

May 13, 1952

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2,596,571

TUBE CLEANER

Filed April 12, 1947

Fig. 1.

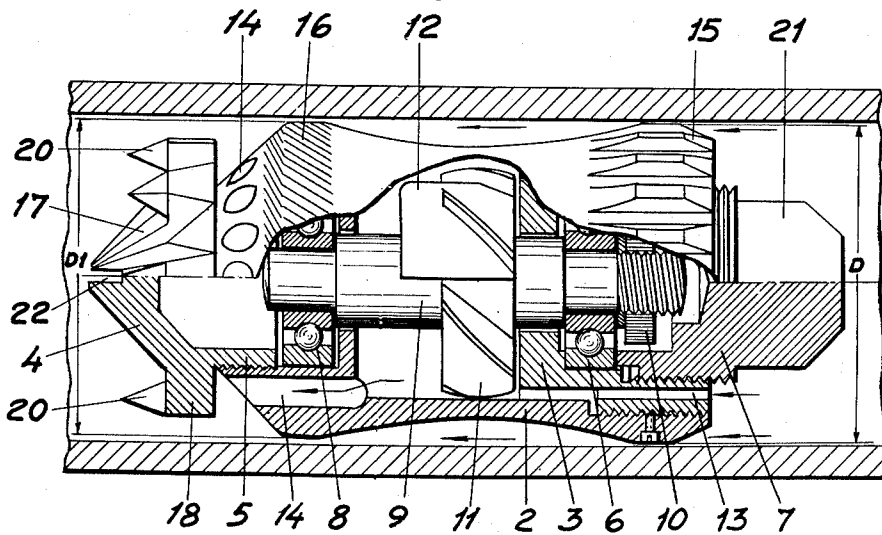
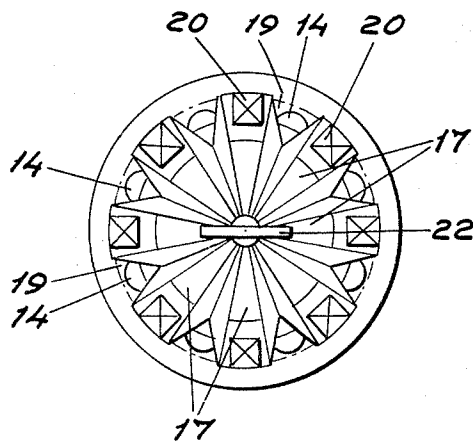


Fig. 2.



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# UNITED STATES PATENT OFFICE

2,596,571

## TUBE CLEANER

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Application April 12, 1947, Serial No. 741,096  
In Sweden November 27, 1945

Section 1, Public Law 690, August 8, 1946  
Patent expires November 27, 1965

5 Claims. (Cl. 15—104.06)

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This invention relates to pipe cleaning machines especially adapted to perform within a pipe to be cleaned a longitudinal movement by the action of a fluid filling the pipe behind the machine to work up the pipe thereby releasing sediment, rust and incrustations of any kind. Hereby a special handle for the manual introduction and removal of the cleaning machine in and out of the pipe respectively will become unnecessary, thus facilitating the work of the operators and enabling pipes of arbitrary length to be treated, the machine thereby also being able to pass through elbows.

In pipe cleaning machines of this kind known heretofore the turbine is driven by fluid under pressure, filling the pipe behind the pipe cleaning machine. The turbine, in turn, rotates a cutter head in relation to a nonrotative casing. Experience has however shown that in pipe cleaners of said known kind the cutter head frequently will get jammed in the incrustations and sediment coating the wall of the pipe. Thereby the turbine is brought to a standstill with the result that the pipe cleaning machine jams far inside a pipe, where it is not accessible.

This inconvenience, however, will not occur in the pipe cleaning machine according to the present invention, wherein the turbine freely operates, inside the casing, without the risk of getting jammed in the pipe. If, for example, the casing of the machine according to the invention should accidentally get jammed in the pipe to be cleaned, the turbine will continue operating, rotating the eccentric weight, which serves to put the casing in vibration. Said vibrations are still transferred through the cutting means to the incrustations, gradually breaking down same to clear a path for the machine.

