June 21, 1955 C. B. PLETCHER 2,710,980

WATER JET PROPELLED NOZZLE HEAD FOR PIPE CLEANING APPARATUS

Filed June 14, 1954

Fig. 1

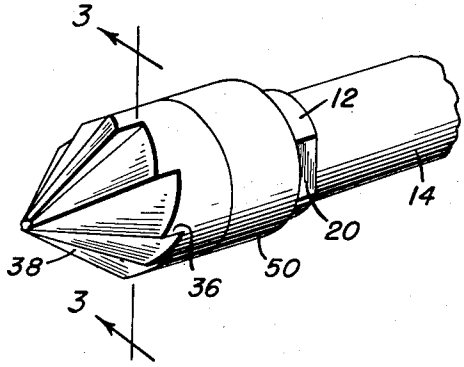


Fig. 5

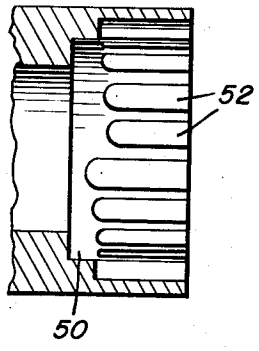


Fig. 3

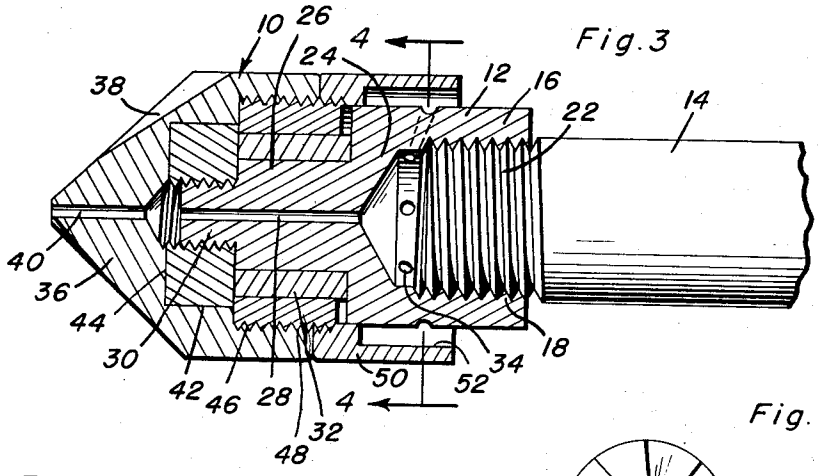


Fig. 2

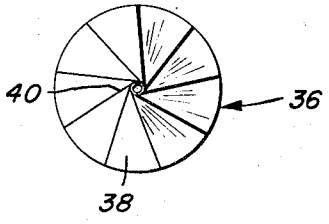
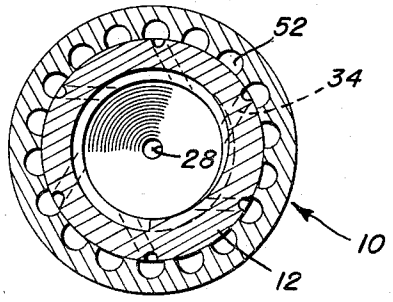


Fig. 4



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WATER JET PROPELLED NOZZLE HEAD FOR PIPE CLEANING APPARATUS

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3 Claims. (Cl. 15—104.12)

This invention appertains to apparatus for cleaning pipes, conduits and similar elongated hollow bodies and is particularly directed to improvements over my prior Patent No. 2,336,293, granted December 7, 1943.

A primary object of the present invention is to provide a nozzle head which has integral cutters on its forward end and which is constructed to be rotated by the pressure of the water passing axially therethrough and issuing from the center of the forward end in the form of a jet and is moved axially forward in a pipe or similar body under the propulsion of the water pressure so as to advance its cutters in screw fashion.

Another object of this invention is to provide a nozzle head having an inner and outer section, the outer section including the forward end of the nozzle head and a rearwardly directed socket which has axially extending vanes formed about its rear end and the inner section including a coupling for attachment to a flexible hose and having a plurality of jets which direct the water against the vanes to rotate the outer section relative to the inner section, which is fixedly secured to the hose.

A further object of this invention is to provide a novel type of bearing engagement between the two sections, such bearing engagement including a freely rotatable sleeve carried by the outer section and into which the inner section is threaded and a nylon bearing sleeve on the inner section which forms the sole bearing surface for the inner section in engaging the sleeve and the wall of the socket of the outer section.

A further object of this invention is to provide a compact nozzle head, which is durably constructed to withstand constant use and extreme pressures and to cut through any debris and force it out of a pipe.

These and ancillary objects are attained by this invention, the preferred embodiment of which is set forth in the following description and illustrated in the accompanying drawing, wherein:

Fig. 1 is a perspective view of a nozzle head constructed in accordance with this invention;

Fig. 2 is a front end elevational view thereof;

Fig. 3 is a longitudinal vertical sectional view taken on line 3—3 of Fig. 1;

Fig. 4 is a cross-sectional view taken on line 4—4 of Fig. 3, and

Fig. 5 is a fragmentary longitudinal sectional view of the rear portion of the socket, showing the vane construction.

Referring now more particularly to the drawing, the nozzle head includes a forward outer section **10** and a rearward inner section **12**, the latter being adapted to be coupled to a flexible hose **14** through which the water or water and air or similar mixture is conveyed.

