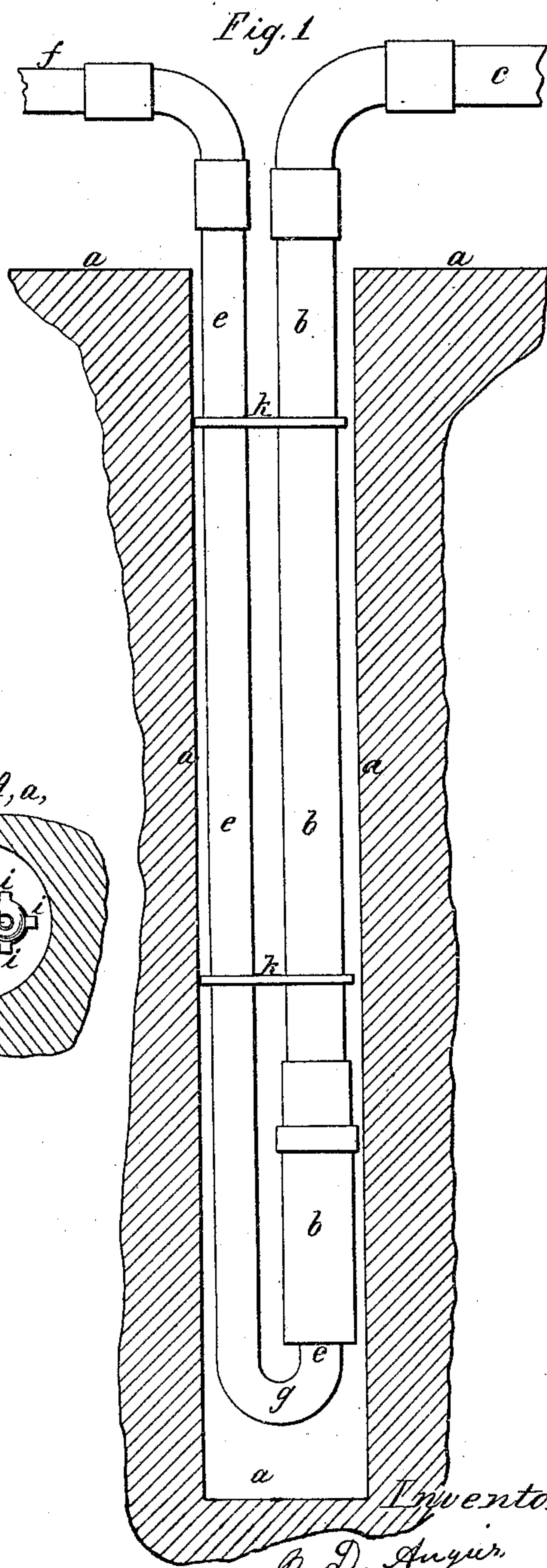
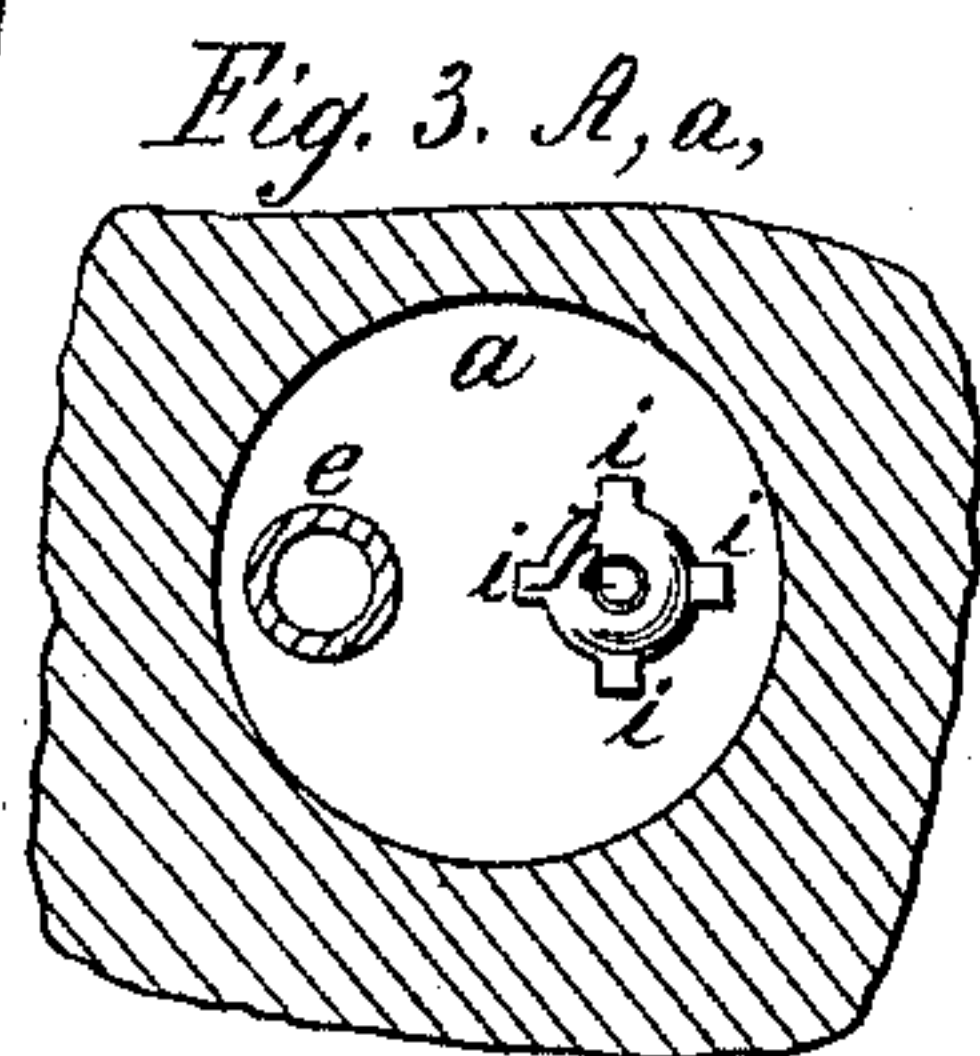
