H. J. TOOGOOD.

LID FOR GAS RETORTS.

APPLICATION FILED APR. 27, 1909.

944,005.

Patented Dec. 21, 1909.

6 SHEETS—SHEET 1.

Fig. 1.

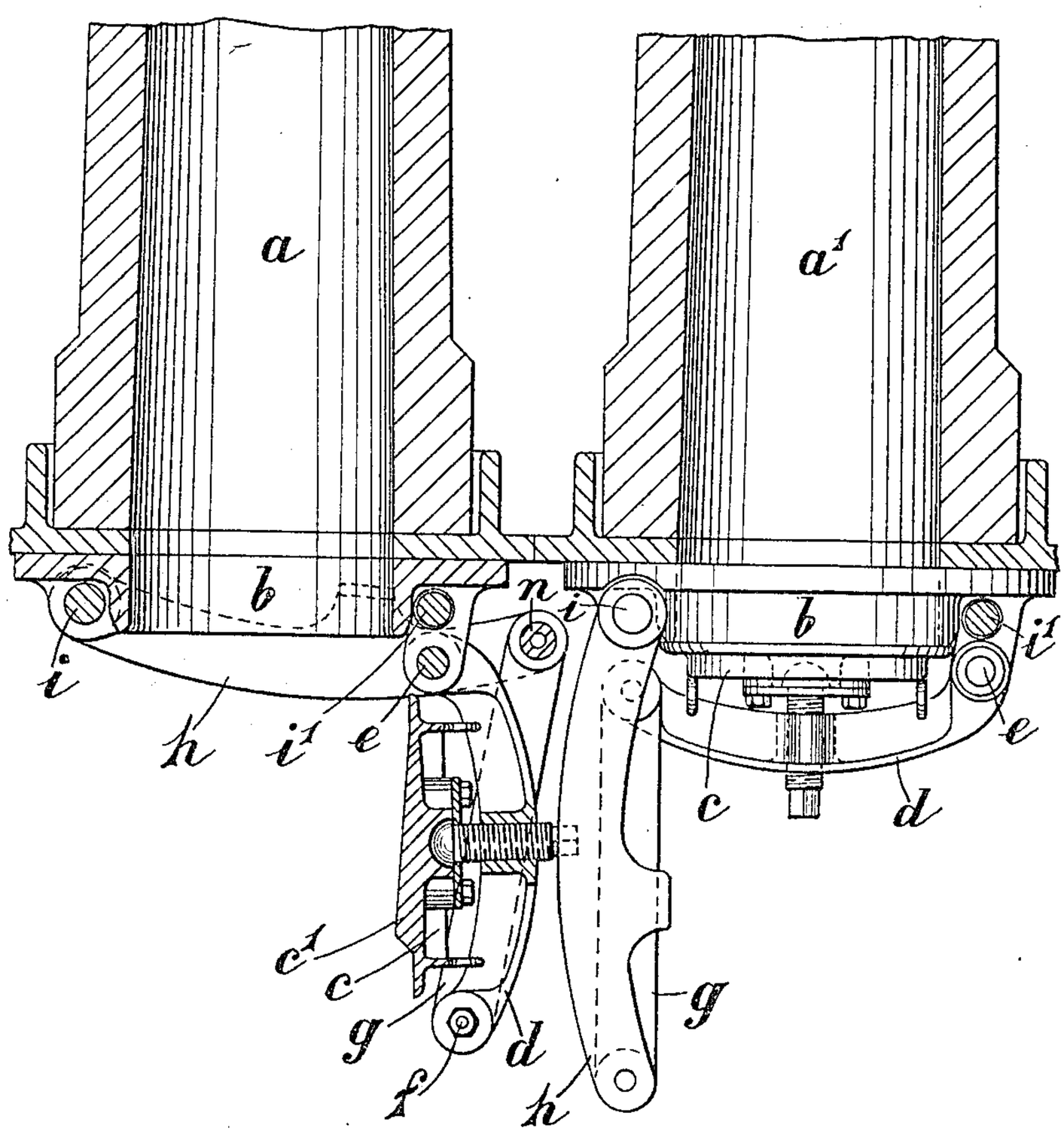

