

June 9, 1953

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2,641,008

PIPE RECONDITIONING MACHINE

Filed April 27, 1948

5 Sheets-Sheet 1

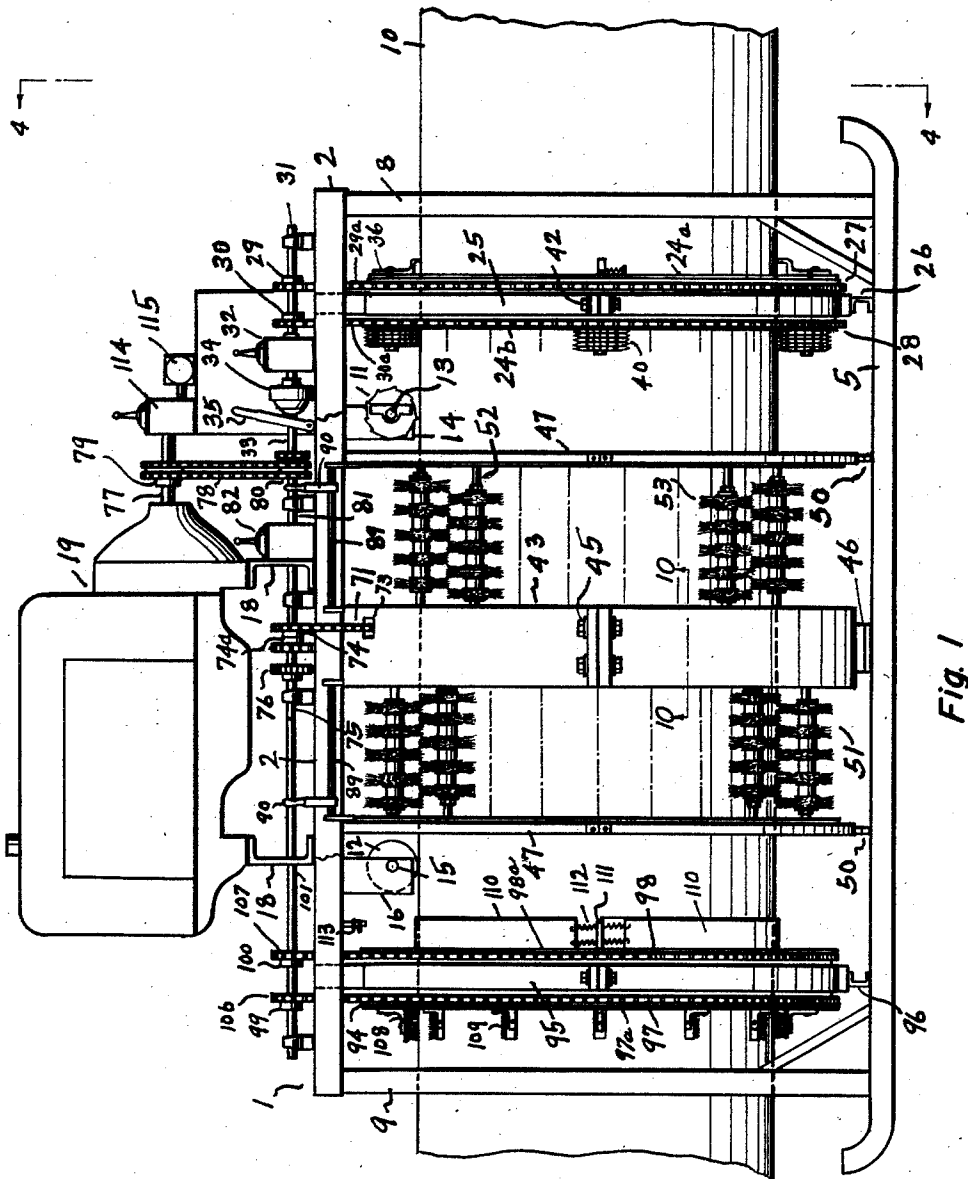


Fig. 1

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5 Sheets-Sheet 2

