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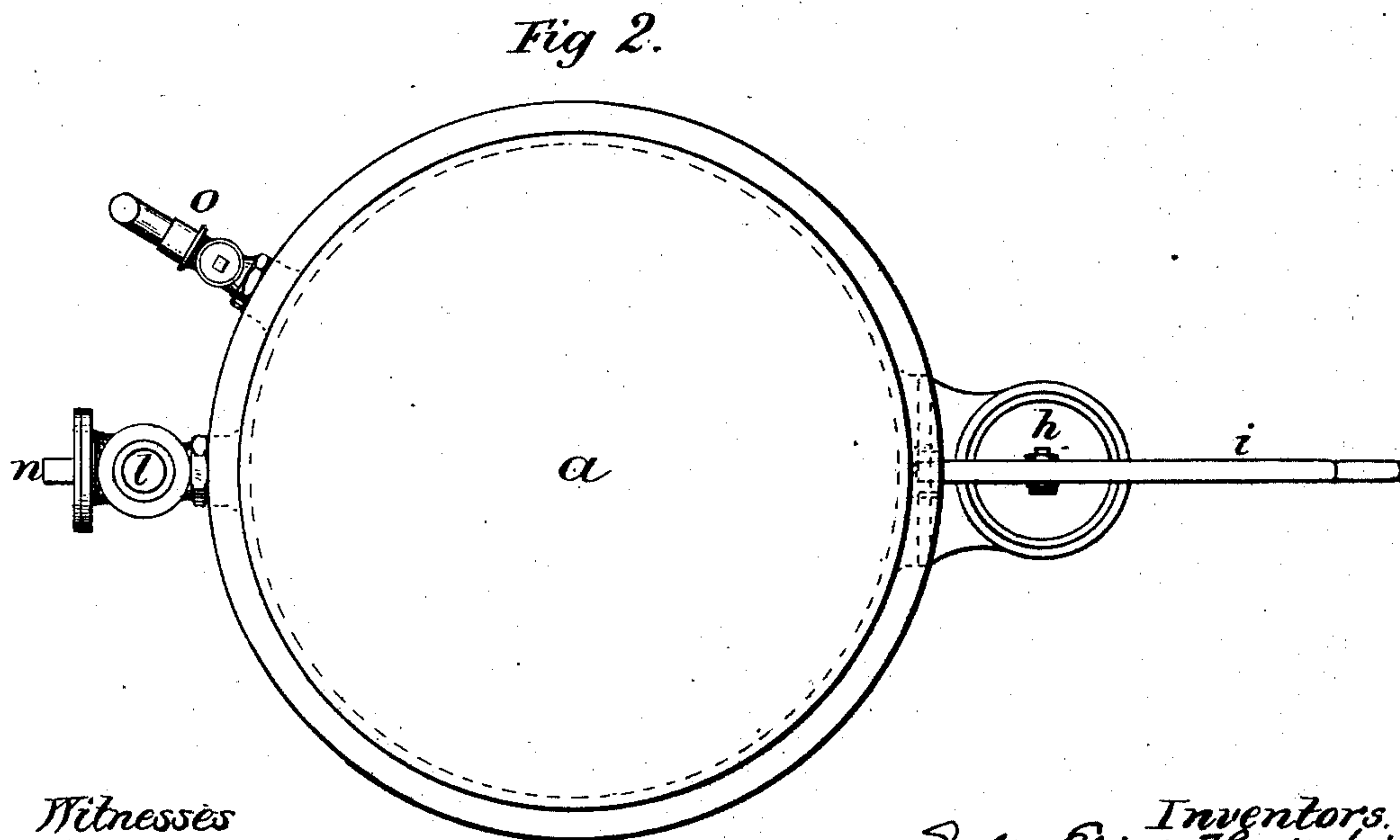
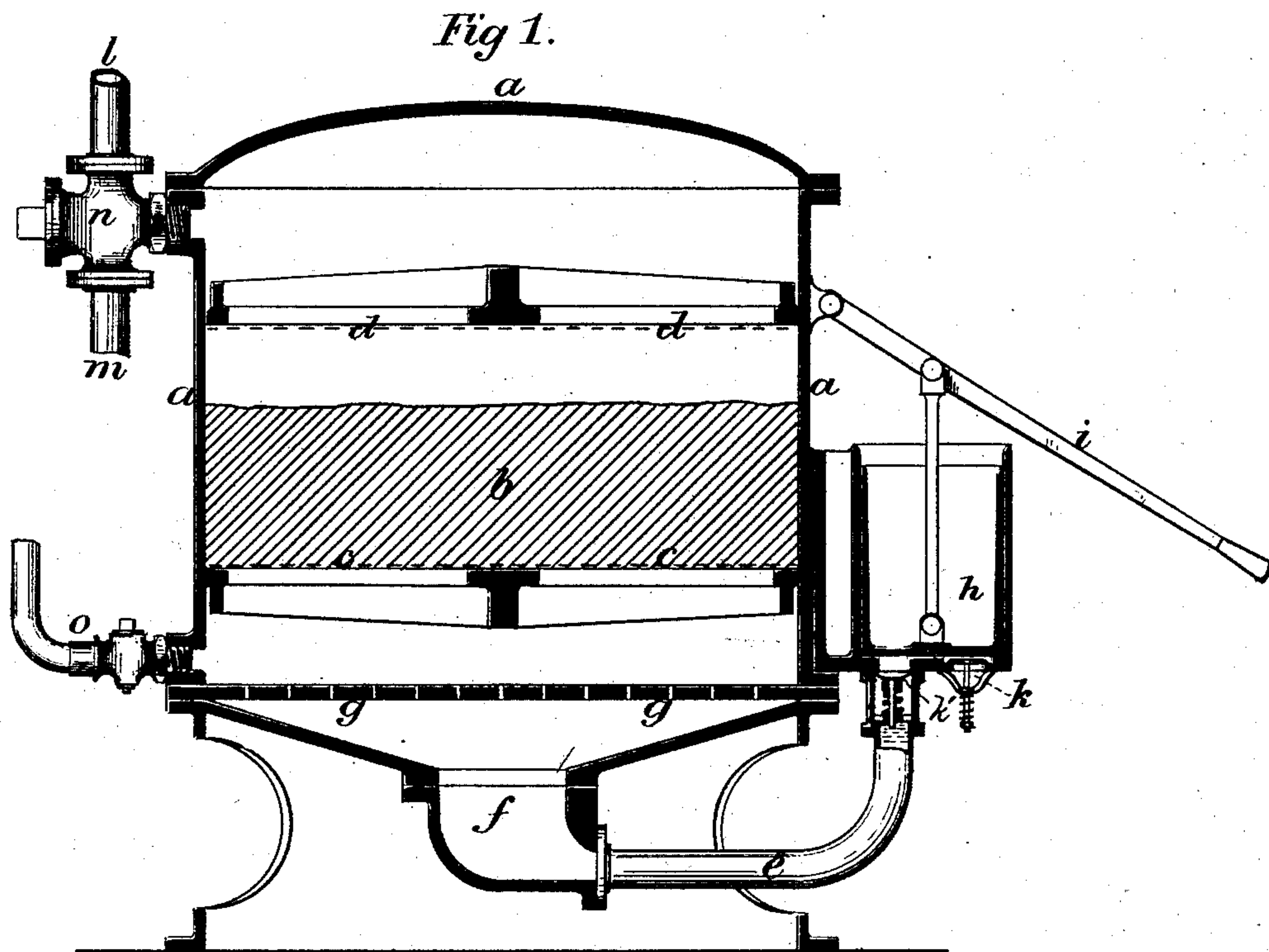
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J. E. HODGKIN & E. PERRETT.

