March 21, 1967 M. P. MANESS 3,310,113

WELL CLEANER

Filed June 12, 1964

FIG. 1.

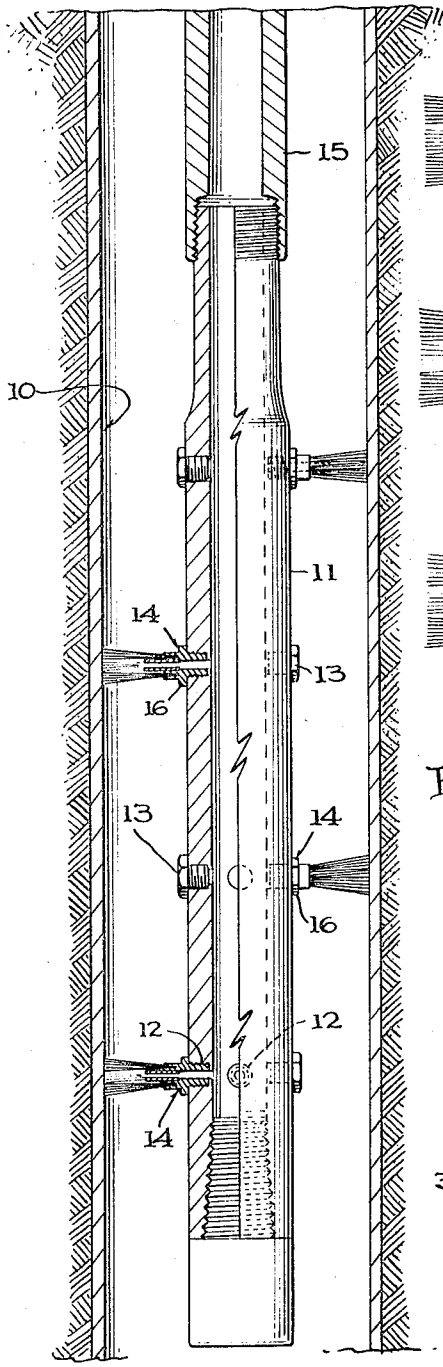


FIG. 3.

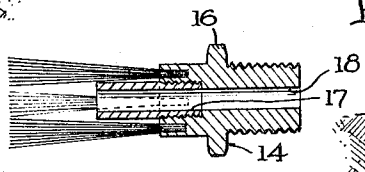


FIG. 4.

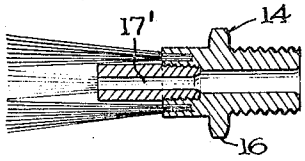


FIG. 5.

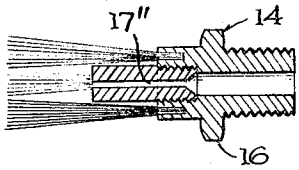


FIG. 7.

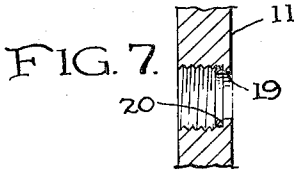


FIG. 6.

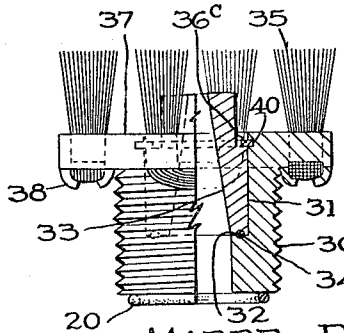
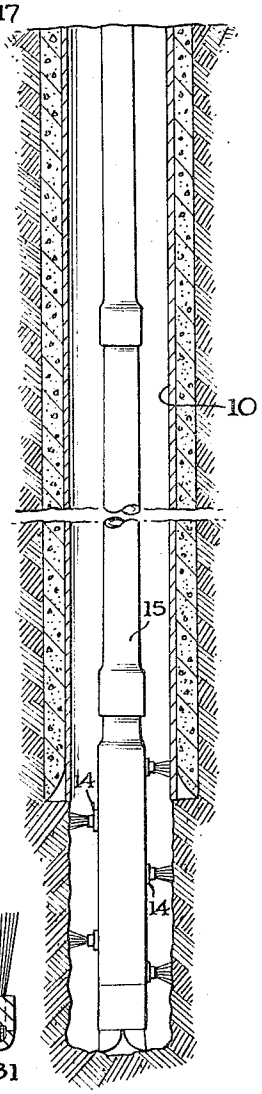


FIG. 2.