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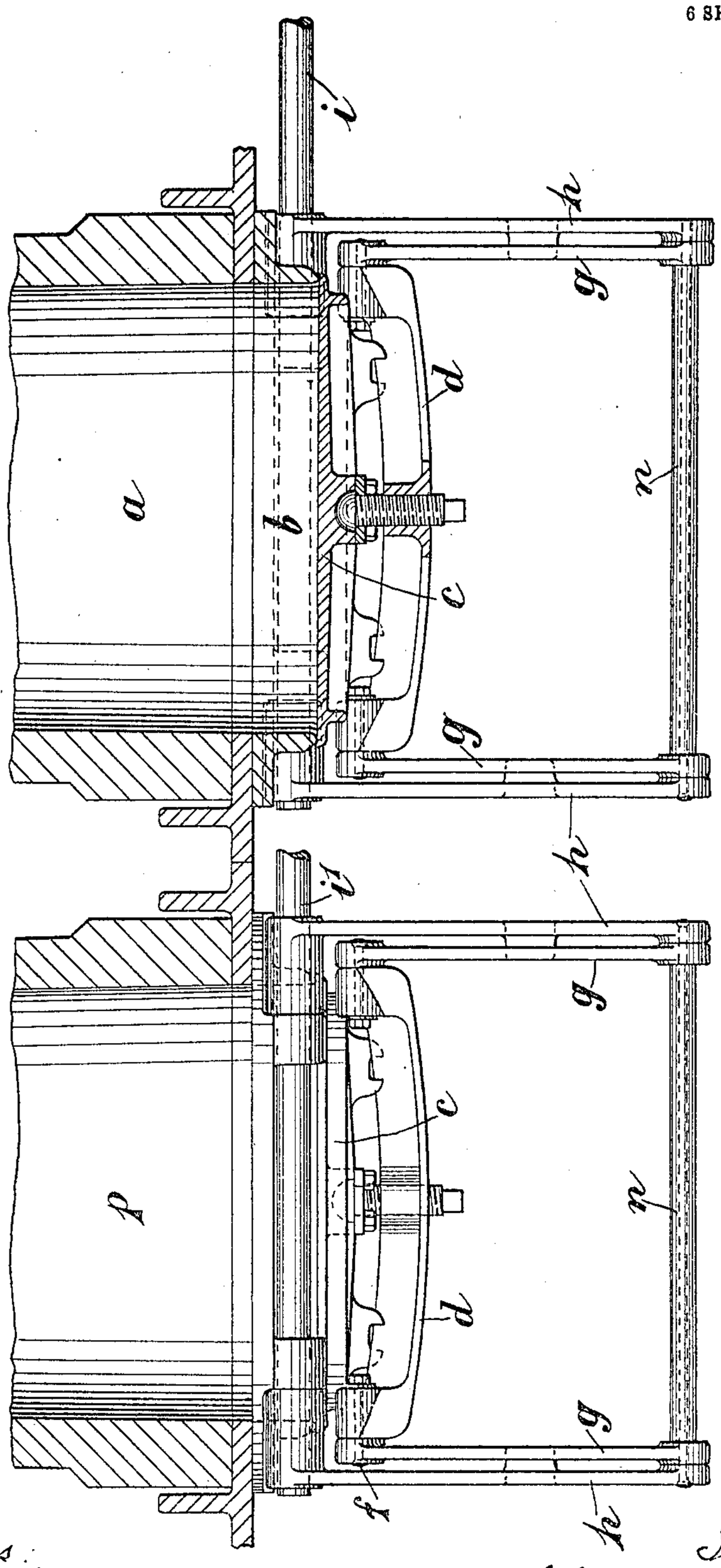
Fig. 2.



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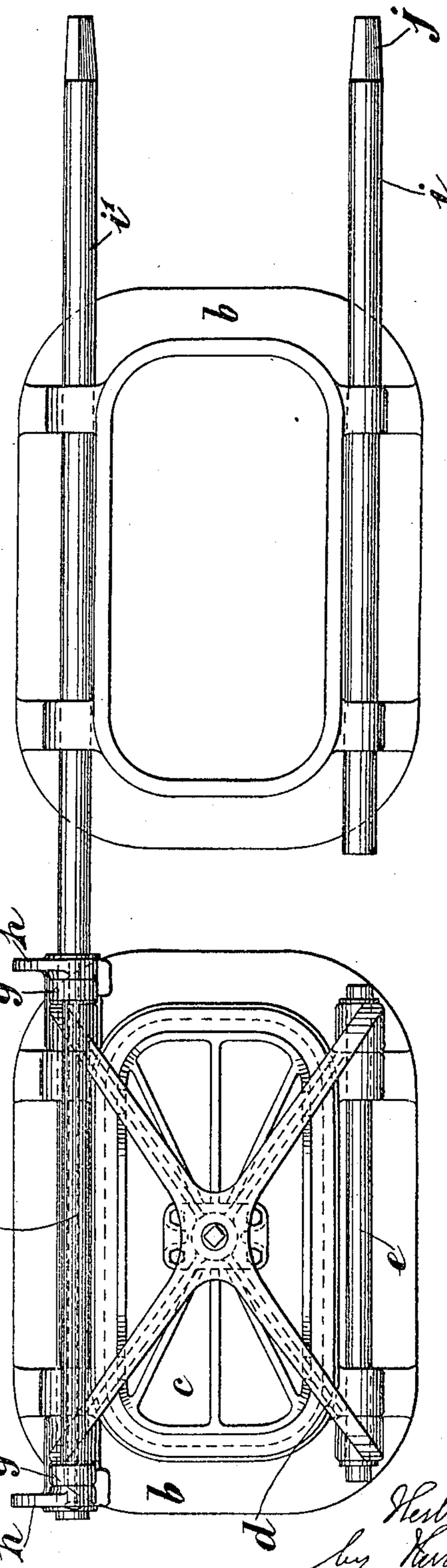