APPARATUS FOR CLEANING THE FILTERING MEDIA OF FILTERS.

No. 317,457.

Patented May 5, 1885.



Witnesses  
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E. A. Finckel

Inventors.  
John Eliot Hodgkin  
Edward Perrett  
by H. A. Finckel, Atty.

(No Model.)

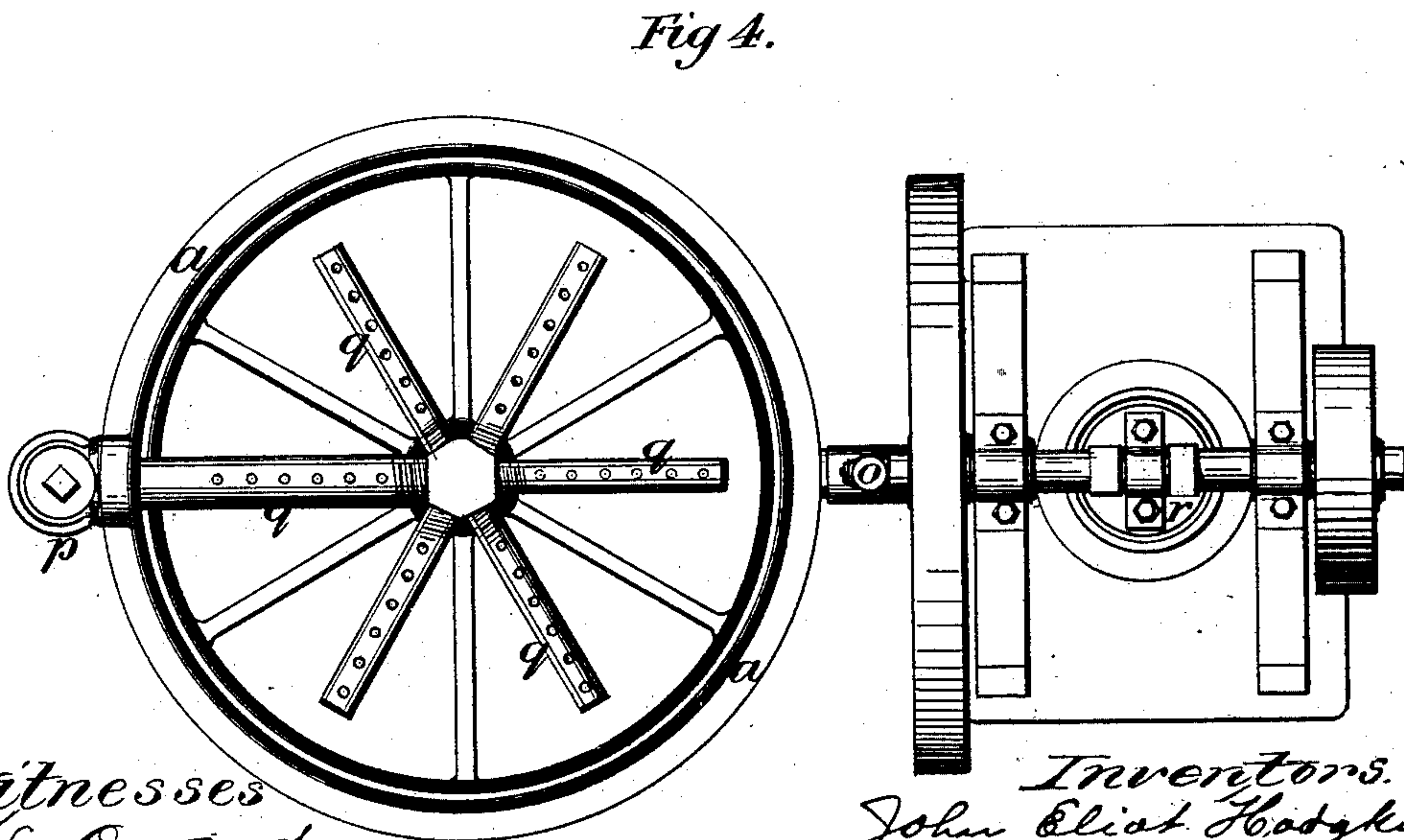
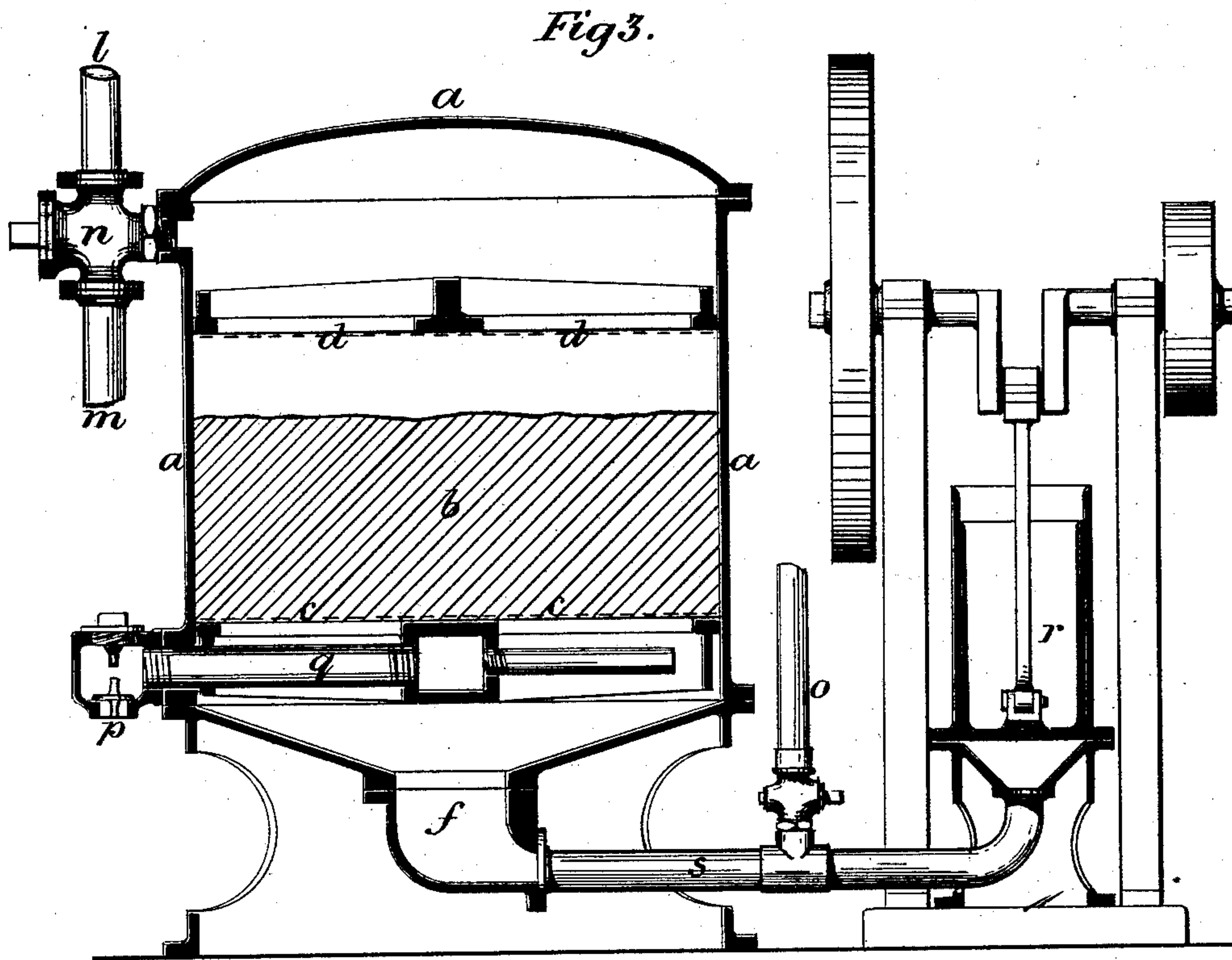
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J. E. HODGKIN & E. PERRETT.

