May 8, 1951 L. B. MOON 2,552,339

FLUID PROPELLED PIPE LINE BRUSH

Filed May 31, 1947 2 Sheets-Sheet 1

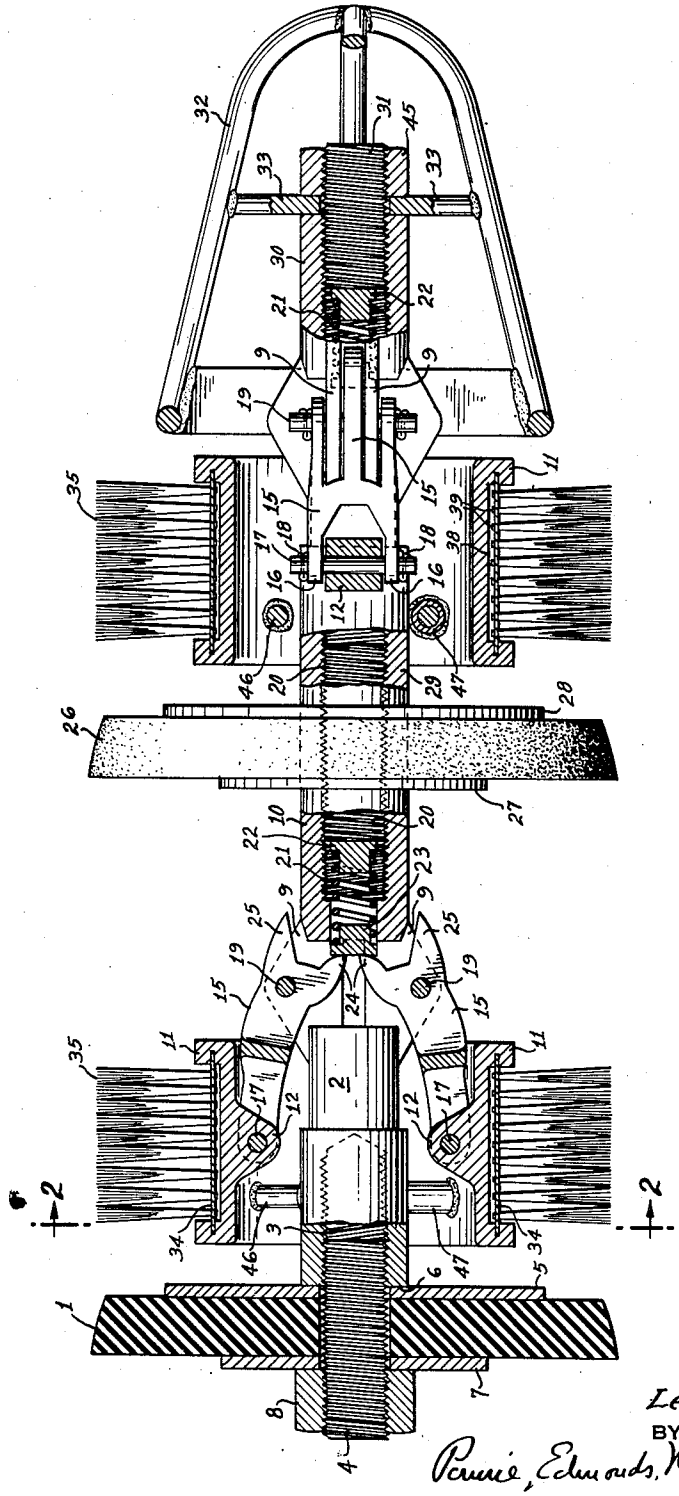


Fig. 1

INVENTOR
Lewis B. Moon
BY
Pennie, Edmonds, Morton & Barrows
ATTORNEYS

May 8, 1951 L. B. MOON 2,552,339

FLUID PROPELLED PIPE LINE BRUSH

Filed May 31, 1947 2 Sheets-Sheet 2

Fig. 2

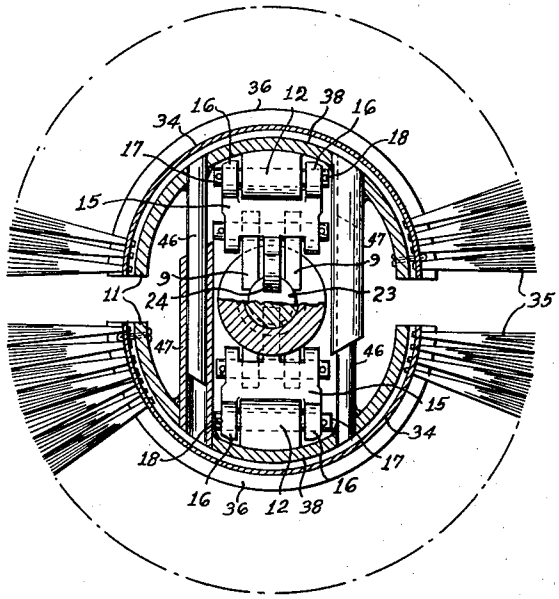


Fig. 3

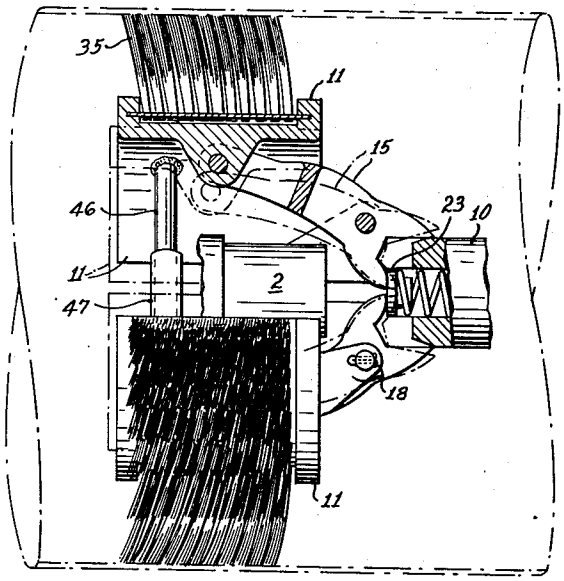
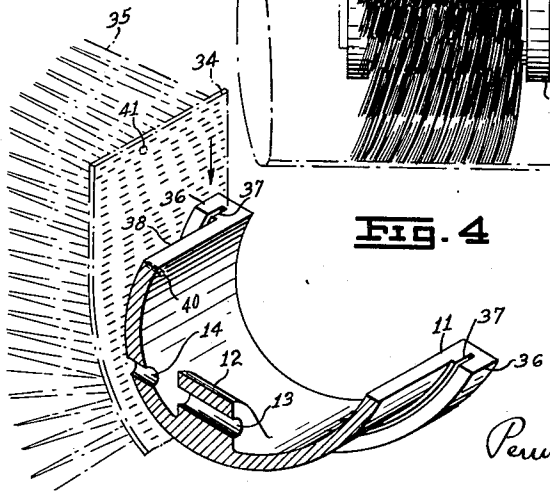


Fig. 4



INVENTOR
Lewis B. Moon
BY
Pennie Edmonds, Morton & Barrows
ATTORNEYS

Patented May 8, 1951

2,552,339

UNITED STATES PATENT OFFICE

2,552,339

FLUID PROPELLED PIPE-LINE BRUSH

Lewis B. Moon, Mechanicsburg, Pa., assignor to Sinclair Refining Company, New York, N. Y., a corporation of Maine

Application May 31, 1947, Serial No. 751,514

1 Claim. (Cl. 15—104.2)

1

This invention relates to an apparatus for cleaning pipes and more particularly to an expanding brush or scraper for cleaning pipe lines.

It has heretofore been the practice to clean the interior of pipe lines through which oil is conveyed by placing a brush of a size equal to the diameter of the pipe in the pipe line and forcing it through the pipe line by the pressure of the fluid which is being pumped through it. The devices heretofore employed for this purpose have not been entirely satisfactory because of their short life. In such devices the bristles have been rigidly attached to the support. As a result, the abrasive action produced when the brush is forced through the pipe line causes rapid wear of the bristles and the devices soon lose their effectiveness.

In the present invention I provide an expanding scraper or brush in which the brushes are hingedly mounted and in which coil springs are employed to exert pressure on them and force them outwardly in contact with the inside of the pipe. Thus, as the bristles wear, the brush supports, and the brushes, move outwardly maintaining contact with the inside of the pipe and resulting in uniform cleaning of the pipe line throughout the section or sections through which the brush or scraper is passed.

