No. 620,830. Patented Mar. 7, 1899.

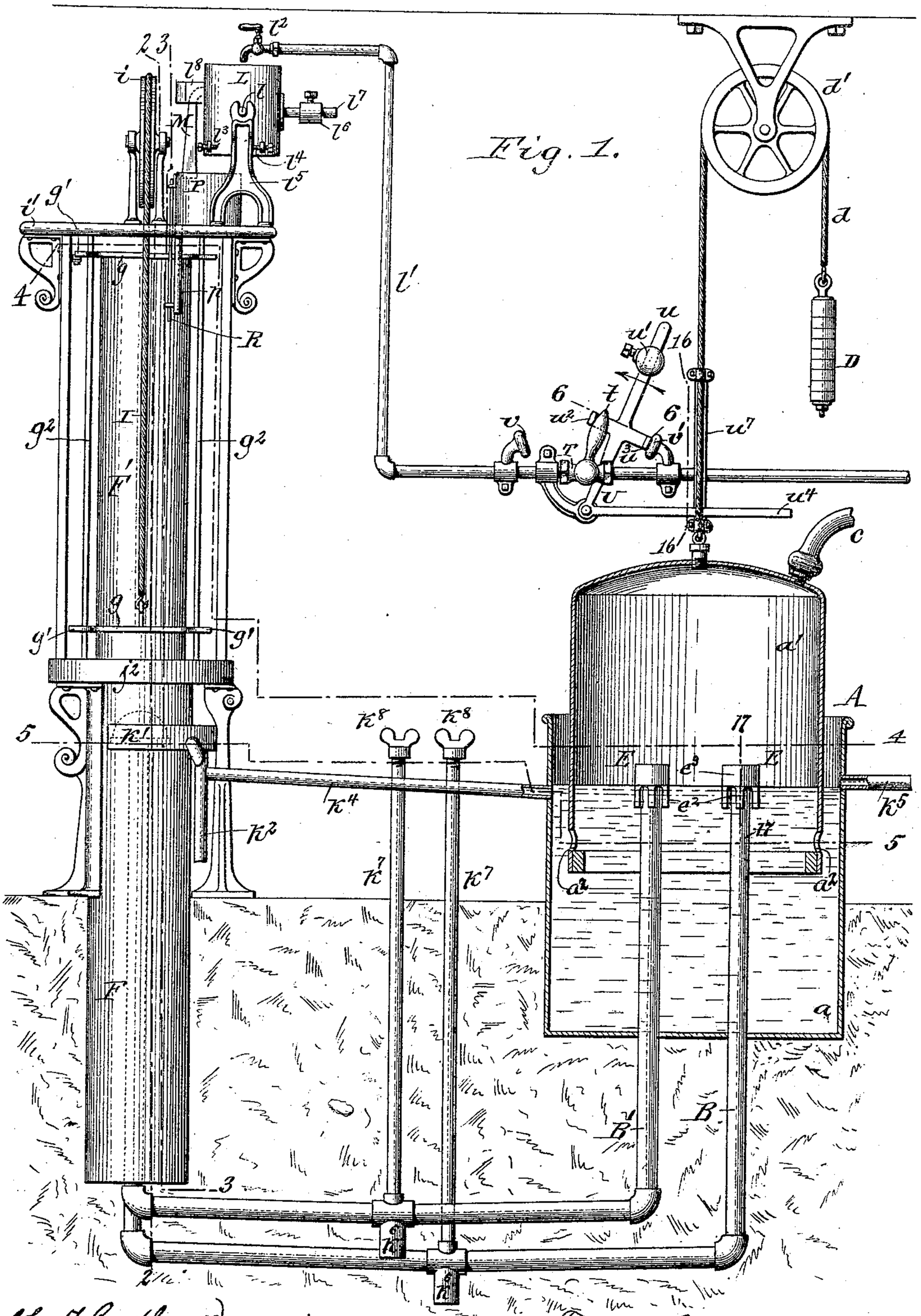
F. A. BAYNES.

AIR SUPPLYING APPARATUS.

(Application filed Aug. 18, 1897.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.



Chas. F. Burkhardt.
F. Gunther Wilhelm

WITNESSES:

Fred. A. Baynes INVENTOR

By Wilhelm Bonner

ATTORNEYS.

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(No Model.) 4 Sheets—Sheet 2.

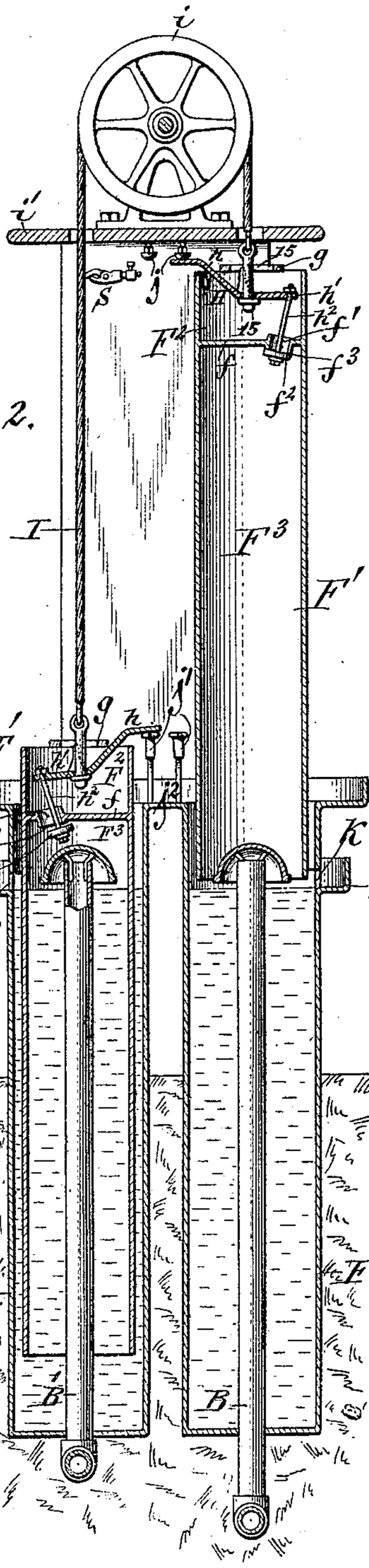

Fig. 2.