Fig. 3.

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6 SHEETS—SHEET 4.

Fig. 4.

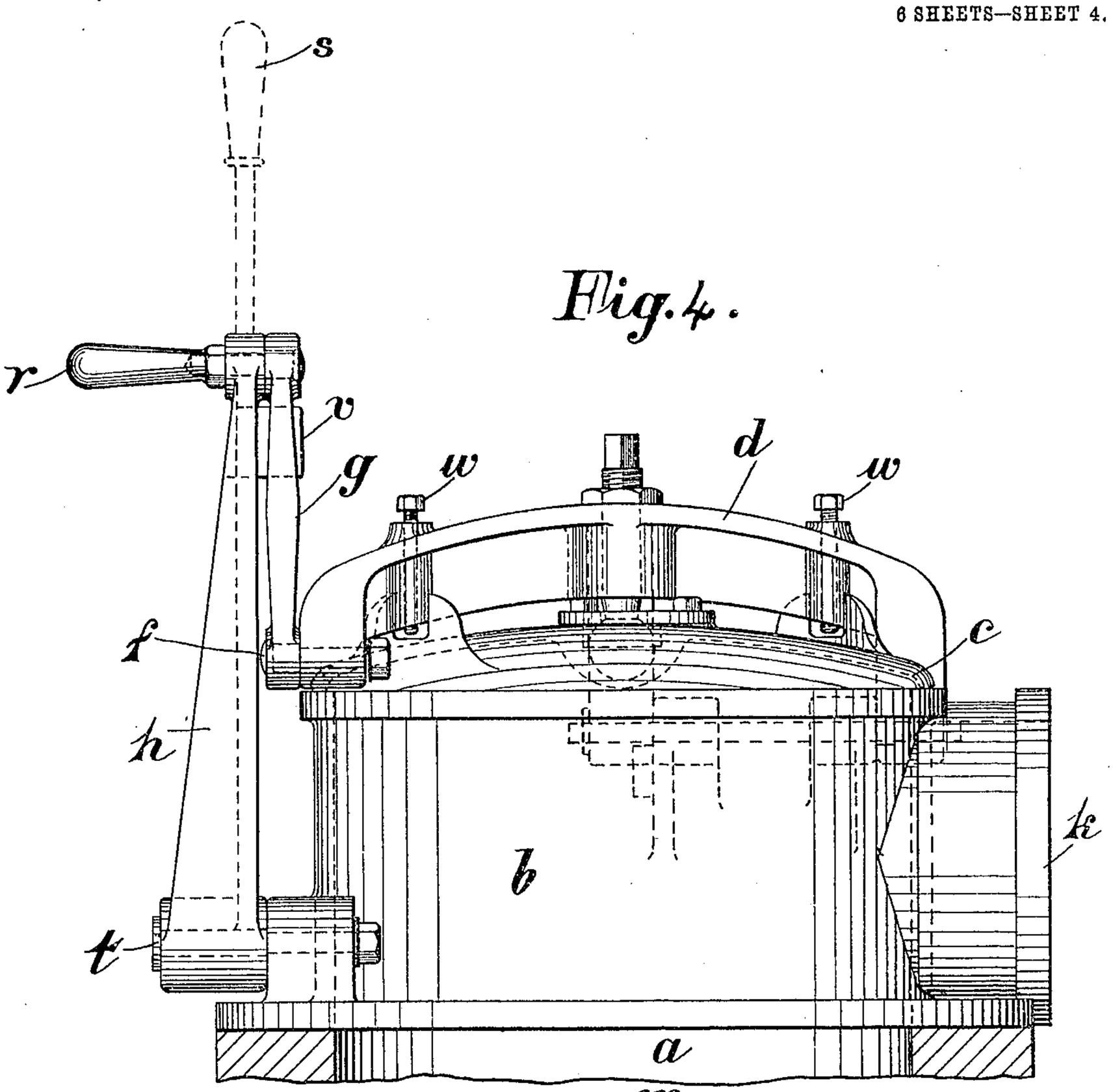
