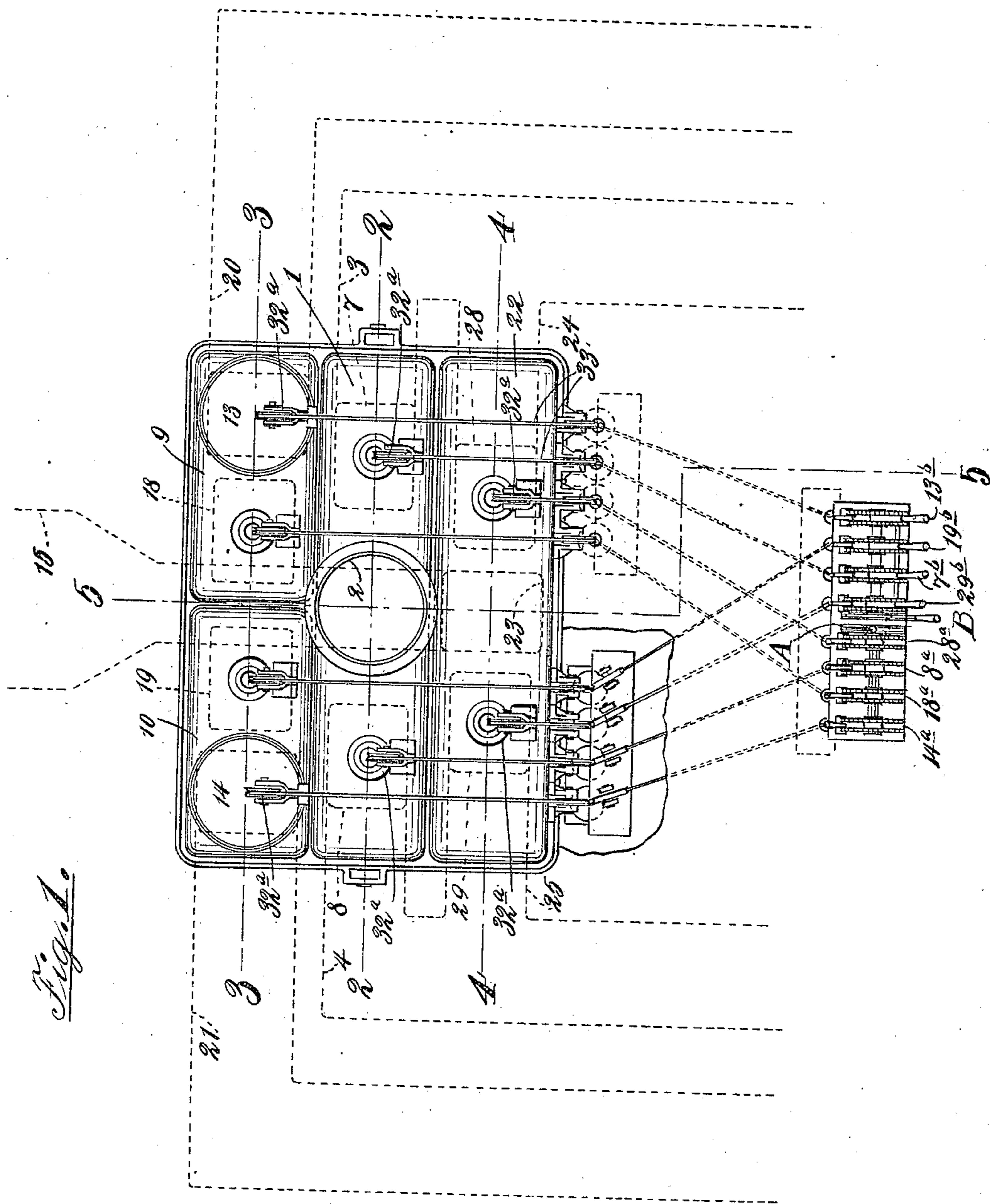


No. 837,666.

PATENTED DEC. 4, 1906.

A. W. CLAUSEN.
GAS REVERSING MEANS.
APPLICATION FILED NOV. 27, 1905.

4 SHEETS—SHEET 1.



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4 SHEETS—SHEET 2.

Fig. 2.

