No. 798,504. PATENTED AUG. 29, 1905.

W. E. GARDNER.

APPARATUS FOR CLEANING OIL WELLS.

APPLICATION FILED DEC. 8, 1904.

Fig. 1.

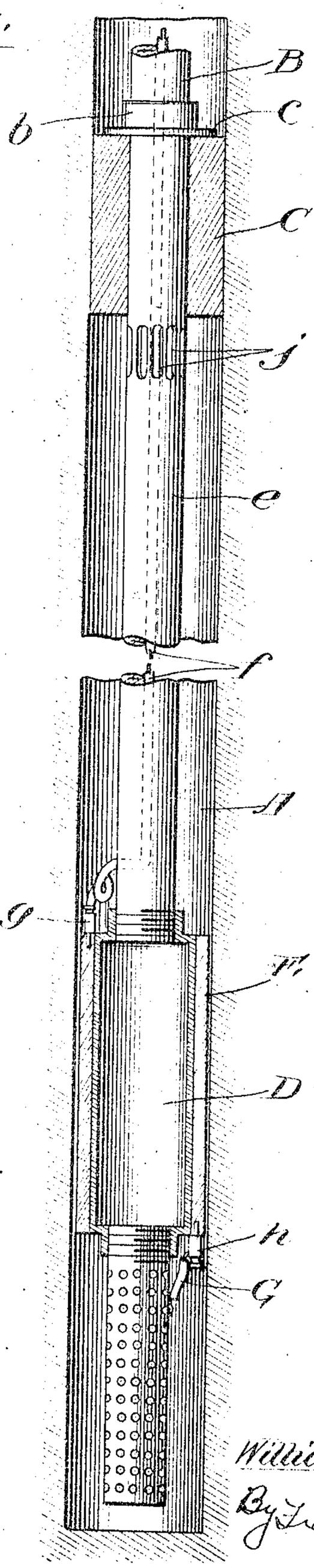


Fig. 2.

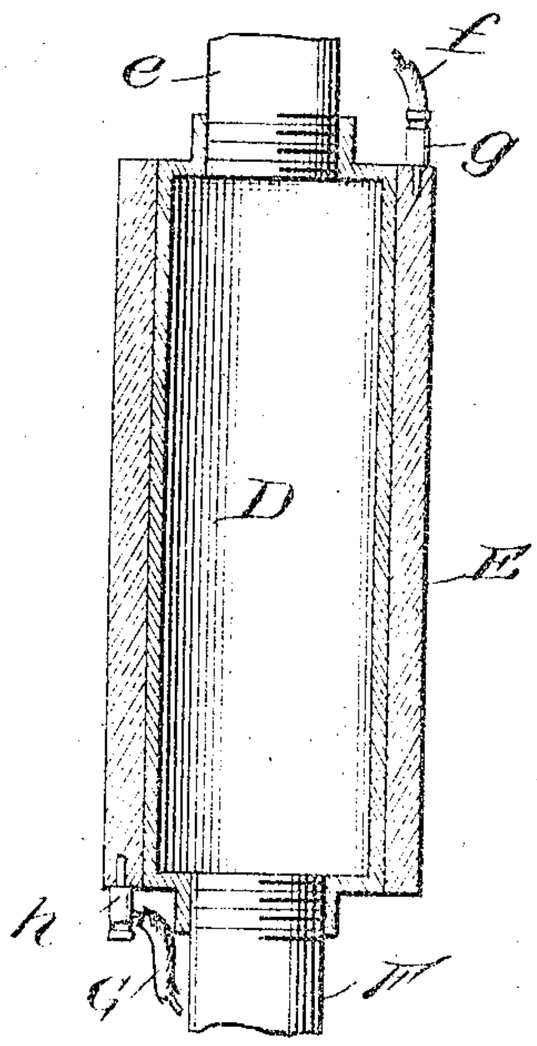
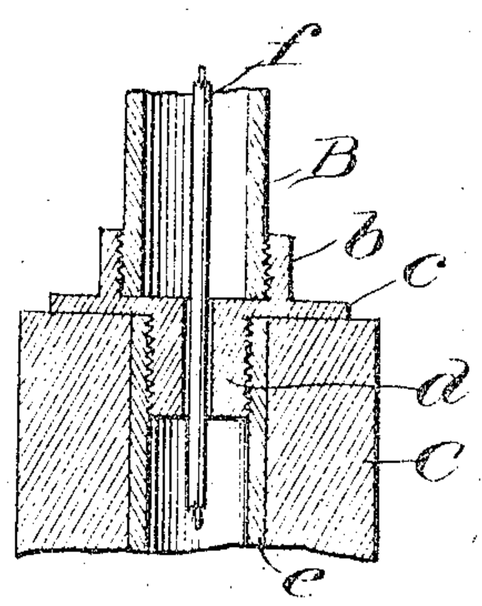


Fig. 3.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR CLEANING OIL-WELLS.

No. 798,504. Specification of Letters Patent. Patented Aug. 29, 1905.

Original application filed October 10, 1904, Serial No. 227,851. Divided and this application filed December 8, 1904. Serial No. 235,985.