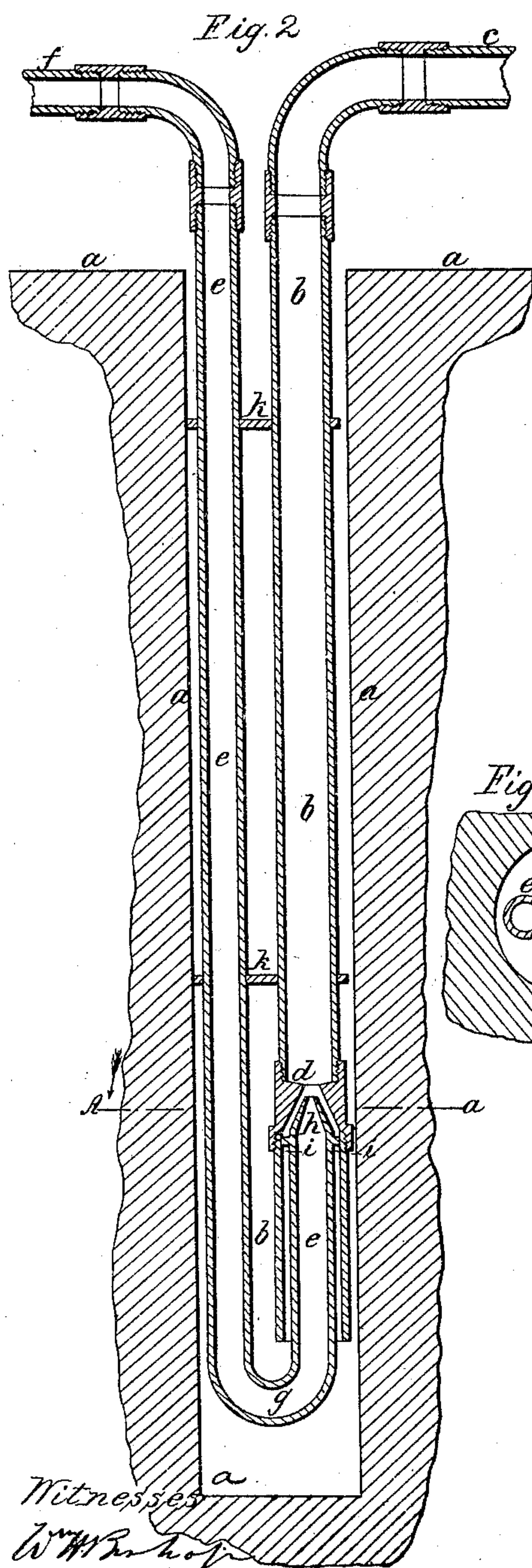


