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CONDUIT BROACH

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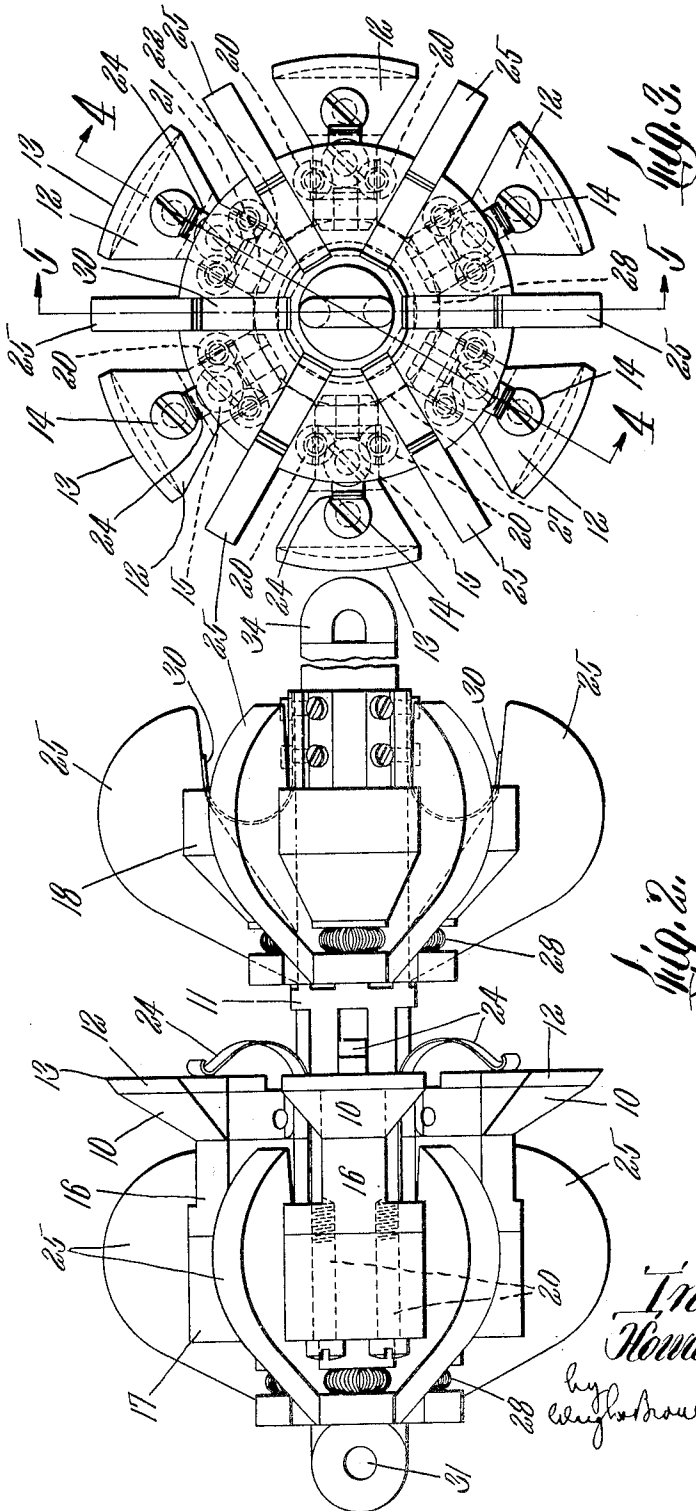


Fig. 2.

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CONDUIT BROACH

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This invention relates to apparatus for cleaning out pipes or conduits of indeterminate length. Pipes and conduits are utilized for conducting all sorts of fluids and in many cases are liable to become more or less clogged with sediment or other obstructions, either in ordinary use or by reason of extraordinary use or circumstance. It frequently happens that the conduit lines are laid in such a manner that it is practically impossible to separate the sections and clean them individually. This is particularly true where conduits are encased in a bed of concrete, such an installation often being under ground as well. The present invention is designed to provide apparatus which may be inserted into an open end of a conduit, is collapsible to a certain extent when moving in one direction so as to pass partial obstructions in the conduit, but when moved in the opposite direction will engage such obstructions and carry them out of the conduit. While my apparatus can be used with practically any kind of conduit, the embodiment of my invention as shown and hereinafter described is intended particularly for use in cylindrical conduits, and in particular, conduits which are made of wet pulp fiber and which after drying are impregnated with pitch or equivalent waterproofing material. Such conduit is often used with a complete casing of concrete surrounding it, the pulp conduit thus serving as a core mold for the concrete and as a lining for the molded bores through the concrete. It sometimes happens that small quantities of excess pitch cling to the inner walls of the conduit sections and partially block the interior. After the fiber conduit has been laid with a casing of concrete around it, it sometimes happens that the fiber conduit expands or warps, probably due to absorption of moisture by the fibers. Such expansion or warping results in a wrinkling of the wall of the fiber conduit, portions of which thus project inwardly to a certain degree, thus partially blocking the normal bore of the conduit. The broach which has been developed according to my invention is particularly adapted for restoring the bore

of such conduits to normal dimensions by cutting or scraping obstructions, whether they be inward bulges of the fiber walls, accumulations of excess pitch, or foreign matter deposited within the conduit.