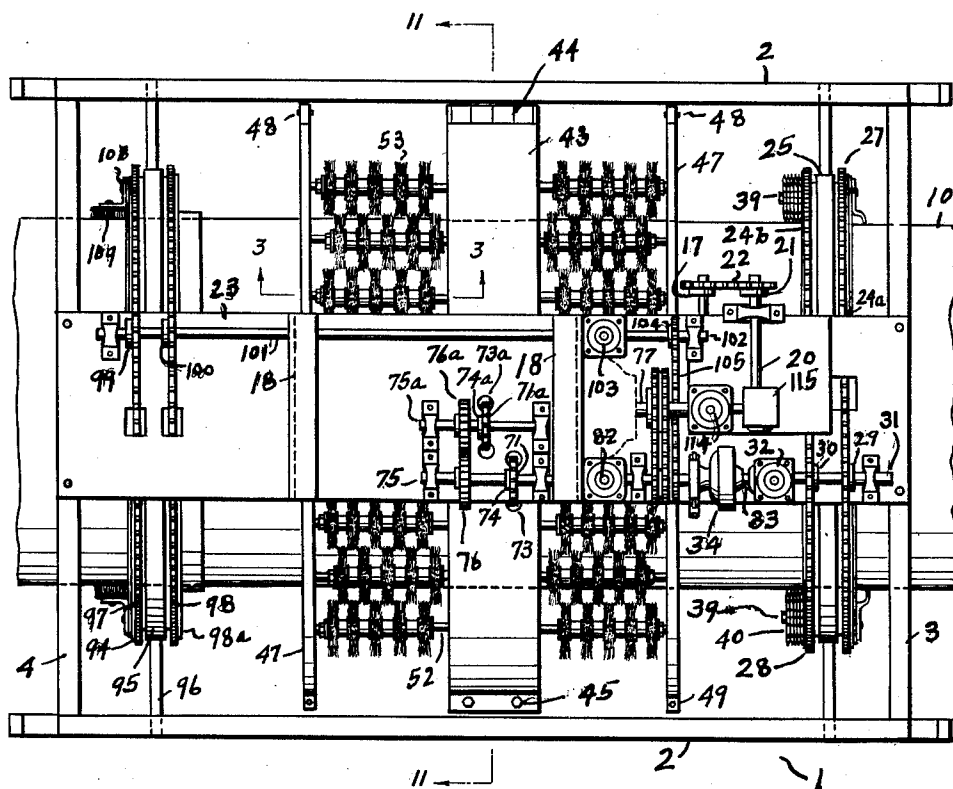


Fig. 2

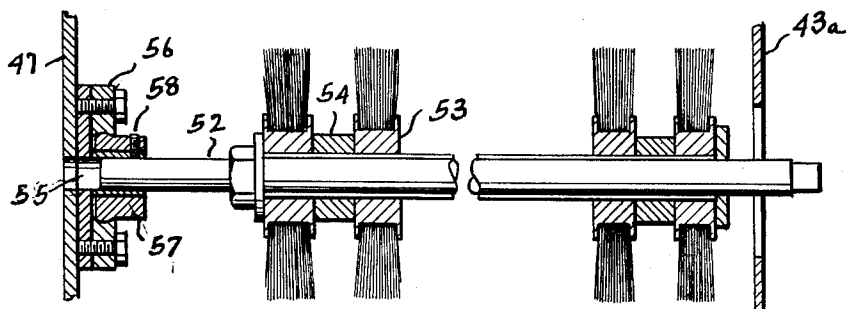


Fig. 3

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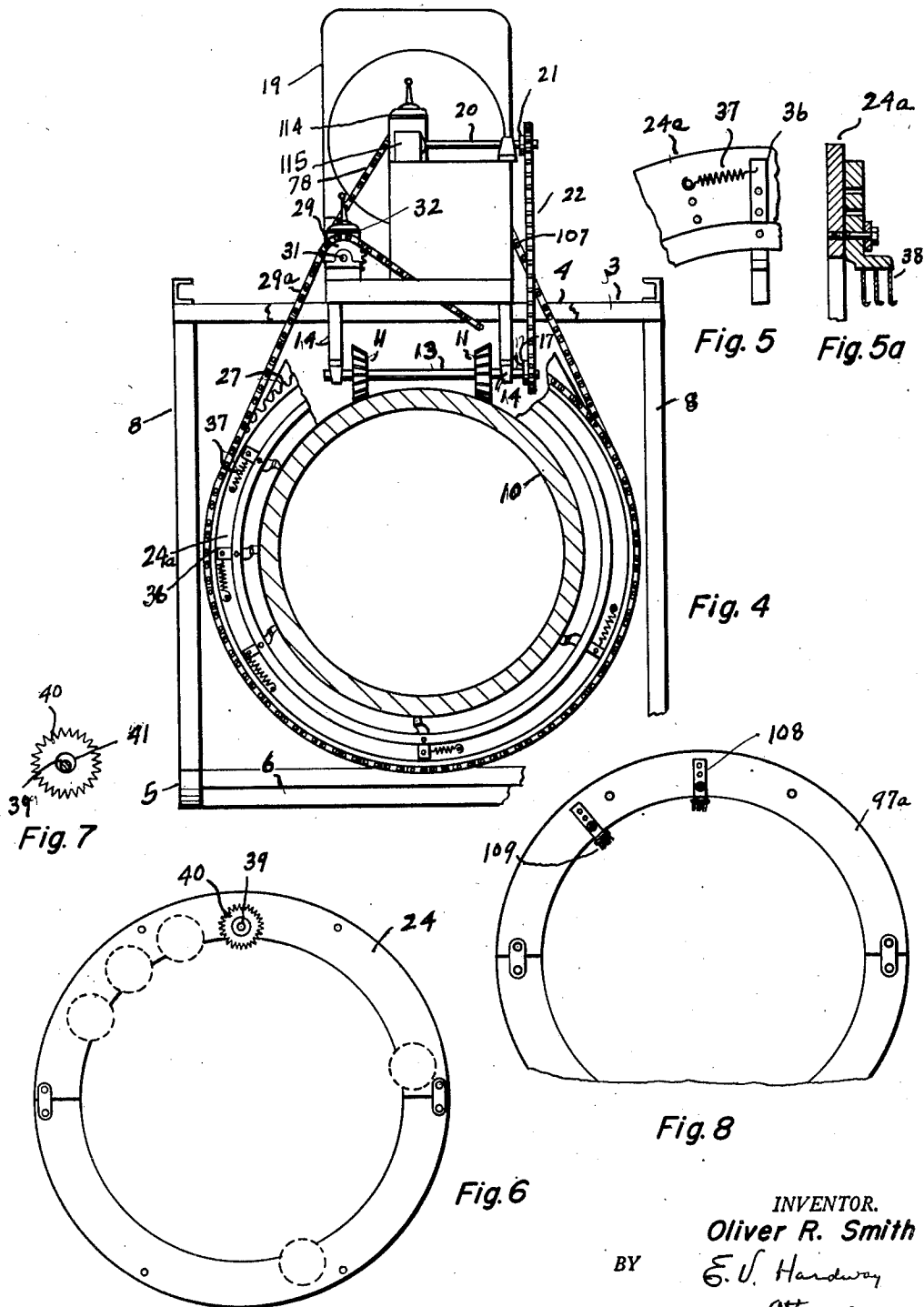
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5 Sheets-Sheet 3



