H. R. DAVIS.

Apparatus for Flooding Oil-Wells.

No. 225,111. Patented Mar. 2, 1880.

Fig: 1.

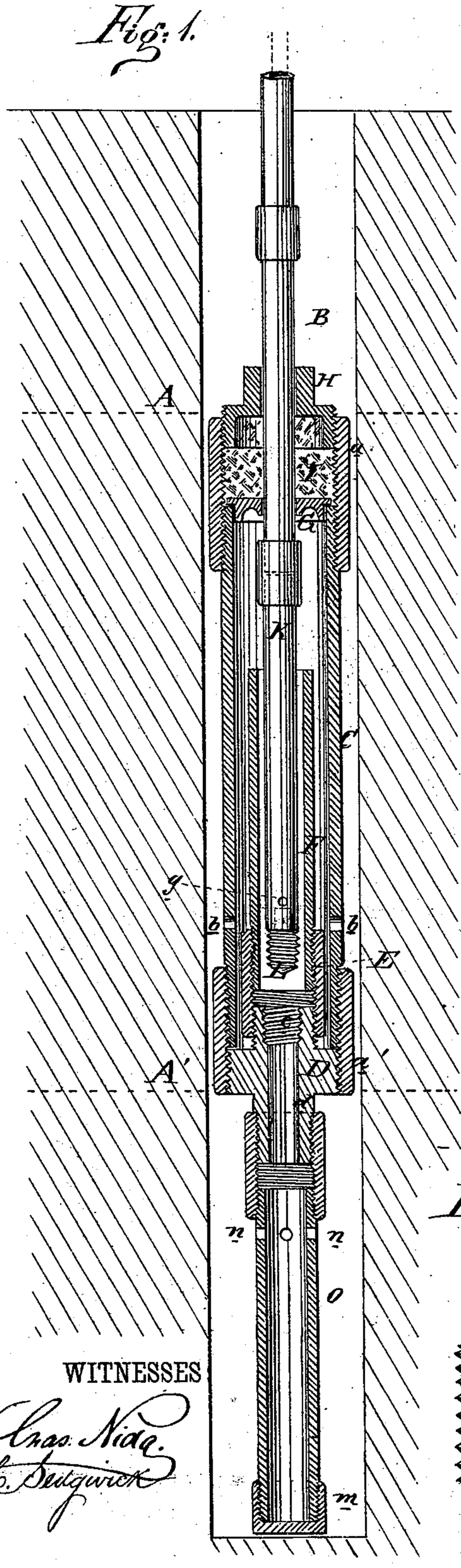

Fig: 2.

