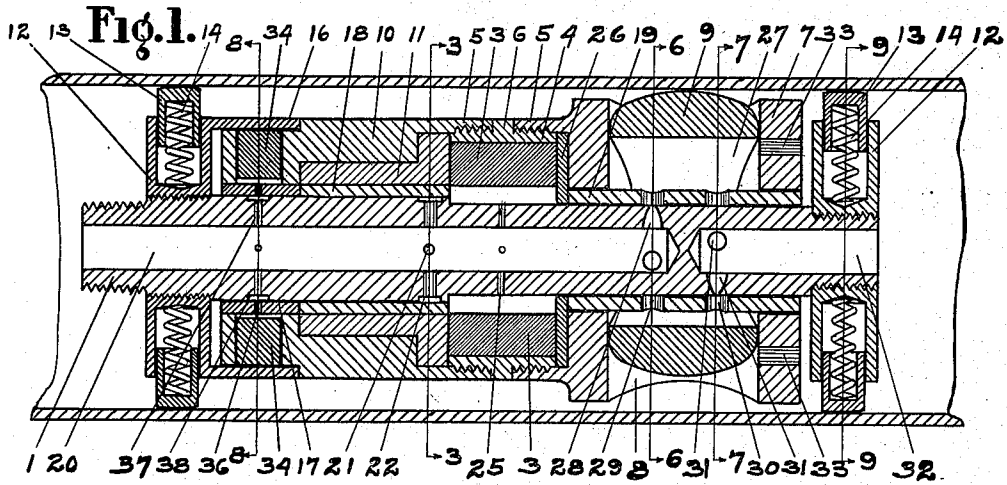
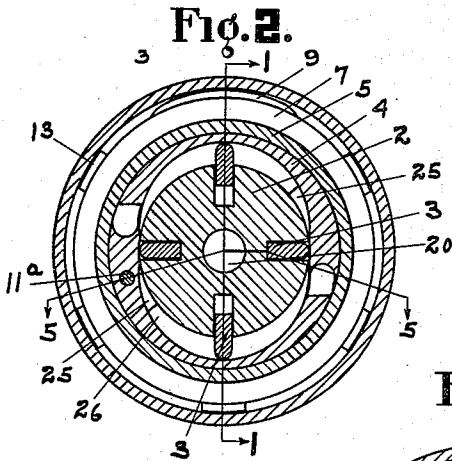
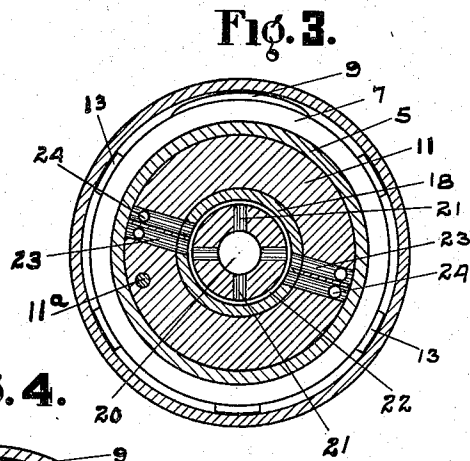
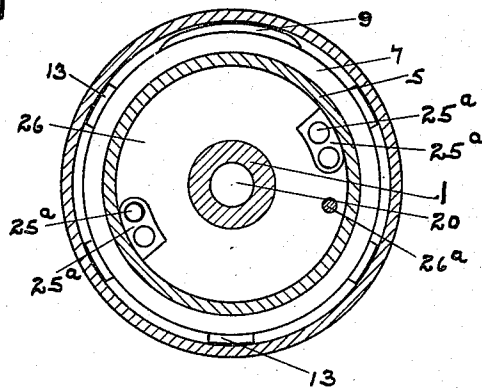


E. E. HAUER.
TUBE CLEANING APPARATUS.
APPLICATION FILED APR. 5, 1912.

1,147,237.

Patented July 20, 1915.

2 SHEETS—SHEET 1.



Inventor

Witnesses

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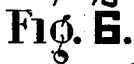
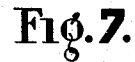
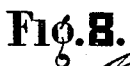
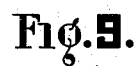
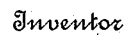
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2 SHEETS—SHEET 2.