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WELL CLEANER

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This invention relates to improvements in apparatus for cleaning and abrading well casings and bores thereof where a fluid is injected through a group of nozzle means which may be moved longitudinally and rotatably relative thereto by means of pipe sections.

Heretofore, the well cleaning methods and apparatus taught in the prior art have comprised perforated sections of pipe to which have been applied slidable bands adapted to carry brush elements as well as bands provided with spaced, offstanding tufts of bristles, the supporting bands of which are rigidly secured by screws.

In the present invention apertured plugs are threadedly positioned in bored openings in various sections of pipe and extend therefrom in a plane normal to the wall of the pipe. Abrading means comprising tufts of steel wire are inserted or embedded into the exterior planar wall of one type of plug and in still another form are positioned in apertures therein. Nozzle means are adapted to extend from openings in the plug and project out into the area under control of the bristles so that fluid pumped down the pipe is highly concentrated in a particular area when emitted from the nozzles into the well casing, screen or bore.

Accordingly, the principal object of the invention is to provide readily removable plugs in apertured pipe sections, said plugs being arranged to receive nozzle means having variable dimension outlet aperture means.

Still another object of the invention is to provide improved means by which the tufts of bristles may be secured on said plug.

A still further object of the invention is to provide another embodiment wherein a removable nozzle means is secured in the plug by a spring means.

The details of the invention, as well as additional objects and advantages, will be clearly understood with reference to a preferred embodiment illustrated in the accompanying drawings employing similar reference numerals to identify the same elements in each of the several views, and in which:

FIG. 1 is a more or less diagrammatic view partially in cross-section and partially in elevation of the apparatus in a well casing;

FIG. 2 is an elevational view of the apparatus extending through a well casing into a bore hole;

FIG. 3 is a sectional view of an improved plug with one type of nozzle means;

FIG. 4 is another sectional view of a plug with another nozzle of smaller area;

FIG. 5 is still another plug with a nozzzle having a smaller aperture;

FIG. 6 is another type of plug shown partially in section and partially in elevation; and

FIG. 7 shows a counterbored pipe wall with seal means provided therein.

Turning now to the drawings, there is shown in FIG. 1 a well casing **10** into which extends a section of pipe **11** that is appropriately bored and threaded, as at **12**, in a plurality of locations about its circumference.

Certain portions of the pipe section are capped, as illustrated at **13**, with other of the bored openings being equipped with apertured plugs **14** forming a part of this disclosure.

It is to be understood that the perforated section of pipe **11** may be attached to the lower end of a drill stem which is indicated at **15** in FIG. 2.

The plugs **14** each include an offstanding or surrounding collar to the edge portion **16** of which is applied a suitable conformation adapted to receive a wrench for setting the plugs in the apertures.

In the form of the invention shown in FIG. 1, the pipe **11** is drilled entirely through the wall, thereafter threaded and certain areas capped. However, in the embodiment of the invention shown in FIG. 7, the pipe **11** is threaded only partially through the wall thereof to provide a reduced collar means **19** and against which an O-ring **20** may be positioned for a purpose that will become apparent later in the description.

In the embodiment of the invention shown in FIGS. 3–5 it will be noted that all of the plugs **14** are substantially identical in that they are threaded as at **12**, include the portion **16** adapted to receive a spanner wrench and tufts of bristles which may consist of steel wire. In FIG. 3, the nozzle **17** is threaded into the plug as shown and is provided with an aperture substantially coincident with the axial opening **18** in the plug.

In FIG. 4 there is illustrated another plug **14** with a nozzle **17'** of a slightly smaller circumference and the use of this type of nozzle is desirable where a more concentrated flow of fluid is necessary for the cleaning operation.

In FIG. 5 still another nozzle **17''** is shown which has an aperture of still smaller circumference that will be required to clean in areas that resist the cleaning operation performed by the regular equipment that has already been described.

Turning now to FIG. 6, there is illustrated another embodiment of this invention and in which a plug means **30**, threaded as shown, is adapted to be substituted for those plug means forming a part of this invention that have already been described. The plug means **30** is counterbored as at **31** to provide a shoulder **32** against which the nozzle means **33** is adapted to abut, there being interposed between the shoulder **32** and said nozzle means a seal means **34**.

