

July 21, 1931.

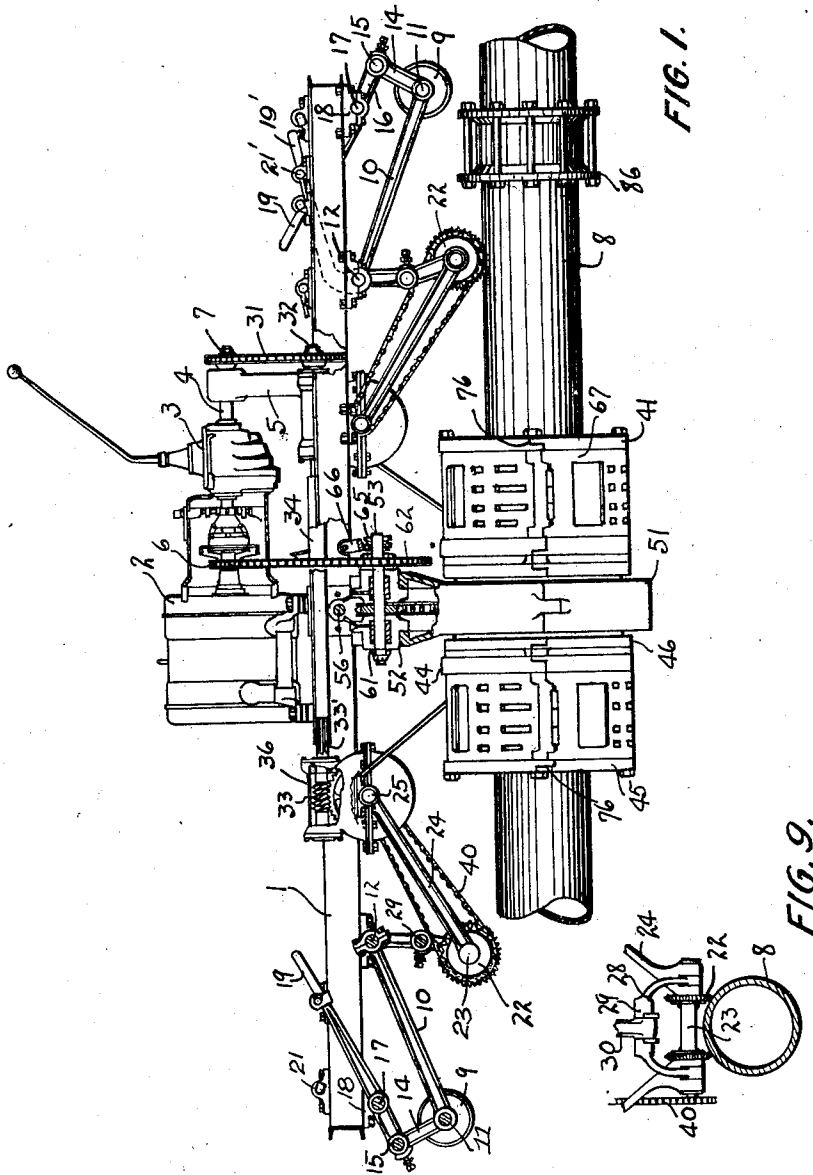
F. McMANIS

1,815,573

DEVICE FOR CLEANING THE OUTSIDE OF PIPES

Filed June 18, 1927

5 Sheets-Sheet 1



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July 21, 1931.

