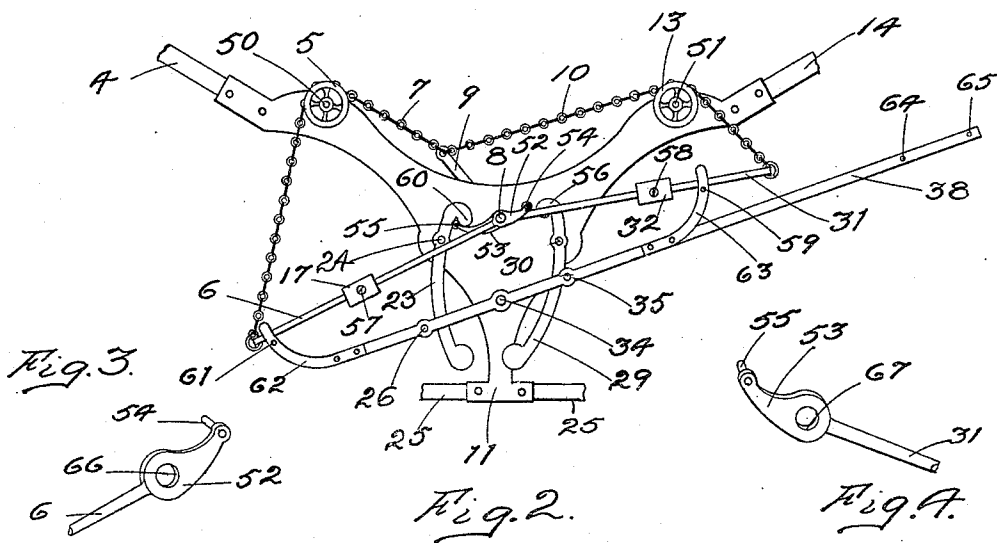
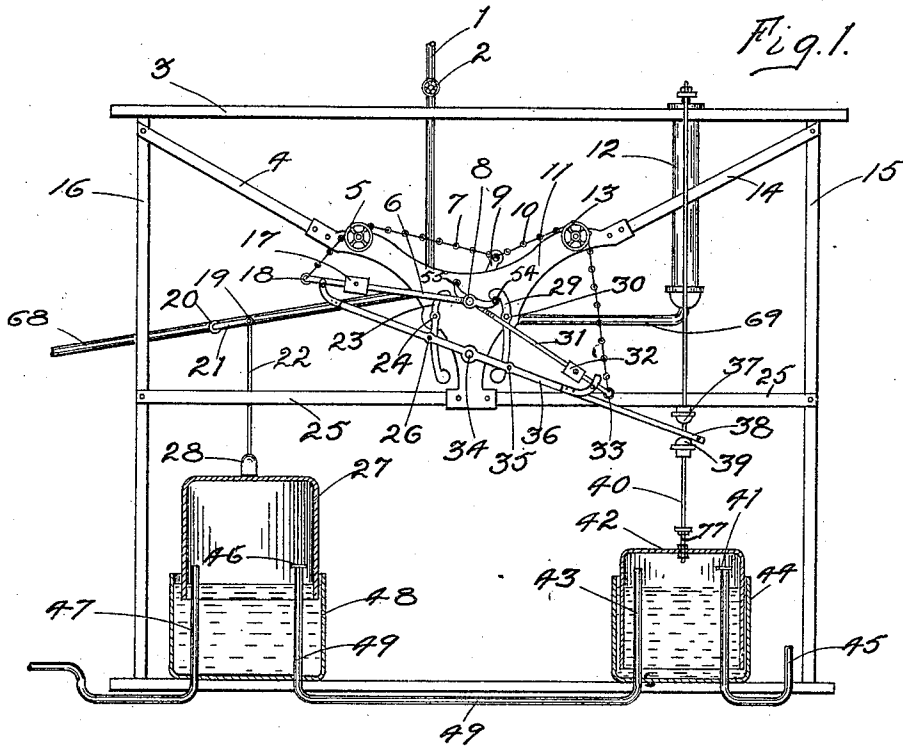


A. P. RICKMIRE.
GAS APPARATUS.
APPLICATION FILED OCT. 8, 1908.

942,929.