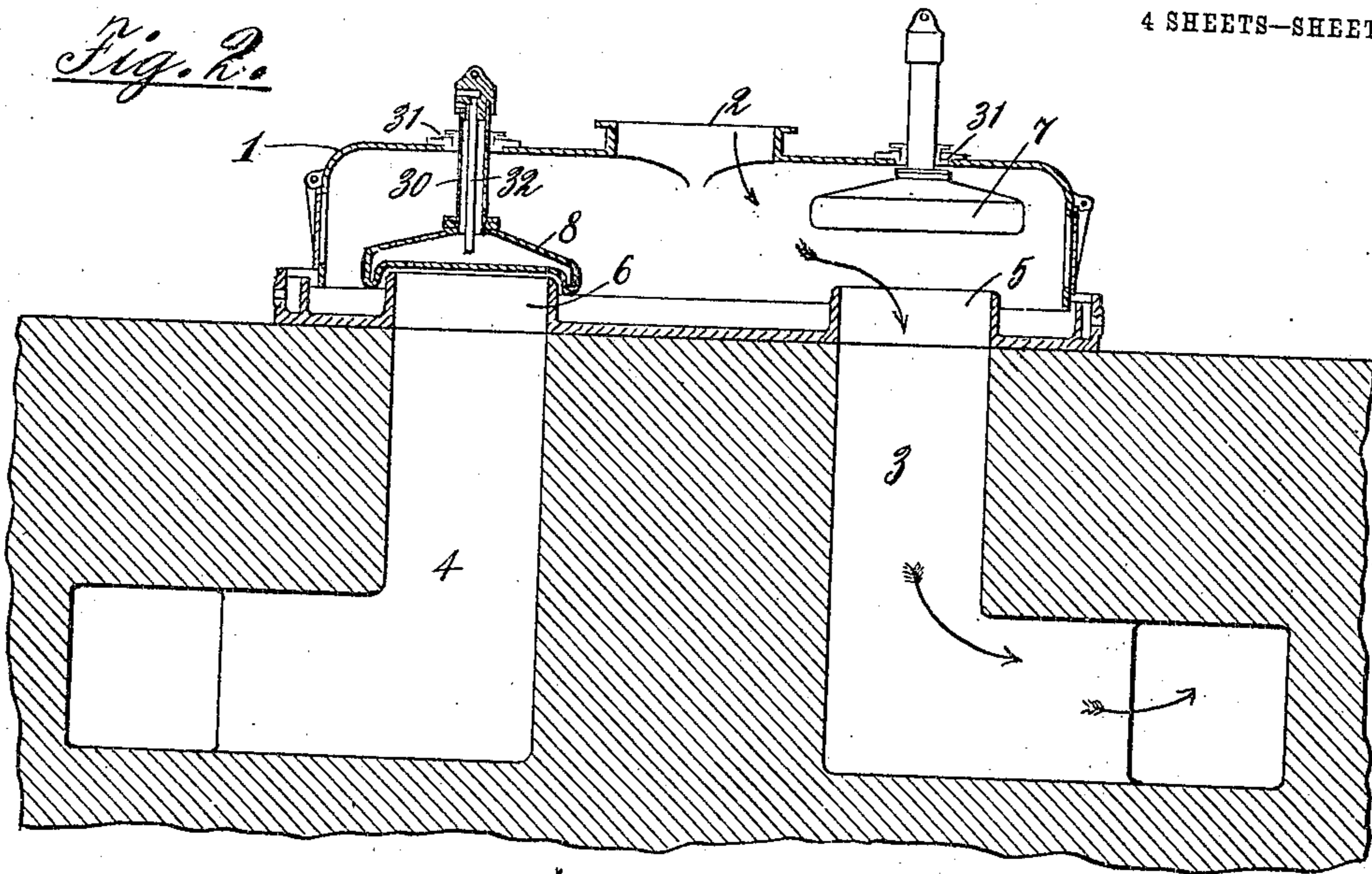
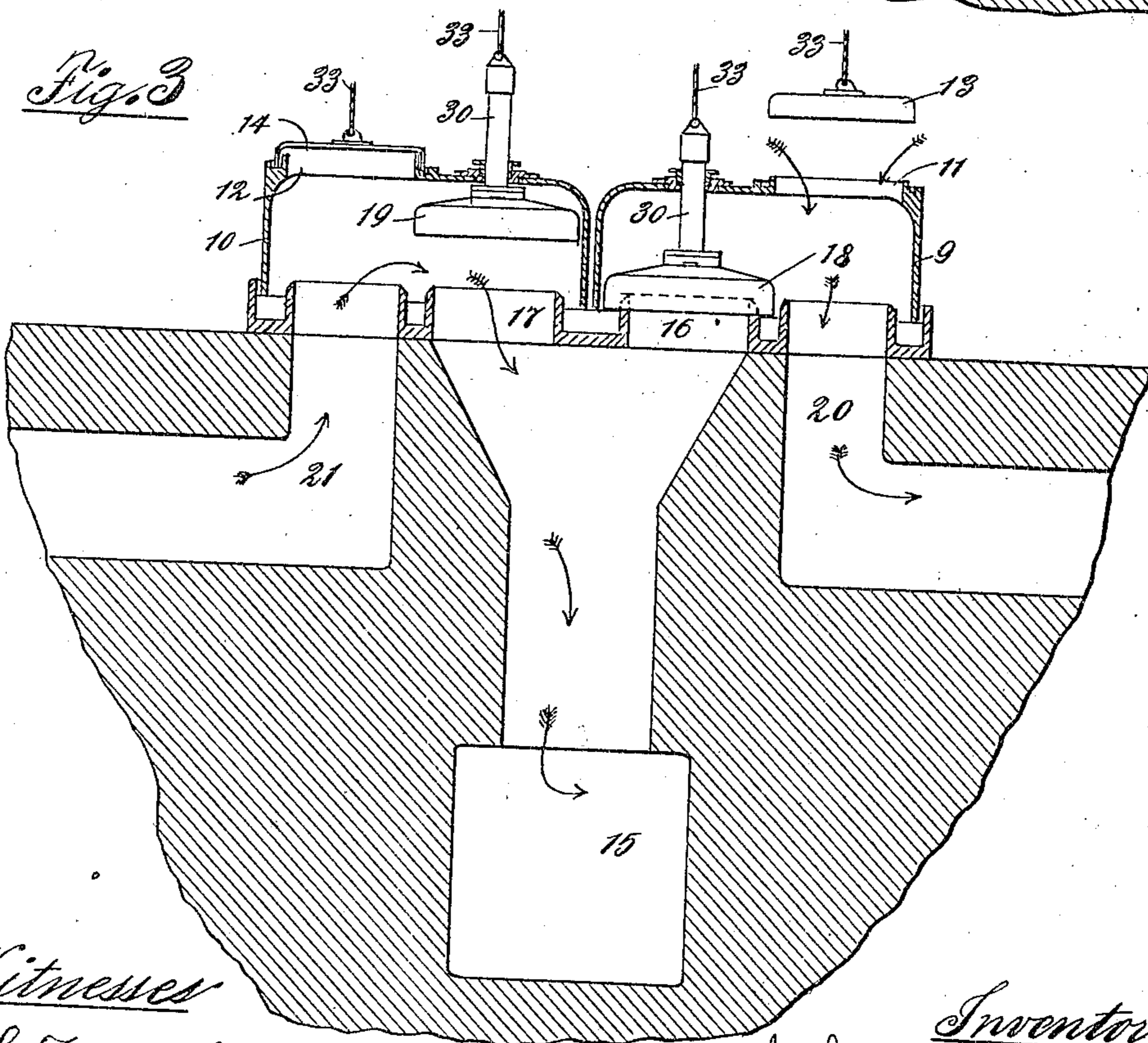