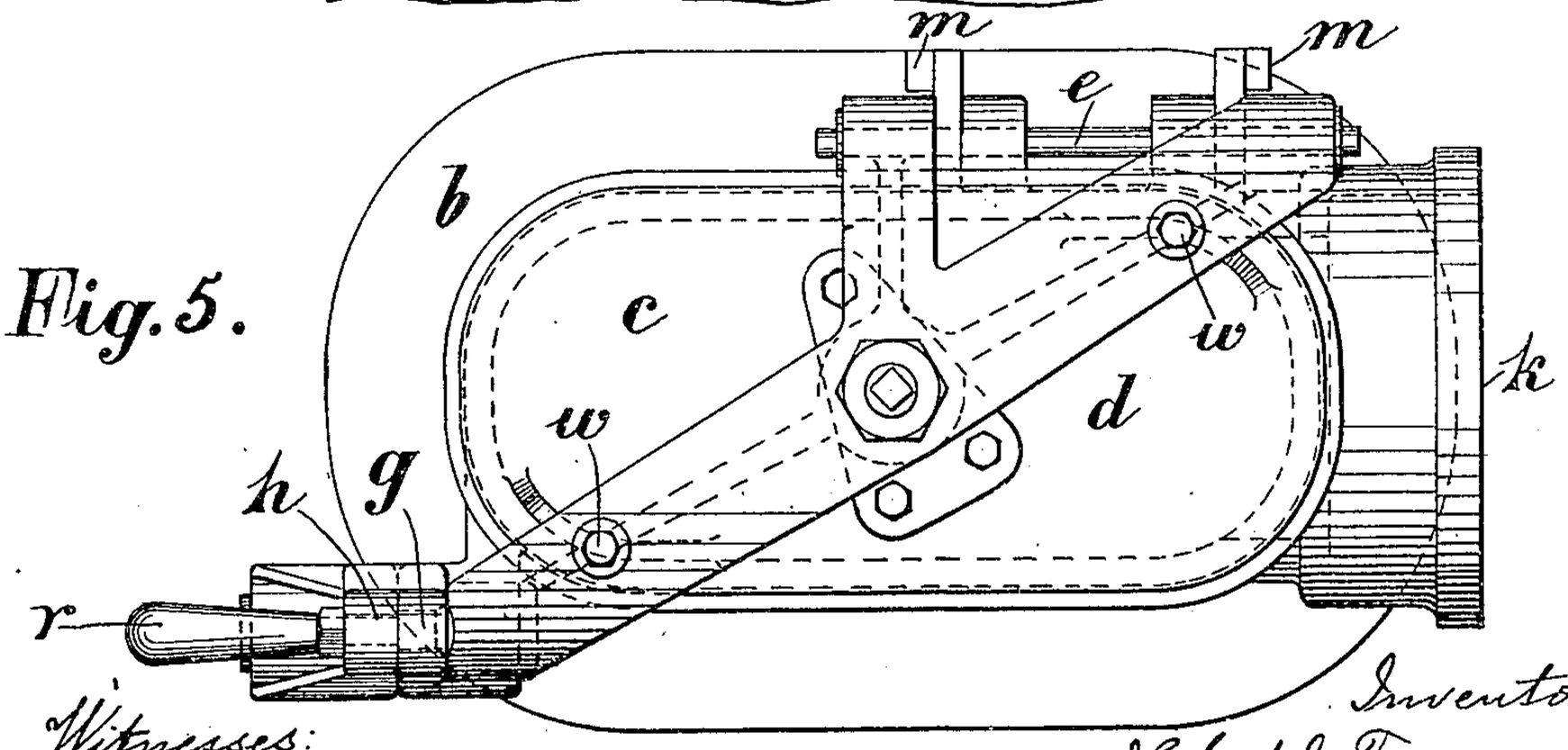


Fig. 5.



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6 SHEETS—SHEET 5.