For a more complete understanding of my invention, reference is had to the description which follows and to the drawings of which,—

Figure 1 represents an embodiment of my invention shown in operating position within the conduit.

Figure 2 is an elevation of one of the units of the apparatus illustrated in Figure 1.

Figure 3 is an end elevation of the unit shown in Figure 2.

Figures 4 and 5 are sections on the lines 4—4 and 5—5 respectively of Figure 3.

Referring to the drawings in detail, the apparatus as shown comprises a number of individual units which may be linked together in succession as shown in Figure 1. These units are preferably of identical construction and any desired number may be linked together for use. In Figure 1, three are shown, but in many cases I prefer to use as many as six, or even more. As shown more clearly in Figure 2, each unit comprises a set of tool blocks 10 mounted in a circle around an elongated core member 11. Each tool block 10 is provided with a tool bit 12 which as shown may comprise a flat piece of steel having a scraping edge 13 and secured to the tool block 10 as by a pair of screws 14, 15. Each tool block 10 may be pivotally mounted to a tool post 16, these posts being likewise distributed around the periphery of the core member 11. The core member 11 as shown in Figures 2 and 4 comprises an elongated body with an enlarged portion 17 near its rearward end and another enlarged portion 18 near its forward end. The forward face 19 of the enlarged portion 17 forms a shoulder against which the tool posts 16 are seated. These may each be held in place as by a pair of screws 20. Each tool post 16 is provided with a pair of forwardly extending ears 21 between which an ear 22 on the tool block 10 is retained by a pin 23, this pin acting as a pivot on which the block

10 may swing. As shown in Figure 4, when the block 10 with its tool 12 is in normal scraping position, it is in engagement with the forward face of the tool post 16 and the scraping edge 13 is at its greatest outward position from the axis of the core member 11. The pivotal mounting of the block 10 permits a forward swing of the block with its tool, such motion, however, being resiliently opposed as by a light spring 24 which may be attached in any suitable manner to the core member 11. It is thus obvious that if an obstruction is encountered by the tool block 10 during rearward motion of the apparatus in a conduit, the block will swing forwardly against the pressure of the spring 24 and permit the apparatus to pass the partial obstruction. When, however, the apparatus is pulled in a forward direction, the scraping tools 12 will engage unyieldingly with any obstructions which they may encounter on the inner surface of the conduit and will scrape such obstructions clear. In order that the tools 12 may bend forwardly without interfering with adjacent tools, these tools must be circumferentially spaced in circular series as shown in Figure 3. Thus a single unit constructed as shown will not scrape the entire inner circumference of the conduit wall, but only spaced segments thereof. For this reason, it is preferred to use a number of units in tandem as indicated in Figure 1, the scraping edges of each unit being angularly disposed about the axis of the apparatus in such a manner that the portions of the circumference left unscraped by the first unit will be engaged by the scrapers of the succeeding units.

In order to maintain the ring of scraping edges of each unit yieldingly centered in a conduit which is being cleaned, I provide centering means which may consist of two sets of radially extending arms 25, one set being supported by the core member forwardly of the scraping blades, the other set being supported by the core member to the rear of the scraping blades. As shown in Figures 2 and 5, the arms may be of uniform construction and may be shaped somewhat like a fin, the outer portion being rounded as at 26 so as to ride over obstructions without catching thereon when the apparatus is moving either forwardly or rearwardly in a conduit. The arms 25 may be resiliently mounted in any suitable manner. As shown, I provide a perforation 27 through the inner end of each arm, and thread a helical spring 28 through the apertures of the arms of each set. The enlarged portions 17 and 18 of the core member 11 are longitudinally slotted to receive the arms 25 and to guide the arms in their radial motion about the spring 27 as a pivot. The inner end of each arm 25 is provided with a face 29 which is adapted to engage the surface of the core member 11

when the arm is in its normal outward position in such a way as to limit such outward motion, this limit being reached preferably when the outermost point of the arm lies in a circle with the other outermost points of the arms of its set, having a circumference substantially equal to that of the circle in which the scraping edges 13 are disposed. Both of these circles should be substantially equal to the normal interior diameter of the conduit to be cleaned. The arms 25 are adapted to swing inwardly about the spring 27 as a pivot, such inward swing being resiliently opposed as by a suitable spring 30 which may be secured in any desired manner to the core member 11. Thus individual arms 25 may yield and slide over partial obstructions which may be encountered as the apparatus is pushed into a conduit, but the arms at all times will tend to keep the apparatus centered with respect to and aligned with the axis of the conduit. The successive units may be linked together in any desired manner. As shown, the rearward end of the core member 11 is formed with an eye 31, the forward end of the body member being reduced and threaded as at 32 to receive a cap 33 having an eye member or staple 34 secured thereto. By means of this construction, the individual units may be quickly separated from one another by unscrewing a core member from the cap 33 with which it is associated. The forward unit of a series may be connected to any sufficiently rigid member 35 by which the scraping apparatus may be pushed into a conduit and pulled therefrom. The push and pull rod 35 may be linked as at 36 in order to enable the apparatus to be used in conduit having bends therein.