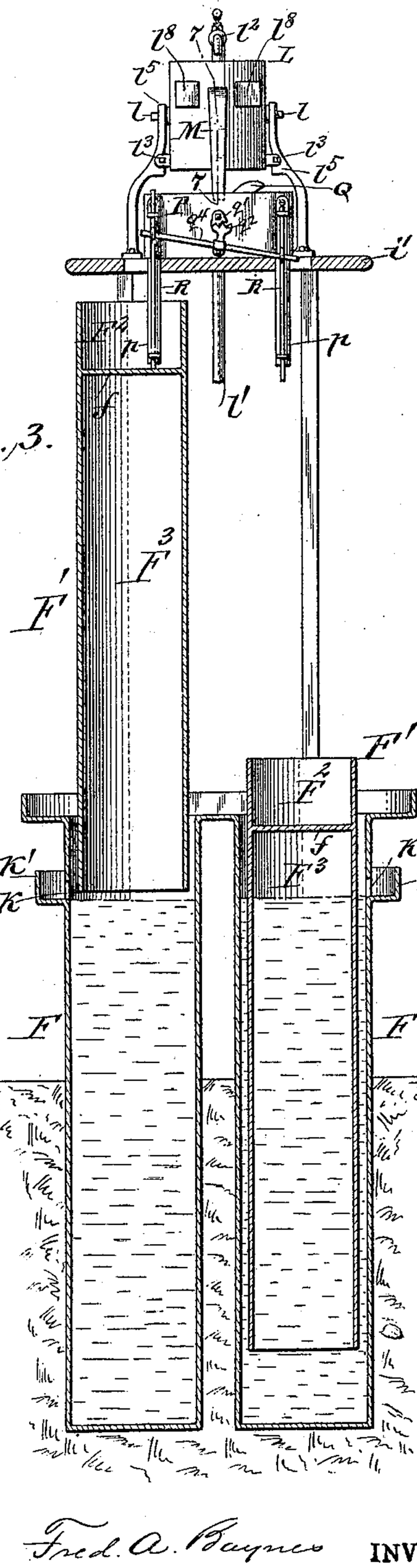

Fig. 3.

Witnesses:
Chas. F. Burkhardt,
F. Gutten. Wilhelm.

Fred. A. Baynes INVENTOR.
By Wilhelm Bonner
ATTORNEYS.

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(No Model.) 4 Sheets—Sheet 3.

Fig. 4.

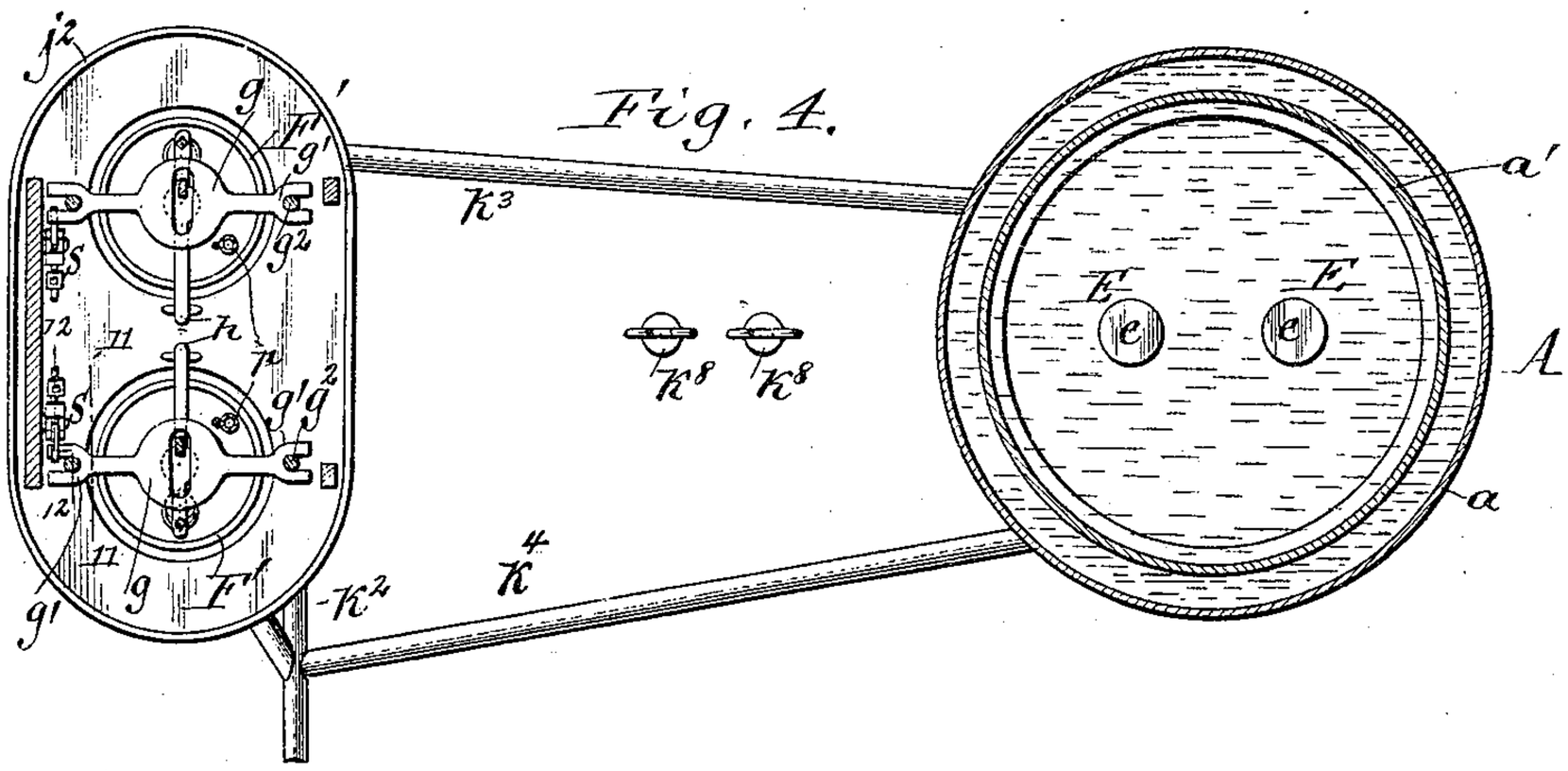


Fig. 5.

