June 15, 1926. 1,588,772

C. RORABECK

TUBE CLEANING APPARATUS

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Fig. 2

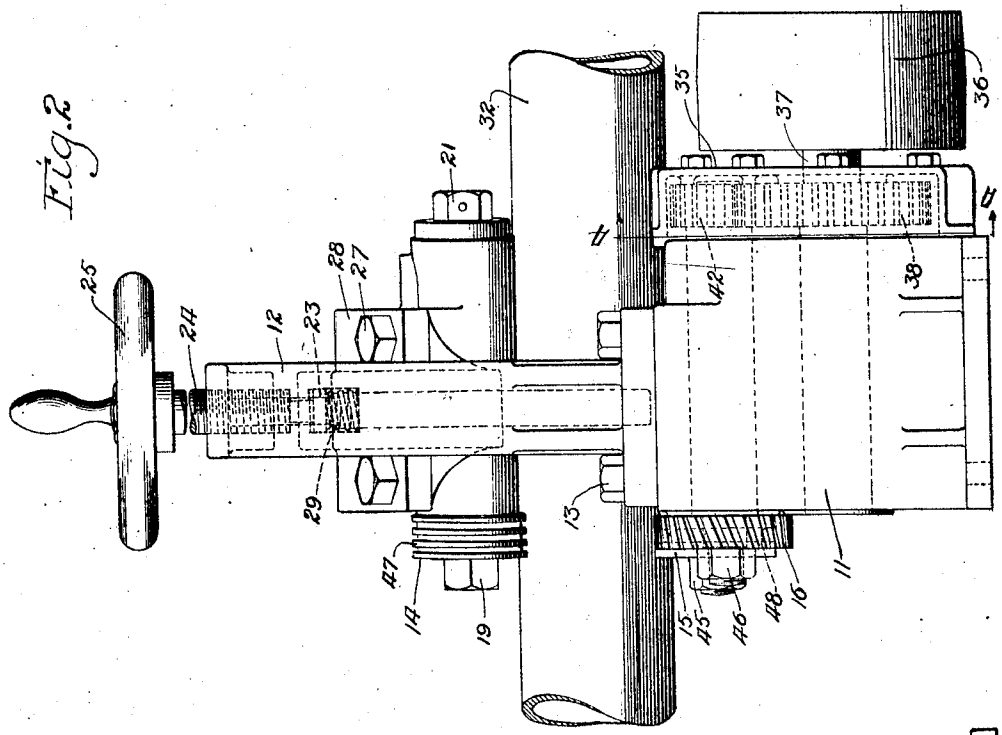
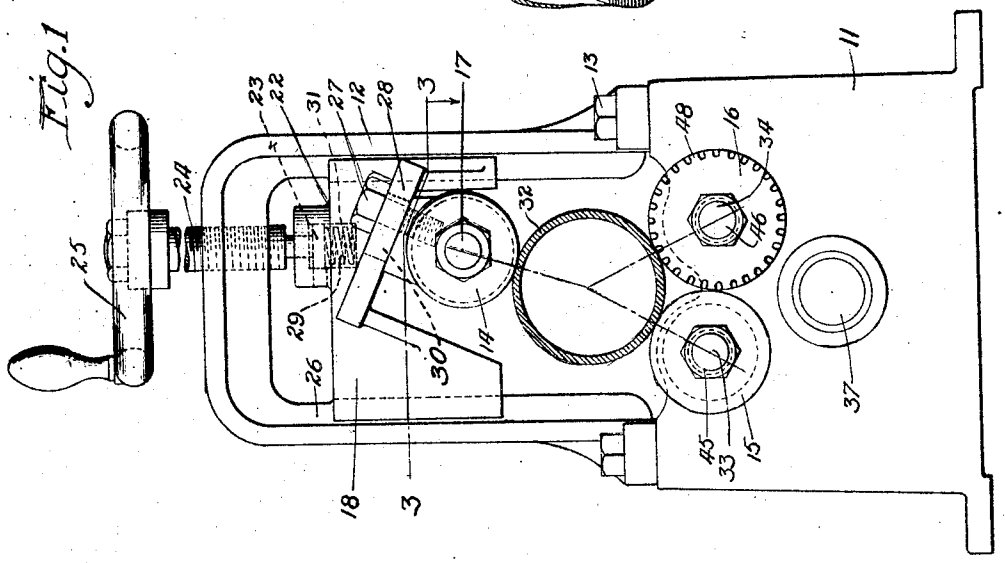