In operating the device, as many units as are deemed desirable may be connected together and with a push rod 35. The apparatus is then inserted in the conduit to be cleaned and pushed rearwardly for a short distance depending upon the amount and character of obstructing matter in the conduit. A retraction of the apparatus to the orifice of the conduit will result in a scraping and cleaning of the inner walls of the conduit for the distance through which the apparatus has passed. This action may be repeated, successive portions of the conduit being cleaned by successive insertions and withdrawals of the apparatus. As the apparatus moves rearwardly when being pushed further into the conduit, both the centering arm and the scraping blades will yield to partial obstructions and will bend inwardly against the pressure of their respective springs until the obstructions are passed. On the return movement of the apparatus, however, the scraping blades will be maintained in their outwardly extending, scraping position, this position being

maintained not only by the pressure of the springs 24 against the blocks 10, but also by the reaction of obstructing matter and frictional resistance of the walls which are being scraped. By providing relatively sharp edges 13 on the blades 12, the broach will cut away obstructions which adhere to the walls of the conduit and will shave off portions of fibrous conduit walls which may extend inwardly due to warping or swelling.

Having thus described certain embodiments of my invention, it should be evident to those skilled in the art that various modifications and changes may be made therein without departing from its spirit or scope as defined by the appended claims.

I claim:—

1. A conduit broach comprising a plurality of scraping edges, means for resiliently holding said edges in a circle in normal scraping position, means for positively preventing backward motion of said edges from their normal scraping position, and means resiliently tending to center said circle of edges in a conduit.

2. A conduit broach comprising a plurality of arcuate scraping edges normally arranged in a circle, means for pivotally supporting each said edge for forward and inward swinging motion, means for resiliently opposing said forward and inward motion of the scraping edges, means for preventing backward swing of the edges from said normal position, and means resiliently tending to center said circle of edges in a conduit, said centering means comprising a plurality of elongated radially extending members, and means resiliently holding said members with their outermost points substantially in a circle equal and parallel to the circle of edges.

3. A conduit broach comprising an elongated core, a set of scrapers pivotally mounted on said core and disposed in a circle therearound, said scrapers having scraping edges at their outermost extremities and being pivoted to swing said edges forwardly and inwardly toward said core and outwardly to a normal scraping position, said core having means for preventing backward swing of said edges beyond normal scraping position comprising a shoulder thereon engaged by said scrapers when in normal scraping position, means resiliently holding the scrapers in scraping position, centering means carried by said core forwardly and rearwardly of said set of scrapers, said centering means each comprising a set of radially extending arms pivotally mounted on and symmetrically arranged with respect to said core to swing outwardly to a limiting position and inwardly toward the core, and means for resiliently holding said arms in their outward limiting position.

4. A conduit broach comprising a plurality of scraping units linked together, each said

unit comprising an elongated core, a set of scraping tools pivotally mounted on said core and normally arranged in a circle therearound, means for preventing said scraping tools from swinging backwardly from normal scraping position, means for yieldingly holding said tools from swinging forwardly and inwardly toward said core, and means carried by said core for resiliently maintaining said core coaxial with a conduit into which it is inserted.

5. A conduit broach comprising a core having a forwardly facing shoulder, a plurality of tool posts secured to said core and arranged in circular series against said shoulder, said tool posts each having a forward face, a tool block pivotally mounted on each tool post for forward rocking movement, said tool block having a portion engageable on a portion of the forward face of its tool post to limit rearward swing thereof, spring means tending to hold said tool block in its limiting rearward position, and a scraping tool carried by said tool post.

6. A conduit broach comprising a core, a plurality of scraping blades arranged in circular series about said core, and means for centering said broach in a conduit, said centering means comprising an arm extending obliquely from said core and resiliently and pivotally attached thereto, said arm having a curved outer edge and a face on its inner end portion, said face being arranged to engage said core to yieldingly limit the outward swing of the arm on its pivotal mounting, and spring means pressing said arm outwardly.

7. A conduit broach comprising a core, having an enlarged portion with longitudinal slots extending radially thereinto, a plurality of scraping blades mounted about said core in circular series, and a centering device comprising a plurality of arms extending obliquely outward from said core, the inner end portions of said arms being perforated and normally in contact with said core, each arm being in sliding engagement with the sides of one of said slots, and a flexible endless member threaded through said perforations and extending around said core.

In testimony whereof I have affixed my signature.

HOWARD PARKER.