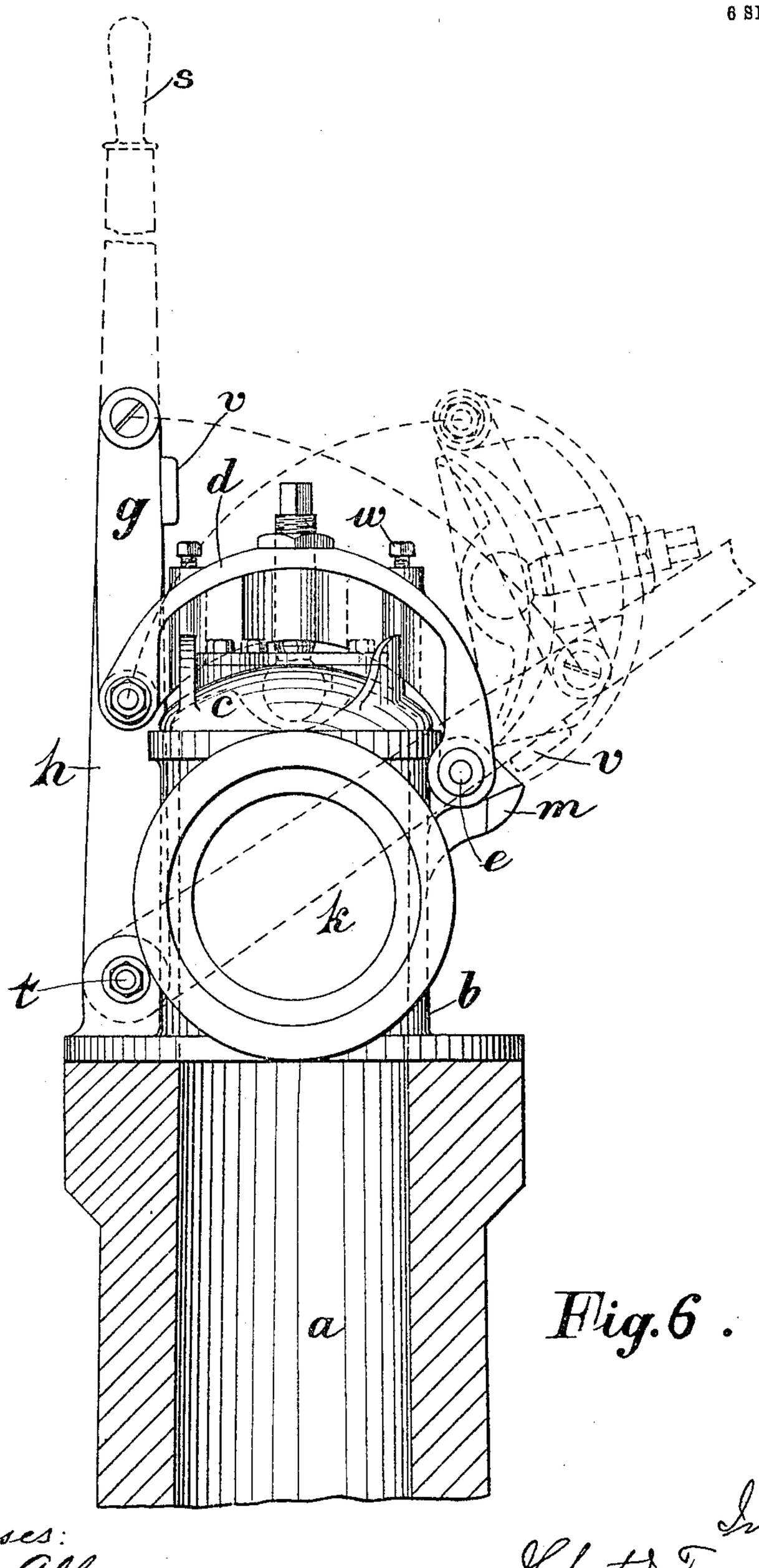

Fig. 6.