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5 Sheets-Sheet 4

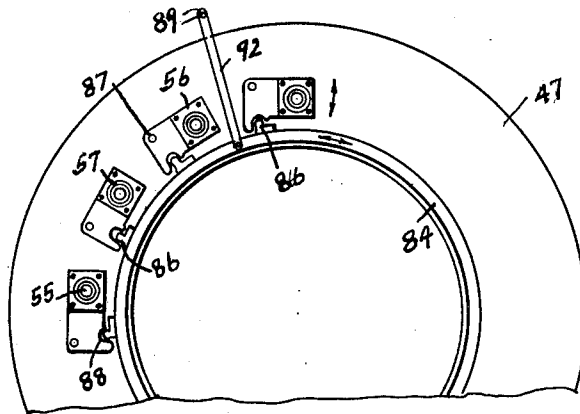


Fig. 9

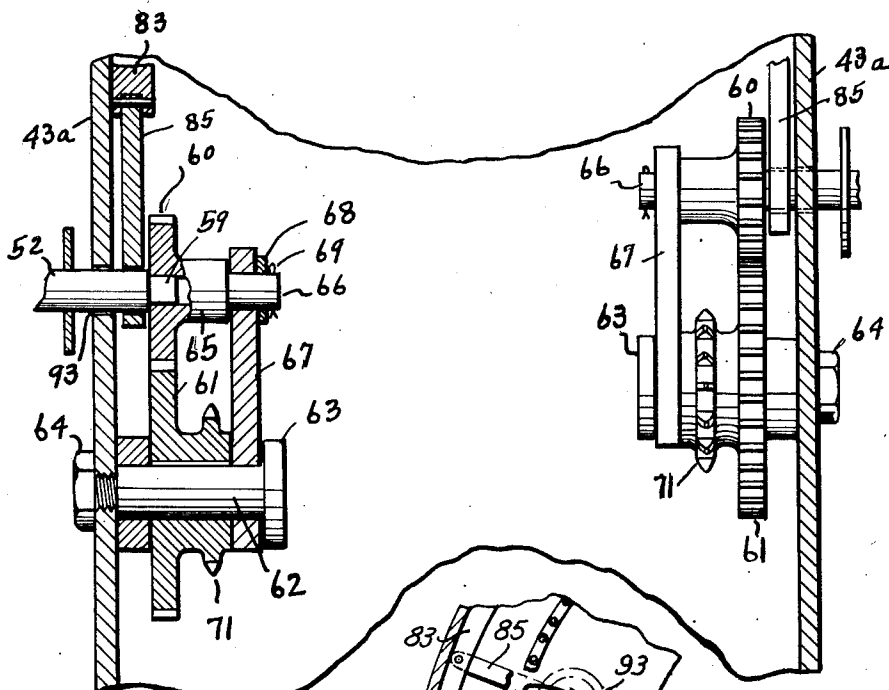


Fig. 10

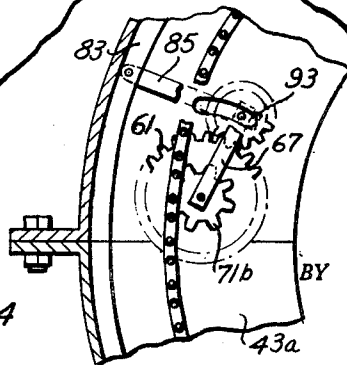


Fig. 14

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PIPE RECONDITIONING MACHINE

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5 Sheets-Sheet 5

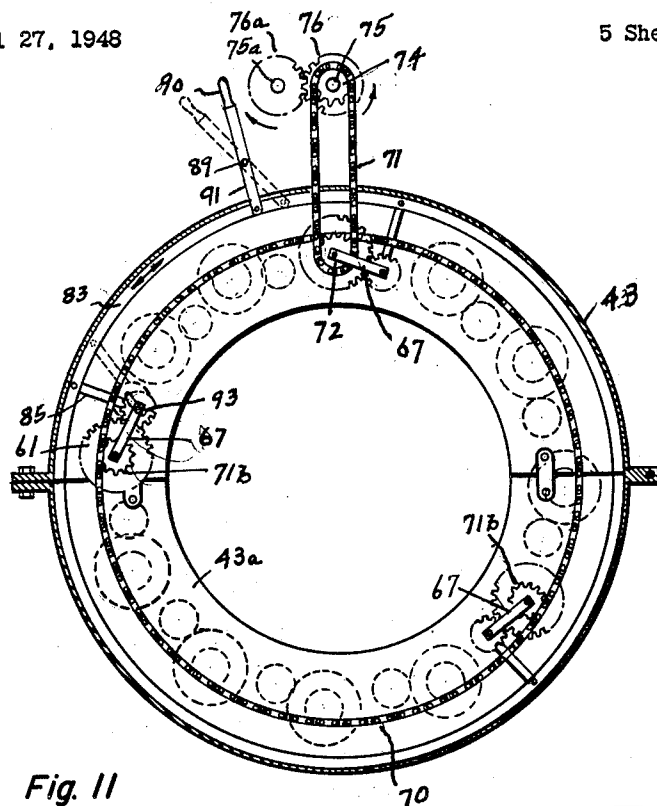


Fig. 11

