Aug. 12, 1947. A. M. HILL ET AL 2,425,373

METHOD AND APPARATUS FOR SALVAGING PIPE LINES

Filed April 30, 1943 2 Sheets-Sheet 1

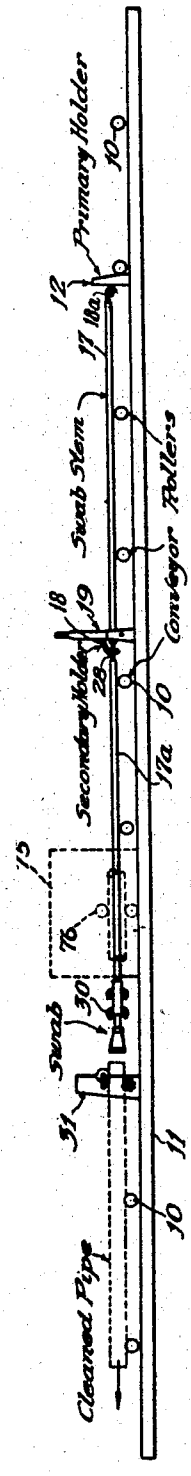


Fig. 1.

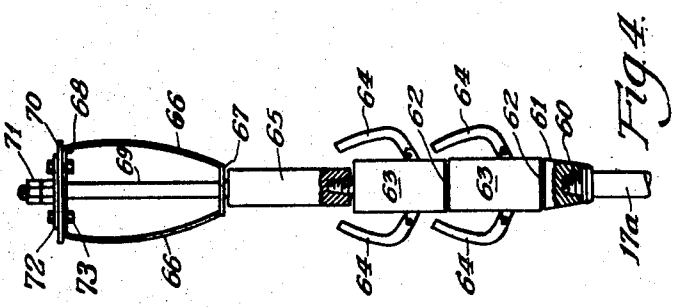


Fig. 4.

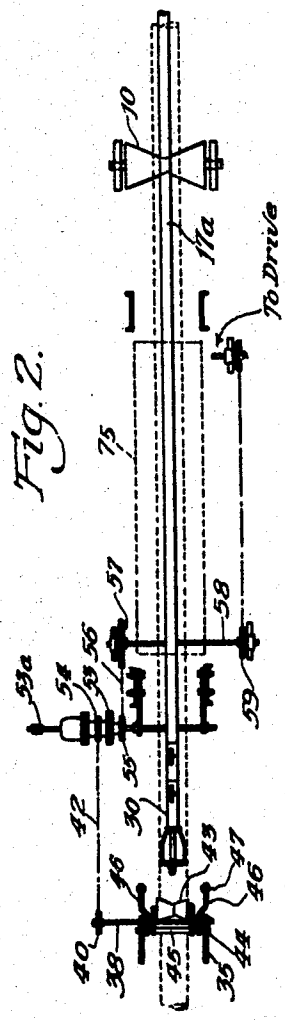


Fig. 2.

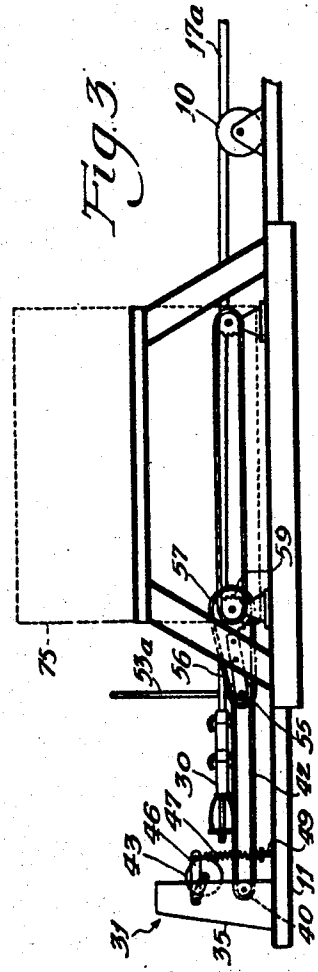


Fig. 3.