An important feature of the invention is the provision of means for regulating the tension of the springs and the consequent pressure of the brush elements against the pipe wall. The degree of friction between the brush and the wall may thus be varied depending upon the condition of the pipe line. Another important feature of the invention is the provision of an expanding brush so constructed that each brush element forms a substantially complete circle and is therefore in contact with the entire inside wall of the pipe line through which the brush or scraper is passed.

In the accompanying drawings I have shown one embodiment of the invention. In this showing:

Fig. 1 is a longitudinal, sectional view;

Fig. 2 is a transverse, sectional view on line 2—2 of Fig. 1;

Fig. 3 is a view partly in elevation and partly in section of one of the brush units in a pipe, the pipe being shown in dotted lines; and

Fig. 4 is a detailed view of one of the brush supports or saddles.

Referring to the drawings, the device generally comprises a central shaft having one or more brush units mounted thereon, the brush units being of a diameter equal to the diameter of the

2

pipe to be scraped and cleaned and having one or more discs of a diameter equal to or slightly greater than the diameter of the pipe, which discs perform the functions of retaining the scraper axially of the pipe and serving as a means against which the fluid in the pipe exerts pressure on the scraper to propel it through the pipe to be cleaned. In actual practice the device is inserted in the pipe line through what is known as a scraper trap and is forced through the line to the next scraper trap where it is taken out, cleaned, inspected and repaired, if necessary. These scraper traps are located at various points in the line, usually at booster stations.

In the illustrated embodiment of the invention, the disc 1 formed of rubber or similar material and of a diameter slightly greater than the diameter of the pipe line to be cleaned, is arranged at one end of the apparatus. As shown, the apparatus includes a central shaft 2 adjacent the disc and this shaft is provided with a central threaded bore 3. A threaded rod 4 is received in the end of the shaft and projects from the end of the shaft. A disc 5 of metal or other suitable material is arranged against the end 6 of the shaft 2. The rubber disc 1 is arranged in contact with it and a second metal disc 7 of smaller diameter is arranged on the opposite side of the rubber disc, the three discs being provided with openings for the passage of the threaded rod 4. A nut 8 is arranged on the projecting end of the threaded rod to retain these parts in assembled position. At the opposite end of the shaft section, two pairs of plates 9 are welded to the shaft section, one pair being arranged on opposite sides of the center, and each pair of plates being parallel to each other. The opposite ends of these plates are welded to a second hollow shaft section 10. The brush elements of one unit are mounted or arranged surrounding the shaft section 2. As shown (see Figs. 2 and 4) each brush section consists of a pair of semi-circular saddles 11 which are hingedly mounted to permit movement toward and away from the inner wall of the pipe line. The inside of each saddle is provided with a lug 12 (see Fig. 4) having an opening 13 extending therethrough and the wall of the saddle is provided with a hole 14 in alignment with this opening. The saddle is supported by a link 15 having a forked end 16 (see Fig. 2) to receive a hinge pin 17. The hinged pin is received in openings in the forks 16 and passes through the opening 13 in the lug 12. In assembling the unit, the pin 17 is inserted through the hole 14 and after it is in posi-

tion, it is retained by means of cotter pins 18 arranged in each end beyond the forked ends of the link. The links are pivotally supported on pivot pins 19 carried by the plates 9.

The hollow section 10 of the central shaft is threaded to receive a rod 20 substantially similar to the rod 4 and a coil spring 21 is arranged in the end of the hollow shaft 10 toward the links 15. As shown, a spring guide or follower 22 is supported on the end of the threaded rod 20 and a similar spring guide or follower 23 is arranged at the end of the shaft adjacent the portions of the links 15 which extend beyond the pivots 19. The ends of the links are provided with toes 24 adapted to be engaged by the follower 23 whereby the links are urged axially of the shaft to move the brush saddles outwardly. The ends of the links are further provided with toes 25 which are adapted to engage the shaft section 10 to limit this outward movement.