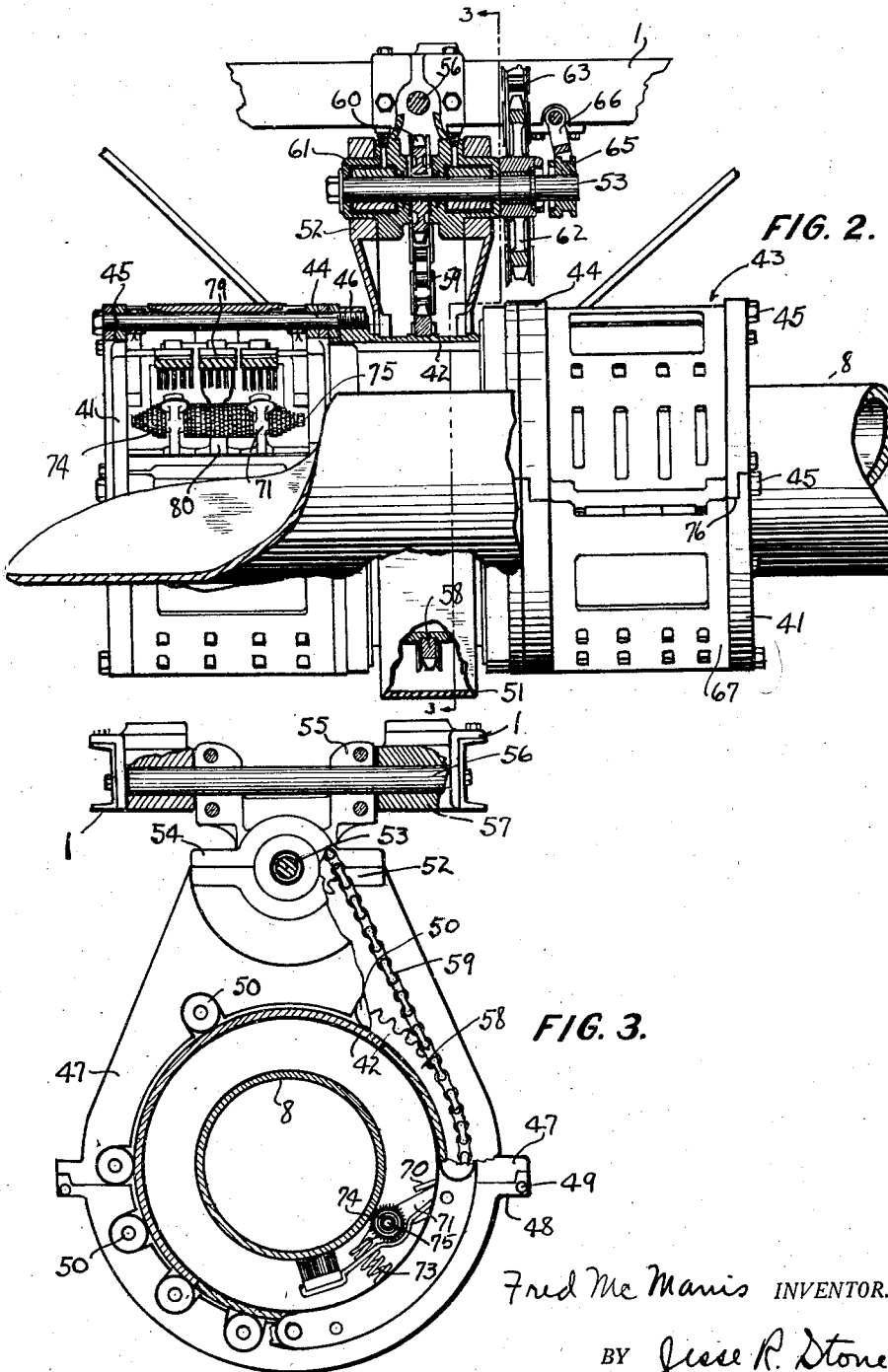
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DEVICE FOR CLEANING THE OUTSIDE OF PIPES

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5 Sheets-Sheet 2



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DEVICE FOR CLEANING THE OUTSIDE OF PIPES

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5 Sheets-Sheet 3

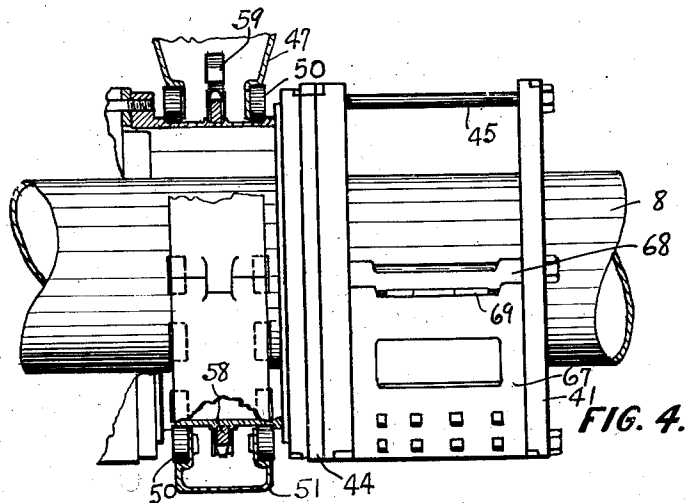


FIG. 4.

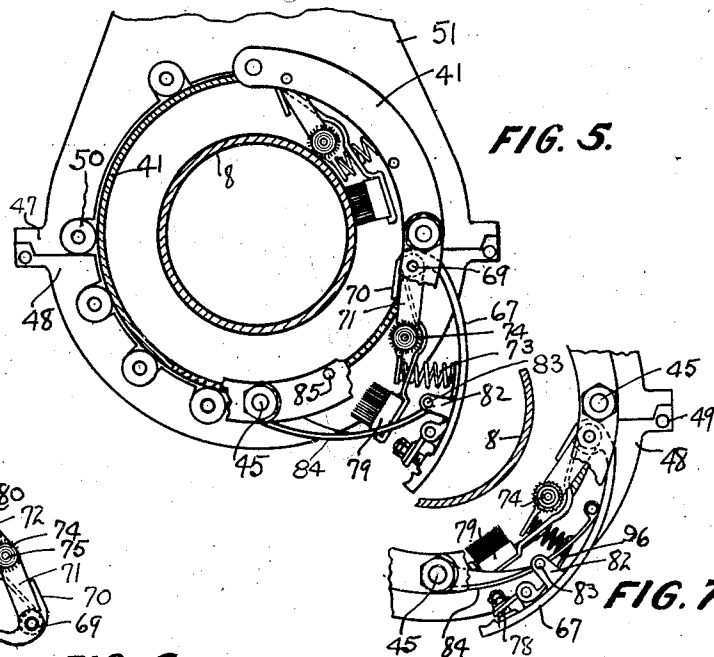


FIG. 5.

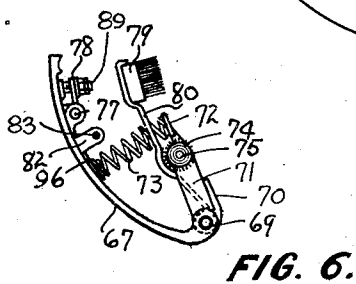


FIG. 6.