Fig. 1



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Fig. 3

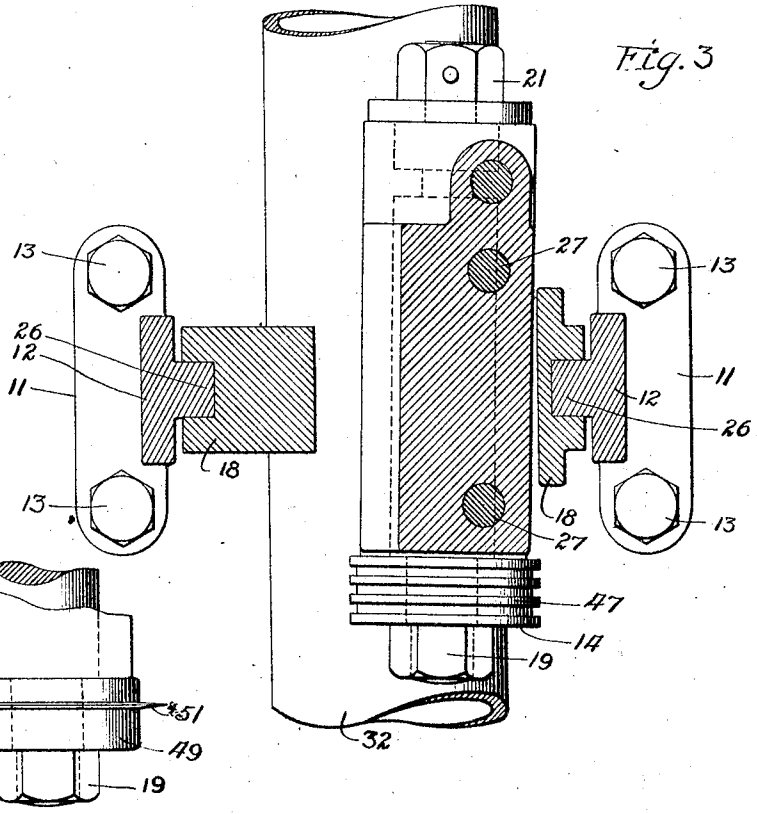
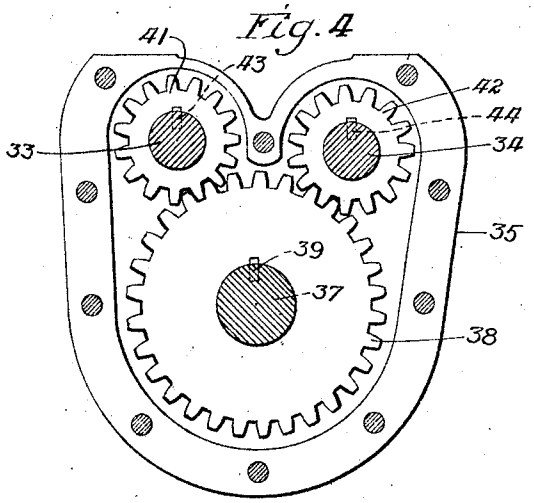


Fig. 5

Fig. 4



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UNITED STATES PATENT OFFICE.

CLAUDE RORABECK, OF CHICAGO HEIGHTS, ILLINOIS, ASSIGNOR TO INLAND ENGINEERING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

TUBE-CLEANING APPARATUS.

Application filed October 21, 1921. Serial No. 509,314.

This invention relates in general to apparatus for cleaning such articles as tubes, pipes, shafts and the like, and has more specific reference to an improved arrangement and action of the rollers by which the articles are cleaned.

A principal object of the invention is the provision of efficient means for exerting variable tractive force upon the tube, or other article, to draw it through the machine without the nicety of adjustment and exact relative size of said rollers, which has been found necessary in other types of machines.

A further object of the invention is the provision, in a tube cleaning machine, of cleaning and polishing rollers of different pressure upon the tube whereby both the removing of the rust or scale and the polishing of the tube may be more efficiently done than has heretofore been found possible.

Another object of the invention is the provision of means for causing one of the rollers to maintain constant operative contact with the surface of the tube, regardless of the irregularities in the contour thereof.

Still another object of the invention is the provision, in tube cleaning apparatus, of two driving rollers having different pressure and action upon the surface of the tube, and being arranged to co-operate with a third driven roller whereby the latter and one of the driving rollers act in advance of the other driving roller to remove substantially all the dirt prior to the action of said last mentioned roller.

Another and highly important object of the invention is the provision of means for misaligning the axis of one or more of the rollers with respect to the axes of the others, for the purpose of exerting tractive force on the tube, and of causing a different action thereon by the roller having the misaligned axis.

Still another object of the invention is the provision of apparatus of this character adapted, by a simple substitution of parts, to be used for cutting the tube to remove defective parts or to provide desired lengths.

Numerous other objects and advantages of the invention will be apparent, as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings,

Figure 1 is an end elevation of an apparatus embodying the principles of my invention;

Fig. 2 is a side elevation thereof;

Fig. 3 is an enlarged section taken substantially on the line 3—3 of Fig. 1;

Fig. 4 is a vertical section taken substantially on the line 4—4 of Fig. 2; and

Fig. 5 is a detail view of a cutting roller adapted to be substituted for one of the rollers shown in Fig. 1.