To all whom it may concern:

Be it known that I, WILLIAM EDWARD GARDNER, a citizen of the United States, and a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for Cleansing Oil-Wells, of which the following is a full, clear, and exact specification.

This application is a division of Letters Patent of the United States granted to me January 17, 1905, No. 780,279, for a method of cleansing oil-wells.

The object of my invention is to soften and clean the walls of the bore of the oil-bearing strata of an oil-well, so as to remove the solidified paraffin or other base of the crude oil, which dams up and chokes the passages and channels through which the crude oil naturally flows into the well. This I accomplish by means which heat and cause the ebullition of the fluid that accumulates in the well and confines and causes the steam generated thereby to expand against and eat its way into the surrounding accumulations of obstructing material in the bore of the oil-bearing strata of the well, and thus remove the same, substantially as hereinafter fully described and as particularly pointed out in the claims.

In the drawings, Figure 1 is a longitudinal vertical section of the lower oil-bearing strata of an oil-well, showing my improvements, partly in side elevation and partly in section, applied thereto. Fig. 2 is a longitudinal vertical section of the heater used in connection therewith. Fig. 3 is a vertical central section of the portion of the plug or well packing and coupling used in connection therewith.

Referring to the drawings, A represents the bore of a well, the walls of which may, if desired, be lined by suitable pipe or tubes, down as far as the oil-bearing strata of the well. My invention necessitates a metal pipe B, of smaller diameter to be inserted down into the well, that has its lower end tapped into a suitable head *b*, which latter is provided with circumferential flanges *c* and with a plug *d*, extending downward centrally therefrom, that is tapped into the upper end of a section of pipe *e*, extending down into the oil-bearing strata of the well, as will hereinafter more fully appear. The bore of the well, above the head *b* is separated from the portion of the same below said head by a packing C, which surrounds the upper end of the section of pipe *e* and fills the space between the outer circumference of the same and the walls of the well sufficiently tight to prevent the escape of the steam and hot fluid generated by the apparatus of my invention from the space below said packing. The pipe *e* extends down into the oil-bearing strata of the well, preferably to a point near the bottom of the same, where it is tapped into the upper reduced end of a hollow chamber D, constituting the boiling-chamber of the heater used in connection with my invention, and provides a support for the circumferential casing E of the resistance material surrounding the same. The lower end of chamber D is likewise reduced, preferably in the same manner as its upper end, and has tapped into the same a perforated intake-pipe F, the lower end of which is preferably closed.

The plug *d* of the head *b* has a small vertical opening therein for the downward passage therethrough of an insulated positive wire *f* of an electric circuit, whose lower end at a point just above the heater extends laterally out through a suitable opening in the side of the pipe *e* and is connected to a suitable binding-post *g*, tapped into the upper end of the resistance material of the heater at a suitable point. The lower edge of the resistance-casing E has a binding-post *h* tapped into it, and an insulated negative wire G connects said binding-post with the perforated intake F. The metal pipe of my invention forms the negative leg of the electric circuit.

In operation when the circuit is turned on the resistance-casing E becomes highly heated and the fluid which accumulates in the oil-bearing strata of the well and fills the chamber D soon becomes sufficiently heated for it to flow upward through the pipe *e* to a point just below the packing C, where it passes out of the elongated perforations *j* in the sides of the pipe into the space between the same and the walls of the well, where, becoming cooler, it gravitates downward to the bottom of the well and is then drawn into the intake and caused to circulate the same as before. When this oil becomes sufficiently heated to generate steam, the circulation and agitation of the

fluid and steam in the oil-bearing strata is very great, and softens and loosens the paraffin or other base of the oil, and works its way into the surrounding oil-bearing earth and thoroughly cleanses the passages and channels leading therefrom into the well to such an extent as to cause the well to flow again in as great or greater quantity as originally.

I claim—

1. An apparatus for cleansing oil-wells comprising suitable means for closing the bore of the well, and a suitable heater in the well below the means for effecting said closure.

2. An apparatus for cleansing oil-wells comprising means for closing the bore of the well, and a suitable tubular heater in the well below the means for effecting said closure.

3. An apparatus for cleansing oil-wells comprising means for closing the bore of the well, a pipe depending therefrom having transverse perforations near its upper end and a tubular heater secured to the lower end of said pipe.

4. An apparatus for cleansing oil-wells comprising means for closing the bore of the well, a pipe depending therefrom having transverse perforations near its upper end, a tubular heater secured to the lower end of said pipe, and a perforate intake-tube secured to the lower end of said heater.

5. An apparatus for cleansing oil-wells comprising a suitable pipe depending from above to and adjacent to the oil-bearing strata of the well, a suitable union closing the lower end of the same, a pipe connected to and depending from said union having perforations in its upper end, a packing surrounding the upper end of said last-mentioned pipe and closing the bore of said well and a tubular heater connected to the lower end of the said pipe.

In testimony whereof I have hereunto set my hand this 19th day of November, A. D. 1904.

WILLIAM EDWARD GARDNER.

Witnesses;

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E. K. LUNDY.