Inventors:
Arthur M. Hill
Edward J. Miller
Eugene G. Baker
By: Ernest A. Johnson
Attorney.

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METHOD AND APPARATUS FOR SALVAGING PIPE LINES

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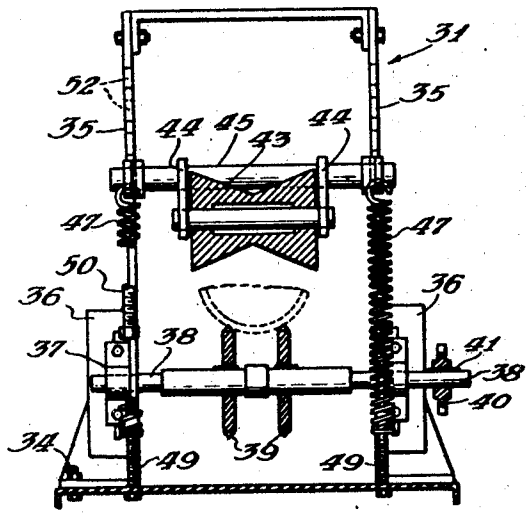


Fig. 5.

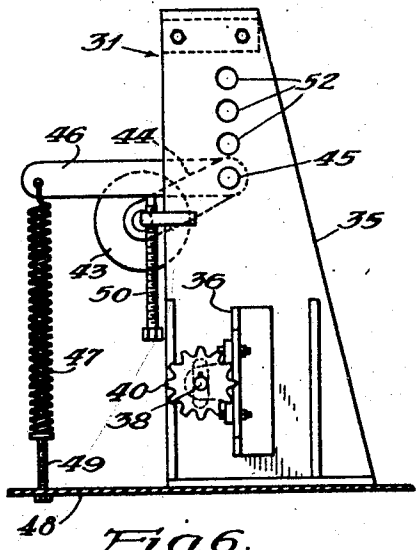


Fig. 6.

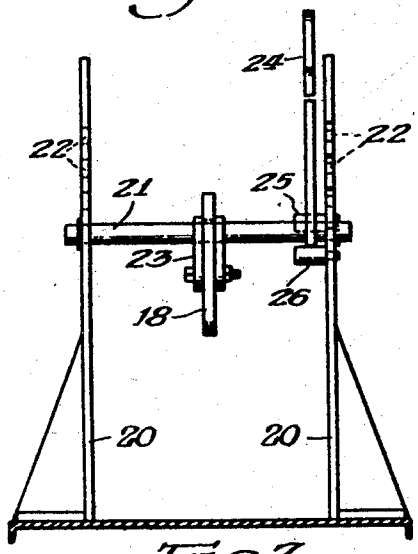


Fig. 7.

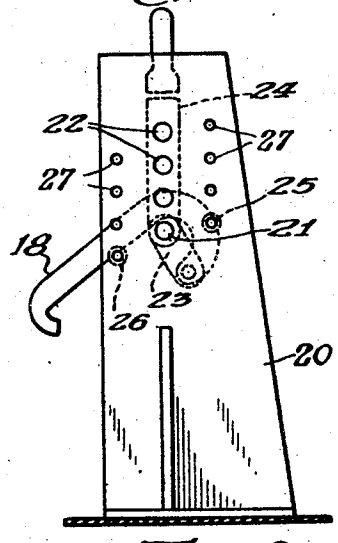


Fig. 8.

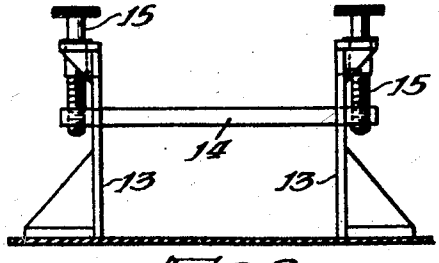


Fig. 9.