Fig. 3.



Witnesses

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4 SHEETS—SHEET 3.

Fig. 4.

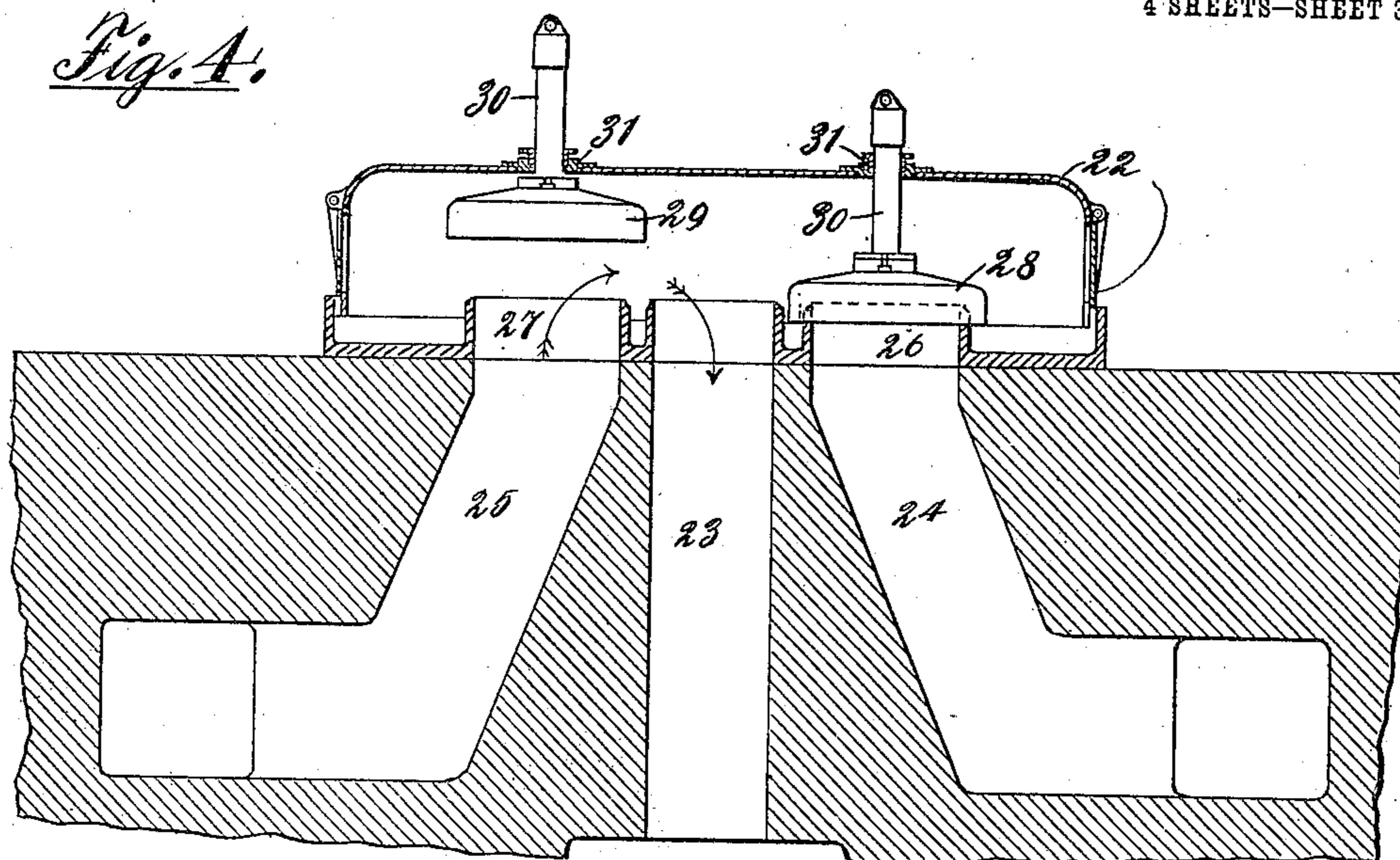
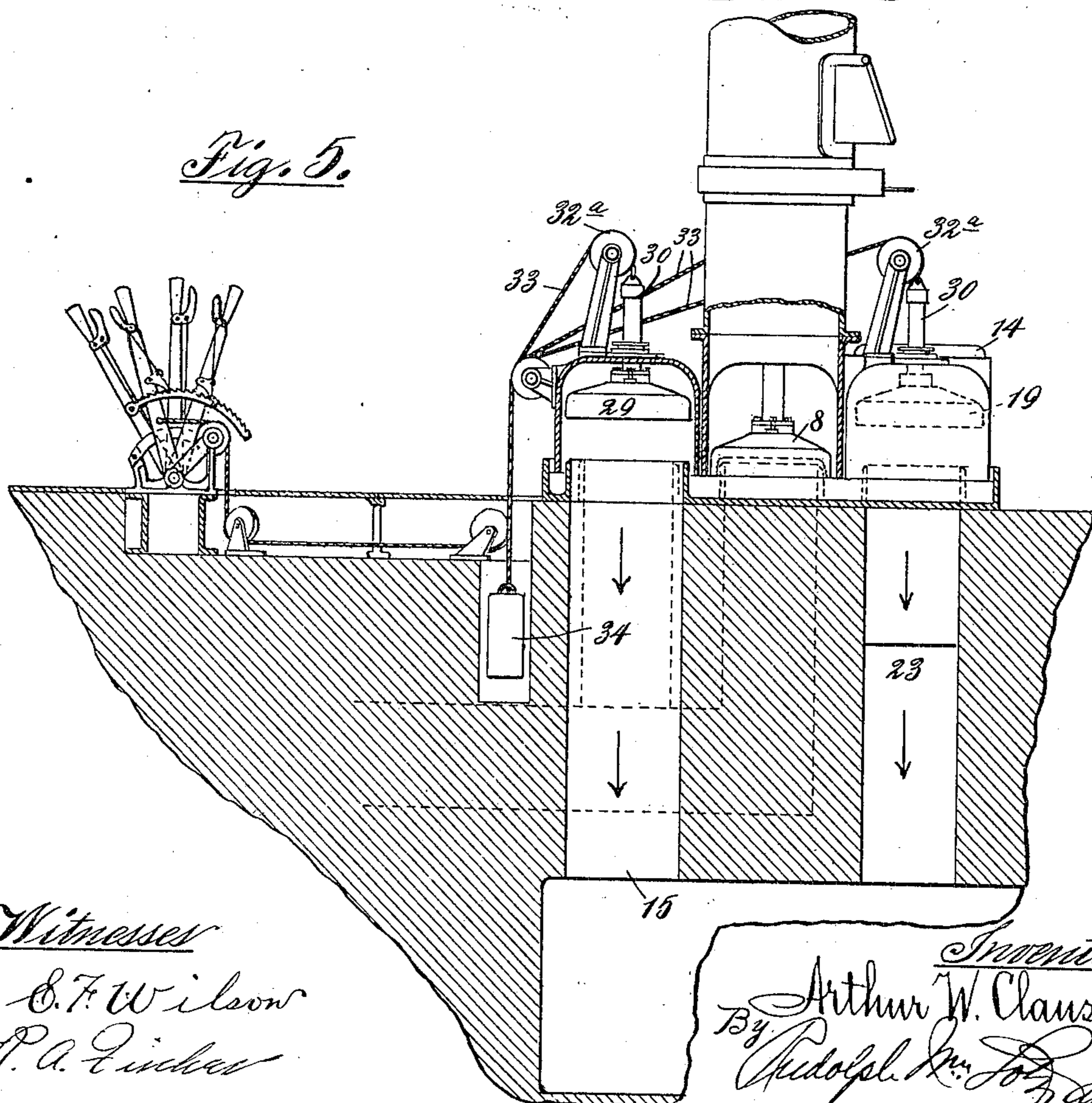


Fig. 5.