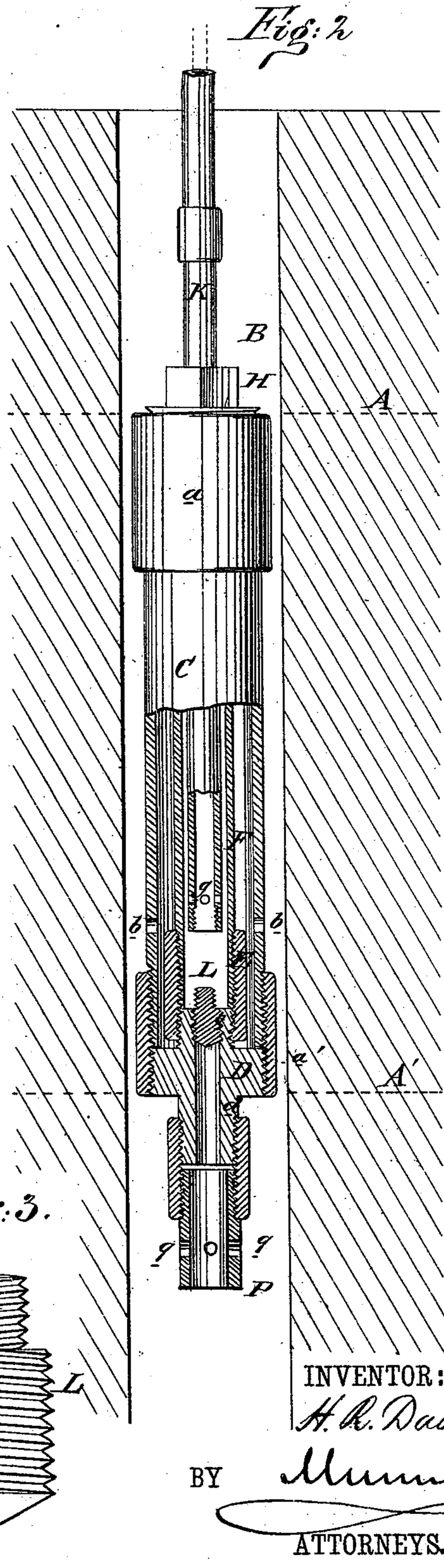

Fig: 3.

WITNESSES

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HENRY R. DAVIS, OF PIONEER, PENNSYLVANIA.

APPARATUS FOR FLOODING OIL-WELLS.

SPECIFICATION forming part of Letters Patent No. 225,111, dated March 2, 1880.

Application filed December 15, 1879.

To all whom it may concern:

Be it known that I, HENRY R. DAVIS, of Pioneer, in the county of Venango and State of Pennsylvania, have invented a new and Improved Apparatus for Flooding Oil-Wells and Regulating the Flow of Gas therefrom, of which the following is a specification.

Figure 1 is a vertical elevation of the device, partly in section, as arranged when the flood is off the well. Fig. 2 is a vertical elevation of the device, partly in section, as arranged when the well is flooded. Fig. 3 is a vertical elevation of the screw-plug.

Similar letters of reference indicate corresponding parts.

The object of this invention is to continuously flood or lubricate oil-wells other than flowing oil-wells with oil, in order to prevent the accumulation on their sides of incrustations of salt, lime, or paraffine or other oil-deposits; and the further object of the invention is to secure a continuous flow of gas from those wells from which the steady outflow of gas is interrupted by pumping.

In many oil-producing localities, especially in those in which this device is applicable, the oil-producing wells produce, also, large quantities of salt-water, and the two, mingling and flowing up together, are pumped into tanks, where they separate by gravity. In these wells it is found that the sides of the well or the well-casing become incrusted with salt, lime, and other mineral deposits for a considerable depth, and with paraffine or other fatty deposits from the oil, which incrustations and deposits contract the bore of the well and interfere with its working. These incrustations are formed by the slow exudation of the oil and water through the pores of the rock or well-casing and the evaporation of their more volatile elements; and as the depth of the "sand-rock" may vary from fifteen feet to seventy-five feet, and as this exudation usually begins near the top of the rock, these fatty and mineral deposits or stalactites often extend throughout the whole depth of the rock, causing much trouble and inconvenience.

In order to prevent these deposits or a serious increase of them, and in order to soften or dissolve them, that they may readily crumble and fall off, it is customary to pour some of the lighter oils, and in some instances benzine, into the well; but this process, which is called "flooding," entails expense and trouble, and is only partially effective. In these districts, too, there are many wells called "head" wells, which are wells that yield so slowly that they are not pumped continuously, but periodically, as they become filled to a certain height with oil and water exuding from the rock, and because each filling-up is called a "head" the wells are called "head" wells. From most of these head wells there is a continuous flow of gas upward between the pump-tube and the well-casing, and this gas is ordinarily used, by means of pipe-connections, as fuel under the boilers that operate the works; but it is found on the periodical pumping that the gas ceases to flow in its ordinary channel, and instead is drawn up through the pump-tube in combination with the oil and water, and being pumped into the tanks uselessly escapes therefrom; hence the boilers are deprived of this gaseous fuel during the operation of pumping.

It is to prevent the incrustations of mineral deposits and fatty matter above alluded to, and to prevent this waste of gas from head and other wells, that I have invented the device herein described, whereby the exuding surface of the well-casing may be kept constantly covered with oil, so that there can be no evaporation therefrom, and whereby the upward flow of gas between the well-casing and the pump is made continuous.

In the drawings, the space between the lines A A′ represents the sand-rock through which the well B is bored, said well being presumably about five and a half inches in diameter.

C is the outer tube of the device, furnished at each end with couplings *a a′*, and made about four inches in diameter, and of sufficient length to extend through the sand-rock from A to A′. A few inches above the lower coupling this tube C is provided with lateral perforations *b b*, for purposes hereinafter described.