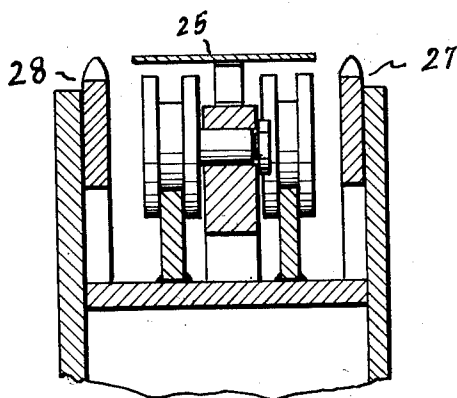


Fig. 12

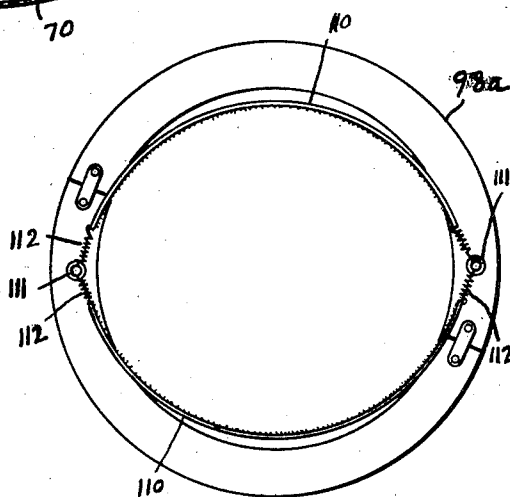


Fig. 13

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UNITED STATES PATENT OFFICE

2,641,008

PIPE RECONDITIONING MACHINE

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Application April 27, 1948, Serial No. 23,532

3 Claims. (Cl. 15—83)

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The invention relates to a pipe reconditioning machine.