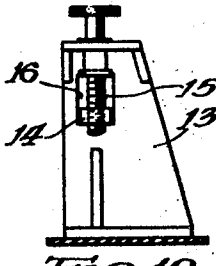


Fig. 10.

Inventors:
Arthur M. Hill
Edward J. Miller
Eugene G. Baker
By: Ernest A. Johnson
Attorney

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2,425,373

METHOD AND APPARATUS FOR SALVAGING PIPE LINES

Arthur M. Hill, Edward J. Miller, and Eugene G. Baker, Tulsa, Okla., assignors to Stanolind Pipe Line Company, Tulsa, Okla., a corporation of Maine

Application April 30, 1943, Serial No. 485,260

11 Claims. (Cl. 134—8)

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Our invention relates to an improvement in devices for salvaging pipe and more particularly pertains to apparatus of the type wherein sections of the pipe are fed longitudinally through the apparatus. More specifically our invention relates to a method and apparatus for mechanically swabbing and externally cleaning a pipe.

It is an object of the invention to provide method and means for mechanically swabbing sections of salvaged pipe. It is a further object to provide a swabbing device in connection with a cleaning apparatus of this type wherein the swab is stationary and means are associated therewith for moving the pipe longitudinally thereover. A further object is to provide a means for continuously swabbing a plurality of separate pipe sections. Another object is to provide means for the removal of the swabbed accumulations after swabbing each pipe. These and other objects of our invention will become apparent as the description thereof proceeds.

The invention resides particularly in the construction and arrangement of the mechanical elements making up the apparatus whereby pipe is salvaged by cleaning the exterior and swabbing the interior in one operation. We will describe our invention more or less in detail by reference to the drawings wherein:

Figure 1 is a diagrammatic representation of our pipe swabbing assembly;

Figure 2 is a top plan view of our improved swabbing device;

Figure 3 is an elevation of the apparatus illustrated in Figure 2;

Figure 4 is a view diagrammatically illustrating details of the swab;

Figure 5 is an elevation partly in section illustrating one embodiment of the mechanism for moving the pipe off the swab;

Figure 6 is an elevation of the mechanism in Figure 5 illustrating one means of adjusting the compression roller;

Figures 7 and 8 are elevations of a secondary swab stem holder; and

Figures 9 and 10 are elevations of the primary swab stem holder.

The embodiment of our invention illustrated in the drawings comprises conveyor rollers 10 mounted on a frame member 11, the frame member supporting the other elements of our apparatus as described hereinafter. A primary swab stem holder 12 is mounted on member 11 as illustrated diagrammatically in Figure 1. Details of holder 12 are shown in Figures 9 and 10. The holder comprises a pair of braces 13 adapted to adjustably support anchor bar 14 which is drilled and tapped at points near its ends to receive the adjusting bolts 15. The braces 13 are provided with slots 16 to permit the upward and downward adjustment of the bar 14. Normally the primary

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swab stem 17 and the secondary swab stem 17*a* are linked or coupled together and are secured either by primary holder 12 or secondary holder 19. When the holder 19 is applied the primary swab stem 17 is backed away so that end hook 18*a* can be lifted off anchor bar 14. Thus in starting a section of pipe through the apparatus, the secondary swab stem 17*a* is secured by holder 19, the primary swab stem 17 is released from the holder 12 and the pipe is passed longitudinally over the primary swab stem 17. The swab stem 17 is then resecured by fastening the hook 18*a* over the bar 14 of holder 12 and holder 19 is released.

The details of the secondary swab stem holder 19 are shown in Figures 7 and 8. The supports 20 are rigidly fastened to the frame members 11 and rotatably support between them a shaft 21 in holes 22 provided in the supporting plates 20 for that purpose. A plurality of holes 22 are provided to permit adjustment of the height of the holder so as to accommodate different sizes of pipe. A forged steel hook 18 is linked to hook arm 23 fixed to the center of shaft 21 and an operating lever 24 engages the shaft 21 near one end. Suitable stop numbers 25 and 26 are provided to limit the throw of the lever 24. These stop members likewise are adjustably fastened to plate 20 by means of selected pairs of holes 27.