Fig. 5.



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UNITED STATES PATENT OFFICE.

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TUBE-CLEANING APPARATUS.

1,147,237.

Specification of Letters Patent.

Patented July 20, 1915.

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To all whom it may concern:

Be it known that I, ELMER E. HAUER, a citizen of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented certain new and useful Improvements in Tube-Cleaning Apparatus, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to tube cleaning apparatus.

The object of my invention is to provide an improved and more efficient cleaning device in which a reciprocating tool is carried by a rotating body or casing, the tool and the body or casing each being given their respective movements by the direct and positive action of the motive agent.

A further object is to adapt the device for operation within the tube and to provide means for centering it within the tube to give clearance for the action of the reciprocating tool.

With these and other objects in view my invention consists of the constructions and combinations hereinafter described and set forth in the claims.

In the accompanying drawings which form a part of this specification Figure 1 is a longitudinal section of a cleaning apparatus embodying my invention, taken on the line 1—1 of Fig. 2. Fig. 2 is a cross-section on the line 2—2 of Fig. 5. Fig. 3 is a cross-section on line 3—3 of Fig. 1. Fig. 4 is a cross-section on line 4—4 of Fig. 5. Fig. 5 is a longitudinal section on line 5—5 of Fig. 2. Fig. 6 is a cross-section on line 6—6 of Fig. 1. Fig. 7 is a cross-section on line 7—7 of Fig. 1. Fig. 8 is a cross-section on line 8—8 of Fig. 1 and Fig. 9 is a cross-section on line 9—9 of Fig. 1.

Like numerals represent the same parts in the several views.

In the drawings 1 represents a stationary shaft having an enlarged portion 2 provided with slots in which blades 3 are seated. A cylinder 4 forms a chamber of such dimensions that when the enlarged portion 2 of the shaft is mounted therein it will contact with the walls of the chamber in two places opposite each other forming two oppositely disposed crescent shaped chambers as particularly shown in Fig. 2. A two-part casing 5 is screw-threaded over the cylinder against an abutment 6 on said cylinder and

the front end of said casing is provided with a forwardly projecting head 7 having a transverse bore 8 in which a piston hammer 9 reciprocates. The rear portion of said casing has a rearwardly extending head 10 in which a bearing member 11 is seated and said bearing member is secured by dowel-pin 11^a to the cylinder. The stationary shaft 1 extends beyond the heads 7 and 10 and is provided with supports or carriers 12 screw-threaded thereto as shown. Said supports or carriers have radial bores with studs 13 seated therein and pressed outwardly by springs 14 to center the device within a tube and give clearance for the operation of the piston hammer. Pins 15 engaging shoulders formed by slots in the studs as particularly shown in Fig. 9 retain the studs in place and the slots allow for the necessary play of the studs. The rear support or carrier has a forwardly projecting portion 16 into which a reduced portion of the rear head projects as shown in Figs. 1 and 5. Bushings 17, 18 and 19 are provided so that they can be readily removed in case of wear.

The stationary shaft extends beyond the rear support or carrier and is screw-threaded to attach a conduit to supply the motive agent to a longitudinally extending conduit 20 in said shaft. Branch conduits 21 open into an annular groove 22 in the shaft, through which the motive agent passes into radial conduits 23 in the bearing member and its bushing and thence by inlet ports 24 into the crescent shaped working chambers. The blades 3 are held outwardly against the walls of the working chambers by the pressure of the motive agent through ports 25 and said blades form abutments so that the pressure of the motive agent admitted through the ports 24 causes the cylinder with its casing and heads to rotate, the exhaust passing through exhaust ports 25^a extending through a plate 26 and the head 7 to the atmosphere. Said plate 26 is seated in the head 7 and secured against rotation to the cylinder 4 by a dowel-pin 26^a as particularly shown in Figs. 1, 4 and 5.