An object of the invention is to provide a machine of the character described especially adapted for use in reconditioning pipe lines preparatory to wrapping the same.

The machine has been specially designed for cleaning pipe having a rough or pitted surface, for removing dirt, rust and scales therefrom, for applying a coating material thereto and for distributing said material uniformly about the pipe preparatory to applying the wrapping material to the pipe.

While the machine is particularly useful in cleaning and reconditioning raised pipe lines it is also useful in cleaning pipe, generally, which has accumulated surface rust or other deposits.

Other objects and advantages will be apparent from the following specification which is illustrated by the accompanying drawings, wherein:

Figure 1 is a side elevation of the machine.

Figure 2 is a plan view thereof with the motor removed.

Figure 3 is an enlarged, fragmentary, sectional view taken on the line 3—3 of Figure 2.

Figure 4 is a fragmentary, cross-sectional view taken on the line 4—4 of Figure 1.

Figure 5 is a fragmentary, front elevation of a pick supporting ring employed.

Figure 5a is a cross-sectional view thereof.

Figure 6 is a rear elevational view of the ring shown in Figure 5.

Figure 7 is an enlarged, side elevation of a toothed disc employed.

Figure 8 is a fragmentary, elevational view of an annular brush carrier.

Figure 9 is a fragmentary, elevational view of a brush supporting frame employed.

Figure 10 is a fragmentary, cross-sectional view taken on the line 10—10 of Figure 1.

Figure 11 is a cross-sectional view of the machine taken on the line 11—11 of Figure 2.

Figure 12 is a fragmentary, cross-sectional view of a driving ring employed, and

Figure 13 is an elevational view of the coating wipers shown mounted on the adjacent brush carrier.

Figure 14 is a fragmentary view of Figure 11, on a somewhat enlarged scale, showing the relationship between the parts of the bearings and supporting means for the inner ends of the brush shafts.

Referring now more particularly to the drawings the numeral 1 designates a framework as a whole.

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This framework comprises the top, longitudinal side members 2, 2 connected by the front and rear cross-bars 3, 4 and similar bottom side members 5, 5 connected by the front and rear cross-bars 6 and 7. The top and bottom frames thus formed are connected by the front and rear vertical beams 8, 8 and 9, 9. This framework is accordingly rectangular in cross-section to receive, therethrough the pipe 10 to be cleaned.

This framework is supported on the pipe by the front and rear carrier wheels 11, 11 and 12, 12. The front carrier wheels 11 are fixed on a transverse axle 13 whose ends are mounted to rotate in transversely aligned bearings of the hangers 14 which are fixed to and depend from the top of the framework and the rear carrier wheels 12 are fixed on a transverse axle 15 which has bearings in hangers, as 16, which are also fixed to and depend from the top of the main framework.

One end of the axle 13 is extended and fixed thereon there is a sprocket wheel 17.

Mounted on suitable transverse beams 18, 18, on the main frame, there is a motor 19 of any selected type.

Positioned forwardly of the motor and mounted to rotate in suitable transversely aligned bearings there is a shaft 20 whose outer end has a sprocket wheel 21 fixed thereon and operating over said sprocket wheels 21 and 17 and transmitting rotation from the former to the latter there is a sprocket chain 22.

The shaft 20 may be operatively connected with and disconnected from the motor in a manner to be hereinafter described and when connected with the motor and driven thereby it will operate through the chain 22 to rotate the shaft 13 and the carrier wheels 11 so as to propel the entire machine along the pipe 10 as a track. The periphery of the carrier wheels 11 are beveled to conform to the curvature of the pipe and are also serrated so as to more readily engage with the pipe to propel the machine along as indicated in Figure 4.

Extending longitudinally of the frame and secured to the front and rear cross-bars 3 and 4 there is a platform 23 provided to support the driving mechanism.