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(No Model.)

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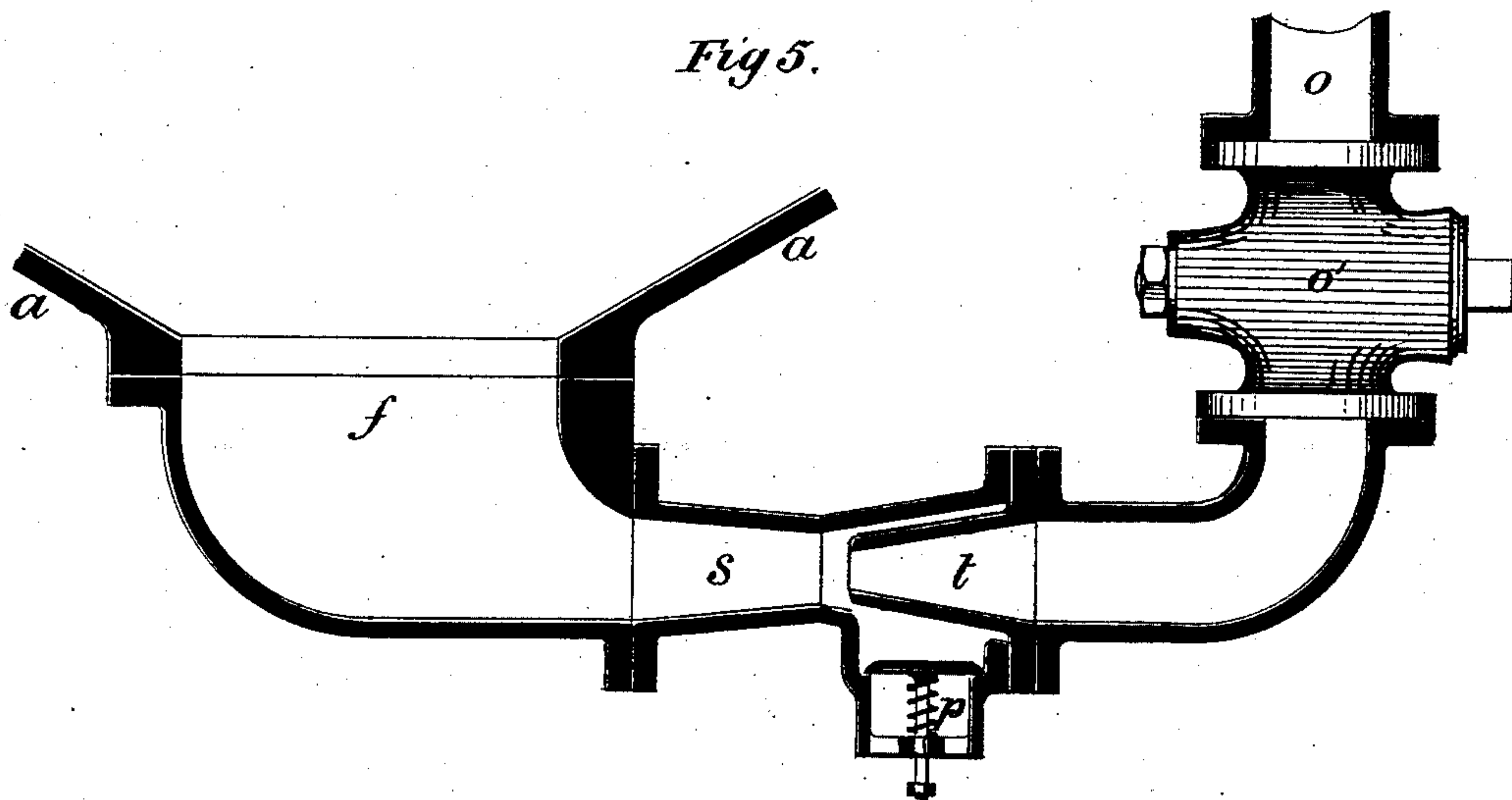
J. E. HODGKIN & E. PERRETT.