Witnesses

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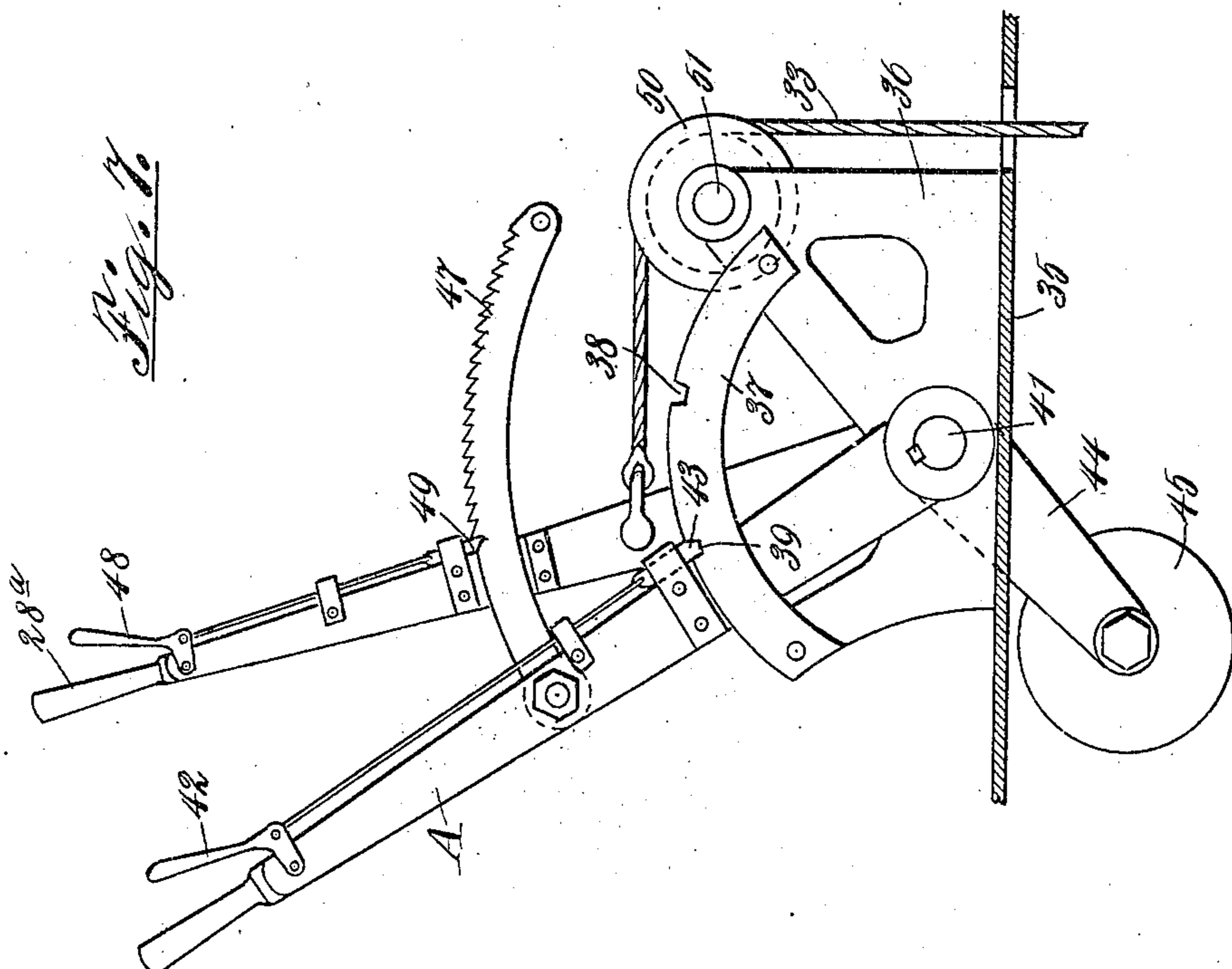
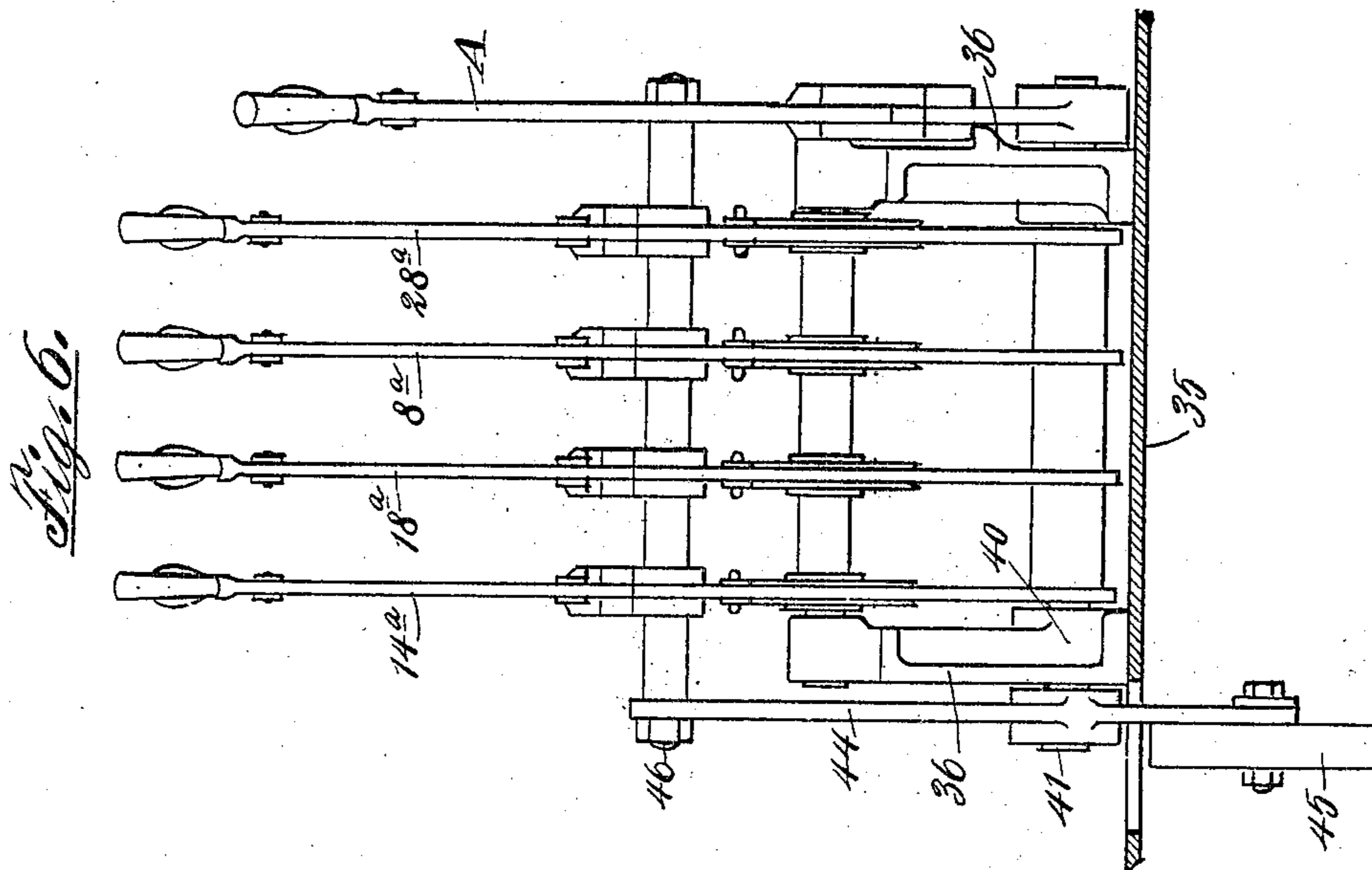
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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