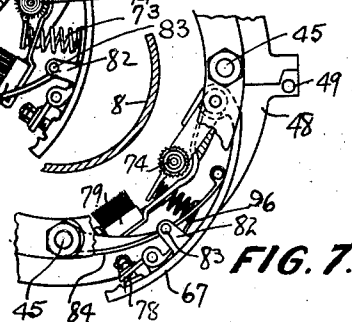


FIG. 7.

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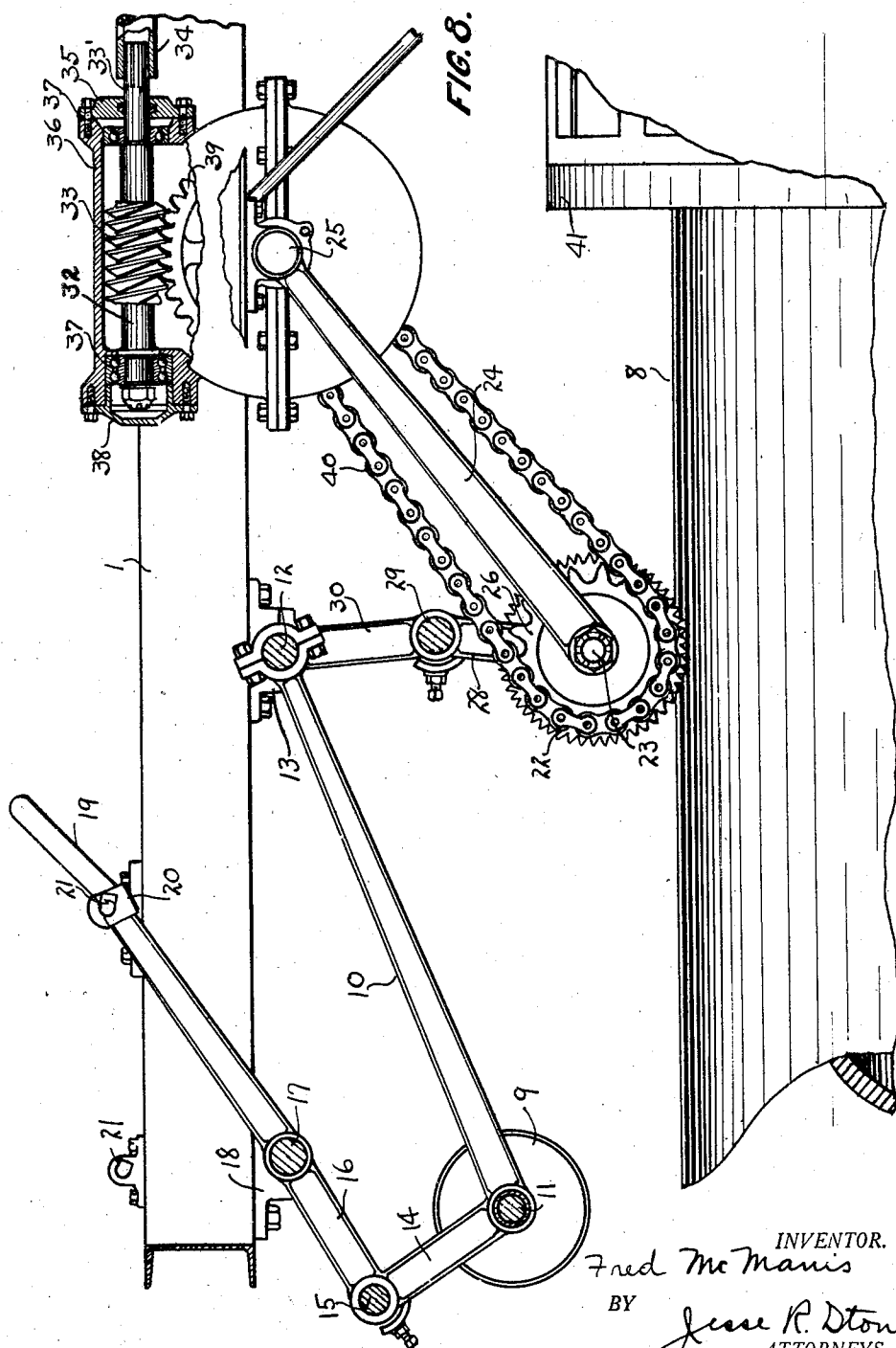
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DEVICE FOR CLEANING THE OUTSIDE OF PIPES

Filed June 18, 1927

5 Sheets-Sheet 4



July 21, 1931.