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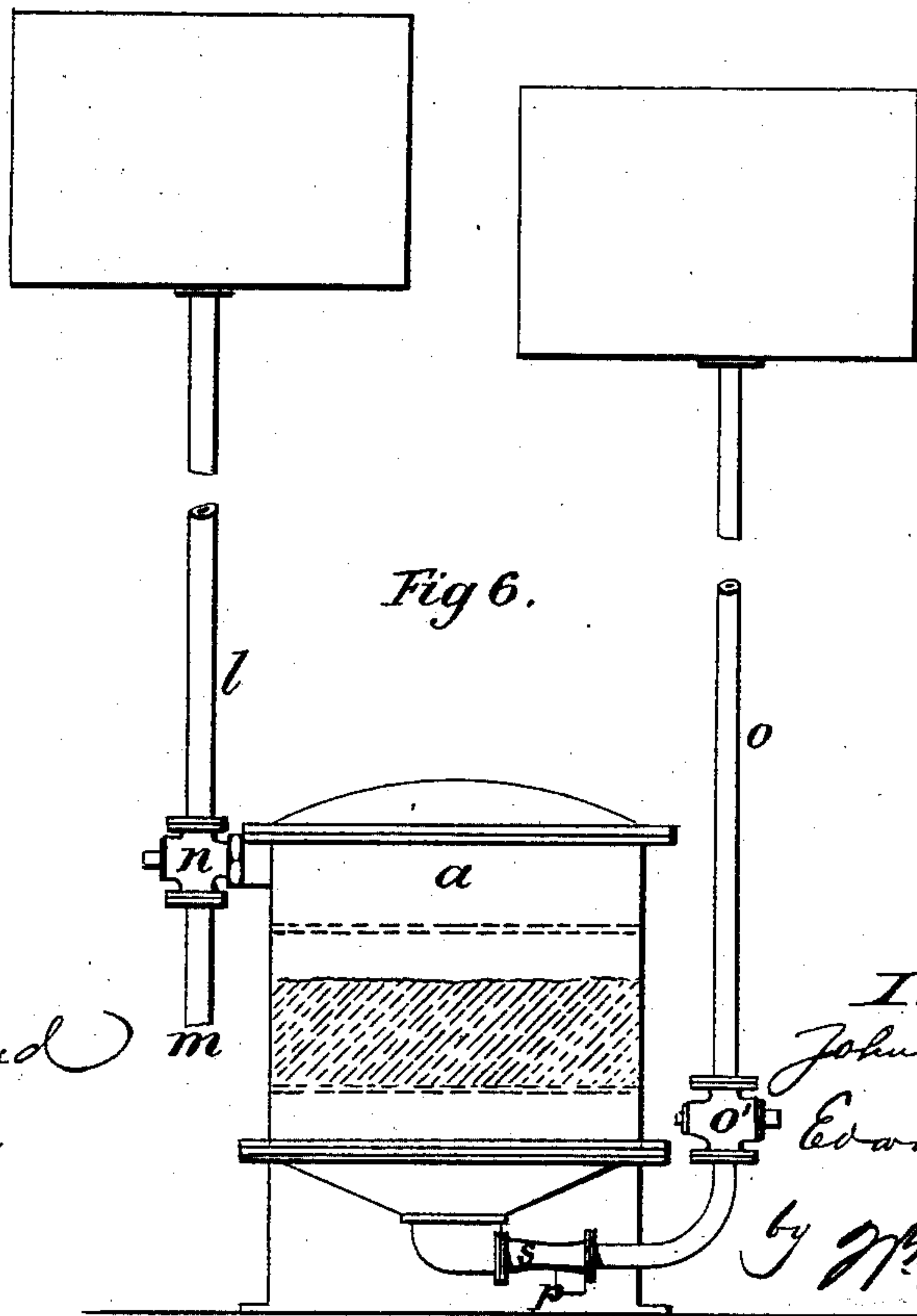
No. 317,457.

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*Fig 5.*



*Fig 6.*



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(No Model.)

