July 10, 1928. 1,676,389

H. W. FLETCHER

METHOD OF CLEANING SOAKING DRUMS

Filed Nov. 9, 1925 2 Sheets-Sheet 1

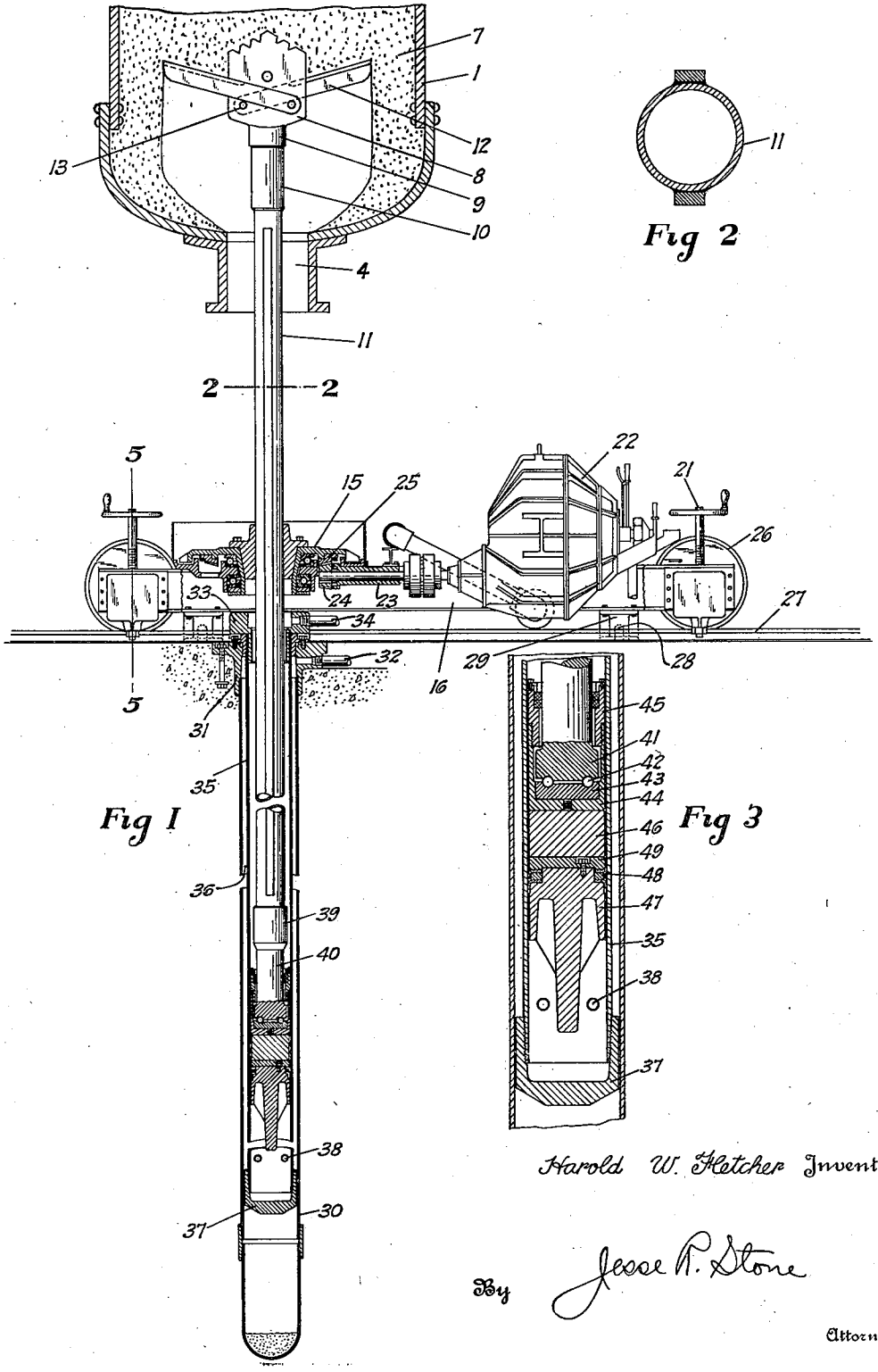


Fig 1

Fig 2

Fig 3

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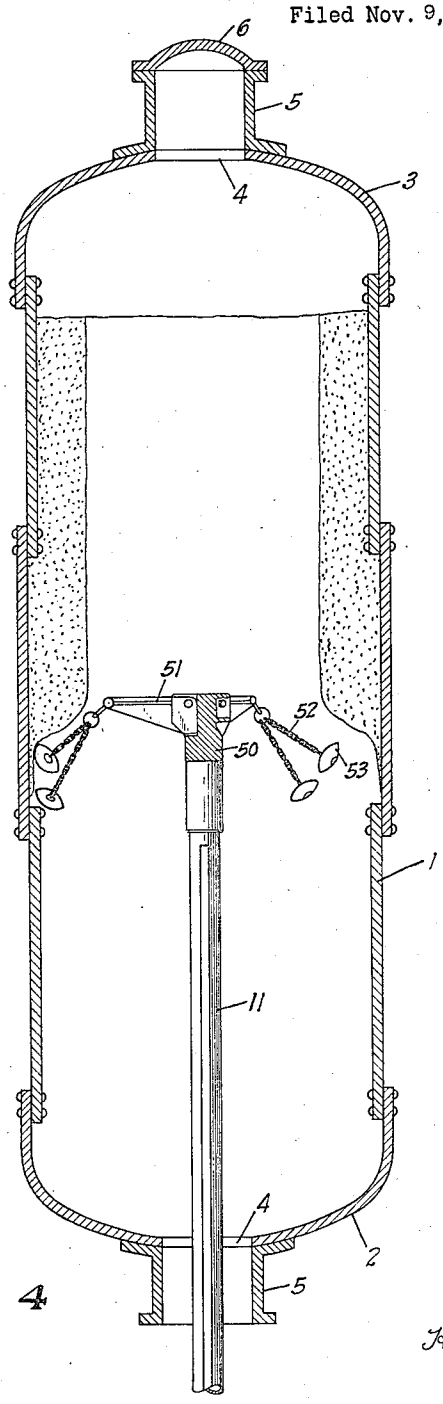


Fig 4

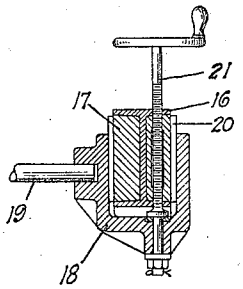


Fig 5

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UNITED STATES PATENT OFFICE.

HAROLD WHEELOCK FLETCHER, OF HOUSTON, TEXAS.

METHOD OF CLEANING SOAKING DRUMS.

Application filed November 9, 1925. Serial No. 68,040.

My invention relates to operations upon soaking drums to clear them of coke and other similar deposits thereon, which result from the distillation of hydrocarbon oils.

In the distillation of petroleum and similar hydrocarbon oils it is a common process to heat the oil to a high temperature under pressure and run it into a so-called soaking drum where it is maintained at the desired temperature and pressure to distil off therefrom, the lighter fractions of the mass in the drum. This process causes a deposit of carbon, coke and other heavy residuum upon the walls of the drum until the interior of the said drum finally becomes clogged so that it has to be shut down and cleaned of its accumulations.

It is an object of my invention to provide an apparatus whereby the drum may be most quickly and effectively cleared of the coke and carbon therein.

It is also desired that the process of cleaning the drum of residuum be such as to operate quickly without injury to the apparatus.

The particular construction and arrangement of the parts of the improved apparatus is seen in the drawings herewith in which Fig. 1 is a side view, partly in elevation, and partly in central vertical section of an apparatus, embodying my invention. Fig. 2 is a transverse section on the plane 2—2 of Fig. 1. Fig. 3 is an enlarged detail of the hydraulic piston employed with my device; Fig. 4 is a central vertical section through a soaking drum showing a cleaning tool therein; and Fig. 5 is a sectional detail of a hoisting jack employed. Like numerals of reference are applied to like parts in all the views.