The secondary swab stem holder 19 is released by operating the lever 24 to lift the hook 18 from the eye 28 in the secondary swab stem 17*a*. When the hook 18 is in this raised position, the pipe is free to roll along rollers 10 on to the secondary swab stem 17*a* which carries the swab 30. During this operation the swab stem 17 is secured by the primary swab stem holder 12. After the pipe has completely passed the secondary holder 19 the secondary swab stem 17*a* can again be secured by hook 18 and eye 28 and the primary holder 12 is released to permit another pipe section's passing longitudinally over the leading end of swab stem 17 and the procedure related above repeated.

The pipe which is longitudinally disposed about the swab stem 17*a* passes through the external cleaning zone and over the swab 30. The drive provided by the external cleaning machine, such as by traction means associated therewith or by the action of the cleaning brushes themselves continues to force the pipe over the swab and on to the tractor mechanism 31 diagrammatically represented in Figure 1. The drive provided prior to the swab is diagrammatically illustrated by element 76 in Figure 1. Thus, for example, simultaneously a cleaned and swabbed portion of the pipe will be entering mechanism 31, another portion being swabbed, and another portion being cleaned externally.

Details of the tractor mechanism 31 for drawing the cleaned and swabbed pipe from the appa-

ratus and on to the conveyor rollers 10 are shown in Figures 5 and 6. Mechanism 31 includes side members 35 which are fixed to the conveyor frame 11, for example, as by means of bolts 34. Bearings 37 are mounted within bearing holders 36 and support between them driven shaft 38 having tractor wheels 39. One end of the shaft 38 is provided with a sprocket 40 held in place by key 41. This sprocket is driven as, for example, by chain 42 in a manner described in connection with Figures 2 and 3. An adjustable idling compression roller 43 is mounted to cooperate with tractor wheels 39. This compression roller 43 is supported by arms 44 rigidly fixed to the shaft 45 extending between the side members 35. Spring arms 46 are rigidly attached to the shaft 45 in such a manner that the supporting arms 44, the shaft 45 and the spring arms 46 comprise a modified bell crank. A pair of tension springs 47 are adjustably secured between the ends of the spring arms 46 and a conveyor brace 48 by adjusting the bolts 49. Adjustable stop members comprising bolts 50 are carried by the side members 35 for the purpose of limiting the downward movement of the compression roller 43, as for example, when the pipe is out of the path of movement of the roller. The idling compression roller assembly just described is adjustably mounted on the side members 35 to provide for the passage of pipes of different diameter. Spaced holes 52 are provided for this purpose. It will be apparent that bolts 49 and 50 also can be adjusted to compensate for the higher or lower mounting of the compression roller assembly on shaft 45.

Normally the tractor wheels 39 and compression roller 43 will idle. Alternatively the tractor wheels 39 will be driven through shaft 38 and sprocket 40 at a speed necessary to move the pipe thereover at the same rate as it is passing through the external cleaning zone. It is desirable, however, that when the section of pipe has left the external cleaning zone and is about to be withdrawn from the swab 30 that the pipe travel faster than it did previously thereby leaving a gap between its trailing end and the leading end of the following pipe. This gap permits the removal of the swabbed accumulations from the swab 30. This increase in speed is accomplished by providing a clutch assembly 53 and the associated sprockets and chains.

A single prime mover diagrammatically illustrated by 75 in Figs. 1, 2 and 3 can supply the drive for both the traction means diagrammatically illustrated at 76 in Figure 1 and for the tractor mechanism 34 and can be applied at any suitable point. Thus the drive transmitted through clutch assembly 53, sprocket 54, chain 42 and sprocket 40 to tractor rolls 39 can be applied to the clutch assembly 53 by sprocket 55, chain 56, sprocket 57, shaft 58, sprocket 59, etc. Sprocket ratios can be varied as is well known in the art to attain the desired rate of pipe removal. The operator by means of clutch lever 53a can control the speed of the tractor wheels 39 with the result that the cleaned pipe is withdrawn more rapidly than the following section of pipe, leaving a gap between the two sections through which the swabbed accumulations may fall. The cleaned section of pipe then passes on to the conveyor rollers and is free to roll from the conveyor on to the pipe rack.