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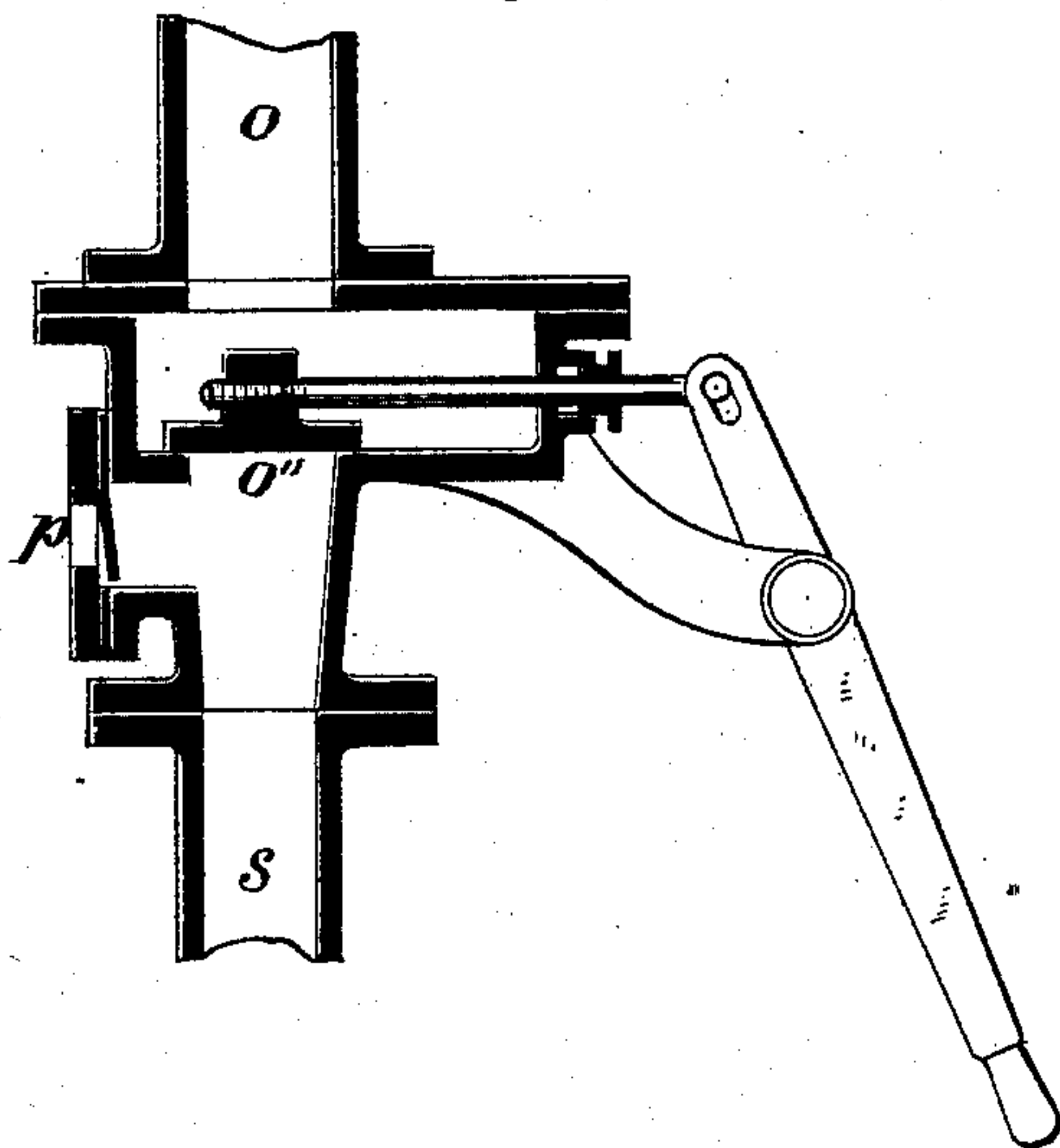
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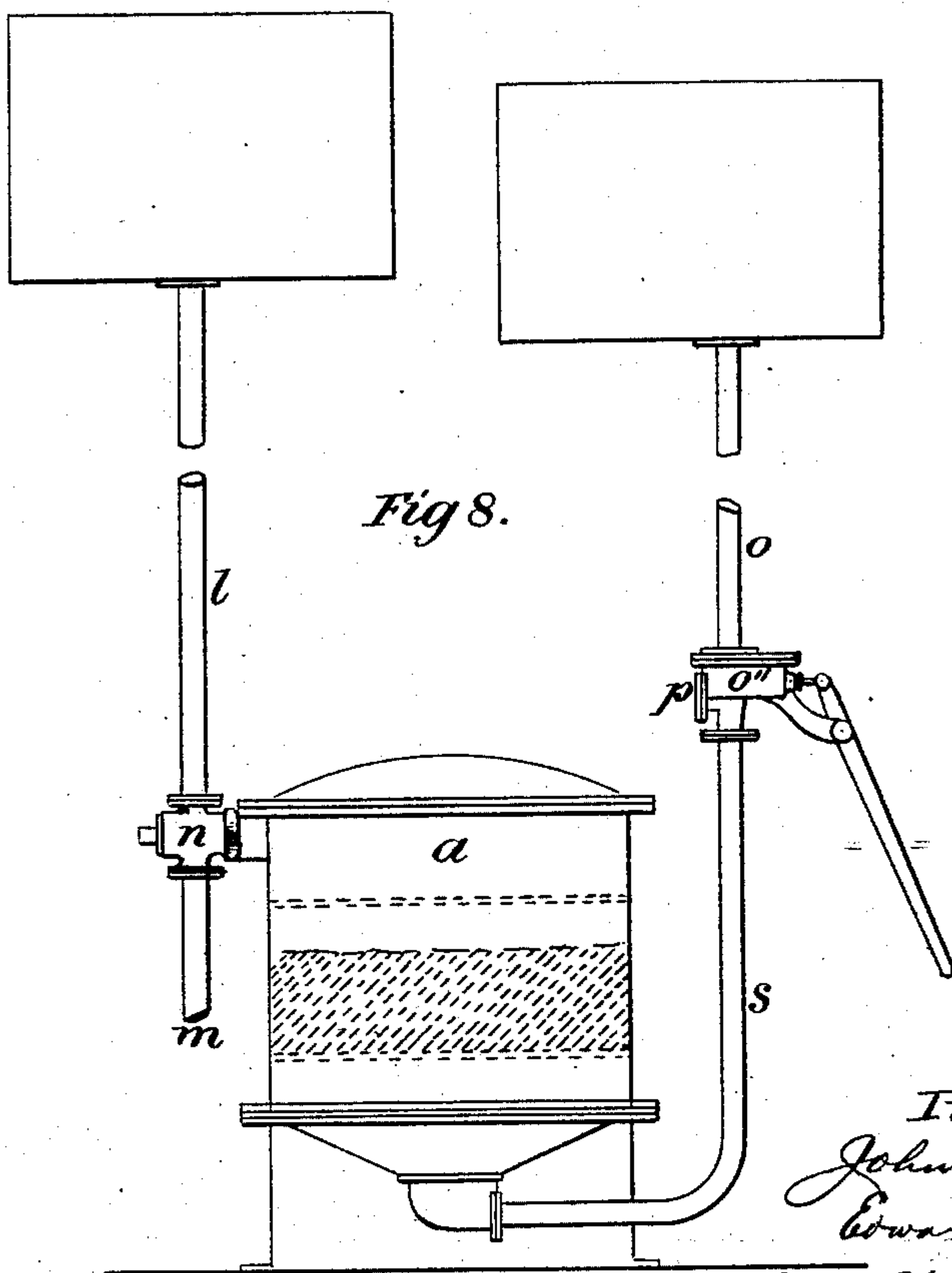
No. 317,457.

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*Fig 7.*



*Fig 8.*



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(No Model.)