A preferred form of apparatus, constructed in accordance with my invention, comprises primarily, as shown in the drawings, a supporting frame 11 having a guiding yoke 12 secured thereto by means of bolts 13, and a plurality of rollers 14, 15 and 16 mounted in a manner to be hereinafter described.

The roller 14 is carried on a short shaft 17 having bearings in a journal 18 and is held in place by means of nuts 19 and 21. Extending through and secured in a bearing 22, held in the journal 18, is a screw head 23 carried by a screw shaft 24 threaded through the yoke 12 and operable by means of a hand wheel 25. The journal 18 is slidable on guides 26 in the yoke 12 and is thus adjustable, being carried by the screw head 23. Screws 27, extending through a crosshead 28, bear upon the shaft 17, and adjustment of these screws accurately controls the position of the shaft which forms the axis of the roller 14.

It will be noted by reference to Figs. 1 and 2 that I have provided a spring 29, positioned in a recess 31 in the journal 18 and under compression of the screw head 23. The purpose of this spring is to cause constant tension upon the roller 14, so that the latter will continuously maintain its contact with the tube 32. It will be understood, however, that for certain purposes it may be desirable to omit the spring 29 and that this might be done without in any way interfering with the operativeness of the apparatus, since sufficient clearance is provided to permit the screwhead 23 to bear directly upon the crosshead 28.

The rollers 15 and 16 are positioned beneath the roller 14 and in such relative arrangement with respect thereto that the

tube 32 may be received between the three rollers and operated upon in a manner to be hereinafter described. Said rollers 15 and 16 are carried on shafts 33 and 34 journaled in a journal box 35 in the lower part of the frame, and are both driving rollers, being rotated in a manner which may be readily understood by reference to Figs. 2 and 4. A pulley 36 is carried on a stub shaft 37 having bearings in the lower part of the journal box 35, and this shaft 37 carries also a large spur gear 38. The pulley 36 is connected with a suitable source of power, and rotation of the gear 38 which is keyed at 39 onto the shaft 37, rotates also pinions 41 and 42 keyed at 43 and 44 onto the roller shafts 33 and 34. The rollers 15 and 16 are secured on the shafts 33 and 34 and held in place by nuts 45 and 46 and are rotated through the mechanism just described to act upon the tube 32. The resulting effect upon the tube will be understood from a consideration of the construction and relative arrangement of the rollers.

Referring to Fig. 1, attention is called to the fact that the rollers 14 and 15 are arranged on a more direct line with respect to the center of the tube 32 than are the rollers 14 and 16. This results in a greater rolling pressure between the rollers 14 and 15 and a lighter pressure upon the roller 16. The rollers 14 and 15 are grooved to provide flanges 47, of which there are preferably at least four in number. These rollers are positioned slightly in advance of the roller 16 and remove the principal part of the dirt, rust or scale from the surface of the tube prior to the action of the roller 16 thereon. The roller 16 is provided with helical teeth 48 and is not grooved as are the other rollers. The teeth 48 have a polishing effect on the tube and it will be observed that this roller 16 is of larger diameter than the others, thereby giving a different surface speed.

In order to cause the tube to travel through the apparatus, I prefer to arrange at least one of the rollers in non-parallel relation whereby a tractive force is exerted upon the tube. This is accomplished by means of adjustment of the screws 27, and it will be apparent that the horizontal position of the roller 14 may be varied to provide for any desired speed of travel of the tube. This may be readily done by loosening said screws and retightening them upon the shaft after the latter has been moved to its adjusted position, slots 30 being provided in the part 28 of the journal box 18 to permit this adjustment. The roller having the misaligned axis is also caused to have a different action upon the tube surface, the tilted position causing the flanges 47 to perform a polishing operation. The head 28 is angularly arranged and movement of the shaft axis with the head angularity preserves the active element of the roller in contact with the tube 32.

It frequently becomes desirable in operating upon tubes and other articles, which my apparatus is designed to treat, to cut said articles into predetermined lengths or to remove defective portions thereof. For this purpose I provide a cutting roller 49 having a thin blade 51 of extremely hard material, this roller being capable of substitution for one of the other rollers in a manner which will be readily understood. It will be realized, of course, that for a cutting operation the various rollers must be arranged in parallelism to hold the tube in stationary position.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. Tube cleaning apparatus, comprising, in combination, two driving rollers and one driven roller relatively mounted to receive between them and operate on a tube to be cleaned, one of said driving rollers being adapted for polishing and having less pressure thereon than is exerted on said other rollers.