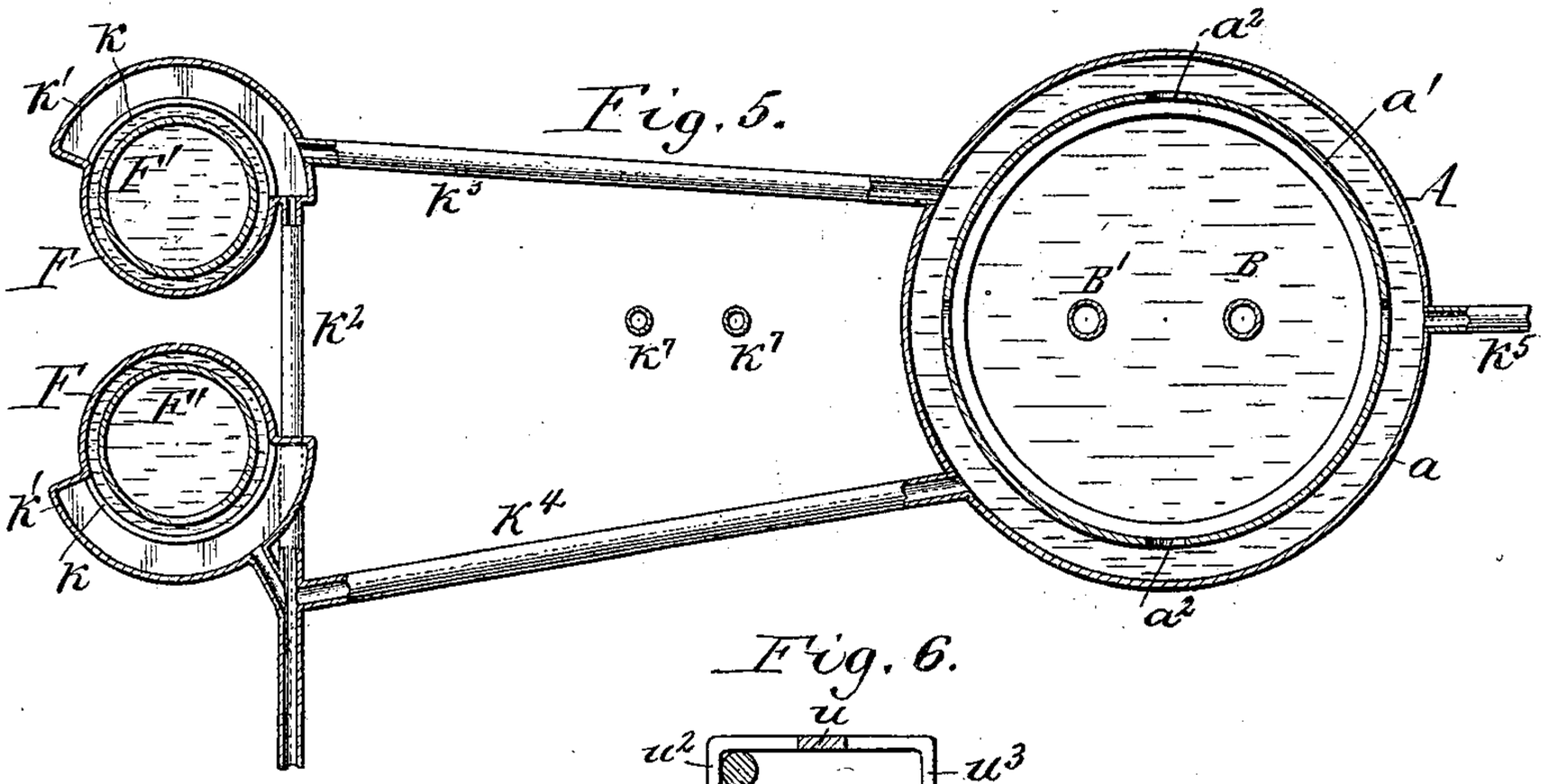


Fig. 6.

Fig. 7.

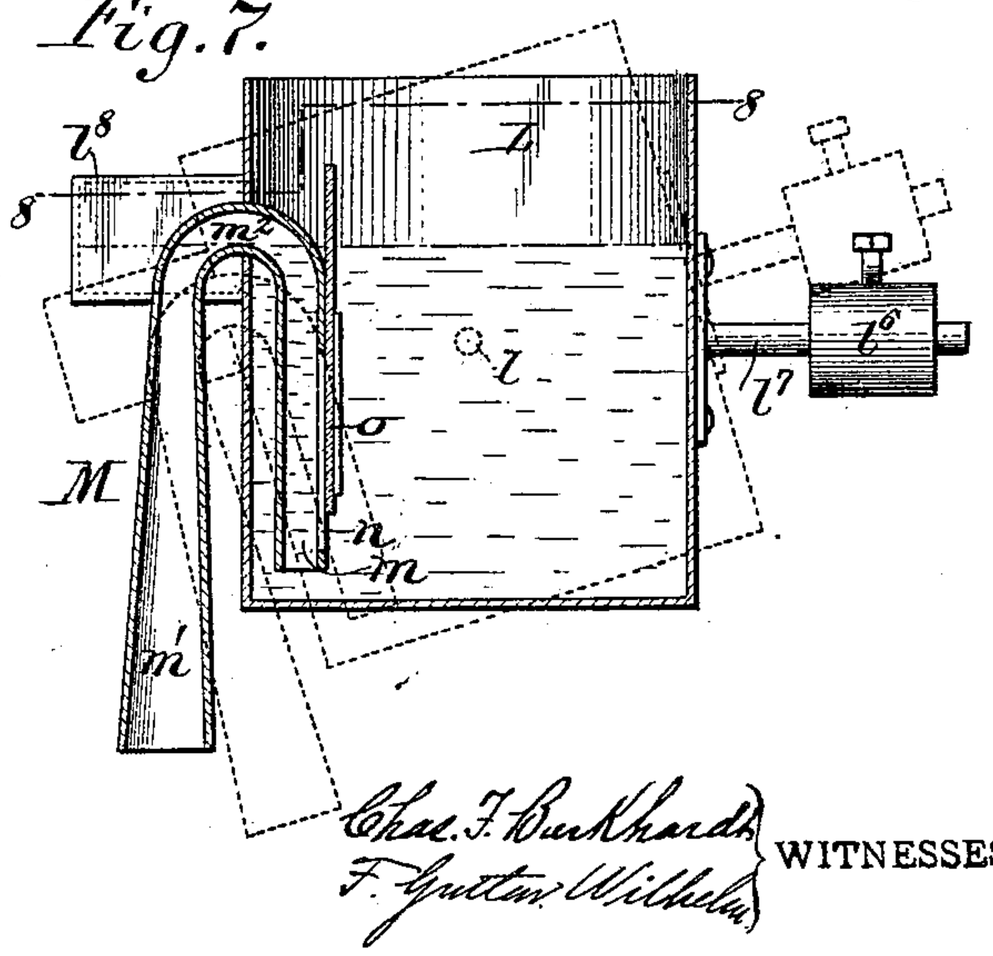
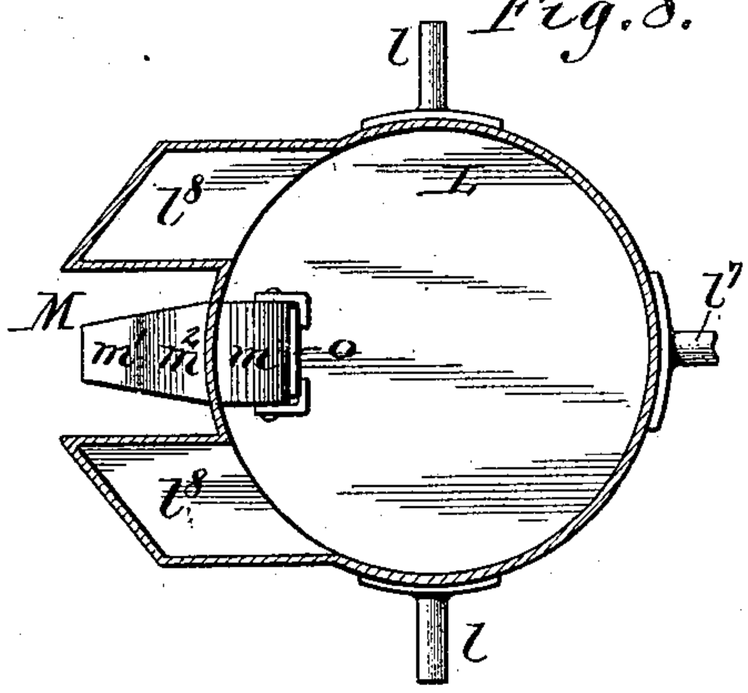


Fig. 8.



Witnesses:
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F. Gutten Wilhelm

F. A. Baynes INVENTOR.
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ATTORNEYS.

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(No Model.) 4 Sheets—Sheet 4.

