P. J. DARLINGTON.

FLUID OPERABLE FLUE CLEANER.

APPLICATION FILED JULY 12, 1912.

1,150,419.

Patented Aug. 17, 1915.

Fig. 1.

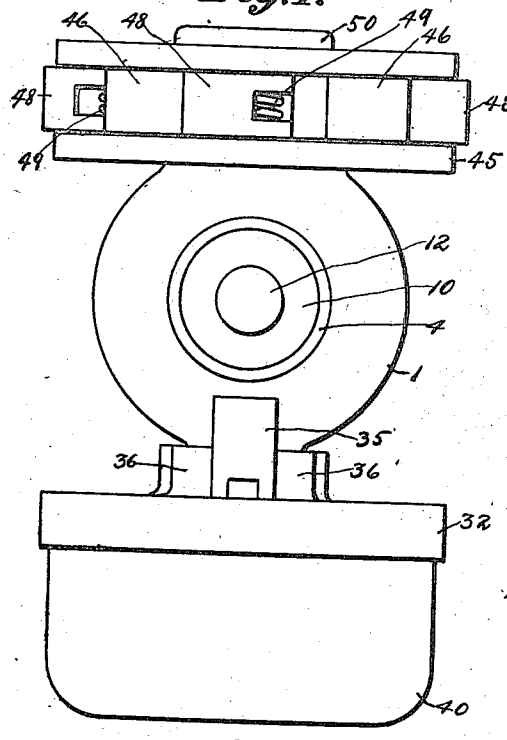


Fig. 2.

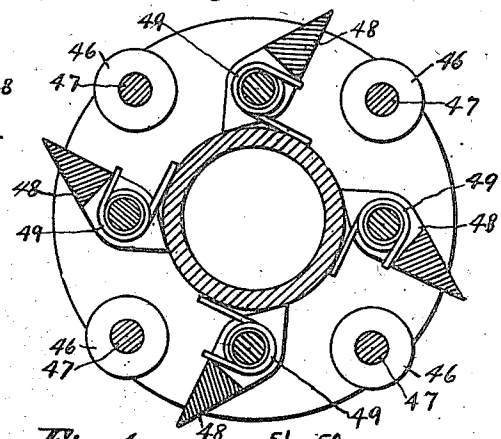


Fig. 3.

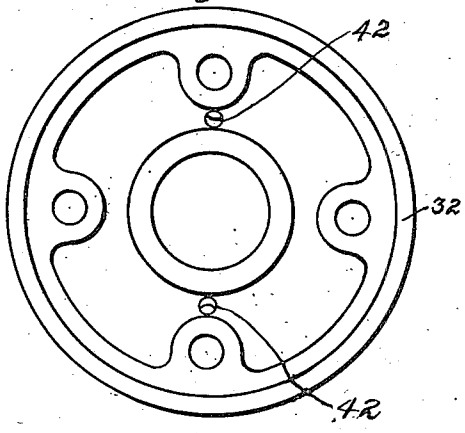
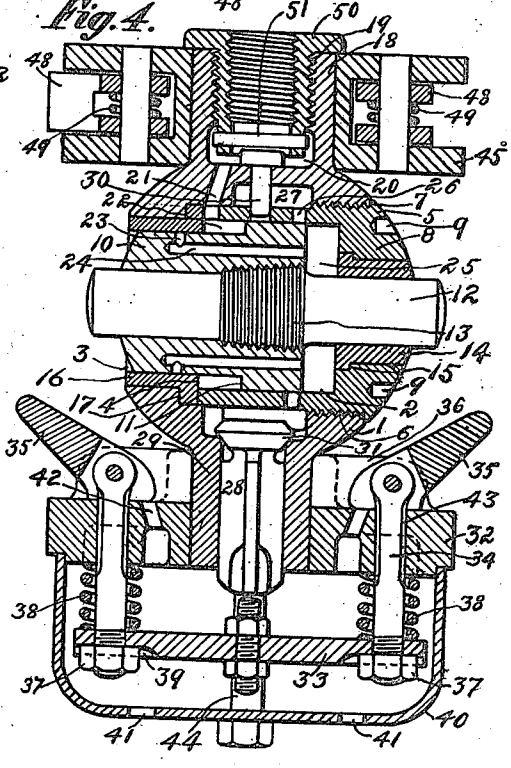


Fig. 4.