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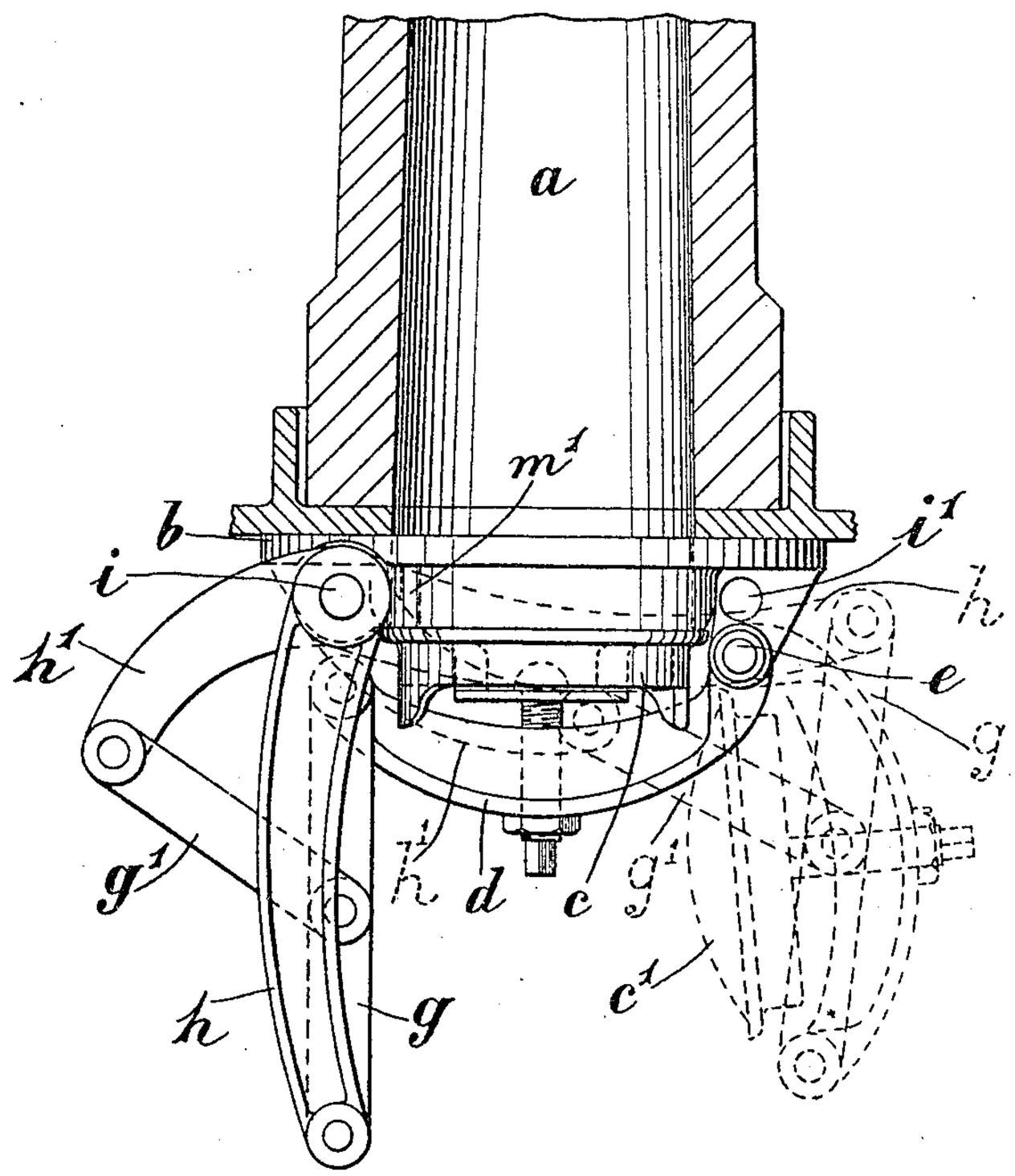
6 SHEETS—SHEET 6.

Fig. 7.



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UNITED STATES PATENT OFFICE.

HERBERT JOHN TOOGOOD, OF ELLAND, ENGLAND, ASSIGNOR TO ROBERT DEMPSTER & SONS, LIMITED, OF ELLAND, ENGLAND.

LID FOR GAS-RETORTS.

944,005. Specification of Letters Patent. **Patented Dec. 21, 1909.**

Application filed April 27, 1909. Serial No. 492,434.

To all whom it may concern:

Be it known that I, HERBERT JOHN TOOGOOD, residing at Elland, in the county of York, England, have invented certain new and useful Improvements in or Connected with Lids for Gas-Retorts; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to the lids or doors closing the mouthpieces of retorts used in gas manufacture, and although especially applicable to the lids at the top and bottom of vertical retorts, my improvements also apply to other forms of retorts.