Fig. 9.

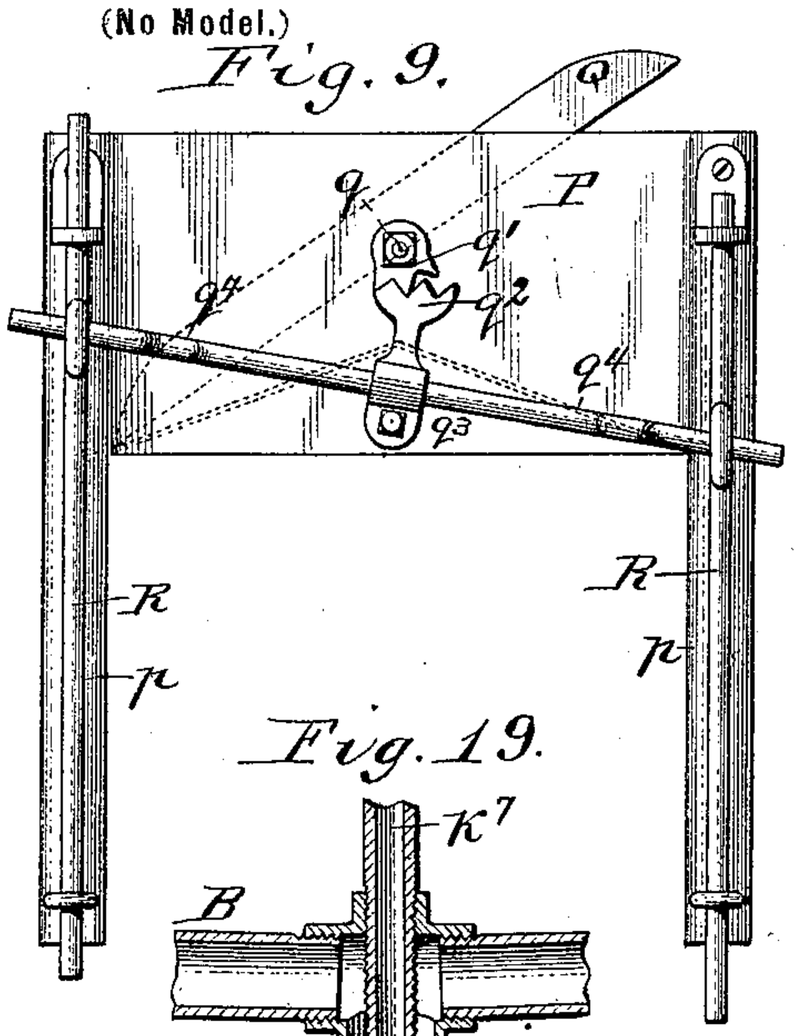


Fig. 12.

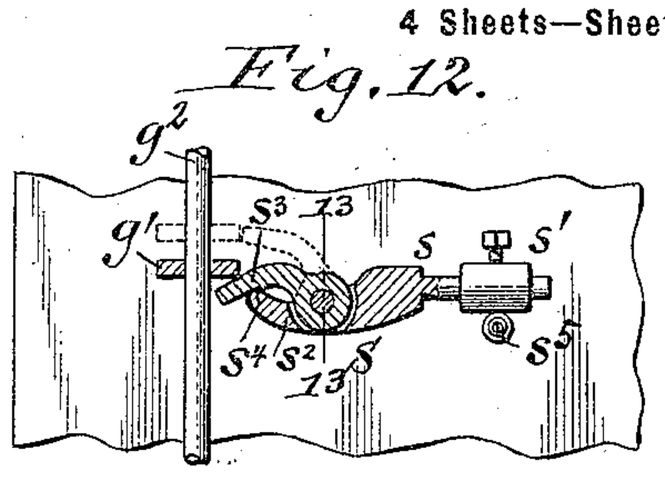


Fig. 19.

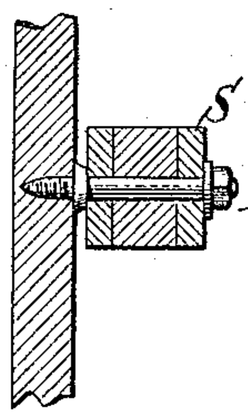


Fig. 13.

Fig. 10.

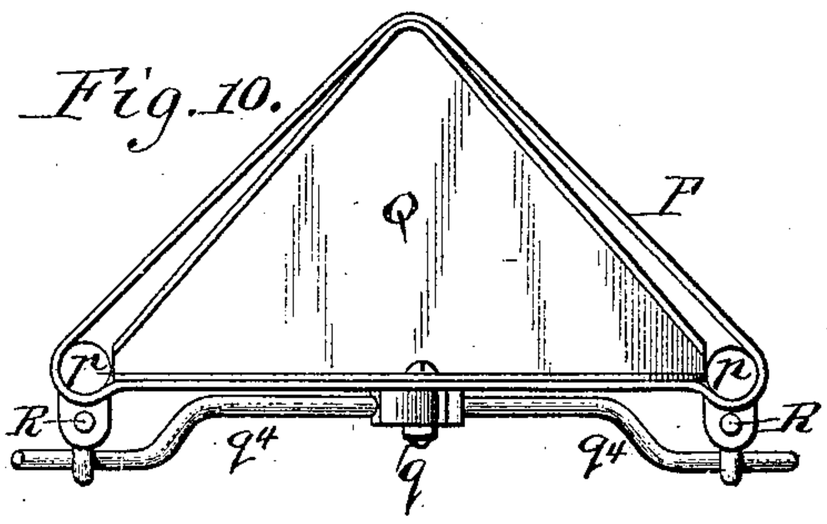


Fig. 14.