Witnesses:

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UNITED STATES PATENT OFFICE.

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FLUID-OPERABLE FLUE-CLEANER.

1,150,419. Specification of Letters Patent. Patented Aug. 17, 1915.

Application filed July 12, 1912. Serial No. 709,015.

To all whom it may concern.

Be it known that I, PHILIP J. DARLINGTON, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Fluid-Operable Flue-Cleaners, of which the following is a specification.

This invention relates to what I shall for convenience term a fluid operable flue cleaner, the object of the invention being to provide an effective machine of this character which is adapted to remove internal and external deposits upon flues, tubes and the like. The operating fluid may be of any suitable nature, although compressed air is highly advantageous and preferable.

In the drawings accompanying and forming part of the present specification I have shown in detail one of the several convenient forms of embodiment of the invention, which to enable those skilled in the art to practice the same will be fully set forth in the following description, the novelty of the invention being defined by the claims following said description. From this it will be clear that I do not restrict myself to such disclosure; I may depart therefrom in several respects within the scope of the invention set forth in said claims.

Referring to said drawings: Figure 1 is an elevation of a flue cleaner involving my invention. Fig. 2 is a transverse section through the pawl mechanism. Fig. 3 is a plan view of the centering head, and, Fig. 4 is a longitudinal sectional view of the machine.

Like characters refer to like parts throughout the several figures of the drawings.

My device comprises a part cylindrical and part spherical frame 1 formed with a transverse cylindrical bore, one portion 2 of said bore being of large diameter and the other portion 3 of small diameter, the two portions forming an internal shoulder 4 where they join. A lining 5 screwed into the bore portion 2 is secured therein by a screw thread 6 against a shoulder 7. Lining 5 is formed with an integral outer end wall 8 having holes 9 to receive a wrench for screwing it in or out.

A cylindrical plunger 10 is formed of two diameters, the large diameter sliding freely in the lining 5 and the small diameter sliding freely in the small cylinder bore portion 3, there being a shoulder 11 at the juncture of the two portions of said bore. A stem 12 is secured into the plunger 10 by a taper screw thread 13 and extends beyond the plunger at both ends, and through end wall 8 being supported thereby. Where stem 12 passes through end wall 8, there is a renewable bush 14 with flange 15 at the inner end to prevent it blowing out. The small diameter bore portion 3 in frame 1 is made with a renewable bush 16 having a flange 17 at its inner end to prevent its blowing out. A rearwardly extending longitudinal cylindrical extension 18 of frame 1 is formed with an internal screw thread 19 to receive the motive fluid supply pipe and with an admission chamber 20. An admission passage 21 communicates from chamber 20 to an annular pressure space 22 between shoulder 4 of frame 1 and shoulder 11 of plunger 10 whereby the motive fluid pressure exerts a continuous effort to drive plunger 10 inward. As plunger 10 moves inward radial admission ports 23 formed in plunger 10 pass shoulder 4 and admit motive fluid to longitudinal admission ports 24 formed in plunger 10 and communicating to space 25 behind the large end of plunger 10, thereby driving the plunger outward with a force proportioned to the greater cross-area of space 25 than of annular space 22. The plunger now moves forward until the large end of plunger 10 has uncovered radial cross-exhaust ports 26 formed in lining 5 and communicating with an annular exhaust space 27 formed in the bore of frame 1, which in turn normally communicates with outside air through a longitudinal exhaust port 28 concentrically formed in a forwardly extending longitudinal cylindrical extension 29 of frame 1. While moving outward, the radial admission ports 23 have passed shoulder 4 thereby cutting off the admission space 25. This cutting off of admission together with the uncovering of the exhaust opening reduces the pressure in space 25 until the plunger is

again forced inward by the pressure in space 22, thereby completing one cycle of operation. The stem 12 constitutes a convenient hammer member. The resulting action is a rapid vibration of plunger 10 transversely through frame 1, the ends of stem 12 striking hammer blows upon the inner surface of the tube being cleaned and accomplishing the purpose of the device. A dowel pin 30 headed in admission chamber 20 passes through the front wall thereof and into lining 5 to prevent it accidentally screwing out, said dowel pin being held axially in place by the fluid pressure. A check valve 31 in longitudinal exhaust port 28 is arranged to seat against outward flow of exhaust when free to do so, thereby stopping the operation of the plunger. A centering head 32 of diameter to fit and slide freely in the tube to be cleaned, is secured concentrically on cylindrical extension 29. A cross-yoke 33 is supported on eye-bolts 34 free to slide longitudinally in head 32. Fingers 35 are pivoted to eye-bolts 34 and formed with flat faces to rest against the rear face of centering head 32 while the fingers 35 reach out and beyond the circumference of head 32 or the diameter of the tube to be cleaned.