There is a front rotatable ring 24 mounted to rotate within a surrounding circular bracket 25 which is suitably fixed within the forward end of the frame and supported on a transverse supporting bar 26. The ring 24 is formed with annular external sprocket teeth 27, 28 on opposite sides of the bracket 25 and these sprocket teeth are aligned with corresponding small sprocket

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wheels 29, 30 which are fixed on a longitudinal shaft 31 which is mounted on the platform 23 and the speed of rotation of this shaft may be controlled by a conventional transmission mechanism indicated generally by the numeral 32. This transmission mechanism may be driven from a suitable shaft 33 which is equipped with a conventional clutch 34 that may be engaged and disengaged by the clutch lever 35. Ring 24 is driven from sprockets 29, 30 through sprocket chains 29a, 30a.

The shaft 33 is operatively connected with and driven from the motor 19 in a manner to be hereinafter described.

There is an annular anchor 24a on the forward side of the ring 24 and spaced apart around the forward side of the anchor 24a there are the radial pick carriers 36 which are pivotally mounted on said anchor as best illustrated in Figures 5 and 5a and there are the pull springs 37 whose forward ends are connected to the upper ends of said carriers 36 and whose other ends are connected to the annular anchor at the rear of said carriers, as shown in Figures 4 and 5.

The inner ends of these pick carriers are forwardly turned and said forwardly turned ends carry the inwardly directed picks 38 which are held in yielding contact with the surface of the pipe by means of the pull strings 37 and as said ring 24 is rotated and the machine moved longitudinally of the pipe these picks will pass over the entire area of the pipe and will engage and remove scale and other foreign matter and will enter external pits on the pipe removing corrosion and other foreign matter therefrom.

These picks merely give a preliminary cleaning to the external surface of the pipe but they loosen up the foreign matter adhering to the external surface of the pipe in preparation for its subsequent removal.

The rear side of the ring 24 carries an annular anchor 24b which has a series of rearwardly directed spindles 39 fixed thereto. These spindles are placed rather close together, as indicated in Figure 6, and mounted on each spindle 39 there is a series of discs 40. The bearings 41 through the discs which receive the corresponding spindles are somewhat larger than the spindles so that said discs may move radially relative to the spindles as they are rotated. Their external teeth are in contact with the pipe being cleansed and as the ring 24 is rotated about the pipe the disc teeth travel about the surface of the pipe and chip off and remove additional foreign matter that may be left on the pipe by the picks 38. The ring 24 is rotated rather rapidly about the pipe and the discs will vibrate radially relative to their respective spindles due to irregularities of the surface of the pipe and obstructions thereon so that they will effectively penetrate matter adhering to the surface of the pipe and will follow the contour of the pipe and will very effectively remove a large portion of the coating on the pipe which they encounter.

As indicated in Figure 1 the bracket 25 is formed of two similar sections whose adjacent ends are outwardly turned and bolted together by means of the bolts 42, as shown in Figure 1.

Approximately midway between the front and rear ends of the main frame there is a brush frame which comprises a central circular bracket 43 which is composed of upper and lower arcuate sections which are hinged together at one side by the hinge 44 and which are bolted together at the other side by means of bolts, as 45. This

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bracket is supported on a cross-bar 46 whose ends, in turn, are mounted on the respective bottom side members 5, 5. The brush frame also includes the end rings 47, 47 which are also formed of sections hinged together at one side by the hinges 48, 48 and which are secured together at the other side by means of suitable bolts, as 49.

The end rings 47 are supported by the corresponding bars 50, 50 whose ends are mounted on the respective bottom side members 5, 5.

Mounted in the brush frame on each side of the central bracket 43 there are the rotatable brushes designated generally by the numeral 51.

As will be noted from an inspection of Figures 1 and 2 there are the front and rear series of brushes. The front series rotate in one direction and the rear series rotate in the other direction. Some of the brushes are not shown in Figure 1 for the sake of clearness but the brushes of the respective series are mounted in adjacent relation and completely surround the pipe 10, as indicated in dotted lines in Figure 11.

These brushes are mounted on similar shafts as 52, as more clearly indicated in Figure 3. There are the series of circular brushes, as 53, mounted on each shaft in spaced relation and whose hubs are keyed to the corresponding shaft to rotate therewith and the adjacent brushes 53 are maintained in proper spaced relation by the spacers 54 between them on the shaft 52. Furthermore it will be noted that the brushes 53 of one shaft are staggered in relation to corresponding brushes of the adjacent shafts. This is indicated more clearly in Figures 1 and 2; also the brushes may be set slightly diagonally, relative to the axis of the pipe to more adequately contact with the entire area of the pipe as the machine moves along the pipe.

The outer end of each shaft 52 is fitted into a bearing, as 55, carried by the adjacent end ring 47 of the brush frame and secured to the inner side of said frame there is a bearing assembly 56 with which a bearing 57 has a universal connection. This bearing 57 is clamped to the shaft 52 by a clamp screw 58.