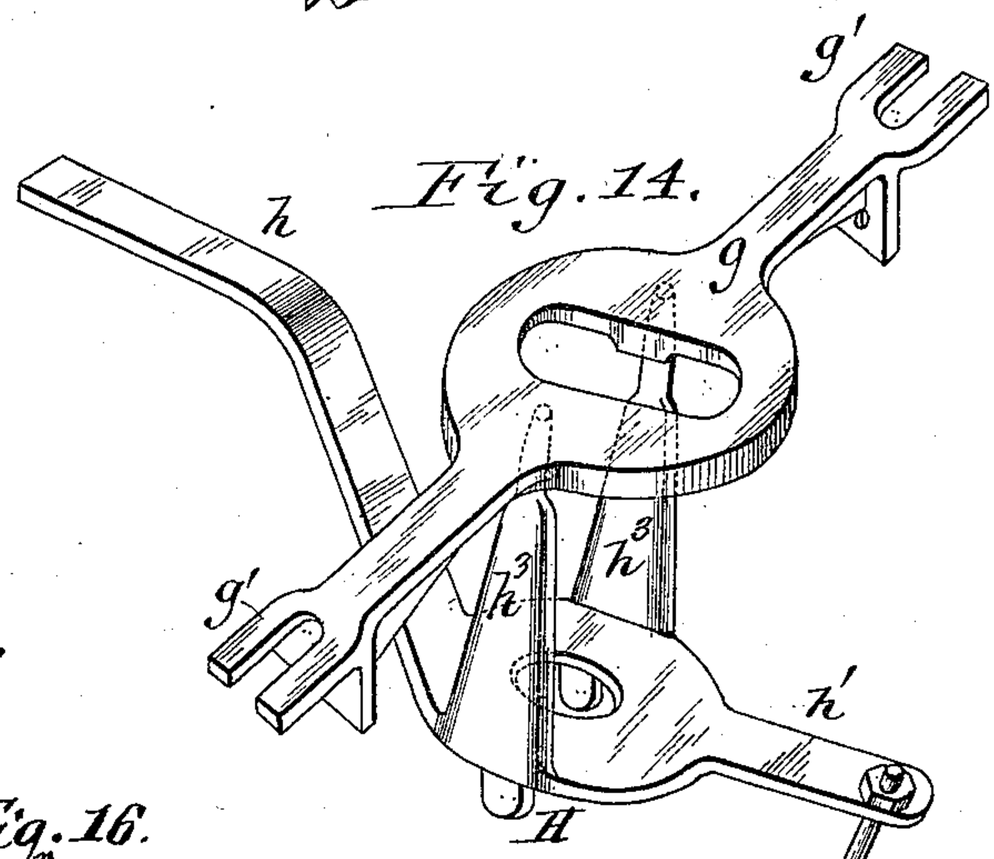


Fig. 11.

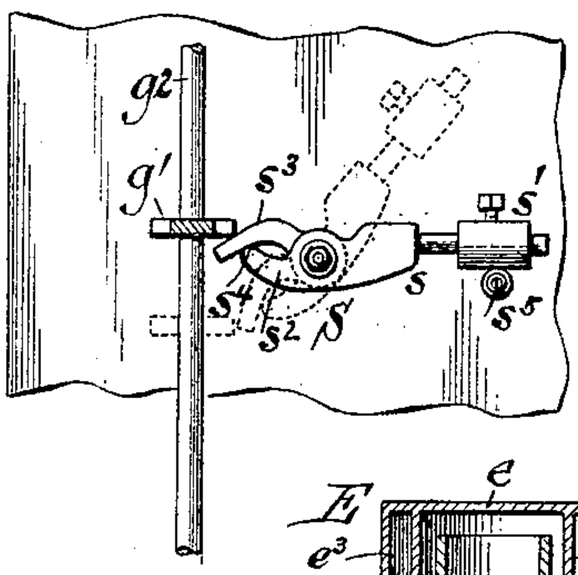


Fig. 16.

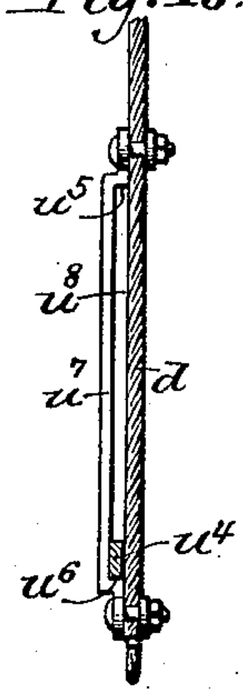


Fig. 15.

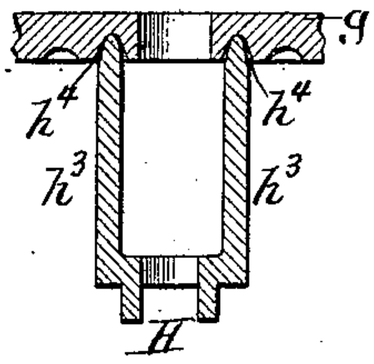
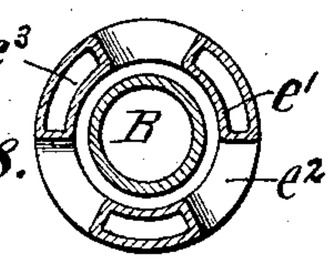


Fig. 18.



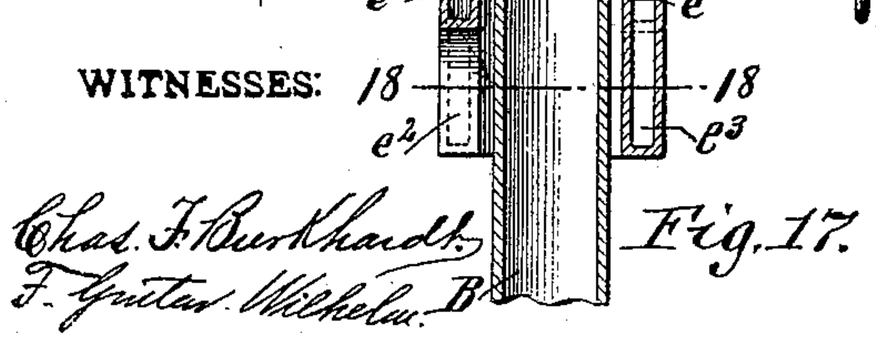


Fig. 17.

WITNESSES:

Chas. F. Burkhardt.

F. Gutes. Wilhelm.

Fred. A. Baynes INVENTOR.

By Wilhelm & Bonnet

ATTORNEYS.

UNITED STATES PATENT OFFICE.

FREDERICK A. BAYNES, OF BUFFALO, NEW YORK, ASSIGNOR TO REBECCA BAYNES, OF SAME PLACE.

AIR-SUPPLYING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 620,830, dated March 7, 1899.

Application filed August 18, 1897. Serial No. 648,625. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK A. BAYNES, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in Air-Supplying Apparatus, of which the following is a specification.

This invention relates to an apparatus for supplying air to a carbureter in which artificial gas is produced by forcing air through a body of hydrocarbon oil.

The object of this invention is the production of an air-supplying device for this purpose which is durable and reliable and is automatically started and stopped when the supply of air drops below or rises above the normal, thereby insuring uniformity in the supply of air to the carbureter.

In the accompanying drawings, consisting of four sheets, Figure 1 is a vertical longitudinal section of my improved air-supplying apparatus. Figs. 2 and 3 are vertical transverse sections in lines 2 2 and 3 3, Fig. 1, looking in opposite directions. Figs. 4 and 5 are horizontal sections in lines 4 4 and 5 5, Fig. 1, respectively. Fig. 6 is a horizontal section, on an enlarged scale, in line 6 6, Fig. 1. Fig. 7 is a vertical section, on an enlarged scale, through the siphon apparatus in line 7 7, Fig. 3. Fig. 8 is a horizontal section in line 8 8, Fig. 7. Fig. 9 is a detached elevation, on an enlarged scale, of the water-deflecting device. Fig. 10 is a top plan view of the same. Figs. 11 and 12 are vertical sections of the retarding device, on an enlarged scale, in lines 11 11 and 12 12, Fig. 4, respectively. Fig. 13 is a vertical section in line 13 13, Fig. 12. Fig. 14 is a perspective view of the rock-lever and connecting parts whereby the valve in the plunger is operated. Fig. 15 is a fragmentary vertical section, on an enlarged scale, in line 15 15, Fig. 2. Fig. 16 is a fragmentary vertical section in line 16 16, Fig. 1. Fig. 17 is a fragmentary vertical section, on an enlarged scale, in line 17 17, Fig. 1. Fig. 18 is a horizontal section in line 18 18, Fig. 17. Fig. 19 is a fragmentary vertical section of the drip-cup and connecting parts on an enlarged scale.