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GAS-REVERSING MEANS.

No. 837,666.

Specification of Letters Patent.

Patented Dec. 4, 1906.

Application filed November 27, 1905. Serial No. 289,248.

To all whom it may concern:

Be it known that I, ARTHUR W. CLAUSEN, a citizen of the United States, residing at South Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Gas-Reversing Means for Furnaces; 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.

My invention relates to a novel construction in gas-reversing valves for use in connection with so-called "soaking-pits" and furnaces for steel ingots, into which gas and air are fed alternately from opposite sides at frequent intervals, the object being to provide simple and efficient valves and means for actuating and controlling the same; and it consists in the features of construction and combinations of parts hereinafter fully described and claimed.

In the accompanying drawings, illustrating my invention, Figure 1 is a top plan view of a valve housing or chamber in which valves are disposed and showing the connections of said valves with a set of levers for actuating and controlling the same. Figs. 2 and 3 and 4 are vertical transverse sections on the lines 2 2, 3 3, and 4 4, respectively, of Fig. 1. Fig. 5 is a vertical longitudinal section on the line 5 5 of Fig. 1. Fig. 6 is a detail view in elevation of the operating-levers employed. Fig. 7 is a side elevation of the same.

The main object of my invention is to prevent waste of gas which occurs with the valves at present generally used during the short interval when the same are being shifted to reverse the flow into the soaking-pit.

Another object of my invention is to so arrange the valves and various chambers that the gas-valve chamber is entirely isolated from the air-chamber and the main outlet-chamber leading to the stack, so that an admixture of air and gas in said chamber or the direct passage of any gas into the stack-flue is entirely obviated and explosions and waste thus prevented.

A further object of my invention is to provide valves of very simple and durable construction and provide an independent valve controlling each port and also to provide simple and efficient means for operating and

controlling said valves with speed and certainty.

Referring now to the said drawings, 1 indicates a valve chamber or housing communicating with a source of supply of gas by means of the pipe 2 and with flues 3 and 4 leading to the soaking-pit (not shown) through the ports 5 and 6, controlled by valves 7 and 8, respectively. Adjacent to and parallel with said valve-chamber 1 are two valve-chambers 9 and 10, provided in their roofs with openings 11 and 12, controlled by valves 13 and 14, respectively, by means of which said chambers communicate with the outer air. Each of said valve-chambers 9 and 10 also communicates with a flue 15 leading to the stack or chimney through ports 16 and 17, controlled by valves 18 and 19, respectively. Said chambers 9 and 10 also communicate with flues 20 and 21, leading to the soaking-pit, such communication being permanent and not controlled by valves. Disposed on the opposite side of said valve-chamber 1 is a valve-chamber 22, having constant communication with a flue 23, communicating with the stack or chimney, and which communicates with branch flues 24 and 25, connecting with the flues 3 and 4 through ports 26 and 27, controlled by valves 28 and 29, respectively. Each of said ports is formed in a pan and is surrounded by an annular flange, said pans being adapted to contain water to maintain water seals on said valves when closed. Each of the said valves conforms in shape with and is slightly larger than the port controlled thereby and is provided with a peripheral flange which extends into the water when said valve is closed. All of said valves are vertically movable and are provided with centrally-disposed stems 30, which in all instances where said valves are housed pass through stuffing-boxes 31 in the roofs of the housings. All of said valves and their stems are also hollow to receive water, which is introduced through a small pipe 32 in the stem of each valve connected with the source of supply by means of a suitable flexible connection, the water introduced being discharged from the upper end of said hollow stem.