Referring to the details of the swab 30 shown in Figure 4 the swab stem 17a is provided with a threaded portion 60 for engaging the swab. A tapered sleeve 61 is welded to one end of a rod

62 about which is placed a plurality of sleeves 63 carrying spring-loaded scraper knives 64. The spring loading of the scraper knives can be adjusted by suitable set screws. The sleeves 63 are free to rotate about the rod 62 and are replaceable by other sleeves having larger or smaller scraper knives when cleaning pipe of different diameter. A spacer bar 65 is threaded to the end of shaft 62 and can be provided with suitable means, such as a cotter pin for securing the parts in their threaded positions. The swabbing element 30 comprises the scraper knives 64 which loosen the material and a resilient plate or disc 70 of a self-sustaining but flexible material which fits the pipe tightly and scrapes the accumulations out of the pipe. Between the scraper knives 64 and the disc 70 a resilient centering means is provided to position the swab 30 within the pipe. The centering means comprises a plurality of spring steel bands 66 welded to plates 67 and 68 which are removably fixed about the rod 69 which is illustrated as being integral with the spacer bar 65. Ordinarily about three bands 66 are satisfactory. The diameter of the centering means can be adjusted by the relative spacing of the plates 67 and 68 so that a circle circumscribing the steel bands in their normal position would have a diameter slightly greater than that of the pipe. The function of the spring steel bands 66 is to center the swabbing element 70 whereby its entrance into the pipe is facilitated. The swabbing disc 70 is held in place between element 68 and retaining means 72 by means of bolts 73. The retaining nuts 71 are provided to secure the assembly about the rod 69.

Although we have described certain embodiments of our invention more or less in detail, it should be understood that this is by way of illustration only and not by way of limitation. It is contemplated that various equivalents functioning in the manner of the structures described herein can be used without departing from the spirit of our invention. We do not intend therefore to be limited to the particular construction of the elements except as defined by the claims.

We claim:

1. A pipe swabbing apparatus comprising a guide stem, means for anchoring one end of said stem, a swab stem flexibly linked to the other end of said guide stem in substantial axial alignment therewith, means for independently anchoring said swab stem, roller means disposed below said guide stem for conveying the pipe sections longitudinally along said guide stem, swab means fixed to the free end of said swab stem, a first traction means for urging a conduit longitudinally over said swab stem, and a second traction means for withdrawing the pipe from said swab at a relatively high rate.

2. A pipe swabbing apparatus comprising a primary swab stem and a secondary swab stem in substantial axial alignment, link means for flexibly coupling said swab stems, hook means on the free end of said primary stem, an anchor bar adapted to cooperate with said hook to oppose longitudinal movement of said stems, a pipe swab fixed to the free end of the secondary stem, an eye in the secondary stem adjacent the said link means, a secondary swab stem holder adapted to cooperate with said eye independently to oppose the longitudinal movement of the secondary stem, impelling means disposed between said secondary swab stem holder and said pipe swab adapted to engage the outer surface of a pipe and thereby urge the pipe longitudinally onto said pipe swab,

and a second impelling means adapted to engage the outer surface of said pipe and to accelerate the withdrawal of the pipe from the swab.

3. An apparatus for internally swabbing a conduit comprising in combination a floating swab stem adapted to be anchored at one end, movable means for anchoring the one end of said stem, swab means fixed to the free end of said stem and adapted to pass within the conduit in contact with the inner surface, roller means for supporting the conduit aligned with said swab stem and said swab means, traction means for threading the supported conduit longitudinally along said swab stem and onto said swab means, and a second traction means for independently drawing the conduit over the said swab means.