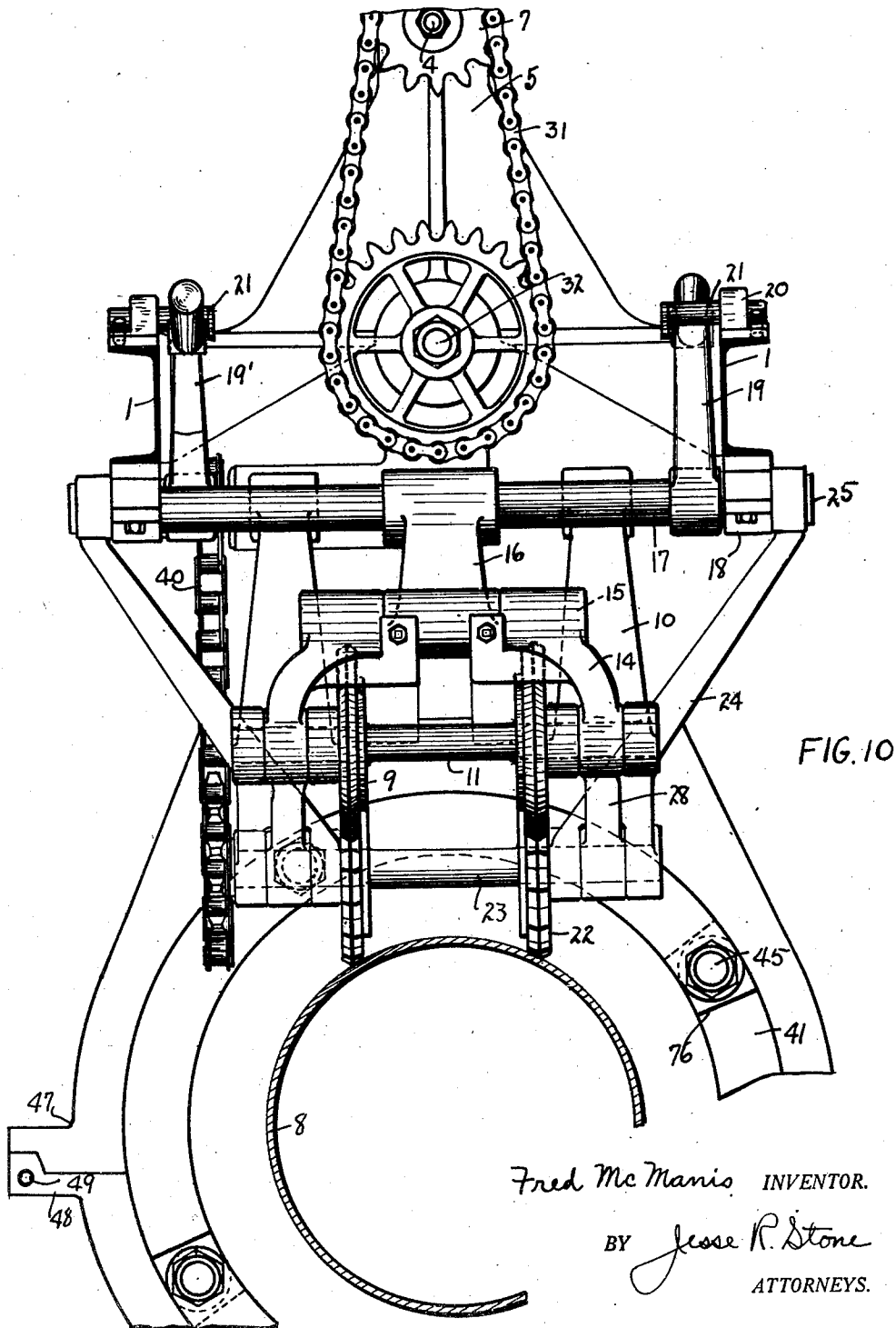
F. McMANIS

1,815,573

DEVICE FOR CLEANING THE OUTSIDE OF PIPES

Filed June 18, 1927

5 Sheets-Sheet 5



UNITED STATES PATENT OFFICE

FRED McMANIS, OF HOUSTON, TEXAS, ASSIGNOR TO W-K-M COMPANY, OF HOUSTON, TEXAS, A CORPORATION OF TEXAS

DEVICE FOR CLEANING THE OUTSIDE OF PIPES

Application filed June 18, 1927. Serial No. 199,757.

My invention relates to an apparatus for cleaning and removing rust, scale and other corrosion and foreign matter adhering to the outside of pipes. It is particularly adapted for use upon pipe lines such as are used in conveying oil or water and in which the size of the pipe is usually comparatively large.

It is well known that pipe employed in pipe lines in the fields and across country, for conveying liquids, are subject to rust and corrosion and will, if not taken care of, disintegrate and require replacement. These pipes may be cleaned and covered with a corrosion resisting coating so that they will last for much longer periods of time than they otherwise would.

It is the purpose of my invention to provide a device which may be employed particularly in the field, for cleaning the outside of the pipe so that the protective coating may be thereafter applied. Although adapted particularly for field work, it is adapted also for shop or yard work, as will appear.

It is an object to provide a pipe cleaning apparatus which may be supported upon and operated along the pipe either when it is in the ditch in which the pipe is laid, or after it has been elevated out of the ditch. It is desired that the machine may be capable of operation at different speeds along the pipe and to act upon the pipe so as to clean the same of foreign material thereon, and that the mounting be flexible to allow slight variation in the position of the cleaners relative to the operating means.

In constructing devices of this kind, as heretofore known, the cleaning apparatus has not been expansible or adjustable to an extent which would allow the passing of flanged couplings upon the pipe without material difficulty, and it is an object of my construction to provide a cleaning apparatus of this type having the cleaning elements mounted so as to be movable toward and away from the pipe and to be adjustable so as to pass the flanged couplings along the line without difficulty.

The invention resides largely in the particular construction and arrangement of the

parts which will be set forth in detail in the specification which follows.