Like letters of reference refer to like parts in the several figures.

A, Figs. 1, 4, and 5, represents an air-holder, into which the air is forced by the air-supplying device and from which the air is drawn and delivered to the carbureter for producing gas. This gas-holder consists, essentially, of a lower chamber or vessel a, which is open at its upper end, and an upper inverted dome or chamber a', which is immersed with its open lower end in a body of water in the lower vessel, which water serves as a seal to prevent the escape of air between the dome and vessel as the dome is raised and lowered by the variation in the amount of air in the dome.

B B′ represent two air-supply pipes which extend with their delivery portions through the bottom of the lower vessel and terminate with their ends above the water-line in said vessel. The air is drawn off from the air-holder for use in the carbureter in any suitable manner—for instance, by means of a flexible tube c, connected with the upper portion of the dome. The weight of the dome is balanced by means of a counterweight D, connected with the dome by a rope or chain d, passing around a roller d', arranged on a stationary support, as shown in Fig. 1.

In order to prevent an excessive pressure of the air in the dome, the latter is provided near its lower edge with a number of vent-openings a^2, Figs. 1 and 5, which permit the air to escape from the dome if the latter is raised above its normal elevated position, thereby preventing the air from being delivered under excessive pressure to the carbureter.

E, Figs. 1, 4, 17, and 18, represents check-valves which are applied to the outlet ends of the air-supplying pipes and which prevent the air from passing backwardly from the dome into the pipes. Each of these check-valves consists of an inverted cup, the horizontal top e of which is adapted to rest upon the end of the air-pipe, and cylindrical body e', separated from the outer side of the pipe by an intervening space and having notches e^2 in its lower edge. In the normal position of this valve its top is pressed against the end of the air-pipe by the pressure of the air in the dome, and its notches are arranged below the water-line, thereby preventing the air from passing from the dome back into the pipe; but when the pressure of the air in the

pipe lifts the valve, so that its openings or notches are raised above the water-level, the air is permitted to pass from the pipe into the dome. In order to aid the air in lifting the check-valve, the latter is provided around its cylindrical portion and between the notches with an air-chamber e^3, thereby rendering the valve buoyant and sensitive and permitting the same to be raised by a comparatively light pressure of air.

The pump whereby the air is delivered to the air-holder is constructed as follows:

F F, Figs. 1, 2, 3, 4, and 5, represent two upwardly-opening stationary cylinders, which are arranged side by side and which are filled partly with water. The inlet ends of the air-supply pipe extend upwardly through the bottoms, respectively, of these cylinders and terminate with their upper ends above the water-line.

F′ F′ represent two reciprocating cylindrical plungers, which are adapted to move up and down in the stationary cylinders. Each of these plungers is open at its upper and lower ends and provided in its upper portion with a horizontal partition f, which divides the plunger into an upper water-chamber F^2 and a lower air-chamber F^3. This partition is provided with an opening f', which is adapted to be opened and closed by a valve f^2, moving toward and from a valve-seat f^3, surrounding the lower end of said opening. During the upward movement of each plunger the valve f^2 is open, allowing air to pass into the air-chamber. When the plunger is in its highest position, the valve f^2 is closed, as shown in the right-hand portion of Fig. 2, and a quantity of water is delivered into the water-chamber, which causes the plunger to descend and force its lower end into the water of the stationary cylinder, whereby the air between the water and the partition f of the plunger is forced through the air-pipe into the air-holder. During the last portion of the downward movement of the plunger the valve f^2 is opened, as shown in the left-hand portion of Fig. 2, thereby allowing the water in the water-chamber to escape into the stationary cylinder and permitting the plunger to draw in a new charge of air into its air-chamber during the subsequent upward movement of the plunger. In order to prevent the water escaping from the water-chamber from entering the air-pipe, the upper end of the latter is provided with a canopy, which is secured thereto, so as not to obstruct the opening, and which extends downwardly around the side of the pipe, so as to carry the water away from the open upper ends thereof. The plunger is guided in its vertically-reciprocating movement by means of a cross-bar g, Figs. 1, 4, and 14, secured to the upper end of the plunger and provided on opposite sides of the plunger with notched ears g', which engage with vertical guide-rods g^2.

H, Figs. 2, 4, 14, and 15, represents a rock-lever whereby the valve f^2 is opened and closed and which is provided with an outer arm h and with an inner arm h', to which latter the valve f^2 is connected by a rod h^2. The rock-lever is pivoted by means of two upwardly-projecting lugs h^3, formed on opposite sides of the lever and engaging with two sockets h^4, formed in the under side of the cross-bar g on the upper end of the plunger, as represented in Figs. 2, 14, and 15. The plungers are connected, so that they are raised and lowered alternately, by means of a rope or chain I, which passes, with its upper portion, around a wheel i, which is pivotally supported upon a bracket i' or other stationary support. When one of the plungers is depressed by the weight of the water in its upper chamber, the other plunger, which has emptied its water, is raised and allows air to enter its lower chamber. The lifting-cord is connected at its ends with the respective rock-levers adjacent or eccentric to the pivots thereof, as shown in Figs. 2 and 14, so that the weight of the plungers is utilized for holding the valves f^2 in an open or closed position. During the last portion of the upward movement of each plunger the outer arm of the rock-lever mounted thereon strikes a stop or tappet j on the bracket i', whereby the rock-lever is turned so that its connection with the lifting-rope I is shifted between the pivot of the rock-lever and the outer end of its inner arm, whereby the weight of the plunger is caused to hold the valve f^2 in a closed position, as shown in the right-hand portion of Fig. 2, preparatory to delivering a charge of water into the water-chamber. The valve is held in this closed position until the plunger has nearly reached the limit of its downward movement, when the outer arm of the rock-lever strikes a stop or tappet j', arranged on a shelf or trough j^2 on the lower stationary cylinder, whereby the rock-lever is turned so that its connection with the lifting-rope is shifted to the opposite side of the pivot of the rock-lever, as shown in the left-hand portion of Fig. 2, whereby the valve f^2 is opened and held in this position by the weight of the plunger for permitting the water to discharge from the water-chamber into the stationary cylinder and to allow of a fresh charge of air to enter the air-chamber during the subsequent upward movement of the plunger. The upper and lower stops j j' are both made adjustable, so that the opening and closing of the valve may be regulated, this adjustment being effected, for instance, by means of a screw connection between these stops and their supports. In order to prevent the water from rising in the cylinders above the inlets of the air-pipes and entering the latter, each of the cylinders is provided below the top of the air-pipes with an overflow outlet-opening k, whereby the surplus water is conducted into a trough k', arranged on the cylinder. The troughs of both cylinders are connected by a pipe k^2, which leads to a drain. A portion of the wa-

ter escaping from the cylinders is conducted into the water-vessel air-holder by branch pipes k^3 k^4, which connect the air-holder with the trough of one of the cylinders, and the pipe k^2. The water is prevented from rising above the outlet end of the air-pipes in the air-holder by means of an overflow-pipe k^5, which connects with the air-holder below the outlet of said pipes, thereby maintaining the water in the air-holder always at a uniform level.