The nozzle means **33** illustrated in this view includes a converging means defining an aperture, the innermost enlarged portion of which merges into the means defining the aperture in the plug means. The outer extremity of said nozzle means extends substantially beyond the planar wall of the plug means and into the area under the control of the bristle means **35**. An expansible spring clip means **36***c* is adapted to be positioned in an annular recess provided in the counterbore and into which the nozzle is placed. The nozzle means **33** has a shelf portion which is substantially coplanar with the slotted area **40** provided in the plug means **30**. Thus, it will be apparent that various types and sizes of nozzles may be installed in the plug body means by merely removing the expansible spring **36***c*. With further reference to FIG. 6, the annular offstanding wall **37** may have its perimeter provided with any suitable configuration adapted to receive a spanner or other wrench means as previously explained. The wall **37** is suitably apertured as is best understood by examining the center area of this view and groups of steel wire bristles, preformed into U-shaped bundles, are inserted in the means defining the aperture from the rear of wall **37** so that the groups of steel bristles extend therebeyond, as shown. The lower surface of wall **37** is deformed as at **38** to form a gripping means for the bundles of bristles, all of which will be clearly understood from an examination of the drawing.

Although several embodiments of the invention have been depicted and described, it will be apparent that these embodiments are illustrative in nature and that a number of modifications in the apparatus and variations in its end use may be effected without departing from the spirit or scope of the invention as defined in the appended claims.

What I claim is:

1. In an apparatus for cleaning the interior of well casing and bores, the combination comprising at least one section of pipe bored and threaded at predetermined locations in a plane normal to the length of said section, apertured, threaded plugs positioned in at least a plurality of said bores, said plugs having front planar walls, axially apertured nozzle means threadedly secured into said plugs, abrading means surrounding said nozzle means and offstanding from the planar wall of said plug, whereby when said pipe is lowered into a well and pressure is introduced thereinto the interior of the well may be cleaned by the abrading means and the fluid emitted from said nozzle means.

2. In an apparatus for cleaning the interior of well casing and bores, the combination comprising at least one section of pipe bored and threaded at vertically spaced intervals and at points approximately 90° apart about the circumference of said pipe and in a plane normal to the length of said section, apertured, threaded plugs positioned in at least a plurality of said bores, said plugs having front planar walls which are counterbored longitudinally thereof, axially apertured nozzle means seated in said counterbored portion, said counterbored portion further including spring means cooperating with said plug means to retain said nozzle in the counterbore, abrading means surrounding said nozzle means and offstanding from the planar wall of said plug, whereby when said pipe is lowered into a well and pressure is introduced thereinto the interior of the well may be cleaned by the abrading means and the fluid emitted from said nozzle means.

3. In an apparatus as claimed in claim 2, wherein said nozzle means has an outer extremity which extends substantially beyond the plug and substantially medially of the extent of said abrading means so that the pressure emitted therefrom and into said abrading means is highly concentrated in force.

4. In an apparatus for cleaning the interior of well casing and bores, the combination comprising at least one section of pipe bored and threaded at predetermined locations in a plane normal to the length of said sections, apertured, threaded plugs positioned in at least a plurality of said bores, said plugs having front planar walls which are counterbored longitudinally thereof, axially apertured nozzle means seated in said counterbored portion, said counterbored portion further including spring means cooperating with said plug means to retain said nozzle in the counterbore, abrading means surrounding said nozzle means and offstanding from the planar wall of said plug, whereby when said pipe is lowered into a well and pressure is introduced thereinto the interior of the well may be cleaned by the abrading means and the fluid emitted from said nozzle means.

5. In an apparatus as claimed in claim 4, wherein the spring means comprises an expansible clip means adapted to be received in recesses provided in said plug means and nozzle means.

6. In an apparatus as claimed in claim 4, wherein the plug is provided with a collar means, said collar means being provided with a series of apertures, U-shaped tufts of bristles extending through said apertures and means carried by said collar means for securing said bristled tufts against inadvertent displacement.

7. In an apparatus as claimed in claim 6, wherein the means for securing the bristle tufts in said collar comprise upset portions extending from opposed areas of said collar.

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