Due to the different diameters of the rings of cutting means 15 and 16 respectively, the casing is not only put in a vibrative movement, but also in a gyratory or helical movement, along the pipe to be cleaned.

An embodiment of the invention is diagrammatically shown in the accompanying drawing, in which:

Fig. 1 is a side-view of the cleaning machine partially in section and Fig. 2 is a front view.

Referring to the drawing, the reference numeral 2 denotes the casing of the pipe cleaning machine according to the invention in the rear end of which is connected a sleeve 3 and in the other (front) end a sleeve 5 provided with a tapered conical part 4. Inserted in the sleeve 3 is a ball-bearing 6 supported by a body 7 screwed

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in the sleeve. In the vicinity of the sleeve 5 a bearing 8, preferably a ball-bearing, is fitted in the casing 2. In these two bearings 6 and 8 is supported a shaft 9, threaded at one end and provided with a nut 10. On the shaft 9 is fixed a bladed turbine 11 and on the shaft is also fixed an eccentrically located weight 12. It will, of course, be appreciated that the weight 12 could be connected to the turbine.

For driving the turbine a number of inlet channels 13 and outlet-channels 14 are arranged, said channels in the embodiment shown being placed circularly or peripherally in each end of the casing, the inlet-channels 13 being formed in the sleeve 3 and for some part of its length facing the casing 2. On the rear end of the housing is provided a number of cleaning members 15, in the form of fins, and arranged on the front end of the casing are part-helical ribs 16, which are skewed with respect to the axis of the casing. The outside diameter D of the ring of cleaning members 15 is larger than the corresponding diameter D1 of the ring of cleaning members 16, the first mentioned ring being conformed to the diameter of its respective pipe so as to closely fit the pipe wall. Also the conical body 4 is provided with cleaning members 17 and with a flange 18 having a plurality of concavities 19 registering with outlet-channels 14. Between the concavities are provided axially directed points 20, the bodies of which are suitably polygonal e. g. square. The body 7 is provided with a projecting portion 21, e. g. for grasping the pipe cleaning machine, if it is necessary to remove same or to displace same. The point of the conical part 4 is provided with a groove 22 for receiving a tool, such as a tapered chisel.

When in use the entire pipe cleaning machine is pushed into the pipe which is to be cleaned. Then the pipe is shut up behind the cleaning machine, e. g. by means of a flange connected to a source of fluid under pressure, e. g. a water conduit or the like. This medium then will exert a pressure upon the rear surface of the cleaning machine trying to force it forwardly and simultaneously flowing rapidly through the channels 13 putting the turbine in a rapid rotation, the fluid thereafter discharging through the outlet channels 14.

The eccentric weight 12 then puts the entire cleaning machine in agitation, vibration and trembling causing the cleaning members to strike or scratch against the tube wall tearing off the sediments thereon, said sediments thereafter being carried with the fluid flowing between and

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around the cleaning members and carried away in the flow direction of said fluid. Also if the tube is almost choked up by sediments the cleaner may work itself forwardly by means of the edges 17 and points 20, the conical part clearing a path through the sediments. Due to the obliquity of the cleaning members 16 and in part also due to reaction of the turbine the cleaning machine will perform a slow rotative motion while working itself forwardly in the pipe due to pressure of the medium against the action of the rear ring of cleaning members.

When necessary, the pipe may be after-treated by means of a rotating pipe cleaning machine provided with a brush or the like.

When using steam-boilers the steam may also be utilized for turbine operation instead of water and so on. The eccentric weight and the motor may be arranged in another way relatively to each other, possibly outside the cleaning body.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a pipe cleaning machine, the combination of a casing having cutting means rigidly fixed to said casing, said cutting means being adapted to perform within a pipe to be cleaned a longitudinal movement, said casing having a rear wall which has substantially the area of the pipe, said wall being adapted to propel the casing longitudinally through the pipe under the impetus of fluid under pressure behind the casing, at least one inlet duct providing a communication between said fluid under pressure and the interior of said casing, at least one outlet duct from the interior of said casing opening at its front end, a turbine arranged inside said casing and adapted to be rotated by fluid under pressure admitted through said inlet duct, and a weight connected with said turbine in an eccentric position in relation to its axis of rotation for the purpose of imparting, when rotated, a rotative and vibrative movement to said casing in order to cause its cutting means to perform an abrasive and scraping action on incrustations and sediments present in said pipe.

