May 31, 1927. 1,630,677

H. L. STALEY

TUBE CLEANER VALVE

Filed Oct. 27, 1924

Fig. 1.

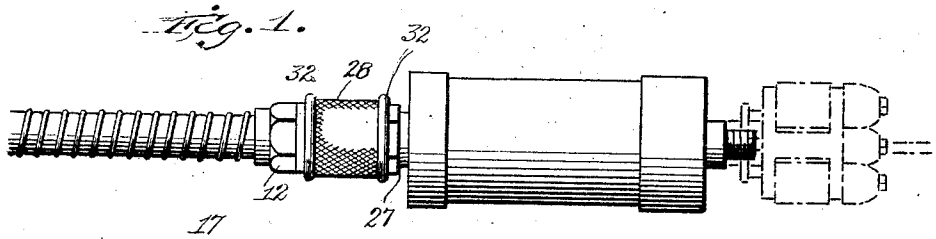


Fig. 2.

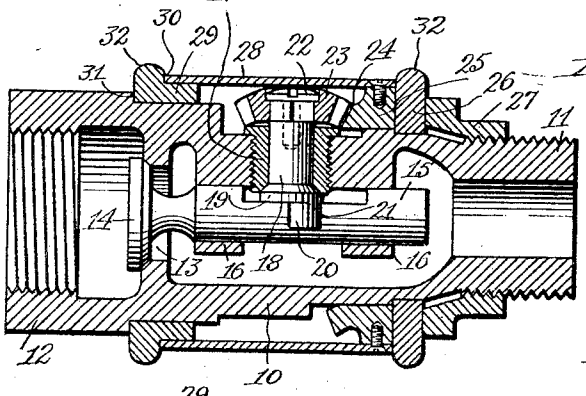


Fig. 5.

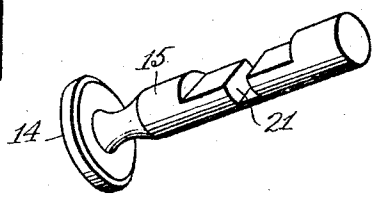


Fig. 3.

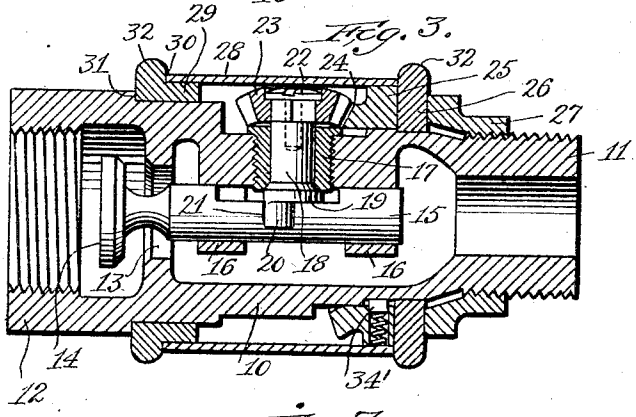


Fig. 6.

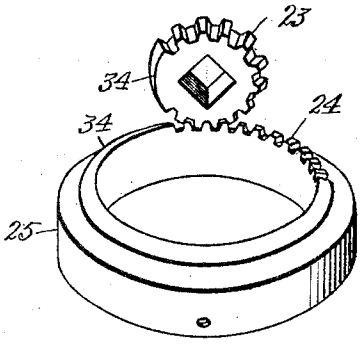


Fig. 7.

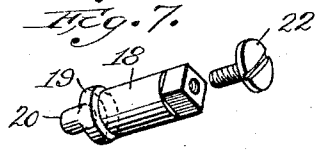
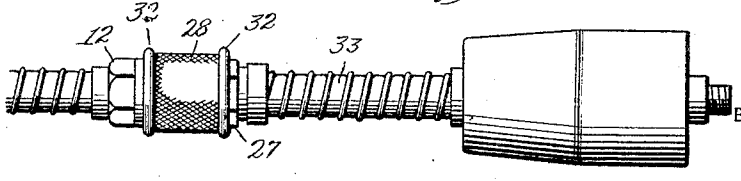


Fig. 4.



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UNITED STATES PATENT OFFICE.

HARRISON L. STALEY, OF MARTINSVILLE, INDIANA.

TUBE-CLEANER VALVE.

Application filed October 27, 1924. Serial No. 746,092.

The object of this invention is to provide a simple valve for that type of tube-cleaner operated by compressed air or other fluid, the air being conducted to a motor-actuated tool at the end of a flexible hose, the cleaning of the tube being accomplished by shifting the motor-driven tool back and forth in the tube to be cleaned. My valve is located adjacent to the motor and therefore enters the tube with the motor. Thus positioning the valve renders it convenient for the operator to open and close the valve to start or stop the motor.