Referring to the drawings herewith, Fig. 1 is a side elevation of a device embodying my invention, said device being shown as mounted upon a pipe for operation, certain parts being broken away for greater clearness. Fig. 2 is a broken detail of the cleaning device with parts broken away to disclose the operating features thereof. Fig. 3 is a transverse section on the plane 3-3 of Fig. 2. Fig. 4 is a side elevation of a broken detail of the cleaning device with portions of the housing and operating mechanism broken away. Fig. 5 is a broken sectional detail of the cleaning drum and cleaning mechanism. Fig. 6 is a side view of one of the cleaning elements removed from the housing. Fig. 7 illustrates the cleaning elements in a position different from that shown in Fig. 5. Fig. 8 is an enlarged sectional detail showing a side elevation of the supporting and traction mechanism for moving the cleaner along the pipe; Fig. 9 is a transverse section of the pipe illustrating the traction device engaged therewith. Fig. 10 is a broken front elevation of the device.

In carrying out my invention, I provide a frame approximately rectangular in shape, made up of two longitudinally extending beams 1, connected by cross beams, preferably of channel iron construction. This frame serves as a mounting for a motor 2 of any desired type, an ordinary electric motor being shown. The drive from said motor is delivered through a transmission mechanism 3 of an ordinary preferred make, whereby the operating mechanism may be driven at the required number of speeds forward and reverse. This motor and its control mechanism are supported upon the frame 1, the drive shaft 4 being supported at its forward end within a supporting bearing post 5 midway between the two side members of the frame. The said shaft 4 has a sprocket wheel 6 approximately midway of the frame and a similar sprocket wheel 7 beyond the supporting post 5, as shown particularly in Fig. 1. These two wheels serve to transmit power

to the operating mechanism which will be later described.

The complete device here shown is adapted to be supported upon and moved along the pipe 8 as a track. To thus support the frame I provide a plurality of rolling members at each end of the frame. There is a pair of wheels or rollers 9 at each end of the frame, said rollers being mounted upon an adjustable support comprising legs 10, one end of which forms a bearing for the shaft 11 of the roller 9 and the upper end thereof extends rearwardly and is pivotally attached to a shaft 12 in the bearings 13 on the lower side of the frame 1. The wheels 9 are thus adapted to swing in an arc about the shaft 12 as a center. Legs 14 also pivotally connected with the shaft 11 have connection with a shaft 15 which is in turn supported on the forward end of a lever 16. Said lever 16 has as a fulcrum and support a shaft 17 supported in bearings 18 in the frame. Said lever is fixed on the shaft and a lever arm 19 also fixed to the shaft, extends above the frame within the control of the operator. Said lever 19 when in the position shown in Fig. 8 whereby the guide wheels 9 are raised above the pipe, may be engaged adjacent a bracket 20 and latched in position therein by means of the bolt 21, thus retaining the guide wheels in inoperative position.

Mounted on the frame 1, inwardly from the guide wheels 9, are a pair of traction wheels 22. Said wheels are mounted upon a shaft 23 supported at the lower end of arms 24, which are pivotally connected with a shaft 25 at their upper ends, and are adapted to swing on said shaft so as to raise and lower the traction wheels 22 relative to the pipe 8. The shaft 23 has thereon at one end a sprocket wheel 26 by means of which said shaft may be rotated. The wheels 22 have radial teeth thereon adapted to engage the pipe and exert a traction thereon tending to move the frame and the cleaner along the pipe.

The shaft 23 upon which the traction wheels are mounted is further supported at the lower ends of links 28 connected with a cross shaft 29 supported at the ends of link 30 which is fixed upon the shaft 12, previously referred to. The links 28 and 30 are set at such an angle relative to the shafts 12 and 23 that a toggle joint is formed for the purpose of exerting downward pressure upon the wheels 22 to cause them to engage with the pipe. This toggle is operated through a lever 19' connected with the shaft 12 upon which links 30 are rigidly secured. Said handle may be locked in position with the wheels 22 in either raised or lowered position by means of locking pins 21' as shown in Fig. 1.

As shown in the drawings, there are two

sets of guide wheels and two sets of traction wheels, one at the forward end and one at the rearward end of the frame 1.

The traction wheels are adapted to be operated from the motor 3 through a chain 31 upon the sprocket wheel 7 mounted upon the shaft 4 of the motor. Said chain 31 is connected with a sprocket wheel upon a shaft 32, mounted longitudinally of the frame. The shaft 32 has thereon at each of its ends a worm gear 33. It will be noted that the body of the shaft 32 is formed of a sleeve 34 connected with the two ends of the shaft, which are solid, the sleeve having a telescopic fit with the ends. As shown particularly in Fig. 8, the shaft 32 of the worm gear extends through the outer cap 35 of a housing 36 in which the gear is placed. An anti-friction bearing 37 furnishes a support for the shaft at each end of the housing, the outer end of the housing being closed by a cap 38. The worm gear 33 meshes with a gear 39 mounted upon the shaft 25 and rotating motion is communicated from the shaft 25 to the gear 26 upon the traction members through a sprocket chain 40 of ordinary construction. It will be thus noted that both of the traction wheels 22 are rotated in the direction desired and at the proper speed to move the cleaner along the pipe at the rate desired.

The cleaner comprises a frame of cylindrical outline made up of two end frame sections connected together by an intermediate bushing 42. There are in fact two cleaners, each identical in its construction, operatively connected by said bushing 42 so as to rotate simultaneously. The cleaners indicated at 43 have annular plates 41 at the outer ends and similar plates 44 on the inner sides. These plates are connected together and spaced apart by through bolts 45 extending through the said plates and projecting beyond the inner plates 44 and screwed within rings 46 forming a part of one of the sections of the bushing 42.