An ordinary type of soaking drum is shown in Figs. 1 and 4. Said drum 1 is made up of large tubular sections riveted tightly together to form a drum of desired length, the ends are closed, except for a central opening, by the curved plates 2 and 3 at the lower and upper ends respectively. The central openings 4 in said plates are surrounded by an outwardly extending nipple 5 adapted to receive a closure plate 6 at the outer end; which may be secured in position in any desired manner.

In use the drums gradually accumulate a thick layer of "coke" 7 thereon which usually extends completely across the drum adjacent the lower end, the upper end being less heavily covered. The said drums are ordinarily mounted in an upright position several feet above the ground.

In cleaning the drums of coke, I contemplate boring a central hole upwardly through the mass of accumulated material from the lower end, and thereafter reaming this opening until the entire mass has been removed from the interior of the drum.

In carrying out this process, I employ a rotary drill of the fish-tail type, and I prefer an expanding drill such as is disclosed in Fig. 1. This drill 8 has a central flattened blade having its shank 9 engaged by a drill collar 10 by means of which the bit is secured to a drive stem or kelly joint 11. The blade has pivoted cutting members 12 thereon which, when in open position, extend laterally at each side of the central blade 8 and act to enlarge the hole at each side of the central cutter. Each cutter 12 is pivoted on a pin 13 which also acts as a stop pin to limit the downward movement of the opposite cutter, as shown in Fig. 1.

The drive stem 11 is rotated by means of a rotary table 15 of a construction similar to those now in common use, except for the fact that it is mounted to be operated upon a movable supporting frame 16. Said frame includes two beams 16 supported at their ends upon blocks 17, which are slidable vertically in a casting 18 at the end of an axle 19. The block 17 has lateral keys 20 thereon slidable in keyways in the members 18 and are adjustable through a jack screw 21.

