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SET SHOE FOR WELL CASINGS

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Fig. 1.

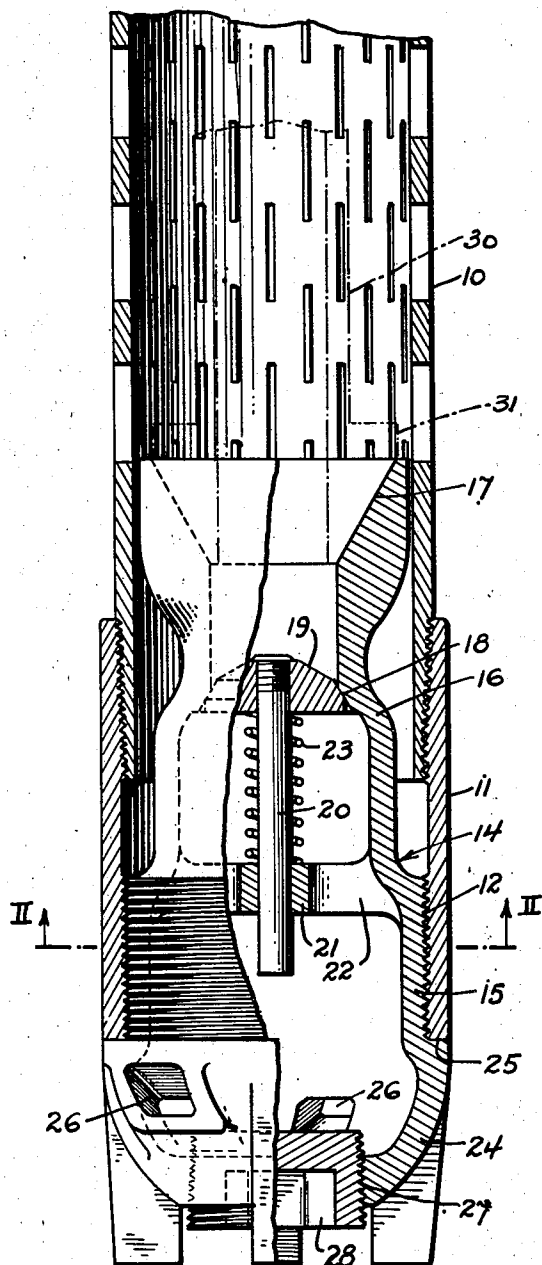


Fig. 2.

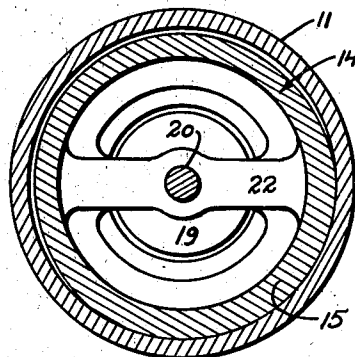
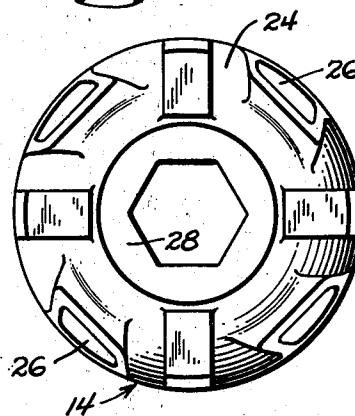


Fig. 3.



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SET SHOE FOR WELL CASINGS

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3 Claims. (Cl. 166—9)

This invention relates to devices commonly termed "set shoes" and utilized in connection with perforated well casing when setting the same in the well bore.

5 Frequently, when setting screen pipe or any other type of perforated pipe in a well bore that has been drilled through the oil sand with mud fluid in the hole, it is necessary to wash the mud out of the bore before finally setting the casing on bottom. It is also necessary to prevent sands from heaving up into the lower end of such pipe.

10 It is the principal object of my present invention to provide an improved and simplified device for the purposes above described, which device constitutes an improvement over devices previously used for this purpose, such as set out in Technical Paper 247, issued by the Bureau of Mines in 1920, entitled "Perforated Casing and Screen Pipe in Oil Wells", and particular reference to pages 33-39 thereof.

15 One form which the invention may assume is exemplified in the following description and illustrated by way of example in the accompanying drawing, in which:

25 Fig. 1 is a central vertical section through the lower end of an oil string of casing showing my improved device fitted thereto, the same being partly in section.

30 Fig. 2 is a transverse sectional view taken on line II—II of Fig. 1.

Fig. 3 is a bottom view of the device.

Referring more particularly to the accompanying drawing, 10 indicates the lower end of a section of perforated casing which is usually set in a well bore in alignment with the oil sands for the purpose of enabling the oil to enter the casing but excluding the sand. Fitted to the lower extremity of this section of casing 10 is what is termed a shoe or coupling 11 which is a tubular steel member. The shoe or coupling 11 is interiorly threaded in its lower end as at 12. Threaded into this threaded section 12 is a hollow plug member 14 preferably made of cast iron or other suitable material. This hollow plug member is formed with a hollow cylindrical section 15 exteriorly threaded that it may be threaded into the threaded section 12 of the shoe or coupling 11.

Extending upwardly from this threaded section 15 and formed integral therewith is a hollow tubular extension 16 whose maximum exterior diameter is less than the interior diameter of the casing 10. This extension 16 is hollow and open ended, as illustrated, and its upper end is formed with an interior wash pipe seat 17. This seat is

frusto-conical with its smaller diameter lowermost.