The bushing 42 connecting the two cleaning members, is supported rotatably within a casing 51, which is shaped to encircle the bushing at its lower side and tapers upwardly and has a bearing member 52 at its upper end forming part of a bearing for the lower side of an operating shaft 53. A bearing member 54, co-operates with the lower member 52 to enclose the shaft, which thus forms a support for the casing. The upper bearing member is sustained by means of a special bracket 55 supported upon a shaft 56 secured at its ends within supporting blocks 57 secured to the frame 1. Said bracket member 55 is a split bracket or support which is fitted about the shaft 56 in such manner as to allow a slight lateral swinging of the casing.

As seen best from Figs. 4 and 5, the casing is formed to receive a plurality of rollers 50

on its inner side about the bushing so as to form a support, permitting rotation of said bushing. These rollers 50 are mounted within the sides of the casing so as to support the weight of the bushing 42 at each end, there being a plurality of these rollers along the upper side as well as on the lower side, to facilitate the smooth rotation of the bushing. Said casing is formed with its lower side, indicated at 48, adapted to be removed from the upper portion. The two meeting sides of the lower section 48 and the upper section 47 are adapted to interfit to receive transverse pins 49, by means of which a detachable connection is made. Both of said pins 49 may be removed to allow the section 48 to drop downwardly away from the inner bushing 42.

The bushing 42 has midway between its ends a radially projecting sprocket member 58 secured rigidly thereto and forming engagement for a sprocket chain 59 which extends upwardly in the casing for engagement with a sprocket wheel 60 upon the shaft 53. Said shaft is mounted, as previously explained, within the bearings in the frame of the housing and said bearings and casing being supported by the bracket 55 especially designed to support the same within the frame. Anti-friction bearings 61 are employed about the shaft and a sprocket wheel 62 is mounted toward one end of said shaft to be connected by means of the chain 63 to the motor shaft, as previously explained. The sprocket wheel 62 is mounted idly on the shaft 53 but may be connected therewith for operation by means of a clutch 65 slidably on the shaft and operative for movement into engagement with the sprocket wheel through means of a clutch lever 66 mounted within the frame 1.

The two cleaner frames, the sprocket wheel 58, and the connecting bushing are connected to form a continuous housing and are longitudinally divided so that one half may be swung away from the other to permit the cleaner to be engaged about the pipe 8. Bolts 45, previously described may act as a hinge pintle at the engaging sides of the two sections of the cleaner so that when one of them is removed at one side, and the drive chain 59 removed, the two sections may swing on the opposite pin 45 to open up and engage about the pipe. The hinge of the cleaner housing is shown at 76 in the drawings. The arrangement is a common one and will be readily understood.

The cleaning elements mounted in each of the cleaning housings, previously mentioned, are secured upon curved plates mounted in the frame and having a hinged connection therewith so that the cleaning elements may be moved toward or away from the pipe when adjustment is desired. The frame preferably has a plurality of cleaning elements and I have

shown four thereof about the circumference of the pipe, two on each longitudinal section, each element being mounted upon a door 67 within the frame and having a hinged connection with the cross member 68 of the frame as shown at 69. The construction of each of these doors with the cleaning elements thereon is best seen in Figs. 5, 6 and 7. Each door is hinged upon a rod 69 mounted at its ends in the plates 41 and 44. The door 67 is curved to conform to the curvature of the frame and has the wall of the door member extended around the pivotal rod 69 and recurved to form a stop 70 for a cutter arm. Said cutter arm 71 is secured to the door 67 and fixed upon a rod 69 to extend in a position parallel with the plate extension 70. Said rod is pivotally secured to the said door so that it may swing to and from the plate and the forward end thereof beyond the cutters has a plate member 72 to receive the end of the spring 73. Said spring 73 tends to throw the cleaning arm inwardly toward the pipe. There are two of these arms 71 mounted to swing inwardly, and these arms are spaced apart and support a cross shaft 75 upon which are mounted rotary cutting elements 74. These cutters are disc shaped cutters mounted side by side upon the shaft and having radial teeth thereon to engage with the pipe for cleaning purposes. As seen from Fig. 2, the cutters at the ends are cone-shaped with the smaller diameter toward the ends thereof so as to engage with the material or with couplings upon the pipe, as the cleaner is advanced and gradually cut away the scale and corrosion and to guide the cutters over the couplings.

The spring 73 which tends to throw the cutters toward the pipe may be adjusted as to tension by mounting the end adjacent the door 67 upon a movable plate 96, one end of which is pivoted to pin 77 supported on said door, an arm 78 on said plate extends beyond the pivot 77 and has an opening to receive a post 89 on the plate. A nut on said post may be thus employed to adjust the tension on spring 73 in an obvious manner.

Brushes 79 are employed in addition to the cleaning cutters. Said brushes are shown as three in number, although any desired number may be used. Said brushes are mounted on a plate at the forward end of an arm 80. Said arm is fixed upon the rod 69 between the cutter arms and is curved to pass around the cutters and extend beyond them to contact with the pipe. The brush arm is thus mounted upon the same pin as are the cutter arms 71 and as the arms 71 are urged resiliently toward the pipe under the influence of the springs 73, both the cutters 74 and brushes 79 are forced into contact with the pipe.