As is well-known, the opening of the ordinary self-sealing lid, as applied to horizontal and inclined gas retorts, requires three distinct operations, namely, the lid is first unsealed by operating a handle, then the catch is removed from the end of the cross-bar, and then the lid is opened or swung horizontally on its hinges. To close the lid, these three operations are reversed. When applying such lids to vertical retorts, certain modifications become necessary; for example, in the case of the bottom mouthpiece lid, which must sustain the whole weight of the charge, and at the same time remain gastight, this lid, instead of swinging horizontally on its hinge, falls when opened into a vertical or nearly vertical position, and consequently requires some means to insure that the lid is held sufficiently open to permit the exit of coke without hindrance; and the lid has also to be raised against gravity when closing. As all the operations of actuating the lid must be performed from the outside of the bench, say eight feet away, there is a difficulty in arranging gearing to perform all the required movements for each of a large number of mouthpieces arranged in close formation along the retort bench. It has been proposed to fit each lid with two rocking shafts protruding to the front of the bench, one of such shafts operating the throw-over catch and the sealing eccentric which are present in the ordinary self-sealing lid while the other shaft effects the actual raising and lowering of the lid; a separate attachment being provided to secure the lid in the full open position during the discharge of the coke.

The principal object of the present invention is to provide a simpler form of gearing for actuating such lids.

According to this invention, I employ a system of toggle-jointed levers arranged to work in conjunction with the hinged cross-bar of each lid. The sealing eccentric and throw-over catch may thus be dispensed with, as a single movement of the levers in one direction unseals and opens the lid, while a single movement in the opposite direction closes and seals the lid, the usual three operations being thus resolved into one. Also, as is well-known, toggle-jointed levers are capable of exerting great pressure at the moment of their centers coming into line, so that by this means I am enabled to obtain the maximum sealing pressure of the lid against the mouthpiece, so as to render it gas-tight even against relatively high pressure of gas, and in the case of bottom lids, against the heavy weight of the charge in the retort.

In the accompanying drawings I have illustrated by way of example different modes of carrying this invention into practice.

Figure 1 is a vertical section of two bottom mouthpieces in the same row, the lid (shown in section) of the retort *a* being open and the lid of the retort a^1 being closed. Fig. 2 is a vertical section at right angles to that in Fig. 1, through two bottom mouthpieces opposite one another in adjacent rows, both lids being closed. Fig. 3 is an inverted plan of the mouthpieces shown in Fig. 2, with the lid of the retort in the front row removed. Figs. 4, 5 and 6 are respectively a side elevation, plan, and front elevation of a top mouthpiece and lid having my improvements applied thereto. Fig. 7 shows a modified arrangement of toggle levers which automatically locks the lid in the fully open position.

Referring firstly to Figs. 1 to 4, letter *a* indicates the retort, *b* the mouthpiece, *c* the lid, *d* the crossbar, which is hinged on the stud or pin *e* and connected at *f* to the toggle lever arm *g*. The other toggle lever arm *h* is secured upon a rocking shaft *i*, the end *j* of which is adapted to be engaged by a suitable lever or the like not shown. This rocking shaft may, however, be worked by a worm, rack, screw, or any other means, as may be found desirable. *k* is the ordinary gas outlet. A stop piece *m* formed on

the web carrying the pin *e* limits the movement of the crossbar *d* in the opening stroke. The levers *g h* are in duplicate, being connected by the stay rod *n*, but in Figs. 3 and 4 the right-hand levers are removed, the construction and action being obvious upon an inspection of the parts shown. The stays *n* may be tubular, and the lids of the retorts *p* in the back row are actuated by shafts i^1, arranged alternately with the shafts *i*, such shafts passing through clearance holes formed in the lugs which carry the hinge pins *e* of the lids of the front row.

In order to obviate any slight inequality in the action of the levers *g h* on opposite sides of the same lid, which may arise from torsion of the shaft *i* or i^1 between them, a single system of toggle levers for each lid may be substituted for the duplicate system shown in Figs. 1 to 3, and the form of the crossbar *d* may be modified. This is illustrated in Figs. 4, 5 and 6, referring to the top lids. Instead of the rocking shaft *i*, a horizontal handle *r*, or an upright (fixed or detachable) handle *s* indicated in dotted lines in Figs. 4 and 6 may be employed to actuate the toggle-jointed levers. The lever *h* works on a stud *t*, and is provided with a lug *v* to prevent the said lever from passing beyond the required distance, that is, a predetermined small distance beyond its dead center or position of maximum pressure so as to lock or hold the levers in such position. Set screws *w* may be adjusted to limit the amount of play between the lid and crossbar when open, these screws being clear of the lid when closed.