A second disc, similar to the disc 1, is supported on the end of the shaft section 10. As shown, disc 26 is arranged between metal discs 27 and 28, similar to the discs 5 and 7, and provided with central openings through which the threaded rod 20 projects. A threaded hollow shaft section 29, generally similar to the hollow shaft sections 2 and 10, is threaded on the projecting portion of the rod 20 and the discs 26, 27 and 28 are clamped between the ends of the shaft sections 10 and 27. A brush or scraper unit, similar to the brush or scraper unit heretofore described, is mounted on the shaft section 29 and as the construction of the parts is the same as that heretofore described, the parts are identified by the same reference numerals and the description will not be repeated. Plates 9, similar to the plates heretofore described, are welded to the shaft section 29 and to a hollow shaft section 30. The hollow shaft section 30 receives a threaded rod 31 by means of which the spring 21 and the spring follower 22 are supported in the manner heretofore described. In Fig. 1 of the drawings the brush section to the right is shown at right angles to the position of the brush section to the left to more clearly illustrate certain features of the construction. A suitable handle 32 may be secured to the end shaft section 30. As shown, the handle member may be provided with radially extending arms 33 forming a spider. The handle is secured to the device by clamping the spider between the end of a shaft section 30 and a nut 45 arranged on the end of rod 3.

To permit replacement of the brush elements when they become worn, I provide a brush consisting of a flexible backing 34, which may be formed of thin sheet metal or the like, and bristles 35. Each end of the saddle 11 is flanged as at 36 and these flanges are provided with grooves 37 to receive the edges of the backing 34 (see Fig. 1). The grooves 37 are spaced outwardly of the outer face 38 of the saddle to provide clearance for the butts 39 of the brush wires when the brush element is inserted in the saddle. Adjacent the end of the saddle, I provide an opening 40 for the reception of a cotter pin to be received in an opening 41 in the backing 34 to retain the brush element in the saddle.

To retain the two semi-circular saddles in alignment, I provide suitable guide means. As shown, each saddle carries a rod 46 extending inwardly, and a sleeve 47 parallel thereto. The rod of one saddle and the sleeve of the other align in a chord of the circle formed by the complete unit. In assembling the brush unit, the rods 46 are inserted in the sleeves 47, and the brush elements are thus guided in the movement resulting from the action of spring 21.

The operation of the device will be apparent from the foregoing description. It is inserted in the pipe line at a scraper trap and is retained in axial alignment by the discs 1 and 26. One of these discs, the one at the back, serves as a means for transmitting force of the fluid under pressure in the pipe line to the scraper to propel it through the pipe line. The brush units are pushed outwardly in all directions against the inside wall of the pipe by the pressure of coil springs 21 on the links 15. By employing brush elements that produce a brush expanding substantially throughout 360° and by exerting pressure to maintain the ends of the brush bristles in contact with the inner wall of the pipe under substantially uniform pressure at all times, the entire interior of the pipe line is cleaned. The pressure exerted on the brush elements can be regulated by adjustment of the threaded rods 20 and 31 permitting the pressure to be increased or decreased, depending upon the condition of the pipe line and the amount of energy necessary to be exerted to clean it. As the bristles wear through abrasion, the brush elements are moved outwardly by the springs so that the ends of the bristles are maintained in contact with the inner wall of the pipe at all times and uniform cleaning is obtained, even after the bristles have worn to a considerable extent. When a brush element becomes too worn for further use, it can be readily replaced by removing the cotter pin from the openings 40 and 41 and a new brush element inserted in the saddle.

I claim:

A brush of circular traverse cross-section comprising a central shaft, a pair of semi-circular saddles surrounding the shaft, brushes arranged in the saddles, links pivoted to said saddles and said shaft, a coil spring carried by the shaft and engaging the links to urge the saddles and brushes outwardly, a rod projecting from each saddle toward the other, and a sleeve carried by each saddle in which the rod of the other saddle is received.

LEWIS B. MOON.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
105,015	Van Slooten et al.	July 5, 1870
152,766	Priest et al.	July 7, 1874
178,007	Hobbs et al.	May 30, 1876
544,908	Clark	Aug. 20, 1895
728,085	Cruzan	May 12, 1903
934,491	Weyh	Sept. 21, 1909
1,195,308	Whidden	Aug. 22, 1916
1,696,677	Hayton	Dec. 25, 1928
1,710,127	Vaughn	Apr. 23, 1929
1,863,950	Stubbs	June 21, 1932
2,392,144	Hall	Jan. 1, 1946