Each of the air-pipes is provided with a drip-chamber or depressed portion k^6, Figs. 1 and 19, and the parts of the air-pipe are inclined, so that the water of condensation which is formed in the pipe will be carried into said chamber. When water collects in this chamber, the same is drawn off by a vertical pipe k^7, so as to prevent the same from obstructing the passage of the air through the air-pipe. The outer end of this pipe is normally closed by a screw-cap k^8 or otherwise to prevent the escape of air through the same when the machine is in use.

The water-chambers of the plungers are alternately supplied with a charge of water by the following devices:

L, Figs. 1, 3, 7, and 8, represents an oscillating siphon-cup which is pivoted on diametrically opposite sides by means of trunnions l, so as to swing in a vertical plane, and into which water is delivered by means of a pipe l', having a hand-valve l^2 arranged with its outlet over the cup. The oscillating movement of this cup is adjusted by means of adjustable stop-screws l^3 l^4, arranged on the cup and adapted to engage with opposite sides of the standards l^5, on which the trunnions of the cup are journaled. When the cup is in an upright position, the stops l^4 bear against one side of the standards, and it is held in this position by means of a weight l^6, adjustably secured to an arm l^7, projecting from the adjacent side of the cup, as represented in Figs. 5 and 7. The opposite side of the cup is provided near its upper end with one or more laterally-projecting tipping pockets or chambers l^8. When the water rises in the cup and fills these chambers sufficiently to overbalance the weight on the other side of the cup, the latter will be tilted toward the side on which the tipping chambers are arranged, as represented in Fig. 7, until the stops l^3 on the respective side of the cup bear against the standards l^5.

M, Figs. 1, 2, 7, and 8, represents a siphon whereby the water is drawn off from the cup intermittently and which is arranged on the same side of the siphon-cup as the tipping chambers. This siphon consists of an inner member m, which is arranged within the cup and opens with its lower end near the bottom of the cup, an outer member m', arranged outside of the cup and opening with its lower end below the cup, and a tubular portion m^2, connecting the upper ends of the inner and outer members and passing through the cup at a point adjacent to the tipping chamber. When the water rises in the cup, it also fills the inner member of the siphon, and the parts are so adjusted that when the water enters the tipping chamber and tips the cup the upper end of the siphon will be carried below the level of the water, whereby the siphon is filled with water and caused to suck the water out of the cup and discharge the same through the lower end of its outer member. When the siphon has drawn off the water from the cup down to the opening in the lower end of the inner member, the weight l^6 predominates and the cup is restored to its normal upright position. In order to enable the amount of water which is withdrawn from the cup during each siphon action to be regulated, the suction-point at the lower end of the inner member is made vertically adjustable. This is accomplished by providing the inner member with a vertical slot n and arranging a slide o over this slot, as represented in Figs. 7 and 8. The lower edge of this slide determines the point at which the suction of the siphon ceases, and by raising and lowering the slide the suction-point is correspondingly shifted and the water withdrawn from the cup is correspondingly varied.

The movements of the plungers and the tipping of the siphon-cup are so timed that the tipping of the cup takes place whenever one of the plungers has reached its uppermost position, and in order to deliver the water alternately into the water-chambers of the plungers a deflecting device is provided which deflects the water from the siphon into the water-chamber of the raised plunger. This deflecting device is constructed as follows:

P, Figs. 1, 2, 9, and 10, represents a valve-chamber which is arranged below the siphon and which is provided on opposite sides with discharge-pipes p p, which are arranged above the water-chambers of the respective plungers.

Q represents a trough-shaped oscillating valve or deflecting-plate which is arranged transversely in the valve-chamber and which is pivoted between its ends by a horizontal pivot q to one of the walls of the valve-chamber, so that the water delivered upon the plate by the siphon can be directed toward either one or the other discharge-pipes of the chamber. The pivot of the valve-plate is provided with a gear-segment q', which is engaged by a gear-segment q^2, secured to a rock-lever q^3. The latter is pivoted transversely on the chamber and provided with two arms q^4 q^4, as shown in Figs. 3, 9, and 10.

R R represent two vertically-movable shipper-rods, each of which is guided upon one of the discharge-pipes p and is loosely connected with one of the arms q^4 of the rock-lever. The lower ends of the shipper-rods project below the respective discharge-pipe on which they are guided and are adapted to be engaged alternately by the partitions f in the plungers. During the last portion of the upward move-

ment of each plunger its partition engages with the lower end of the shipper-rod on the respective side of the machine and raises the same, thereby turning the rock-lever and gear-segments, so that the valve-plate leans toward that side of the machine, whereby the water which issues from the siphon at this time is directed into the water-chamber of the raised plunger. Upon raising one shipper-rod by the upward movement of one of the plungers the rock-lever depresses the other shipper-rod, so that the latter will be in a position to be engaged by the other plunger and reverse the valve-plate and the flow of water when the other plunger has reached the limit of its upward movement.

S S, Figs. 2, 4, 11, 12, and 13, represent retarding-levers which hold the plungers in an elevated position until a full charge of water has been delivered into each of their water-chambers, so as to insure the full downward movement of the plungers. One of these levers is pivoted upon the frame of the machine adjacent to each plunger and is provided on one of its arms s with an adjustable weight s' and on its other arm s^2 with a pivoted finger s^3, which latter is free to swing upwardly, but is held against downward movement by a stop s^4 on the arm s^2, with which said finger engages. The lever is held in a substantially horizontal position by a stop s^5, arranged on the frame and engaging with the under side of the arm s, in which position of the lever the finger on its other arm stands in the path of one of the lugs g' of the plunger cross-bar. During the last portion of the upward movement of the plunger its lug raises the finger without turning the retarding-lever, and when this lug has reached the limit of its upward movement the finger clears the lug and drops back into its normal position. When the water-chamber in the raised plunger begins to fill with water, it descends slightly until its lug g' engages with the finger s^3, when its downward movement is arrested until the entire charge of water has been delivered into the water-chamber. The weight of the full charge of water, together with the plunger and connecting parts, is sufficient to overbalance the weighted arm s of the retarding-lever and clear the latter, thereby permitting the plunger to descend its full extent. When the lug g' after the first portion of the downward movement of the plunger clears the finger s^3 of the retarding-lever, the latter returns to its horizontal normal position.

In order to enable the operation of the air-pumping device to be automatically stopped or started when the supply of air in the air-holder rises above the normal or drops below the normal, the following mechanism is provided:

T represents a valve which is arranged in the water-pipe l' and which is provided with a handle t, whereby the valve may be turned for opening or closing the same, as shown in Figs. 1 and 6.

U represents a shifting elbow-lever which is pivoted on a suitable support and provided at the upper end of its upwardly-projecting arm u with an adjustable weight u'.

u^2 u^3 represent hooks or tappets arranged on the upper arm u and adapted to engage with opposite sides of the handle of the valve for opening and closing the latter. The lower horizontal arm u^4 of the elbow-lever is adapted to be engaged by upper and lower shoulders or tappets u^5 u^6, Fig. 6, which are arranged on the cord or chain d of the air-holder and which are preferably formed on a bar u^7, secured lengthwise to the cord and forming, together with the cord, a slot u^8, in which the lower arm u^4 is guided.