Suitably supported revolubly over each of the valve casings or housings is a pulley 32, over which is trained a cable 33, connected

at one end with the valve and connected at its other end with a hand-lever or other suitable means for imparting movement to said cable, the latter carrying a counterweight 34
 5 at any suitable point to partially balance said valve in order to render the operation of opening the same relatively easy, said weight being so proportioned to the weight of the valve that the latter will readily close by gravity.
 10 The said cables are trained over such idlers disposed between the pulleys 32 and the levers as may be necessary, the said levers being arranged in pairs to render the operation of the valves as simple as possible, as herein-
 15 after more fully described. It will be noted that the said valves are eight in number. These are operated so that four of the same are opened as the other four are closed; but each valve is independently operated and reg-
 20 ulated, as will also hereinafter appear. The said levers correspond in number with the valves and are disposed in a row relatively close together and within easy reach of the operator, said levers being respectively (reading
 25 from left to right, Fig. 1) 14^a, 18^a, 28^a, 29^b, 7^b, 19^b, and 13^b and are connected, respectively, with the valves 14, 18, 8, 28, 29, 7, 19, and 13 and are disposed in two sets of four each relatively so disposed that the positions of all le-
 30 vers in one set are simultaneously shifted to close all valves controlled thereby while the other set is shifted to open all valves controlled thereby.

In order to facilitate rapid shifting of all
 35 valves to reverse the flow of gas and air to the soaking-pit or furnace and the flow of products of combustion from the same, each set of four levers is controlled by a master-lever A and B, respectively, as follows: Mounted on
 40 a suitable platform 35 are two frames, each comprising two parallel upright side plates 36, on one of which quadrants 37 are mounted, each having two recesses 38 and 39 in its upper edge and which is disposed concentric
 45 with a bearing 40 in the lower portion of said side plate, in which a shaft 41 is journaled and to one end of which the master-lever is rigidly secured. On the latter is mounted a hand-
 50 lever 42, which controls a dog 43, adapted to engage said recesses 38 and 39 in the quadrants 37, between which said master-lever moves to lock the latter therewith at either
 55 limit of its movement. On the other end of said shaft 41 a bell-crank lever 44 is rigidly secured, one arm of which extends substan-
 60 tially at right angles to the master-lever and carries a counterweight 45 at its free end, the other arm being parallel with said master-lever. Extending parallel with said shaft 41
 65 and rigidly connected at its ends with said master-lever and the last-named arm of said bell-crank lever 44 is a shaft 46, on which four quadrants 47, concentric with said shaft 41, are rigidly secured at one end, the upper
 edges of said quadrants being provided with

ratchet-teeth facing in the direction of said master-lever.

Each of the levers of each set is pivotally mounted on one of the shafts 41 and carries a hand-lever 48, which controls a spring-actu-
 70 ated dog 49, engaging a quadrant 47, so that each lever is operable independently of the master-lever controlling the set.

As before stated, each lever is connected by means of a cable or the like with the valve
 75 corresponding numerically therewith, said cords or cables being trained over pulleys suitably disposed between the valve and the lever and connected with the latter at oppo-
 80 site ends, one of said pulleys being disposed in vertical alinement with the valve and another pulley 50 being revolvably mounted on a shaft 51, rigidly mounted in the said side plates 36.

The operation of my invention is as fol-
 85 lows: Assuming that, as shown in Figs. 2, 3, and 4 of the drawings, the valves 7, 13, 19, and 29 are open, the gas would flow through the flue 3 and the air through the flue 20 to the soaking-pit or furnace and the products
 90 of combustion from the opposite side of said pit or furnace through the flues 21 and 25, through the chambers 10 and 9, respectively, to the chimney-flues 15 and 23. The levers
 95 7^b, 13^b, 19^b, and 29^b would be thrown back in the position shown in Fig. 1, while the remaining levers are at the forward limits of their movement, the master-levers A and B
 100 being in positions corresponding with the positions of the levers controlled thereby. To reverse the flow of gas, air, and products of
 105 combustion, the levers 7^b, 13^b, 19^b, and 29^b must necessarily be thrown forward and the levers 8^a, 14^a, 18^a, and 28^a thrown back, thereby closing the valves 7, 13, 19, and 29
 110 and opening the valves 8, 14, 18, and 28. To accomplish this, the master-lever B is released by means of the hand-lever thereon, whereupon the valves controlled thereby
 115 will close by gravity and the master-lever A is instantaneously drawn back, thereby opening all of the valves controlled thereby full. This operation is relatively very easy, inas-
 120 much as the counterweights employed so far counterbalance the weight of the valves as to reduce the load on each master-lever to a
 125 minimum. If after reversing the valves it should be desired to partially close one or more thereof, the levers controlling such
 130 valves may obviously be adjusted as desired without disturbing the position of the master-lever; but as the forward movement of said levers is limited by the pulleys 50 they
 135 will all be restored to the rearward limits of their movement in respect to the quadrants 47 when the master-lever controlling the same is moved forward, as will be obvious.

It will thus be seen that I attain in a very simple manner the object sought—viz., to
 140 quickly reverse the flow and to isolate the

gas-chamber from the air and outlet chambers and stack, so that waste of gas and explosive admixtures with air are obviated. I wish, further, to call attention to the fact that inasmuch as the gas is under very low pressure and the air and outlet chambers are always under partial vacuum the stuffing-boxes employed are so loosely packed as to offer practically no frictional resistance to the movements of the valve-stems there-through, and said valves may therefore safely be counterweighted to the extent of seventy-five to ninety per cent. of their weight and the load on the levers and master-levers thus reduced to a minimum. The latter are placed side by side, as shown, so that the operator may, if desired, operate them simultaneously with either hand.