2. In a pipe cleaning machine, the combination of a casing having integral peripheral rings provided with cutting means formed thereon, said cutting means being adapted to perform, within a pipe to be cleaned, a longitudinal movement, said casing having a rear wall, which has substantially the area of the pipe, said wall being adapted to propel the casing longitudinally through the pipe under the impetus of fluid under pressure behind the casing, at least one inlet duct providing a communication between said fluid under pressure and the interior of said casing, at least one outlet duct, from the interior of said casing opening at its front end, a turbine arranged inside said casing and adapted to be rotated by fluid under pressure admitted through said inlet duct, and a weight connected with said turbine in an eccentric position in relation to its axis of rotation for the purpose of imparting, when rotated, a rotative and vibrative movement to said casing in order to cause its cutting means to perform an abrasive and scraping action on incrustations and sediment present in said pipe.

3. In a pipe cleaning machine, the combination of a casing having forward and rear integral peripheral rings provided with cutting means formed thereon the forward ring being less in diameter than the rear one in order to serve as a roughing drill, said cutting means being adapt-

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ed to perform, within a pipe to be cleaned, a longitudinal movement, said casing having a rear wall which has substantially the area of the pipe, said wall being adapted to propel the casing longitudinally through the pipe under the impetus of fluid under pressure behind the casing, at least one inlet duct providing a communication between said fluid under pressure and the interior of said casing, at least one outlet duct from the interior of said casing opening at its front end, a turbine arranged inside said casing and adapted to be rotated by fluid under pressure admitted through said inlet duct, and a weight connected with said turbine in an eccentric position in relation to its axis of rotation for the purpose of imparting, when rotated, a rotative and vibrative movement to said casing in order to cause its cutting means to perform an abrasive and scraping action on incrustations and sediment present in said pipe.

4. In a pipe cleaning machine, the combination of a casing having forward and rear integral peripheral rings provided with cutting means formed thereon, the forward ring being less in diameter than the rear one in order to serve as a roughing drill and having its cutting means skewed with respect to the axis of said casing, said cutting means being adapted to perform, within a pipe to be cleaned, a longitudinal movement, said casing having a rear wall, which has substantially the area of the pipe, said wall being adapted to propel the casing longitudinally through the pipe under the impetus of fluid under pressure behind the casing, at least one inlet duct providing a communication between said fluid under pressure and the interior of said casing, at least one duct from the interior of said casing opening at its front end, a turbine arranged inside said casing and adapted to be rotated by fluid under pressure admitted through said inlet duct, and a weight connected with said turbine in an eccentric position in relation to its axis of rotation for the purpose of imparting when rotated, a rotative and vibrative movement to said casing in order to cause its cutting means to perform an abrasive and scraping action on incrustations and sediment present in said pipe.

5. In a pipe cleaning machine, the combination of a casing provided with a generally conical head having forwardly directed cutters thereon, said head being rigidly mounted on the casing, and forward and rear peripheral rings integral with the casing and provided with cutting means formed thereon, the forward ring being less in diameter than the rear one in order to serve as a roughing drill, and having its cutting means skewed with respect to the axis of said casing; said cutting means being adapted to perform, within a pipe to be cleaned, a longitudinal movement, said casing having a rear wall which has substantially the area of the pipe, said wall being adapted to propel the casing longitudinally through the pipe under the impetus of fluid under pressure behind the casing, at least one inlet duct providing a communication between said fluid under pressure and the interior of said casing, at least one outlet duct from the interior of said casing opening at its front end, a turbine fixed to a central longitudinally disposed shaft pivoted in bearings inside said casing and adapted to be rotated by fluid under pressure admitted through said inlet duct, and a weight connected with said turbine in an eccentric position in relation to its axis of rotation for the purpose of imparting, when rotated, a rotative and vibrative movement to said casing in order to cause its cutting means

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to perform an abrasive and scraping action on incrustations and sediment present in said pipe.  
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