When the dome of the air-holder rises above its normal position, the lower shoulder u^6 on its cord engages with the lower side of the lower arm u^4 of the elbow-lever and turns the same in the direction of the arrow, Fig. 1, until its upper arm has passed, with its weight, beyond the dead-center, when the movement of the lever in the same direction is quickly completed by the weight, and its tappet u^3 strikes the valve-arm with sufficient force to turn the same and close the valve, thereby shutting off the water-supply and stopping the operation of the machine. When the air has been drawn off from the air-holder, so that the dome drops below its normal position, the upper shoulder u^5 of the cord d engages with the upper side of the lower arm u^4 of the elbow-lever and turns the same in the opposite direction from that indicated by the arrow in Fig. 1 until its upper arm has passed, with its weight, on the opposite side of the dead-center. Then the movement of the elbow-lever is quickly completed in the same direction by the weight u', and the tappet u^2 strikes the other side of the valve-arm and turns the same in the opposite direction, thereby quickly opening the water-valve and starting the air-pumping mechanism. The rocking movement of the elbow-lever is preferably limited in both directions by stops v v', arranged upon a suitable support and adapted to be engaged by the tappets or other part of the elbow-lever.

I claim as my invention—

1. In an air-holder, the combination with the upwardly-opening water-chamber, and the vertically-movable dome arranged with its lower open end in said chamber, of an air-supply pipe opening into the dome above the water-line, a check-valve applied to the outlet of said pipe and air-chambers arranged on said valve and immersed in the water of the chamber, substantially as set forth.

2. In an air-holder, the combination with an upwardly-opening water-chamber and a vertically-movable dome immersed with its open lower end in the water in said chamber, of an air-supply pipe opening into the dome above the water-line, a valve fitting loosely over the outlet of said pipe and provided in its side with openings, immersed in the water, and an air-

chamber arranged on the valve between the openings thereof, substantially as set forth.

3. The combination with the water-cylinder and the air-pipe opening into the same, of a plunger moving vertically in said cylinder and provided in its lower portion with an air-chamber which surrounds the outlet of said air-pipe and in its upper portion with a water-chamber, a water-passage leading from said water-chamber down to said air-chamber, a valve arranged in said air-chamber and closing said passage, and means whereby said valve is opened as the plunger approaches the end of its downward stroke, substantially as set forth.

4. The combination with the water-cylinder and the air-pipe opening into the same, of a plunger moving vertically in said cylinder and provided in its lower portion with an air-chamber which surrounds the outlet of said air-pipe and in its upper portion with a water-chamber, a water-passage leading from said water-chamber down to said air-chamber, a valve arranged in said air-chamber and closing against the lower end of said passage, and a valve-actuating device arranged in said water-chamber and extending through said water-passage down to said valve, substantially as set forth.

5. The combination with the water-cylinder and the air-pipe opening into the cylinder above the water-line, of a plunger moving vertically in said cylinder and provided with an air-chamber in its lower portion and a water-chamber in its upper portion, a valve whereby the water and air chambers may be connected and disconnected, and a rock-lever whereby said valve is operated, substantially as set forth.

6. The combination with the water-cylinder and the air-pipe opening into the cylinder above the water-line, of a plunger moving vertically in said cylinder and provided with an air-chamber in its lower portion and a water-chamber in its upper portion, a valve whereby the water and air chambers may be connected and disconnected, a rock-lever pivoted on the plunger and operating said valve, and stops or tappets against which said lever is adapted to engage for shifting the lever, substantially as set forth.

7. The combination with the water-cylinder and the air-pipe opening into the cylinder above the water-line, of a plunger moving vertically in said cylinder and provided with an air-chamber in its lower portion and a water-chamber in its upper portion, a valve whereby the water and air chambers may be connected and disconnected, a rock-lever pivoted on the plunger and operating said valve, stationary tappets whereby the lever is alternately turned in opposite directions, and a shifting cord or chain connected with said lever adjacent to its pivot, substantially as set forth.

8. The combination with two water-cylinders and two air-pipes opening into said cylinders above the water-line, of two vertically-movable plungers arranged in said cylinders and each provided with an air-chamber in its lower portion, a water-chamber in its upper portion and a valve for permitting the water to escape from the water-chamber, rock-levers pivoted on the plungers and connected with the valves, and a cord or chain passing around a pulley and connected at its ends with said levers adjacent to their pivots, substantially as set forth.

9. The combination with the water-cylinder and the air-pipe opening into the cylinder above the water-line, of a vertically-movable plunger arranged in the cylinder and provided with an air-chamber in its lower portion, a water-chamber in its upper portion and a valve for connecting and disconnecting said chambers, a deflector arranged over the inlet of the air-pipe, and a water-overflow arranged in the side of the cylinder below the inlet of the air-pipe, substantially as set forth.

10. The combination with the oscillating siphon-cup and the siphon connected therewith on one side of its pivot, of a lateral extension formed on the upper portion of the cup on the same side on which the siphon is arranged, and a balancing-weight arranged on the cup on the opposite side of its pivot, substantially as set forth.

11. The combination with the oscillating siphon-cup and the siphon connected therewith on one side of its pivot, of a lateral extension formed on the upper portion of the cup on the same side on which the siphon is arranged, a balancing-weight arranged on the cup on the opposite side of its pivot, and stops whereby the oscillating movement of the cup is limited substantially as set forth.

12. The combination with two water-cylinders and two plungers connected to move in said cylinders vertically in opposite directions and each provided with a water-chamber, of a stationary valve-chamber having stationary discharge-pipes which open above the water-chambers of the plungers, a rocking deflecting-plate arranged in said valve-chamber and adapted to direct the water alternately to said pipes, and means whereby said plate is rocked from the plungers, substantially as set forth.

13. The combination with two water-cylinders and two plungers connected to move in said cylinders vertically in opposite directions and each provided with a water-chamber, of a stationary valve-chamber having stationary discharge-pipes opening above the water-chambers of the plungers, a deflecting-plate arranged in said valve-chamber and mounted centrally on a horizontal pivot, a rock-lever having a gear-segment which meshes with a gear-segment on the valve-pivot and projecting on opposite sides of its pivot and two shipper-rods which are connected respectively with opposite ends of the rock-lever and adapted to be engaged alternately by the plungers, substantially as set forth.

14. The combination with two water-cylin-

ders and two plungers connected to move in said cylinders vertically in opposite directions and each provided with a water-chamber, of a valve-chamber having two discharge-pipes which open above the water-chambers of the plungers, a rocking deflecting-plate arranged in said valve-chamber and adapted to direct the water alternately to said pipes, means whereby said plate is rocked from the plungers, and an oscillating siphon-cup arranged to receive the water-supply and to deliver a measured quantity of water periodically to said deflecting-plate, substantially as set forth.

Witness my hand this 11th day of August, 1897.

FREDERICK A. BAYNES.

Witnesses:

THEO. L. POPP,

FREDERICK G. BAGLEY.