In the drawings annexed:

Fig. 1 is a side elevation of a well known type of tube-cleaner provided with my valve;

Fig. 2 is a longitudinal sectional view of the valve closed;

Fig. 3 is a view similar to Fig. 1, showing the valve open;

Fig. 4 is a view similar to Fig. 1, showing the manner of connecting the valve to the motor when the same is adapted for use in cleaning curved boiler-tubes;

Figs. 5, 6 and 7 are detail views hereinafter described.

Referring to the drawings annexed by reference characters, 10 designates a tubular valve-casing having a threaded nipple 11 at its outlet-end for connection to the usual cleaning-tool and a nipple 12 at its inlet-end for connection to the usual flexible hose used for conducting the air to the motor.

At the inlet-end of the valve-casing is a valve-seat 13, and adapted to seat on this seat 13 is a disk-valve 14 whose stem 15 projects into the valve-casing and is slidingly supported in guides 16 attached to the adjacent wall of the valve-casing. Extending through the wall of the valve-casing is a threaded bushing 17, and journaled in this bushing is a radial stub-shaft 18 whose inner end is provided with an annular flange 19 bevelled on its outer face to fit against a similarly-bevelled seat on the inner end of the bushing 17, the air-pressure within the valve-chamber serving to hold the bevelled flange 19 against the bushing-seat to thus insure against the escape of air around the stub-shaft without the use of packing.

The valve-stem 15 is slabbed off to receive the disk-like head or flange 19 of the stub-shaft, and this head 19 is provided with a wrist-pin 20 set eccentrically on the head 19 and working in a transverse slot 21 formed in the valve-stem, this wrist-pin and slot forming a sort of cross-head arrangement for actuating the valve to open and closed positions by the rotation of the stub-shaft 18, as is obvious.

The stub-shaft 18 has affixed to its outer squared end, by means of a screw 22, a bevel-gear 23, and meshing with this bevel-gear is an operating-gear 24 carried by a ring 25 rotatably mounted upon the annular, exterior surface of the valve-casing. By rotating the ring 25, it will be seen that the valve may be opened or closed.

The ring 25 is held in position by a ring 26 which is in turn held against an annular shoulder on the valve-casing by means of a nut 27 screwed onto the nipple 11. For convenience in rotating the ring 25 I key or screw thereto a sleeve 28 knurled exteriorly for convenience in manually rotating it in either direction. This sleeve 28, as will be noted, encloses the gearing and thus protects it against accumulation of dirt. The end of the sleeve 28 opposite the point of connection to the ring 25 is supported upon a ring 29 mounted upon the valve-casing, this ring 29 being provided with a shoulder 30 against which the end of the sleeve abuts, and the valve-casing being provided with a shoulder 31 against which the ring abuts. In this way, it will be observed that the parts are held in assembled, operative position by means of a single nut 27, whereby I provide not only for easy assembling, but easy disassembling of the parts. The rings 25 and 29 are provided with flanges 32 which project beyond the circumference of the operating sleeve 28. The purpose of this is to provide runners for the valve when the same is used on tools adapted for cleaning curved boiler-tubes, as shown in Fig. 4, in which case the valve is spaced away from the motor a short distance by means of an interposed section 33 of hose. When the valve is positioned in this manner, the flanges 32, as the motor is moved back and forth in the boiler-tube, run on the interior surface of the boiler-tube and thus protect the operating-sleeve 28 against wear and also against accidental operation. It is desirable that these flanges 32 shall be of some hard metal to withstand the wear, and it will be observed that they are so readily removable that they can be easily interchanged with soft iron rings when the tool is to be used in straight boiler-tubes, as shown in Fig. 1.

A feature of great importance is the

means for locking the valve open. It will be observed that the valve opens against pressure and that, therefore, it is under constant tendency to close while the tool is in operation. I provide against premature closing in the following way: The gears 22 and 24 are partial gears, i. e., gears which are blank for a portion of their circumference, the blank spaces being filled in by solid flanges 34 to thereby limit the rotation of the gears by causing them to jam when the ends of their flanges 34 come into abutting relation. These gears, therefore, can be given only a partial revolution before they are jammed to a standstill. The teeth and the jam-flanges are so located and proportioned that on the opening movement, the gears will jam immediately after the wrist-pin 20 passes over center, i. e., axial center of the valve-stem, so that air-pressure against the valve will tend to hold the gears in locked position and thus prevent the valve coming to closed position. It will be understood that this locking action cannot take place until the wrist-pin has passed beyond center and that, therefore, there must be, theoretically at least, a slight movement of the valve toward its seat before the locking action takes place.