Intermediate its ends, the interior of the extension 16 is formed with a valve seat 18 with which a poppet type valve 19 cooperates. This valve 19 is fitted with a valve stem 20 reciprocably mounted in a guide 21 carried by a web 22 formed integral with the body 14 at the junction between the threaded section 15 and the tubular hollow extension 16. A spring 23 is provided which normally maintains the upwardly seating valve 19 seated.

At the lower end of the threaded section 15 of the body 14 is an inverted dome-shaped portion 24 which is likewise hollow. The exterior diameter of this dome-shaped member 24 agrees with the exterior diameter of the coupling or shoe 11 so that an annular shoulder 25 will be formed to abut against the lower end of the shoe 11 when the body 14 is fitted thereto.

The inverted dome-shaped portion 24 of the body is provided with a series of radial ports 26 which extend slightly upwardly and laterally in order that when fluid is expelled therefrom under high pressure, the fluid will assume a whirling action which adds to its washing efficiency.

The dome-shaped member at its center is formed with a threaded port 27 in which a plug 28 is threaded. By removing this plug before lowering the device into the hole, a stream of fluid may be directed downwardly instead of merely laterally or radially through the ports 26 as is the case when the plug 28 is in place.

In operation of the device, it is constructed and assembled on the lower end of perforated pipe substantially as illustrated. When the casing is lowered into the hole, a wash pipe shown in dotted lines at 30 is placed in the casing, which wash pipe has an abutment member 31 tapered to correspond with the wash pipe seat 17 so that fluid under high pressure directed downwardly through the wash pipe 30 will pass into the tubular extension 16, unseat the valve 19 and discharge through the ports 26. The formation of these ports, as described, is such as to give the washing water or fluid a swirling action. This fluid washes the mud out of the well, as previously described. After the washing action has been accomplished, the wash pipe 30 is removed and the valve 19 seats so as to prevent sand from heaving up through the coupling 11 and the body 14 into the perforated pipe.

From the foregoing it is obvious that I have provided a very simple and inexpensive device for use in connection with setting perforated

pipe in a well that has been drilled in the oil sand with mud fluid in the hole and which may be used to wash the mud out of the well before setting the casing on bottom and preventing sand from heaving up into the casing.

While I have shown the preferred form of my invention, it is to be understood that various changes may be made in its construction by those skilled in the art without departing from the spirit of the invention as defined in the appended claims.

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

1. A device of the character described comprising a tubular coupling for connection to the lower end of a string of perforated casing, a hollow body member having a threaded hollow cylindrical portion to be threaded into the lower end of said coupling, said body having a hollow cylindrical extension formed integral with said threaded section and extending upwardly therefrom coaxially thereof, said extension being of an exterior diameter less than the interior diameter of the casing to which said coupling is fitted, said extension being open ended and being formed with a tapered wash pipe seat at its upper end, a valve seat formed about the interior perimeter of said extension intermediate the ends thereof, a spring-pressed upwardly seating valve cooperating with said seat, an inverted dome-shaped portion at the lower end of said threaded section and of an exterior diameter agreeing with the exterior diameter of the coupling to provide an annular shoulder abutting against the lower extremity of the coupling, said hollow dome-shaped portion being formed with ports through the wall thereof to enable fluid to be pumped downwardly through the body and outwardly into the bore around said coupling.

2. A device of the character described comprising a tubular coupling for connection to the lower end of a string of perforated casing, a hollow body member having a threaded hollow cylindrical portion to be threaded into the lower end of said coupling, said body having a hollow cylindrical extension formed integral with said threaded section and extending upwardly therefrom coaxially thereof, said extension being of

an exterior diameter less than the interior diameter of the casing to which said coupling is fitted, said extension being open ended and being formed with a tapered wash pipe seat at its upper end, a valve seat formed about the interior perimeter of said extension intermediate the ends thereof, a spring-pressed upwardly seating valve cooperating with said seat, an inverted dome-shaped portion at the lower end of said threaded section and of an exterior diameter agreeing with the exterior diameter of the coupling to provide an annular shoulder abutting against the lower extremity of the coupling, said hollow dome-shaped portion being formed with ports through the wall thereof to enable fluid to be pumped downwardly through the body and outwardly into the bore around said coupling, said ports being upwardly and laterally directed to give the discharged fluid a whirling action.

3. A device of the character described comprising a tubular coupling for connection to the lower end of a string of perforated casing, a hollow body member having a threaded hollow cylindrical portion to be threaded into the lower end of said coupling, said body having a hollow cylindrical extension formed integral with said threaded section and extending upwardly therefrom coaxially thereof, said extension being of an exterior diameter less than the interior diameter of the casing to which said coupling is fitted, said extension being open ended and being formed with a tapered wash pipe seat at its upper end, a valve seat formed about the interior perimeter of said extension intermediate the ends thereof, a spring-pressed upwardly seating valve cooperating with said seat, an inverted dome-shaped portion at the lower end of said threaded section and of an exterior diameter agreeing with the exterior diameter of the coupling to provide an annular shoulder abutting against the lower extremity of the coupling, said hollow dome-shaped portion being formed with ports through the wall thereof to enable fluid to be pumped downwardly through the body and outwardly into the bore around said coupling, said dome-shaped member being formed with a central port and a removable plug fitting said port.

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