The piston hammer 9 operating in the bore 8 is provided with an elongated opening 27 through which the stationary shaft 1 and bushing 19 extend. Ports 28 from the inlet conduit in the shaft are adapted to register with ports 29 through the bushing 19 to admit the motive agent to reciprocate the

piston hammer and the motive agent is discharged through exhaust ports 30 in the bushing 19, said exhaust ports being adapted to register with ports 31 opening to a discharge conduit 32 in the shaft. Auxiliary exhaust ports 33 extending from the bore 8 and opening to the atmosphere in front of the head 7 are provided to relieve the pressure the instant the hammer strikes the tube as particularly shown in Fig. 1. The ports 33 are covered and uncovered by the heads of the reciprocating piston hammer.

To give the rotary casing or head that carries the piston hammer a uniform speed under varying pressures, blocks 34 are seated in radial openings in the head 10 and pressed outwardly against the projection 16 of the rear carrier by the pressure of the motive agent admitted to the rear of said blocks through openings 36 in the bushing 17, supplied through branch conduits 37 and groove 38 in the shaft. The arrangement is such that by employing the blocks 34 of such proportions in their contact with the projection 16 the friction caused thereby will vary in accordance with the varying pressures of the motive agent and a uniform speed will be maintained.

Having thus described my invention I claim:—

1. In a tube cleaning apparatus, a stationary shaft having a supply conduit for the motive agent, a casing mounted to rotate on said shaft and having a transverse bore therethrough, a piston tool in said bore with means to admit the motive agent thereto from said supply conduit to reciprocate said piston tool to deliver hammer blows beyond the respective ends of and in line with said bore, substantially as described.

2. In a tube cleaning apparatus, a stationary shaft having a supply conduit for the motive agent, a casing mounted to rotate on said shaft and having a transverse bore therethrough, a piston tool in said bore having an opening through which said shaft extends and means to admit the motive agent thereto from said supply conduit to reciprocate said piston tool to deliver hammer blows beyond the respective ends of and in line with said bore, substantially as described.

3. In a tube cleaning apparatus, a stationary shaft having a supply conduit with ports, a casing having a bushing mounted to rotate on said shaft and having a transverse bore therethrough, a piston tool in said bore having an opening through which said shaft and bushing extend, said bushing having ports adapted to register with the ports in said shaft admitting the motive agent to reciprocate said piston tool to deliver hammer blows beyond the respective ends of and

in line with said bore, substantially as described.

4. In a tube cleaning apparatus, a stationary shaft having supply and exhaust ports, a casing having a bushing mounted to rotate on said shaft and having a transverse bore therethrough, a piston tool in said bore having an opening through which said shaft and bushing extend, said bushing having ports adapted to register with the ports in said shaft to admit and discharge the motive agent to reciprocate said piston tool to deliver hammer blows beyond the respective ends of and in line with said bore, substantially as described.

5. In a tube cleaning apparatus, a stationary shaft having supply and exhaust ports, a casing with a head and a bushing mounted to rotate on said shaft and having a transverse bore therethrough, a piston tool in said bore having an opening through which said shaft and bushing extend, said bushing having ports adapted to register with the ports in said shaft to admit and discharge the motive agent to reciprocate said piston tool to deliver hammer blows beyond the respective ends of and in line with said bore, said head having auxiliary exhaust ports, substantially as described.

6. In a tube cleaning apparatus, a stationary shaft, a casing mounted on said shaft, means within said casing to rotate said casing, said casing having a transverse bore therethrough, a reciprocating piston tool in said bore adapted to deliver hammer blows beyond the respective ends of and in line with said bore and said shaft having a supply conduit with ports to supply the motive agent to said rotating means and to said reciprocating piston, substantially as described.

7. In a tube cleaning apparatus, a stationary shaft, a casing mounted on said shaft, means within said casing to rotate said casing and means to govern said rotation and give said casing a uniform speed under variations of pressure of the motive agent, said casing having a transverse bore therethrough, a reciprocating piston tool in said bore adapted to deliver hammer blows beyond the respective ends of and in line with said bore, said shaft having a supply conduit with ports to supply the motive agent to said reciprocating piston and to said rotating and governing means, substantially as described.

In testimony whereof I have hereunto affixed my signature in the presence of two witnesses.

ELMER E. HAUER.

Witnesses:

OLIVER H. HOUSE,
VIRGIL BAKER.