It will be observed that when this quick-acting valve is placed behind the tube-cleaning turbine it gives to the operator, when cleaning from tube to tube, absolute control over starting and stopping the turbine instantly. The use of my valve permits the operator to keep his eyes on the job and both hands on the turbine, as there is no need for reaching around blindly for a valve beyond or almost beyond his reach, nor for signalling the man at the shut-off outside the drum. My device, therefore, will render it unnecessary to resort to the expedient of endeavoring to rig up some arrangement that will bring the throttle valve within reach of the tube-cleaner operator at every position of the boiler front, expedients which are always very awkward and generally abandoned altogether in favor of placing an extra man on the platform to operate the valve. It is true that, with my valve, the tube-cleaner must be drawn back through the tube while running, but this operation consumes but a few seconds and it frequently removes some scale-spots left by the forward passing of the cleaner through the tube, thus insuring increased thoroughness in cleaning.

It will be observed that with one easy quarter-turn of the knurled sleeve the air (or water in some cases) is full on and the valve is at the same time automatically locked open in such manner that no amount of vibration can close it. It will be understood, however, that, for safety's sake, a detent may be employed to hold the parts in open position; in Fig. 3, I have shown at 34′ a common form of spring detent carried by the ring and gear 24—25 adapted to snap into a V-groove in the exterior of the casing 10; an expedient like this will be amply sufficient to prevent jarring the parts into position for closing the valve under the most severe conditions.

What I claim as new is:

1. A boiler-tube cleaner embodying a motor-driven tool, a short section of hose attached to the inlet-end of the motor, a manually-operable valve attached to the end of this short section of hose, and a supply-hose attached to the inlet-end of the valve, said valve being provided with separated annular flanges serving as runners, all of the aforesaid parts being of such size as to enter the tube being cleaned.

2. A throttle-valve for tube-cleaners embodying a valve-casing, a reciprocable valve, and means for actuating said valve, said means embodying a stub-shaft extending into the valve-casing and provided at its inner end with a valve-like head, the casing being provided with an inwardly facing valve-like seat against which said head abuts to thus render the shaft-bearing air-tight.

3. A throttle-valve for tube-cleaners embodying a valve-casing, a reciprocable valve, and means for actuating said valve, said means embodying a shaft extending into the valve-casing and carrying an eccentric wrist-pin at its inner end, a transverse slot in the stem of the valve engaged by this wrist-pin, a pinion affixed to the shaft outside of the valve-casing, and a partial gear for driving said pinion journalled upon the valve-casing, the teeth on said partial gear extending to a point where the gears will be locked against further rotation when the wrist-pin passes over center, to thereby lock the valve in open position against fluid pressure.

4. A throttle-valve for tube-cleaners embodying a valve-casing, a reciprocable valve, means for operating the valve embodying a pair of gears arranged exteriorly on the valve-casing, a knurled sleeve affixed to the driving one of these gears, this sleeve serving to enclose the gears, and means for removably holding the sleeve and the gears in assembled relation.

5. A throttle-valve for tube-cleaners embodying a valve-casing, a reciprocable valve therein, means for opening the valve against fluid pressure embodying a stub-shaft extending into the valve-casing and provided with an eccentric wrist-pin in engagement with the aforesaid valve, a pinion on the outer end of said shaft, and a driving gear engaged with said pinion and journaled on and surrounding the valve-casing, one of said gears being a partial gear, the teeth extending to a point where the gears will be locked

against further rotation when the wrist-pin passes over center, to thereby lock the valve in open position against fluid pressure.

6. A throttle-valve for tube-cleaners embodying a tubular casing, a reciprocable valve located therein and adapted to open against the fluid pressure, and means for opening said valve against fluid pressure embodying a tubular bearing extending radially through the casing and having a valve-face at its inner end, a stub-shaft journaled in said tubular bearing and having a valve at its inner end and also an eccentric wrist-pin for actuating the aforesaid valve, a pinion affixed to the outer end of said stub-shaft, a ring-like partial gear surrounding the valve-casing and journaled thereon and in constant mesh with said pinion, an operating sleeve surrounding the valve-casing and enclosing the gears and affixed to said ring-like gear, and means for holding the gears and the sleeve in assembled relation, so that the sleeve will enclose both gears.

In testimony whereof I hereunto affix my signature.

HARRISON L. STALEY.