Fingers 35 are guided by and float between parallel ribs 36 formed on the rear face of centering head 32. Adjustable nuts 37 secure cross-yoke 33 on eye-bolts 34 and adjust the position of cross-yoke 33 axially close to check valve 31 when the check valve is closed and fingers 35 seated on the face of head 32 and projecting beyond the radius of the tube to be cleaned. It will be noted that the stem of the valve 31 is rigidly connected with the cross yoke 33. Spiral springs 38 yieldingly support cross yoke 33, eye-bolts 34 and fingers 35 in the position shown in Fig. 4 when the device is outside the tube to be cleaned. Grooves 39 with sides fitting against the flat side faces of the nuts 37 prevent accidental unscrewing from vibration. A thin shell 40 covers over the front face of centering head 32 and protects yoke 33 and check valve 31 from soot or dirt. Shell 40 has exhaust openings or holes 41 to allow the exhaust fluid to escape. Blow passages 42 are formed through head 32 and blow passages 43 are formed in eye-bolts 34 to assist in blowing away soot or dirt which might accumulate between fingers 35 and the rear face of head 32. Bolts 44 secure shell 40 in a centering on the front face of head 32. A double flanged ring 45 is secured on and concentrically with rear extension 18 of frame 1. Ring 45 is of slightly less diameter than the inside of the tube to be cleaned. Rollers 46 are longitudinally pivoted between the flanges of ring 45 and are free to rotate on their pivots 47. Rollers 46 reach to a radius slightly less than the inside diameter of the tube to be cleaned, thereby forming an anti-friction support for revolution of the device within the tube. Pawls 48 are mounted between the flanges of ring 45 free to rock in a transverse plane, projecting at an angle, all in the same direction, from the radius through the pivot and with their outer ends yieldingly held at a circumference greater than the inside diameter of the tube to be cleaned, by spiral springs 49 with the heels of pawls 48 resting against the hub and between the flanges of ring 45. In order to further secure dowel pin 30, a pipe bushing 50 carrying a cross-pin 51 is screwed into thread 19 cross-pin 51 bearing against the head of dowel pin 30.

The action of the device is as follows: When pushed into the tube to be cleaned, the end of the tube forces back and inward the outer tips of fingers 35, tipping them up on their heels and drawing backward eye-bolts 34 cross-yoke 33 and lifting check valve 31, against pressure of the fluid, from its seat, uncovering the exhaust opening and starting the plunger operating with the ends of the stem striking the inner wall of the tube. The reaction causes the main body of the machine to vibrate and hence a slight transverse movement of the device in the tube. The pawls 48 allow free rotary movement in one direction but resist it in the other, thereby translating this transverse movement into a rotary movement to turn the device in the tube. On removal of the device from the tube, releasing the outer ends of fingers 35 from radial restraint, the combined action of springs 38 and fluid pressure behind check valve 31 return fingers 35 to their original position and move forward yoke 33 allowing check valve 31 to close and stopping plunger by shutting off its exhaust. When starting the device into a tube, plunger 10 and stem 12 will normally drop down into an extreme position of the stroke which would not otherwise allow the device to enter the tube, but as centering head 32 is forward of fingers 35, and fingers 35 are forward of stem 12, the result is that in entering a tube the device is first centered with the tube and supported at the forward end by head 32, then the fingers 35 enter the tube, starting the plunger 10 into operation which carries stem 12 back and forth across the entrance to the tube allowing it and the remainder of the device to enter freely.

What I claim is:

1. A hammer comprising a rotary body, a hammer member supported thereby, means for operating the hammer member, and means for positively preventing rotation

in one direction only of the body while in a tube.

2. In a hammer, a rotary body, a hammer member, means for operating said hammer member, and pawl mechanism for preventing the rotation in one direction only of said body while in a tube or flue.

In testimony whereof I affix my signature in presence of two witnesses.

PHILIP J. DARLINGTON.

Witnesses:
F. E. ANDERSON,
JOSEPH R. BARLOW.