Patented Dec. 14, 1909.

2 SHEETS—SHEET 1.



WITNESSES:

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A. P. Rickmire.

BY

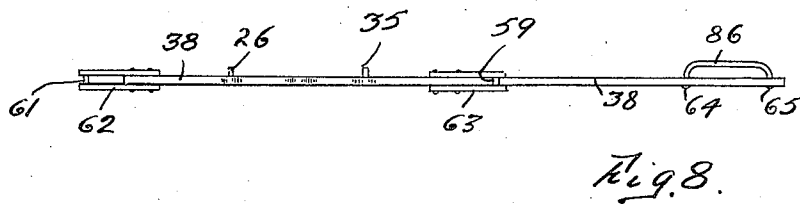
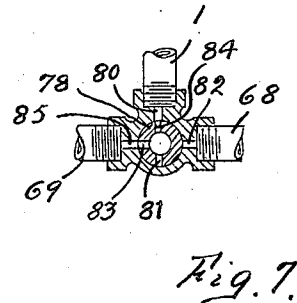
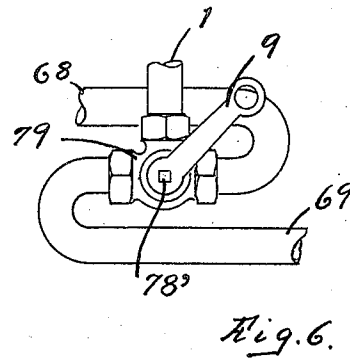
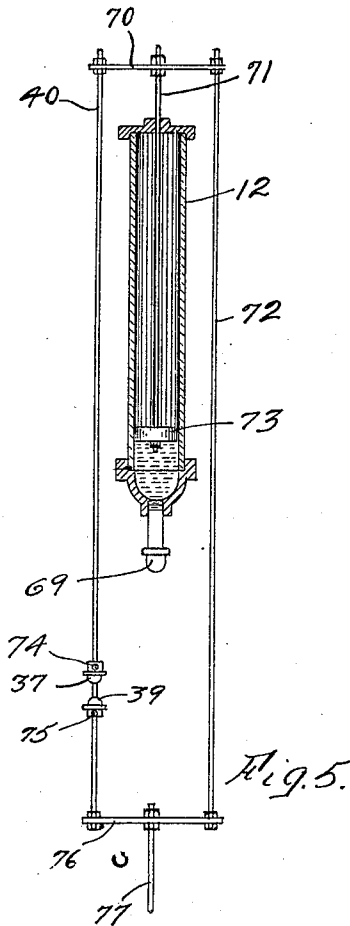
G. B. Kennedy.

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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

ARA P. RICKMIRE, OF WATERLOO, IOWA.

GAS APPARATUS.

942,929.

Specification of Letters Patent.

Patented Dec. 14, 1909.

Application filed October 8, 1908. Serial No. 456,753.

To all whom it may concern:

Be it known that I, ARA P. RICKMIRE, a citizen of the United States of America, and a resident of Waterloo, Blackhawk county, Iowa, have invented certain new and useful Improvements in Gas Apparatus, of which the following is a specification.

My invention relates to improvements in gas apparatus, and the object of my improvement is to secure for such an apparatus devices operatively located and connected between the water motor and air pumps, adapted to automatically control and regulate their actions. This object I have accomplished by the mechanism which is hereinafter fully described and claimed, and which is illustrated in the accompanying drawings, in which:

Figure 1 is a front elevation of my said improved gas apparatus. Fig. 2 is an enlarged detail front elevation of the intermediate automatic regulating means for said apparatus. Fig. 3 and Fig. 4 are enlarged perspectives of the left and right-hand ends of the catch-engaging levers. Fig. 5 is a vertical axial section of the water-motor, and showing its piston connections for the air-pump. Fig. 6 is an outer view of the three-way cock, and Fig. 7 is a vertical axial section of the same. Fig. 8 is an upper plan view, enlarged of the lever connected to the piston-connections between the water motor and air-pumps.