The section **12** includes an axially bored body portion **16** which has threads **18** formed on its inner wall and diametrically opposed flattened wrench engaging portions **20** on its outer wall, adjacent its outer end, which is open to receive the hose that has its threaded end **22** threaded into the body portion. The body portion has a closed

inner end **24**, forwardly from which a cylindrical extension **26** axially extends. The bore in the body portion tapers inwardly at the inner end **24** and the end and extension are formed with a centrally disposed, axially extending jet passage **28**, that is disposed centrally of the bore. A coaxially reduced, exteriorally threaded neck **30** projects forwardly from the extension and provides the means for securing the inner and outer sections together against axial displacement. A nylon bearing sleeve **32** is fixedly circumposed on the extension **26** and abuts at one end against the outer surface of the inner end **24** and extends slightly beyond the terminus of the extension at its other end.

The body portion has the threads formed in its bore from the outer end thereof to a point spaced slightly from the inner end and at such space between the inner end and the threads a plurality of ports **34** are formed through the wall of the body portion in communication with the bore. The ports **34** are spaced equidistantly circumferentially of the body portion and extend substantially tangentially to the bore and are directly slightly rearwardly through the body portion to the exterior in a spiral fashion thereof for a purpose to be described.

The outer forward section **10** is cylindrical and has a conical nose portion **36** which is formed with spirally arranged cutters **38**. The nose portion is solid and has a centrally disposed axial jet passage **40** formed therethrough and disposed at the point of convergence of the cutters **38**.

The nose portion has a bore **42** formed therein rearwardly of the passage **40** and in which a washer **44** is rotatably disposed, the washer having a threaded center opening into which the neck **30** is threaded with the bearing sleeve **32** contacting the outer end of the washer. A locking sleeve **46** is threaded into the counterbore **48** rearwardly of the washer and holds the washer in place. The body portion **16** of the section **12** is rotatably disposed in the rear portion **50**, the wall of which is formed with vanes **52**. The vanes **52** are circumferentially spaced around the wall and extend axially thereof and receive the water from the ports **34**. The portion **50** has its inner end internally threaded and secured on the locking sleeve **46**.

In use the outer section is threaded counter-clockwise onto the inner section, and is rotated counter-clockwise by the arrangement of the ports and vanes as shown in Fig. 4, so that such rotation, in the same direction of the left hand thread arrangement, serves to hold the parts in secured connection. As the outer section rotates, the cutters spirally move along the interior of a pipe in a screw action to scrape the wall of the pipe. The outer section rotates on the bearing sleeve **32**, which provides a smooth surface, that is wear resistant and does not require lubrication. As the outer section is rotated, it also rotates around the washer **44**, into which the inner section is secured. The water conveyed by the hose **14** impacts against the inner end of the bore and some of it is forced back through the tangential ports **34** to impinge on the vanes and drive the outer section around the inner section, which is held fixed by the hose. The water is increased in speed by the reduced diameter of the aligned jet passages and issues from the nose portion in the form of a fine, high pressure jet. The reaction of the water issuing in jets from the ports produces a rotation of the outer section and also the reaction of the backwardly and spirally directed jets from the ports will propel the nozzle head through a pipe.

To clean a pipe, the nozzle head is inserted into the pipe and water is fed under pressure through the hose, which is gradually fed into the pipe under the pull of the nozzle head. The jet, issuing from the nose portion,

will wash out debris and the cutters will cut out fibers, roots, etc., which are not washed out by the jet.

Of course, the diameter of the nozzle head will be governed by the diameter of the pipe to be cleaned since the diameter of the nozzle head will be only slightly less than the internal diameter of a pipe.

While the best known form of this invention has been shown and described, other forms may be realized as coming within the scope of the invention, as defined in the appended claims.

I claim:

1. For use with an apparatus in cleaning pipes, a nozzle head of a diameter substantially equal to the internal diameter of a pipe to be cleaned, said nozzle head including an inner, rearward section having a threaded bore fixedly receiving an end of a flexible hose, and an outer, forward section, means rotatably mounting the outer section on the inner section for rotation relative thereto, a conical nose portion on the outer section, spirally arranged cutters formed on the nose portion, said outer section having a centrally disposed, axial jet passage formed therethrough and said inner section having a similar passage aligned and communicating therewith and with the bore in the inner section, said inner section having an annular series of jet ports directed substantially tangentially from the bore and extending slightly rearwardly through the wall of the section and said outer section having a portion concentric to the inner section and encompassing the ports and formed with axially extending vanes which are acted on by the fine jets issuing from the jet ports to rotate the outer section and propel the nozzle head through the pipe, said outer section having an axial bore receiving the inner section and said vanes being formed on the wall of the bore at the rearward end of the outer section and open through such end.

2. A nozzle head as claimed in claim 1, wherein said inner section includes a body portion containing the bore to receive the hose and having a forward end and a reduced coaxially extending extension on the forward end, said extension terminating in a reduced threaded neck, means carried by the outer section receiving the threaded neck and a bearing sleeve circumposed on the extension and forming the contact between the inner and outer sections.

3. A nozzle head as claimed in claim 2, wherein said outer section has a stepped axial bore formed rearwardly of the nose portion and extending through the rearward end thereof and receiving the extension and neck, said means carried by the outer section for receiving the neck including a rotatable washer disposed rearwardly of the nose portion.

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