The other end of each shaft 52 projects through a corresponding side flange 43a of the circular bracket 43 and terminates in the polygonal end 59 onto which the driving gear 60 is fitted. This gear is in mesh with, and driven by, a larger spur gear 61 which is mounted to rotate on a spindle 62 which is anchored to the adjacent flange 43a as shown in Figure 10. The inner end of the spindle 62 is formed with an enlarged head 63 and its outer end is threaded through the adjacent flange 43a and a securing nut 64 is screwed onto said threaded end.

The spur gear 60 has an inwardly extended hub 65 whose inner end is reduced and formed into a spindle 66.

There is a yoke 67 having end bearings, one to receive the spindle 62 and the other to receive the spindle 66. This yoke is maintained in place by the head 63 of one spindle and by the retaining washer 68 fitted onto the other spindle and maintained thereon in any suitable manner as by a cotter key 69.

The arrangement above described has been designed for the easy removal and replacement of any series of brushes. For example, should it be desired to remove a series of brushes the corresponding clamp screw 58 may be loosened and the shaft 52 then moved endwise through the bearing 55 so as to cause the opposite end of the shaft to clear the corresponding flange

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43a. When the shaft has cleared said flange it may then be swung on its universal bearing 57 into such position that the end of the shaft in the bearing 55 may be readily removed and a new series of brushes may be installed by reversing said procedure last above described. The bristles of the brushes may be formed of any desired material preferably of small steel wire maintained on suitable spool shaped hubs, as 53, shown in Figure 3. The brushes are rotated by means of sprocket chains such as 73, 73a. These sprocket chains operate around, and are in mesh with, sprocket wheels as 71b, which, in the present illustration, are formed integrally with the inwardly extended hubs of the gears 61. This is best illustrated in Figures 10 and 11.

It is to be here noted that there are two sprocket chains 70, 70a one at each side of the brush frame.

These sprocket chains 70, 70a are driven by corresponding sprocket chains 71, 71a. These sprocket chains 71, 71a operate over the lower sprocket wheels 72, 72a which are fixed on an extended inner end of the hubs of corresponding gears 61, said sprocket chains 71, 71a operating through suitable aligned openings, as 73, 73a provided in the bracket 43 and the platform 23, as shown in Figure 2, and said sprocket chains 71, 71a operate over the corresponding sprocket wheels, as 74, 74a which are fixed on the shafts 75, 75a mounted in suitable bearings on the platform 23 and in operative connection through the intermeshing gears 76, 76a which are fixed on said respective shafts 75, 75a. The shaft 75 is driven from the motor shaft 77 through the sprocket chain 78 which operates over suitable sprocket wheels 79 fixed on the shaft 77 as well as over sprocket wheels 80 fixed on a driving shaft 81. This shaft 81 is connected, through a conventional type of transmission mechanism 82, with the shaft 75 and the sprocket chains 71, 71a may thereby be driven.

The motor shaft 77 is also geared to shaft 20, as shown in Figure 2, to propel the machine along, through the transmission 114 and gearing 115.

Provision has been made for shifting the brushes 51 radially toward and from the pipe 10 to vary the abrasive effect of the brushes on the pipe.

In order to accomplish this there are the oscillatable rings 83, 83 mounted within the flanges 43a, 43a of the bracket 43 and mounted within the end rings 47 of the brush frame there are the oscillatable rings 84, 84. Associated with each brush there are the radial links 85 pivotally connected at their outer ends to the corresponding ring 83 and whose inner ends have bearings on the corresponding brush shafts 52. The rings 84 are associated with the outer ends of the respective series of brush shafts and have the spaced external lugs 86 fixed thereon. The outer end bearing assemblies of the shafts 52, shown in Figure 3, are mounted on the corresponding end rings 47, to pivot on the pivots 87 and opposite said pivots are provided with notches 88 into which said lugs 86 project. Consequently as the ring 84 is turned about its axis the bearings and the corresponding outer ends of the shafts 52 will be moved radially.

There are the shafts 89, 89 mounted to rotate on the brush frame. These shafts are oscillatable by means of the levers 90, 90 which are fixed to said shafts.