J. D. ANGIERS & F. CROCKER.
EJECTOR FOR OIL WELLS.

No. 44,587.

Patented Oct. 11, 1864.



Witnesses
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UNITED STATES PATENT OFFICE.

J. D. ANGIER AND FREDERICK CROCKER, OF TITUSVILLE, PENNSYLVANIA.

IMPROVEMENT IN EJECTORS FOR OIL-WELLS.

Specification forming part of Letters Patent No. 44,587, dated October 11, 1864.

To all whom it may concern:

Be it known that we, J. D. ANGIER and FREDERICK CROCKER, of Titusville, Crawford county, and State of Pennsylvania, have invented a new and useful Apparatus for Forcing up Petroleum and other Liquids from Deep Wells; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is an elevation of our said apparatus in a well; Fig. 2, a vertical section of the apparatus; and Fig. 3 a cross-section thereof, taken at the line A *a* of Fig. 2.

Our invention is intended chiefly for raising petroleum from deep wells, although it is applicable to the raising of other liquids from great depths.

In the accompanying drawings, *a* represents a well, and *b* a pipe, the lower end of which extends down to within a short distance of the bottom thereof, and the upper end above the well is connected with a horizontal branch pipe, *c*, leading to any suitable receptacle for the oil or other liquid to be raised. Near the lower end of this pipe there is a sudden contraction, *d*, and from this contraction it gradually enlarges in the form of a hollow frustum to a larger diameter than above the contraction, the lower end being open. Another pipe, *e*, from above the well, extends down alongside of and parallel with the pipe *b*. The upper end branches off, as at *f*, to form a connection in any suitable way with an air-pump—that is, with any suitable pump capable of forcing air into and down through the said pipe *e*. The lower end of this pipe is bent up like a siphon, as at *g*, and extended into the lower and enlarged part of the pipe *b*, and the upper end of the part thus turned up is made conical, as at *h*, with radial spurs *i* projecting from the periphery at or near the base of the cone, so that when inserted there shall be an annular space between the said cone *h* and the conical under part of the contraction *d* of the pipe *b*. The bore of the pipe *e*, which we term the “blast-pipe,” we prefer to make one-third less in diameter

than the discharge pipe *b* above the contraction *d*; and for a well five hundred feet in depth and four and a half inches bore, in which we have successfully worked our said invention, we have made the bore of the blast-pipe *e* one inch in diameter and the bore of the discharge-pipe one inch and a half in diameter. In the same apparatus we made the contraction *d* in the discharge-pipe *b* five-eighths of an inch in diameter, gradually enlarged in a conical form to two inches, and of that diameter to the lower end; and the bore of the blast-pipe *e* was contracted at the discharge end of the conical part *h* to about one-half of an inch in diameter, and this we term the “blast-nozzle.” With the above proportions we have successfully raised petroleum from a depth of five hundred feet; but we do not wish to be understood as limiting ourselves to such proportions. The tube-pipes *b* and *e* are bound together and held at the required distance apart by cross-plates *k k*, through which they pass; and when placed in position in a well the “surface-water” is prevented from running down into the well by the usual and well-known packing heretofore employed for the purpose, interposed between the bore of the well and the outer diameter of the pipes *b* and *e*. The apparatus being thus constructed and located, the horizontal branch *c* of the pipe *b* placed so as to discharge in a suitable receptacle, and the upper end of the blast-pipe *e* connected with some suitable air-pump, and air being thereby forced into the said blast-pipe, it will escape under a pressure proportioned to the force of the blast in an upward direction from the nozzle *h* into the conical part of and just below the smallest part of the contraction. This induces a current of the oil or other liquid from the bottom of the well upward in the annular space between the lower part of the pipe *b* and the nozzle of the blast-pipe, and when it rises above the contraction *d* it is lifted and carried upward by the force of the blast of air below it. In this way we are enabled to force oil and other liquids from the bottom of very deep wells without the use of pistons or valves, while at the same time the force applied does not tend to choke the ways or passages through which the liquid is supplied to the well.

What we claim as of our invention, and desire to secure by Letters Patent, is—

The discharge-pipe, with its contraction and open lower end, substantially as described, in combination with the blast-pipe, having its lower end turned up and provided with a nozzle, and inserted in the lower open end of the discharge-pipe and below the contraction

thereof, substantially as and for the purpose specified.

J. D. ANGIER.
FREDERICK CROCKER.

Witnesses:

WM. H. BISHOP,
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