The doors 67 have at each side thereof inwardly projecting posts 82 the ends of which are formed with openings 83 to receive a pin.

Arms 84 are mounted upon bolts 45 in the frame and extend laterally to bear against the inner side of the door 67. The forward ends have bearing openings therein to receive cross rods 85. Said rods 85 serve, when the doors are closed, to secure them in place. The rods are inserted through openings in the plates 41 and 44 adapted to register with openings 83 in the posts 82 as seen in Fig. 7. When the doors are opened a certain distance the bearing openings in the ends of the arms 84 will register with the openings 83 in the posts and the rod 85 may be then inserted through the openings 83 in the posts 82 and arms 84, as shown in Fig. 5, the doors will be then held in a position with the cleaning elements removed from the housing so that they will not interfere with the passing of the cleaner over a flanged pipe coupling, such as is shown at 86 in Fig. 1. It is understood that when small projections of material or ordinary couplings are encountered that the conical ends of the cutters 74 will ride over them and it will not be necessary to open the doors.

During the operation of the device the frame 1, together with the motor, and the cleaner, will be supported upon the traction wheels 22 which will be extended into contact with the pipe through the operation of levers 19'. The guide wheels 9 are ordinarily in raised position away from the pipe. The cleaner will be fitted about the pipe as previously described and the operation of the motor at the desired speed will cause rotation of the bushing 41 through the chains 63 and 59. The rotation of the bushing will carry with it the cleaners which will scrape and brush the foreign material from the pipe in an obvious manner.

The rotation of the traction wheels 22 at the proper speed will advance the cleaner along the pipe. When a coupling 86 is encountered, the wheels 9 will be lowered after they have passed the coupling, and then the adjacent traction wheels 22 will be raised depending upon the wheels 22 at the opposite end of the frame to continue the movement of the cleaner. The cleaner itself may be enabled to pass the coupling at the proper time by the opening of the doors 67 and supporting them in open position through the arms 84. The opposite end of the frame and its traction wheels will also be enabled to pass the coupling by the use of the guide wheels 9 adjacent thereto as will be seen.

In the operation of the device occasional bends or curves in the pipe are sometimes encountered and it is to be understood that the cleaner has a limited flexibility relative to the frame 1 through its supports. The shaft 53 allows a slight swinging of the casing 51 thereon and the shaft 56 also allows a slight sway in a longitudinal direction. Thus inequalities in the pipe may be accommodated as the cleaner is operated.

The cleaner is removed from the pipe by first removing the lower section 48 of the casing. The bushing and cleaner housings may be then opened by the removal of one of the bolts 45 at each end and then swinging one part away from the other like a clam shell is opened. The device may then be raised away, free of the pipe.

By the use of my improved cleaner, I am enabled to clean all kinds of pipe employed in pipe lines and in oil field equipment without difficulty. All types of couplings on the pipe may be passed without removing the device from the pipe. The cleaning elements are mounted for convenient access and can be controlled with a minimum of difficulty.

Having thus described my invention, what I claim as new and desire to protect by Letters Patent is:

1. In a pipe cleaner, a frame, traction wheels adjacent the end of said frame, guide wheels on said frame, separate means to raise and lower said traction wheels and said guide wheels, pipe cleaning means depending from said frame, and means to operate said traction wheels and said cleaning means.

2. In a pipe cleaner, a frame, traction wheels adjacent the end of said frame adapted to engage a pipe to propel said frame along the pipe, guide wheels on said frame, separate means to raise and lower said traction wheels and said guide wheels on said frame to operate said traction wheels and said cleaning means.

3. In a pipe cleaner, a frame, guide wheels at each end thereof, traction wheels on said frame adjacent said guide wheels, separate means to raise and lower any of said wheels, a rotatable cleaner on said frame, and means to rotate said cleaner and said traction wheels.

4. In a pipe cleaner, a frame, guide wheels at each end thereof, traction wheels on said frame adjacent said guide wheels, separate means to raise and lower any of said wheels, a central bushing, cleaners at each end of said bushing, said bushing and cleaners adapted to engage about the outside of a pipe, and means to rotate said bushing and cleaners.

5. In a pipe cleaner, a supporting frame, a casing depending therefrom, a bushing rotatable in said casing, pipe engaging means to support and propel said frame along the pipe, cleaning frames fixed at each end of said bushing, cleaning elements in said cleaning frames, a motor on said supporting frame and operative connections between said motor and said bushing.

6. In a pipe cleaner, a supporting frame, a casing depending therefrom, a bushing rotatable in said casing, pipe engaging means to support and propel said frame along the pipe, cleaning frames fixed at each end of said bushing, cleaning elements in said cleaning frames, a motor on said supporting frame and operative connections between said motor

and said bushing, including a sprocket wheel on the shaft of said motor, a sprocket wheel on said bushing, and a chain on said wheels.

7. In a pipe cleaner, a frame, means to support said frame, a bushing supported by said frame, cleaner frames at each end of said bushing, doors hinged on said cleaner frames, pipe cleaning elements on said doors, and means to rotate said bushing and cleaner frames.

8. In a pipe cleaner, a bushing adapted to fit about a pipe, a cleaner frame fixed on said bushing, doors on said frame, said doors being adapted to swing to and from the pipe, means to fix said doors in a plurality of adjusted positions, cleaning elements on said doors, and means to rotate said bushing and frame.