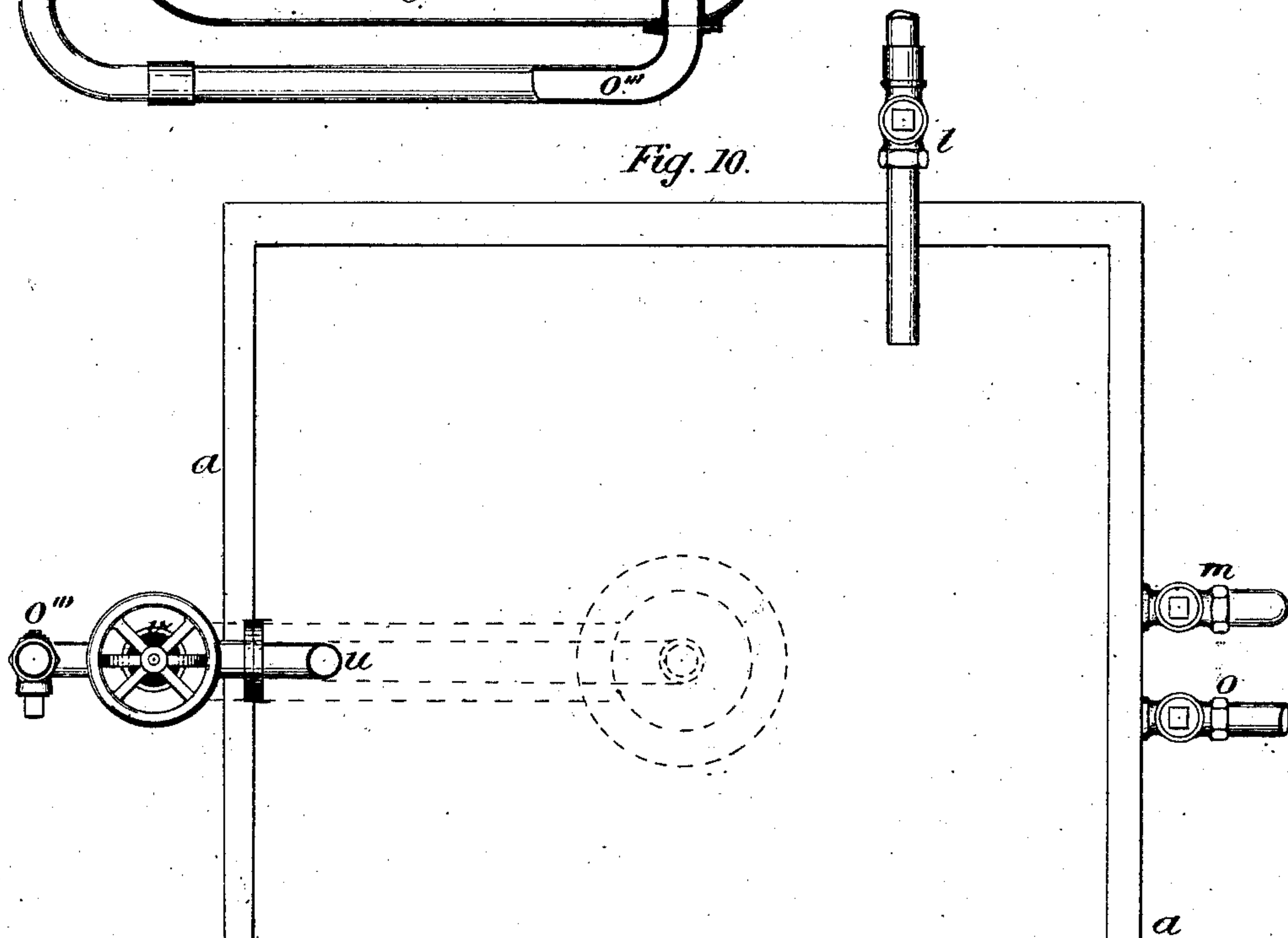
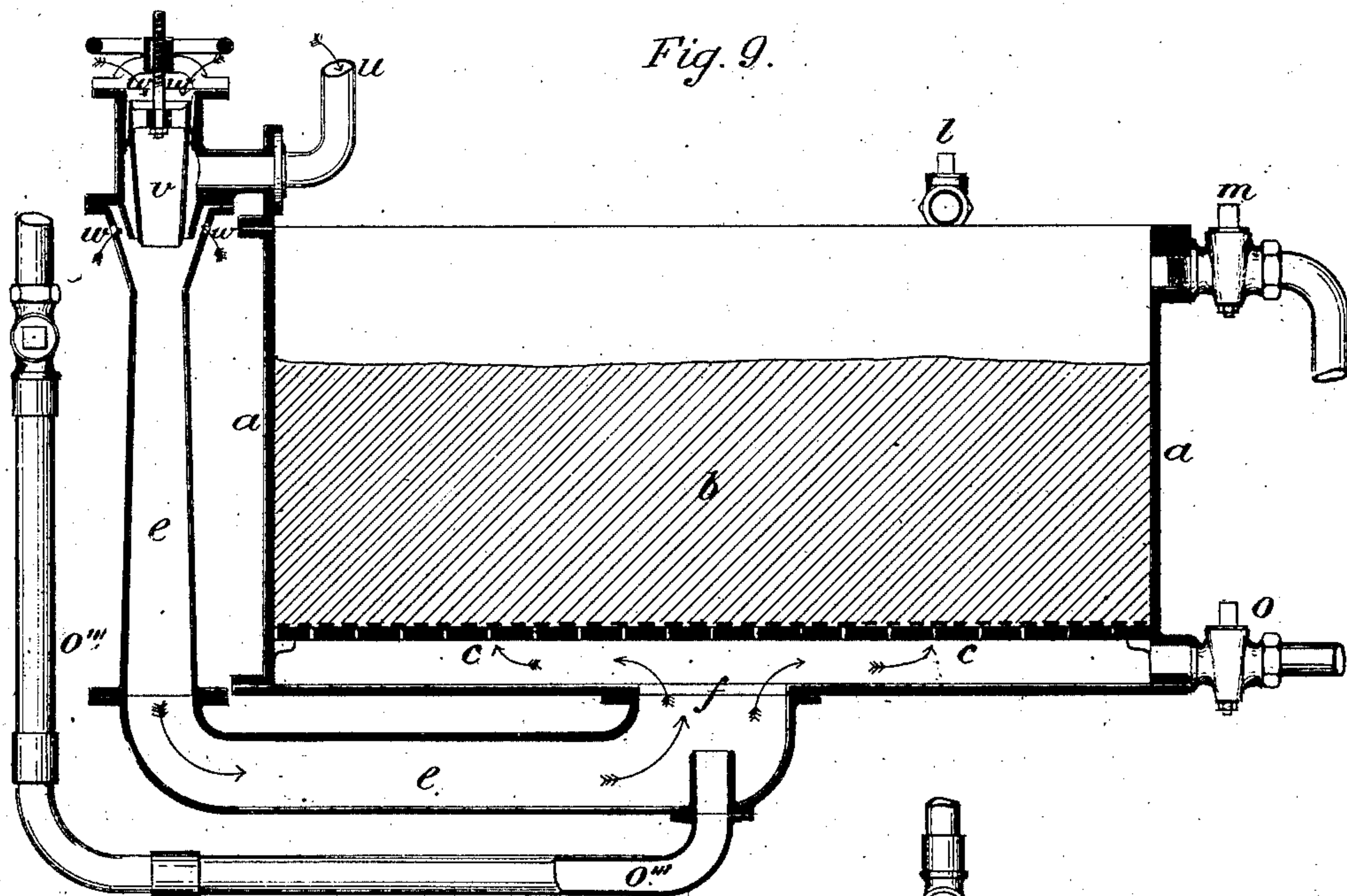
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# UNITED STATES PATENT OFFICE.