These shafts 89 are also connected to the rings

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83 by means of the rigid arms 91, 91 and to the rings 84 by the rigid arms 92, 92. When a lever 90 is manipulated in one direction it will operate through the corresponding arm 91 to shift the ring 83 in one direction and through its arm 92 to also shift the ring 84 in a corresponding direction and as these rings are shifted the corresponding inner and outer ends of the shafts 52 will be correspondingly moved radially, the inner end of each shaft 52 moving along the slot 93 of the adjacent flange 43a and the outer ends of said shafts 52 will be moved radially by the lugs 86 operating in the notches 88 of the bearing assemblies 56. The gears 60 will remain in mesh with corresponding gearing 61 during this radial movement of the brushes. Only one of the slots 93 is shown in Figure 11 for the sake of illustration but there is a similar slot through which the inner end of each of the shafts 52 extends.

Mounted in the rear of the framework there is a rotatable ring 94 very similar to the front rotatable ring 24 and mounted to rotate in a surrounding circular bracket 95 which is suitably fixed within the rear end of the frame and which is supported on a transverse bar 96. The ring 94 is formed with annular external sprocket teeth 97, 98 on opposite sides of the bracket 95 and sprocket teeth are aligned with corresponding small sprocket wheels 99 and 100 which are fixed on a longitudinal shaft 101 which is mounted in suitable bearings on the platform 23. This shaft 101 is driven by a shaft 102, said shafts being operatively connected through a conventional transmission gearing 103. Fixed on the shaft 102 there is a sprocket wheel 104 over which operates a sprocket chain 105 to drive said shaft 102. This sprocket chain 105 is driven from the shaft 33.

Operating over the sprocket wheels 97, 99 there is a sprocket chain 106 and operating over the sprocket wheels 98, 100 there is a sprocket chain 107. These sprocket chains drive the sprocket wheels 97, 98 from the shaft 101.

Fixed on the rear side of the ring 94 there is an annular anchor 97a and extending rearwardly therefrom there are the spaced brackets 108. These brackets are spaced a selected distance apart entirely around said ring 94 and they carry brushes 109 for a purpose to be hereinafter stated.

Fixed on the forward side of the ring 94 there is an annular anchor 98a. Fastened to the forward side of anchor 98a are the arcuate, flexible wipers 110 which are oppositely disposed. They are connected to suitably opposed anchor posts 111, 111, carried by the anchor 98a, by means of coil springs 112 or other suitable elastic tie members.

A suitable liquid coating material may be fed onto the upper side of the cleaned pipe through a spigot 113 which may be connected into a suitable container (not shown) for said coating liquid and as it is fed onto the pipe it will be distributed about the pipe by the wipers 110 and the brushes 109 following said wipers will complete the coating-distributing operation so that the coating material will be distributed uniformly about the cleansed pipe. The pipe will then be ready to receive the wrapping material which completes the operation and prepares the pipe for burial underneath the surface of the earth.

A preferred form of the invention has been shown and described by way of illustration only and not by way of limitation, while the broad

principle of the invention will be defined by the appended claims.

What I claim is:

1. A pipe reconditioning machine comprising, a framework shaped to receive a pipe there-through, a carriage for supporting the framework on the pipe, a brush frame mounted in and supported by said framework, said brush frame comprising, a central circular bracket and end rings spaced from the bracket, one on each side, series of rotatable brushes on opposite sides of the bracket, said brushes having axial shafts whose remote ends are mounted in bearings carried by and movable radially of the end rings and whose other ends are mounted in bearings carried by and movable radially of the central bracket means carried by the brush frame and operatively connected with said bearings and adapted to move the bearings radially, means carried by the central bracket and operatively connected with the respective series of brush shafts and adapted to rotate said brushes and means for driving said rotating means.

2. In a pipe conditioning machine having a framework shaped to receive a pipe therethrough, a brush frame supported on the framework and adapted to surround the pipe, said brush frame comprising, a circular bracket and end rings arranged one on each side of said bracket, brush shafts whose inner ends are mounted in bearings in the brush frame bracket and whose outer ends have spherical bearing connections with the brush frame rings, said brush shafts being mounted for longitudinal movement in their bearings to facilitate the mounting and demounting of the brushes and releasable means for securing each shaft against such longitudinal movement.

3. In a pipe conditioning machine having a framework shaped to receive a pipe therethrough, a brush frame supported on the framework and adapted to surround the pipe, said brush frame

comprising, a circular bracket and end rings arranged one on each side of said bracket, bearings carried by the brush frame bracket and adjustable radially thereof, brush shafts whose inner ends are mounted in the bearings on the brush frame bracket and whose outer ends have spherical bearing connections with the brush frame rings, said brush shafts being mounted for longitudinal movement in their bearings to facilitate the mounting and demounting of the brushes and releasable means for securing each shaft against such longitudinal movement.

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