In the modification shown in Fig. 7, the lever *h*, instead of being keyed on the rocking shaft *i* as previously described, is mounted loosely thereon, and an additional lever h^1 is keyed on the said shaft in the position shown. The end of this lever h^1 is connected by a link g^1 to the lever *g* about the center of the latter. The power transmitted from the shaft *i* by the levers h^1 and g^1 thus causes the movement of the lid and parts connected therewith, from the position shown in full lines in the drawing to the position shown in dotted lines, or vice versa. In the position shown in dotted lines, these additional toggle levers h^1 and g^1 have been carried slightly past their dead centers, the lever h^1 being in contact with the stop m^1 formed on the mouthpiece; the weight of the lid and levers causes the lever h^1 to press against the said stop m^1, so that upon the rocking shaft *i* being set free, as by the stoker's releasing the handle which operates the said shaft, the lid is sustained in the said position. The lid, being thus locked open, cannot oscillate so as to cause obstruction to the falling coke during the discharging of the retort, and wear of the sealing faces by such falling coke is obviated. This arrangement is calculated to give an increased leverage in favor of the stoker for manipulating the lids, and is equally simple in operation, a single pull in one direction unsealing and opening the lid and locking it open, while a single pull in the opposite direction unlocks, closes, and seals the lid.

Instead of the rocking shaft *i* any suitable means may be employed to actuate the toggle-jointed levers, as for instance, a screw, worm or bevel gearing; but the rocking shaft is at present considered most advantageous.

The lids as arranged on the accompanying drawings are secured to their respective crossbars by means of a single ball-headed screw. This formation is for the purpose of allowing the lid to adapt itself to the face of the mouthpiece and the screwed portion is provided for adjustment for wear in the joints of links, and to adjust the pressure exerted by the toggle levers. Any other suitable means may be employed to connect the lid and crossbar, and if found desirable in large lids I may employ more than one connection.

On the inside of the bottom lid *c* a raised or projecting portion c^1 may be provided, as shown in Fig. 1, for the purpose of preventing wear of the sealing faces of the lid, when open, by the falling coke. This projection c^1 may, if found desirable, be sufficiently large (as shown in Fig. 7) to reduce appreciably the capacity of the mouthpiece when the lid is closed; and as the mouthpiece is usually filled with coke before charging the retort with coal, the quantity of coke required for this purpose will be correspondingly reduced.

The top lid arranged as shown in the accompanying drawings will be clear of an ordinary or other traveling charging chute or charging hopper, whether open or closed. Therefore, when the chute is brought into position for charging, the top lid being unsealed and opened by a single pull upon the lever, and, after charging, being closed and sealed by another pull in the reverse direction, before the charging chute is moved, a considerable saving in time and gas will be effected, as compared with other methods now known.

I claim as my invention:

1. In a gas-retort closure, the combination, with a mouthpiece, of a crossbar having one end portion pivoted to one side of the mouthpiece, a toggle-lever having one end portion pivoted to the other side of the mouthpiece from the pivot of the said crossbar, a toggle-arm pivotally connected to the free end portions of the said crossbar and toggle-lever, a lid for closing the mouthpiece, and a clamping device arranged between the said lid and the middle part of the crossbar.

2. In a gas-retort closure, the combination, with a mouthpiece, of a crossbar comprising two pairs of radially-arranged arms, one pair of arms being pivoted to one side of the mouthpiece, a pair of toggle-levers pivoted at one end to the other side of the mouthpiece from the pivot of the crossbar, a pair of toggle-arms pivotally connected to the free end portions of the toggle-levers and the remaining arms of the crosspiece, a lid for closing the mouthpiece, and a clamping device arranged between the said lid and the central part of the crossbar from which its arms radiate.

3. In a gas-retort closure, the combination, with a mouthpiece, of a crossbar having one end portion pivoted to one side of the mouthpiece, a toggle-lever having one end portion pivoted to the other side of the mouthpiece from the pivot of the crossbar, a toggle-arm pivotally connected to the free end portions of the said crossbar and toggle-lever, an operating lever pivoted concentric with the said toggle-lever, a link pivoted between the free end portion of the operating-lever and the middle part of the said toggle-arm, a lid for closing the mouthpiece, and a clamping device arranged between the said lid and the middle part of the crossbar.

4. In a retort closure, the combination, with a mouthpiece, of a crossbar having one end portion pivoted to one side of the mouthpiece, a toggle-lever having one end portion pivoted to the mouthpiece adjacent to its mouth and on the other side thereof from the pivot of the said crossbar, a toggle-arm pivotally connected to the free end portions of the said crossbar and toggle-lever, and a lid for closing the mouthpiece connected with the middle part of the said crossbar.

In testimony whereof I affix my signature in presence of two witnesses.

HERBERT JOHN TOOGOOD.

Witnesses:
ERNEST PRIESTLEY NEWTON,
JOSEPH LANCASTER FLEMMING.