A steam engine 22 on said frame serves to rotate the drive shaft 23 having a pinion 24 operatively connected with the gear ring 25 upon the table 15. The wheels 26 upon the axles 19 run upon rails 27 so that the rotary may be removed to and from operative position beneath the drum, as desired. When ready for operation the truck frame is lowered through the screws 21. A dowel shown in dotted lines at 28 then engages in an opening in a plate 29 upon the frame and anchors the frame against lateral movement until the frame is again raised.

The drive stem is forced upwardly by any desired means for exerting pressure thereon. I have shown a hydraulic system for accomplishing this purpose. A well is dug in the ground beneath the drum of sufficient depth to accommodate the required length of drive

stem, and a piston thereon. Said well is equipped with a casing 30 closed at its lower end and provided with a casing head 31 having a lateral inlet pipe 32 connected therewith for entrance of the pressure liquid.

At the upper end of the casing head a bushing 33 is fitted said bushing acting to support an inner pipe 35 forming a cylinder within which the drive stem projects. The bushing 33 makes a tight fit with the casing head so that the space 36 between the casing and cylinder is a closed one, except for the inlet 34. A cap 37 closes the lower end of the cylinder and openings 38 are formed in the said cylinder adjacent the lower end, to allow inlet of fluid below the piston.

The lower end of the drive stem 11 is connected at 39 with a short heavy shaft 40 forming a continuation thereof. Said shaft has a head 41 at the lower end formed with an annular ball race therein on its lower face to receive anti-friction rollers 42. A bearing plate 43 below the head co-operates with said head to form a bearing. Said plate is supported in a cup-shaped member 44 extending upwardly about the head of the shaft 40 and connected above said head with a bushing 45 having a fluid tight fit with said shaft above the head, but allowing rotation of said head and shaft therein.

The member 44 is secured to a block 46, below which is a piston comprising a body 47 with packing cups 48 at the upper end and a follower plate 49 acting to clamp said cups in position to close the space between the piston and its cylinder 35.

In the operation of this apparatus, the rotary is moved over the well beneath the drum 1 and the piston and drive stem adjusted as shown in Fig. 1, with the stem secured within the driving bushing of the rotary table. The drill bit 8, with its lateral wings 12, moved inwardly parallel with the axis of the blade, is introduced into the lower opening 4 of the drum. The fluid pressure is then turned on below the piston to force it and the drill upwardly with the desired pressure. The drive stem, and bit is then rotated to cut away the coke 7. As the drill cuts the material, it will be forced inwardly by the fluid pressure below the piston and the wing blades 12 will open up and cut the hole as shown.

When a hole has thus been drilled completely through the coke deposit, the drill is withdrawn and a different cleaning tool substituted for the drill bit. Such a tool is illustrated in Fig. 4. It comprises a head 50 secured upon the drive stem, as was the drill bit. Said head has lateral arms 51 secured thereon, and to the outer ends of said arms are secured a plurality of flexible elements 52 having, at their outer ends, suitable cutters 53. Said cutters are shown as discs having a cutting edge adapted to cut the deposits of coke remaining on the drum after the bit has been run. The rotation of the drive stem will throw the cutters outwardly toward the walls of the drum and the cutters will chip into and gradually break off and remove the coke which will drop down by gravity through the opening 4. The tool will be moved gradually upward as it is rotated until the drum is completely cleaned.

When the piston at the lower end of the drive stem is moved downwardly as occasion requires, water is delivered above the piston through the pipe 34, and the pressure fluid in the pipe 32 is cut off. When the drill or the cleaner is operating, however, the pipe 34 furnishes an outlet for the fluid above the piston. When the drum is clean the drive stem may be removed and the rotary raised through the adjustment of screws 21 and then moved out of the way, or to be used upon other neighboring drums.

This method of clearing the drums of coke has been found a great time saver as well as being economical in construction. Its advantages will be apparent to those skilled in the art without further description.

What I claim as new is:

1. A method of clearing solid material from metallic soaking drums having a constricted opening in the lower end thereof, comprising introducing a rotary boring tool within said opening and cutting an upward passage through said material of substantially larger diameter than said opening, then cutting away the material from the walls of said passage until the material is entirely removed.

2. A method of clearing solid material from metallic soaking drums having a constricted opening in the lower end thereof, comprising introducing a rotary boring tool within said opening and cutting an upward passage through said material of substantially larger diameter than said opening, then breaking away the material from the sides of said passage by centrifugally operated tools.

3. A method of clearing solid material from the interior of metallic soaking drums having a comparatively small opening in the lower end thereof, comprising boring a hole from said opening upwardly through said material, then cutting away the walls of said hole until the material is entirely removed from the inner walls of said opening.

In testimony whereof, I hereunto affix my signature, this the 6th day of November, A. D., 1925.

HAROLD WHEELOCK FLETCHER.