9. In a pipe cleaner, a bushing adapted to fit about a pipe, a cleaner frame fixed on said bushing, doors on said frame, said doors being adapted to swing to and from the pipe, means to fix said doors in a plurality of adjusted positions, cleaning elements on said doors, means holding said cleaning elements resiliently toward the pipe, means to adjust the pressure on said holding means, and means to rotate said bushing and frame.

10. In a pipe cleaner, a bushing adapted to fit about a pipe, a cleaner frame fixed on said bushing, doors on said frame, said doors being adapted to swing to and from the pipe, means to fix said doors in a plurality of adjusted positions, arms pivoted on said doors, cleaning elements on said arms, and means to rotate said bushing and frame.

11. In a pipe cleaner, a bushing adapted to fit about a pipe, a cleaner frame fixed on said bushing, doors on said frame, said doors being adapted to swing to and from the pipe, means to fix said doors in a plurality of adjusted positions, arms pivoted on said doors, means to limit the movement of said arms, toward and away from the pipe, cleaning elements on said arms, and means to rotate said bushing and frame.

12. In a pipe cleaner, a cleaner frame adapted to rotate about a pipe, a plurality of cleaning elements carried by said frame and adapted to swing toward and away from the pipe, means to fix said elements in position spaced from said pipe, and means to rotate said frame.

13. In a pipe cleaner, a cleaner frame adapted to fit about a pipe, a plurality of cleaning elements pivoted in said frame to swing toward and away from the pipe, means tending to hold said cleaning elements resiliently toward the pipe, means to adjust the tension on said holding means, means to fix said elements in position spaced from the pipe, and means to rotate said frame.

14. In a pipe cleaner, a frame adapted to fit about a pipe, means to support said frame, means to rotate said frame, a plurality of

doors on said frame, arms on said doors, rolling toothed cutters mounted on said arms, means to hold said cutters, toward the pipe and means to fix said doors in a plurality of positions relative to the pipe.

15. In a pipe cleaner, a frame adapted to fit about a pipe, means to support said frame, means to rotate said frame, a plurality of doors on said frame, arms on said doors, rolling toothed cutters mounted on said arms, means to hold said cutters toward the pipe and means to fix said doors in a plurality of positions relative to the pipe, and brushes on said doors adapted to bear resiliently upon said pipe.

16. A cleaner for pipe having couplings thereon, including a bushing, a cleaner frame thereon, cleaning elements on said frame, means to move said bushing along the pipe, means to support said bushing when a flanged coupling is being passed, means to permit the movement of said cleaning elements away from the pipe to pass said coupling, and means to operate said bushing and frame.

17. A pipe cleaner including a frame, means to support and propel said frame along a pipe, a transverse shaft in said frame, a bracket thereon, an operating shaft supported in said bracket, a casing depending from said operating shaft, a rotatable cleaner in said casing, and means to rotate said cleaner in said casing.

18. A pipe cleaner including a frame, means to support and propel said frame along a pipe, a supporting shaft transversely of said frame, a bracket on said shaft, an operating shaft in said bracket set at right angles to said supporting shaft, a casing depending therefrom, a cleaner in said casing, and means connected with said operating shaft to rotate said cleaner.

19. A pipe cleaner including a frame, means to support and propel said frame along a pipe, a supporting shaft transversely of said frame, a bracket on said shaft, an operating shaft in said bracket set at right angles to said supporting shaft, a casing depending therefrom, a cleaner in said casing, and means connected with said operating shaft to rotate said cleaner, said casing and cleaner having a slight swinging movement relative to said frame on said shafts in the manner described.

20. In a pipe cleaner, an approximately cylindrical cleaner frame, said frame being divided longitudinally into a plurality of sections, a hinged connection between said sections, doors in the sides of said frame, cleaning elements hinged to said doors and means to rotate said frame.

21. In a pipe cleaner, an approximately cylindrical cleaner frame, said frame being divided longitudinally into a plurality of sections, a hinged connection between said

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sections, doors in the sides of said frame, cleaning elements hinged to said doors, means on said doors to limit the movement of said cleaning elements, springs holding said cleaning elements toward the pipe, and means to rotate said frame.

22. In a pipe cleaner, a frame adapted to fit about a pipe, means to rotate said frame, doors in said frame, arms pivotally connected with said door, cutting discs on said arms, brushes mounted on said door, means to hold said arms and brushes resiliently toward the pipe, and means to limit the movement of said discs and brushes.

23. A device for cleaning the outside of pipe, comprising in combination a frame rotatable about the pipe, rods pivotally carried by said frame, a plurality of arms, brushes and cutters carried by said arms and fixedly mounted on each of said rods.

24. A device for cleaning the outside of pipe, comprising in combination a frame rotatable about the pipe, rods pivotally carried by said frame, a plurality of cleaning elements fixedly mounted on each of said rods, and a single means to pivot each of said rods whereby all said cleaning elements contact the pipe.

25. In a pipe cleaning device, separate and independently adjustable traction and guide means adapted to travel on the pipe being cleaned, a frame supported by said means, and cleaning members carried by said frame.

26. In a pipe cleaning device, a supporting frame, a bushing suspended from said frame, cleaner frames adjacent said bushing, means carrying pipe cleaning elements on said cleaner frames, and means to propel said supporting frame and said cleaning elements.

In testimony whereof I hereunto affix my signature this 13th day of June, A. D. 1927.

FRED McMANIS.

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