right angles to each other and intersecting on the axis of a pipe supported on the rollers; screw means for operating said supporting means to turn the rollers and thereby adjust the distance of advancement of the pipe per revolution; screw means for moving said supporting means laterally of said frame work thereby to move the axes of turning of said rollers transversely of said framework to adjust the rig for pipes of various diameters while maintaining said axes of turning at right angles to each other and intersecting on the axis of the pipe; driving gear means mounted upon said framework; and an articulated shaft for each roller connecting that roller to said driving gear means to drive the roller and thereby rotate and advance the pipe.

2. A rig as specified in claim 1, in which each articulated shaft includes a pair of constant velocity universal joints.

3. A rig as specified in claim 1, in which the driving gear means includes a driving chain encircling a sprocket on each articulated shaft and driving and idler sprockets, and in which tension on the chain is varied solely by the idler sprocket.

4. A rig as specified in claim 1, in which each articulated shaft includes a driving section journaled on the framework parallel to the driving section of the other shaft and carries a sprocket wheel that is engaged by a driving chain that also engages the sprocket carried on the other driving section.

5. A rig for supporting and rotating pipes of large diameter and for simultaneously advancing the pipe longitudinally a definite distance per revolution of the pipe, comprising: a rectangular frame; cross bars extending laterally across said frame; plates fixed on said cross bars and frame and forming a V top for the rig; sub-bases slidably mounted on said plates, there being slots in said plates beneath said sub-bases; lugs on said sub-bases projecting through said slots; screws journaled beneath said plates and threaded through said lugs and operable to move the sub-bases in translatory motion towards and away from the median line of the frame to adjust the rig for pipes of various diameters; a base pivotally mounted on each sub-base; a screw journaled on each sub-base; a nut threaded on the screw and fixed on the base to cause rotations of the screw to rotate the base on its pivot; a lock fixed on the sub-base and engaging the base to hold the base fixed in position; a shaft journaled in each base; a roller fixed upon such shaft and positioned thereon so that the axis of the pivot intersects the axis of the shaft at a point midway between the ends of the roller; three shafts journaled on said plates for rotation around axes that are all parallel to the longitudinal median line of the frame; a sprocket fixed on each of said shafts; a driving chain engaging said sprockets; an articulated shaft connecting each roller shaft to a corresponding one of said three shafts, and means for rotating the third one of said shafts thereby to rotate said rollers to rotate and advance the pipe.

6. A rig for supporting and rotating large pipes of various diameters and simultaneously advancing the pipe longitudinally of its axis a definite distance per revolution of the pipe, which distance may be varied, comprising: a frame; a pair of mounting plates fixed on said frame on each side of the longitudinal median line of the frame, said pairs of plates being disposed at right angles to each other with the plane of one pair of plates intersecting the plane of the other pair of plates in a vertical plane through said median line; sub-bases mounted on said plates for limited translatory movements thereover at right angles to said median line; a base pivotally mounted on each sub-base for limited rotary motion thereover; a pipe supporting roller journaled in each base and positioned with respect thereto so that the axis of rotation of the base over the sub-base intersects the axis of rotation of the roller at a point midway between the ends of the roller; means including a screw for rotating each base on the sub-base to set the roller at an angle to give the desired longitudinal advance per revolution to a pipe; means including screws for moving the sub-bases on the plates to position the rollers so that the mid-point of the line of engagement of the roller with a pipe lies on a line through the axis of rotation of the roller and the axis of the pipe; and means on said frame for rotating said rollers thereby to rotate and advance a pipe.

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