D is a screw-plug screwed into the lower end of the tube C, or its coupling *a′*, and provided with upward and downward tubular prolongations *c d*, on which screw-threads are formed.

E is a coupling screwed on the upward pro-

longation *c* of the screw-plug D, and into this coupling E is screwed the vertical tube F, which is about three inches in diameter and of sufficient length to extend upward to the height to which the well is to be flooded.

G is an annular collar fitting within the coupling *a* and resting on top of the tube C. H is a screw-plug screwing into and closing the upper end of the tube C, or its coupling *a*, and between the said collar G and plug H is placed hemp or other suitable packing, I, so that said collar, plug, and packing form a suitable stuffing-box for the pump tube or barrel K, that passes down through this stuffing-box and centrally into the tube F. This pump barrel or tube K is about two inches in diameter, and when the well is unflooded carries in its lower end a screw-plug, L, provided with a right-and-left screw, as shown in Fig. 3, and the said pump-barrel is provided with lateral perforations *g g* just above the said screw-plug.

In the head wells, after a pumping, the oil and water gradually rise between the well-casing and the pump tube or barrel—often until they approach to within two or three hundred feet of the surface of the ground before they are pumped again—while the gas escaping from the rock rises continuously through the oil and water and issues from the top of the well, to be led to the boiler-fires to be used as fuel; but almost immediately that pumping recommences, the upward flow of the gas is checked and diverted downward toward the bottom of the pump, and the gas is then pumped up with the liquid contents of the well; hence, while pumping, the boilers that were supplied with gaseous fuel from the well require to be fed with coal or other solid fuel, and between the two extremes of fullness and emptiness of the well—between the two heads—there is much time that a considerable portion of the sand-rock is uncovered, so that the objectionable incrustations or deposits form and increase thereon.

By the use of the apparatus herein shown and arranged as in Fig. 2, the water and oil can never be lowered below the level of the inner tube, F, which level represents the highest point to be flooded, or the highest point at which any incrustations can occur from the exudation of water or oil from the rock, and because of the deep concentric rings of water and oil formed within the well by the presence of the pump-tube and its surrounding tubes the upward flow of the gas to the top of the well is not diverted while pumping, for the natural upward passage for the gas between the outer tube of the apparatus and the well-casing offers a shorter and less-obstructed way of escape for it than does the passage to the pump-tube.

In pumping with this apparatus in use, as shown in Fig. 2, the flow of the oil and water is from between the well-casing and the tube C to the perforations *b b* in the said tube, thence up between the tubes C and F, and down the latter to the perforations *g g* in the pump-barrel, to be drawn up thence by an ordinary piston and rod.

The well can be unflooded or the flood taken off at any time by pushing down the pump-barrel K, engaging in its lower end the screw-plug L, and then turning the said barrel K and withdrawing the said screw-plug L from its seat in the upward prolongation *c* of the screw-plug D, as shown in Fig. 1, in which case the contents of the well will flow directly upward to the pump-barrel.

In Figs. 1 and 2 it is seen that the well extends below the lower line, A′, of the sand-rock. This extension of a well below the oil-bearing rock is a common practice, as it increases the holding capacity of the well, and affords a "pocket" wherein a partial separation of the oil and water may be effected by their gravities. In wells with these pockets the prolonging-tube O, closed with a cap, *m*, at the lower end, and provided with lateral perforations *n*, may be used, as shown in Fig. 1; or the prolonging-tube P, open at the lower end and provided with perforations *q*, as shown in Fig. 2, may be used.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. For flooding oil-wells, the apparatus herein described, consisting of outer tube, C, provided with lateral perforations *b b*, screw-plug D, with prolongations *c d*, coupling E, vertical tube F, screw-plug H, pump-barrel K, provided with perforations *g g*, and screw-plug L, combined, constructed, and operated substantially as herein shown and described.

2. In a well-flooding apparatus, in combination with the pump-barrel K, tube F, and screw-plug D, the right-and-left screw-plug, L, substantially as herein shown and described, whereby the well may be flooded or unflooded at will, as set forth.

HENRY R. DAVIS.

Witnesses:
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C. SEDGWICK.