4. An apparatus for swabbing the interior and for cleaning the exterior of an elongated conduit, said apparatus comprising roller means for supporting the conduit in a substantially horizontal position, means for cleaning the exterior of said conduit which means performs the added function of urging said conduit over said roller support means, a swab stem passing through said exterior cleaning means, and being anchored at one end, and an internal swabbing means fixed to the free end of said swab stem, said swabbing means being adapted to engage the internal surface of the conduit to be swabbed whereby the exterior cleaning means urges the conduit over the swabbing means and progressive increments of the conduit length are swabbed.

5. An apparatus for swabbing pipe comprising a swab stem, roller means for guiding a pipe section over said swab stem, swabbing means fixed to one end of said swab stem, a first anchor means for resisting the tendency of the swab to travel with the pipe to be cleaned, said anchor means engaging the swab stem at a distance from the swab at least equivalent to the length of the conduit being swabbed, exterior traction means adapted for urging the pipe along the swab stem and over the swabbing means, substantially coaxial means extending from said swab stem for guiding separate sections of pipe onto the said stem, said guiding means comprising an extension of said stem and having an anchor engaging means at one end, and a second anchor means for engaging said guide means to permit transfer of a pipe section from said guide means onto said swab stem.

6. In the method of salvaging pipe line sections, the steps which comprise subjecting a pipe section to an external cleaning operation, progressively ejecting the pipe section from the external cleaning operation, employing the forward motion of the pipe section for passing the pipe section into an internal swabbing zone, and removing the pipe section from the swabbing zone at a higher rate than at which it entered the swabbing zone, said removal being effected by applying an independent traction force to the pipe.

7. The method of successively swabbing a plurality of pipe sections which comprises introducing a pipe section into an internal swabbing zone at a given rate, effecting the swabbing of the trailing end of the pipe section at a higher rate than the leading end, and removing the swabbed material from the swabbing zone before the next succeeding section of pipe enters the swabbing zone.

8. An apparatus for internally swabbing pipe comprising an elongated swab stem, a swab means fixed to one end of said stem, a single retractable means for engaging said stem at a point remote from said swab means, roller means below said stem for supporting said pipe about said stem and swab, an impelling means for urging the pipe longitudinally over said swab stem and swab, and a second impelling means for independently drawing the trailing end of said pipe over said swab at a relatively higher rate than said leading end.

9. An apparatus for internally swabbing and externally cleaning used pipe comprising an elongated swab stem, a swab means fixed to one end of said stem, a retractable means associated with the other end of said stem for retaining said swab and swab stem in a relatively fixed position, said swab stem extending through means for cleaning the exterior of a pipe, roller means below said stem for supporting said pipe about said stem, a traction means juxtapositioned to said exterior means adapted to clean said pipe and to urge the pipe longitudinally over said swab stem and swab, and an independent traction means for drawing the trailing end of said pipe over said swab at a relatively higher rate than said leading end.

10. A pipe swabbing apparatus comprising a primary swab stem and a secondary swab stem in substantially coaxial alignment, a coupling means for said substantially coaxially aligned stems, a pipe swab fixed to the free end of the secondary stem, an anchor means adapted to engage the free end of said primary stem, a secondary stem holder adapted to engage said secondary swab stem, said anchor means and said secondary stem holder being adapted independently and separately to oppose longitudinal movement of the coaxial stems, and impelling means adapted to engage the exterior of a pipe and for urging the pipe longitudinally over said secondary swab stem and swab means.

11. A conduit swabbing apparatus comprising an elongated swab retaining means, a first restraining means for releasably anchoring an intermediate portion of said retaining means to restrain longitudinal movement thereof, a swab means fixed to one end of said retaining means, a second restraining means spaced longitudinally from said first anchor means for releasably anchoring said retaining means to restrain longitudinal movement thereof, said first and second restraining means being spaced from each other a distance at least equal to the length of a conduit, and traction means adapted to urge a conduit over said elongated retaining means and subsequently over said swab.

ARTHUR M. HILL.
EDWARD J. MILLER.
EUGENE G. BAKER.

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