JOHN ELIOT HODGKIN, OF LONDON, AND EDWARD PERRETT, OF WESTMINSTER, ENGLAND.

## APPARATUS FOR CLEANING THE FILTERING MEDIA OF FILTERS.

SPECIFICATION forming part of Letters Patent No. 317,457, dated May 5, 1885.

Application filed September 25, 1883. (No model.) Patented in England April 24, 1883, No. 2,080.

*To all whom it may concern:*

Be it known that we, JOHN ELIOT HODGKIN and EDWARD PERRETT, subjects of Her Majesty the Queen of Great Britain, and residing, respectively, at Queen Victoria street, in the city of London, England, and at Victoria Chambers, in the city of Westminster, England, engineers, have invented a new and useful Apparatus for Cleaning the Filtering Media of Filters, (for which we have received Letters Patent in England, No. 2,080, dated April 24, A.D. 1883,) of which the following is a specification.

Our invention relates to an apparatus for cleaning the loosely-packed filtering media or materials—such as sand, charcoal, or the like—of filters which have become choked or dirty by the passage of the liquid during filtration through such materials; and it consists, essentially, as hereinafter particularly set forth and claimed, in an apparatus for effecting the cleansing of such like filtering materials by passing currents of air or other elastic fluid through them in the form of bubbles, either continuously or intermittently, while covered with water in the filter, thereby disturbing the filtering material and loosening the dirt adhering thereto, which dirt is carried away while in mechanical suspension by a current of water supplied for that purpose from any convenient source.

To carry our invention into effect we combine with the filter an air-pump, driven by hand or by power, for forcing the air or other elastic fluid in the form of bubbles through the said loosely-packed filtering materials while covered with water in the filter, the said air-pump being attached to or placed at any convenient distance from the filter to be cleaned and connected directly with the lower part of the filter by a pipe or air-duct; or we combine with the filter a water-jet nozzle and cock for inducing air or elastic fluid and forcing it in the form of bubbles through the loosely-packed filtering materials; or we combine with the filter a pipe and cock or valve through which a column of water is caused to descend at intervals, and thereby force the air or elastic fluid in the form of bubbles through the said filtering materials in the filter. In those cases where a reciprocating or a plunger

pump or displacer is employed for imparting an alternating movement to a body of water through the filtering medium for the purpose of cleaning the same, as described in the specification to the British Letters Patent of Edward Perrett, dated August 22, A. D. 1882, No. 4,028, our said process of cleaning the said loosely-packed filtering materials while covered with water in the filter may be carried out by causing the air or other elastic fluid to be forced through the filtering materials by the action of the pump or displacer itself which gives motion to the said body of water, such displacer, by the combination therewith of an air-inlet valve, being made to draw in air and force it through the filtering materials at each stroke; or the disturbing current or currents of air or other elastic fluid can be passed in the form of bubbles through the filtering medium, in conjunction with a body of water caused to circulate through the filter by the action of a centrifugal or other pump.

Our said invention may be thus obviously carried out by various mechanical arrangements, some of which are hereinafter described and illustrated in the accompanying drawings, in which similar letters refer to similar parts throughout the several figures.

Figure 1 is a vertical section, and Fig. 2 a corresponding plan, of a filter packed with loose sand, charcoal, and the like, showing the apparatus attached for cleansing the filtering materials by forcing currents of air in the form of bubbles through such materials while covered with water in the filter. Fig. 3 is a vertical section, and Fig. 4 a corresponding sectional plan, of a filter packed with loose filtering materials, and having a modified arrangement attached for forcing air in the form of bubbles through the filtering materials while covered with water in the filter, for the purpose specified. Fig. 5 is a sectional detail of a liquid-jet apparatus for forcing the air in the form of bubbles through the loose filtering materials while covered with water in the filter, for the purpose specified. Fig. 6 is a diagram showing the mode of applying such liquid-jet apparatus to a filter. Fig. 7 is a sectional detail of an air-forcing apparatus acting by the fall of a column of liquid for forcing air in the form of bubbles through the



loosely-packed filtering materials while covered with water in the filter, for the purpose specified; and Fig. 8 illustrates the mode of applying the same to a filter. Fig. 9 is a vertical section of the filter, showing the application thereto of a steam-injector for inducing and forcing the air in the form of bubbles through the filtering materials. Fig. 10 is a corresponding plan of the same.

*a* is the body of the filter; *b*, the filtering material, (consisting of sand, charcoal, or the like,) loosely packed therein, supported on the perforated plate or wire-gauze sheet *c*, and in some cases, if found desirable, a similar perforated plate or wire-gauze sheet, *d*, may be placed a little distance above the filtering material.

*e* is the supply-pipe for the air or other elastic fluid, opening into the filter by an expanded mouth, *f*, underneath a perforated distributing-plate, *g*, and communicating with the air-pump *h*, (here shown as mounted directly upon the body of the filter,) and worked by a hand-lever, *i*, although the said pump may obviously be worked by power from a crank or eccentric, if preferred.

*k* is an air-inlet valve opening into the pump-barrel, and *k'*, Fig. 1, is an eduction-valve opening into the air-supply pipe *e*.