I claim as my invention—

1. Gas-controlling means comprising a valve-chamber communicating with a source of supply of gas, and connected by means of two flues with a furnace or the like, a valve controlling each of said flues disposed in said chamber, air-chambers adjacent said first-named valve-chamber, each having an opening for establishing communication with the outer air, a valve controlling said opening, flues connecting each of said chambers with the furnace, a flue connecting each of said chambers with the stack, valves in said chambers controlling said last-named connection, an outlet-chamber for products of combustion having connection with opposite sides of said furnace, valves in said chamber controlling said connections, said outlet-chamber having constant communication with a stack, and means for actuating said valves.

2. Apparatus of the kind specified, comprising a main flue and an auxiliary air-flue communicating with each of two opposite ends of a furnace or the like, said main flues each communicating at one end with a gas-supply and an outlet-chamber respectively, said gas-supply chamber communicating with a source of supply of gas, and having valves disposed therein controlling the connections with said main flues, and said outlet-chamber having constant communication with a stack and having valves disposed therein controlling the connections with said main flues, said auxiliary air-flues each communicating with an air-chamber having valve-controlled connection with said stack and having valve-controlled connection with a source of supply of air, and operating means controlling all of said valves.

3. Apparatus of the kind specified comprising a plurality of separate chambers having connection with a source of supply of air, a source of supply of gas and with a stack respectively, and with a furnace or the like, valves controlling the connections between said furnace and said chambers and stack and

adapted to control the supply to said furnace and exhaust therefrom, said valves comprising two sets and being adapted when one set is opened and the other closed and vice versa to reverse the flow of gases through said furnace, and operating means controlling all valves of each set for simultaneously operating the same.

4. The combination with a heating-chamber, flues communicating with the same at different points to admit gas and air thereto at one side and exhaust products of combustion at another side, separate isolated valve-chambers communicating with said flues and with sources of supply of air and gas and with a stack, valves disposed in operative relation to each of said connections to control the same, said valves constituting two sets, one of said sets being adapted to be closed when the other is opened to reverse the flow through said furnace, operating means connected with each valve of each set, and means disposed in operative relation to the operating means of all valves of each set to simultaneously operate all of the same.

5. The combination with furnace-flues for feeding gas and air to a heating-chamber alternately in opposite directions and exhausting products of combustion therefrom alternately in opposite directions, and stack-flues adapted to receive the products of combustion, of a plurality of independent valve-chambers communicating respectively with sources of supply of gas and air and said stack-flues and all communicating with said first-named flues, valves disposed in operative relation to said flues and valve-chambers and said sources of supply and constituting two sets one of which is adapted to be opened when the other is closed to reverse the flow of said gases, a single operating device controlling each set of said valves, and auxiliary operating devices disposed in operative relation to each valve to actuate the same independently of said first-named operating device.

6. The combination with means for feeding gaseous fuel to and exhausting gaseous products of combustion from a furnace, of valves controlling said means to alternately reverse the flow respectively, said valves being disposed in two sets and adapted to be actuated to open all valves of one set when those of the other set are closed, operating means controlling each set of said valves, and auxiliary operating means partially controlled by said first-named operating means and controlling each valve independently of the latter to enable the same to be adjusted.

7. The combination with means for feeding gaseous fuel to and exhausting gaseous products of combustion from a furnace, of valves controlling said means to alternately reverse the flow respectively, said valves being disposed in two sets and adapted to be actuated to open all valves of one set when

those of the other set are closed, a master-lever controlling each set of said valves to simultaneously open or close all of the same, auxiliary levers connected with each of said
5 valves and capable of movement independently of said master-lever when said valves are open, and means controlled by said master-lever and coacting with devices on said auxiliary levers for maintaining the latter in
10 position to maintain said valves open.

8. The combination with means for feeding gaseous fuel to and exhausting gaseous products of combustion from a furnace, of valves controlling said means to alternately
15 reverse the flow respectively, said valves being disposed in two sets and adapted to be actuated to open all valves of one set when those of the other set are closed, a master-lever controlling each set of said valves to
20 simultaneously open or close the same, locking means disposed in operative relation to said master-lever to lock the same at either limit of its movement, an auxiliary lever disposed in operative relation to each valve of
25 each set, and toothed quadrants disposed rigid and concentric with said master-lever and engaging locking means on each of said

auxiliary levers to hold the latter against movement in a direction to close the valve controlled thereby.

9. The combination with a heating-chamber, a source of supply of air, a source of supply of gas, and an exhaust-flue for products of combustion, of separate valve-chambers communicating with each of said source of
35 supply and said exhaust-flue respectively, two sets of flues connecting said valve-chambers with opposite ends of said heating-chamber, two sets of valves disposed in operative relation to said sets of flues respectively and said valve-chambers, a single operating device controlling all valves of each
40 set respectively, and auxiliary operating means connected with each valve to operate the same independently of said first-named
45 operating devices.

In testimony whereof I have signed my name in presence of two subscribing witnesses.

ARTHUR W. CLAUSEN.

Witnesses:

RUDOLPH WM. LOTZ,
ROBERT ALF FISCHER.