2. Tube cleaning apparatus, comprising, in combination, an adjustable driven roller, a driving roller and a driving, polishing roller, said rollers being relatively arranged to receive and pass a tube for cleaning therebetween and a greater rolling pressure being exerted on said tube between said driving and driven rollers than between said driving, polishing and driven rollers.

3. Tube cleaning apparatus, comprising, in combination, a driven roller and two driving rollers adapted to receive a tube for cleaning therebetween, one of said driving rollers being constructed to have a polishing action on said tube and having an axis at a less angle with respect to a line between the center of said tube and the axis of said driven roller than the angle between said line and the axis of said other driving roller.

4. Tube cleaning apparatus, comprising, in combination, a driven roller, a driving roller opposed thereto and a polishing roller arranged at a sufficient angle with respect to the line between said driven and driving rollers to cause less pressure thereon by a tube positioned between said rollers than is exerted on said driving roller.

5. Tube cleaning apparatus, comprising, in combination, an adjustable driven roller, a driving roller, a driving polishing roller,

said rollers being arranged to receive and rotate a tube for cleaning therebetween, and means for varying the relative pressure of said tube upon said driving roller and said driving, polishing roller.

6. Tube cleaning apparatus, comprising a plurality of rollers that act on the tube, one of said rollers being adjustable to alter the angular relation between its axis and the axes of other rollers, a bearing for said tube, said bearing and adjustment being adapted to preserve the operative element of the roller in contact with the tube.

7. A machine for cleaning tubes and the like, comprising, in combination, a driving roller, a driven roller, a driving polishing roller arranged to receve and rotate a tube between them to remove scale or rust from the surface thereof, and means for adjusting said driven roller to misalign the axis thereof with respect to the axes of the other rollers to exert a tractive force upon the tube.

8. A machine for cleaning tubes and the like, comprising, in combination, a driving roller, a driven roller, a driving polishing roller arranged to receive and rotate a tube between them to remove scale or rust from the surface thereof, and means for adjusting said driven roller to misalign the axis thereof with respect to the axes of the other rollers to exert a tractive force upon the tube, said driving and driven rollers having cleaning flanges thereon.

9. A machine for cleaning tubes and the like, comprising, in combination, a driving roller, a driven roller, a driving polishing roller arranged to receive and rotate a tube between them to remove scale or rust from the surface thereof, and means for adjusting said driven roller to misalign the axis thereof with respect to the axes of the other rollers to exert a tractive force upon the tube, said driving and driven rollers having circumferential cleaning flanges thereon.

10. A machine for cleaning tubes and the like, comprising, in combination, a driving roller, a driven roller, a driving polishing roller arranged to receive and rotate a tube between them to remove scale or rust from the surface thereof, and means for adjusting said driven roller to misalign the axis thereof with respect to the axes of the other rollers to exert a tractive force upon the tube, said driving and driven rollers having four or more circumferential cleaning flanges thereon.

11. A machine for cleaning tubes and the like, comprising, in combination, a driving roller, a driven roller, a driving polishing roller arranged to receive and rotate a tube between them to remove scale or rust from the surface thereof, and means for adjusting said driven roller to misalign the axis thereof with respect to the axes of the other rollers to exert a tractive force upon the tube, said driving and driven rollers having circumferential cleaning flanges thereon and said driving polishing roller having helical teeth thereon.

12. A machine for cleaning tubes and the like, comprising, in combination, two driving rollers adapted to support a tube to be cleaned thereon, one of said rollers having a polishing surface, a driven roller disposed above said driving rollers and adapted to exert pressure upon the tube to rotate the same between the rollers to effect a cleaning and polishing action thereon, and means for adjusting said upper driven roller to arrange it in non-parallel relation with respect to the other rollers whereby a tractive force is exerted upon the tube as the rollers are rotated to feed it longitudinally.

13. A machine for cleaning tubes and the like, comprising, in combination, two driving rollers adapted to support a tube to be cleaned thereon, one of said rollers having a polishing surface, a driven roller disposed above said driving rollers and adapted to exert pressure upon the tube to rotate the same between the rollers to effect a cleaning and polishing action thereon, and means for adjusting said upper driven roller to arrange it in non-parallel relation with respect to the other rollers whereby a tractive force is exerted upon the tube as the rollers are rotated to feed it longitudinally, said polishing roller being disposed behind said other two rollers.

14. A machine for cleaning tubes and the like, comprising, in combination, two driving rollers adapted to support a tube to be cleaned thereon, one of said rollers having a polishing surface, a driven roller disposed above said driving rollers and adapted to exert pressure upon the tube to rotate the same between the rollers to effect a cleaning and polishing action thereon, means for adjusting said upper driven roller to arrange it in non-parallel relation with respect to the other rollers whereby a tractive force is exerted upon the tube as the rollers are rotated to feed it longitudinally, and adjustable means including a spring for maintaining predetermined yielding pressure upon the tube.

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