*l* is a pipe for the inlet of the unfiltered water into the top of the filter from an overhead tank or otherwise, and *m* is the washout-pipe, these pipes communicating with the upper part of the filter through a two-way or other suitable cock or valve, *n*.

*o* is the outlet-pipe and cock for the filtered water, the said pipe communicating by preference with an overhead tank (not shown in the drawings) above the level of the filtering material, so as to keep it always covered with water.

When the filter is at work, the cock or valve *n* is so turned or adjusted as to shut off the washout-pipe *m* and open the inlet-pipe *l*, the clean water passing out through the outlet-pipe and cock at *o* and rising to the overhead tank or cistern for its reception where used.

When it is required to clean the filtering material, the cock *n* is so turned as to shut off for the time being the inlet-pipe *l* and open the washout-pipe *m*. Air or other elastic fluid is then forced in the form of bubbles through the filtering material by working the air-pump *h*, thereby disturbing the said material and the impurities adhering thereto and allowing the impurities to be separated, such impurities while in mechanical suspension in the water being carried off back through the washout-pipe *m* by a current of clean water admitted for that purpose through the pipe *o* or otherwise.

Fig. 3 is a vertical section, and Fig. 4 a corresponding sectional plan, of filter, with which are combined an air-inlet valve, *p*, perforated air-pipes *q*, and a reciprocating or a plunger-pump or water-displacer, *r*, connected with the lower part of the filter through the pipe, *s*.

The reciprocating movement of the body of water caused by the displacer *r* is made to draw in air or other elastic fluid through the inlet-valve *p* and perforated pipes *q* and force it through the filtering material at each stroke.

As the liquid above the filtering material cannot pass as quickly through the material as the outward stroke of the pump draws the liquid away from below the material, a vacuum space is formed immediately below the material, into which the external air rushes through the inlet or check valve *p*, and, as this air cannot escape, it is necessarily forced by the inward stroke of the pump up through the filtering material.

Fig. 5 is a sectional detail of an arrangement for carrying out our said invention, wherein the air or other elastic fluid is induced and forced either continuously or intermittently through the filtering material by the action of an air-inducing jet of water or other liquid.

Fig. 6 is a diagram showing the mode of applying the same. The pipe *o* and cock *o'* communicate with an overhead clean-water tank and open at the lower end by a jet-nozzle, *t*, into the pipe *s*, leading to the bottom of the filter, an air-inlet valve, *p*, being provided for admitting the air or elastic fluid which is induced by the jet from the nozzle and forced along with the water into the filter and through the filtering material. By alternately opening and closing the cock *o'*, the air may, if desired, be forced in intermittently.

Fig. 7 illustrates another modification of apparatus for carrying out our said invention, and Fig. 8 the mode of applying the same, whereby the forcing of the air or other elastic fluid in the form of bubbles through the filtering material is effected intermittently by the momentum of a descending column of water in the pipe *o*, leading from an overhead tank.

*o''* is a slide or other valve which is to be alternately opened and closed by a hand-lever or otherwise, the air entering the pipe *s* through the inlet-valve *p* when the slide *o''* is closed, and being forced into the filter by the descending column of water when the slide is opened.

In Figs. 9 and 10 we have shown the application of a steam-jet or ordinary injector apparatus to the filtering-vessel for injecting the air requisite for cleaning the filtering materials according to our invention. *a* is the filtering-vessel; *b*, the filtering material, consisting of loose sand, charcoal, and the like. *c* is the perforated plate or wire-gauze sheet for supporting the same and allowing the air to pass through the loose filtering materials in the form of bubbles. *e* is the supply-pipe for the air or other elastic fluid; *f*, the expanded mouth thereof, opening into the bottom of the filtering-vessel. *l* is the pipe for the inlet of the unfiltered water, fitted with an ordinary cock of its own; *m*, the washout-pipe, also fitted with a separate cock of its own; *o*, the outlet-pipe and cock for the filtered water. *o'''* is a separate pipe and cock for admitting a current of clean



or washing water from an overhead tank or other source of supply up through the loose filtering materials in company with the air or other elastic fluid, for the purpose specified.

5 The air is induced into the pipe *e* and forced through the perforated plate *c* and loose filtering materials *b*, resting thereon, by the action of a steam-jet admitted through the steam-pipe *u* into an ordinary air-injector, *v*, the air  
10 entering the pipe *e* by the openings *w w*, as shown by the arrows, and being forced by the steam along the pipe *e* and up through filtering materials, which it permeates in the form of numerous small bubbles while covered with  
15 the water in the filter. When it is required to clean the filtering materials, the inlet-pipe *l* is shut off, the washout *m* opened, the steam is turned on through the injector by the pipe *u*, and clean washing-water is admitted through  
20 the pipe *o'''* from below upward through the loose submerged filtering materials, thereby carrying away the impurities disturbed by the air-bubbles and allowing them to flow off through the washout-pipe *m*.

25 We do not claim the process of cleaning loosely-packed filtering material in filters consisting in passing currents of elastic fluid through it in the form of bubbles and while said material is covered with water, thereby  
30 loosening and mechanically suspending the impurities, and finally removing the impurities by a current of water while so suspended.

What we claim, and desire to secure by Letters Patent of the United States, is—

35 1. The combination, with a filtering vessel packed with loose sand, charcoal, or other like

filtering materials supported on a perforated plate or wire-gauze, of an air-forcing apparatus and pipe leading therefrom to beneath the said filtering materials, a pipe supplying 40 a current of washing-water through the said filtering materials, and a washout-pipe situated above such materials to insure their being always covered with water in the filter during the operation of cleaning, the whole being 45 combined and arranged to operate together substantially in the manner and for the purpose hereinbefore specified.

2. The combination, with a filtering-vessel packed with loose sand, charcoal, or other like 50 filtering material, of a perforated or wire-gauze diaphragm supporting the same off of the bottom of said vessel, a forcing apparatus connected to said vessel beneath the filtering material by a pipe for forcing an elastic fluid in 55 the form of bubbles through said filtering material, a pipe supplying a reversed current of washing-water through the said material, and a washout-pipe situated above said material to insure its being always covered with water 60 in the filter during the operation of cleaning, substantially as shown and described.

In witness whereof we have signed our names in the presence of two subscribing witnesses.

JOHN ELIOT HODGKIN.  
EDWARD PERRETT.

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