Similar numbers refer to similar parts throughout the several views.

The supporting-frame of my machine is composed of the uprights 15 and 16 connected by the separated horizontal beams 3 and 25. The beam 3 supports a water-motor 12, while a substantially triangular back-plate 11 is supported by the beam 25 and by the brackets 4 and 14 which project inwardly from the upper ends of the uprights 16 and 15 respectively.

A tank 44, open at the top and nearly filled with water is located under the water-motor 12, and contains a vertically-movable bell 42, closed at the top but open at the bottom, which dips within the water. The water-motor cylinder 12 contains a solid piston 73 adapted to move therein, and the latter has a piston-rod 71 the outer end of

which has a cross-piece 70. The upper end of the rod 77 whose lower end is secured to the bell 42, is provided with a cross-piece 76, and the ends of the cross-pieces 70 and 76 are connected by side-rods 40 and 72 respectively, which extend parallel to each other and vertically on the outside of the motor 12. The lower part of the side-rod 40 has spaced collars secured to it by screws 74 and 75, the inner ends of which are provided with rubber buffers 37 and 39 respectively.

45 is a pipe whose outer end is open to the atmosphere, while its inner end in the tank 44 rises above the level of the liquid therein, and is provided with a puppet-valve 41. Another pipe 43 has its upper open end above the level of the liquid, and is passed through the bottom of the tank and introduced into another tank 48 of a similar form to the tank 44, with its open end in the tank above the liquid therein closed by a puppet-valve 46. The tank 48 has an inverted bell 27 dipping into its liquid contents, said bell having a pivotal connection 28 to a rod 22, the upper end of said rod being pivoted at 19 to the crank 21 of the rock-valve in a chamber 20, the latter being interposed in the waste-water pipe 68 in communication by way of a three-way cock 79 with the supply-pipe 1. A pipe 47 has its inner open end above the liquid in the tank 48 and it is then passed through the wall of the tank and carried to communicate with the interior of a carbureter (not shown). The reciprocation of the piston-rod 71 by the water-motor causes a like movement through the said connections to the bell 42, the action being to draw air at atmospheric pressure into said bell through the pipe 45 when the bell rises and to close the valve 41 and force the inclosed air through the pipe 43 into the bell 27 when the bell 42 falls, thus compressing the air in the bell 27, and the air in the latter then being forced through the pipe 47 to the carbureter. When the draft of the carbureter upon the reservoir-bell 27 is small, the air therein accumulates and forces it up until the crank 21 is gradually moved to shut off the movement of water in the pipe 68, and thus the action of the motor 12 is slackened and stopped until the

consumption of air causes the bell 27 to fall and open said valve 20.

My intermediate automatic regulating means is thus described. The supply-pipe 1, which has a shut-off cock 2 for use when necessary, communicates with both the waste-pipe 68 and the water-motor pipe 69 by means of the three-way-cock 79. This three-way-cock is of a well-known construction, and is illustrated in Figs. 6 and 7, and its rock-valve 78, according to the way it is turned, permits communication between the pipes 1 and 69 through the ports 80—81 and 84—85, to admit water under head under the piston 73 to force the latter up, or between the pipes 69 and 68 by way of the ports 83—85 and 84—82 to exhaust the water from beneath said piston, the port 80 being closed. A crank 9 is secured to the valve at 78', and its eyeleted extremity is secured to the middle of a chain or cable 7, the latter being passed about idlers 5 and 13 rotatably mounted on the back-plate 11 on the studs 50 and 51 respectively projecting therefrom.

The ends of the chain or cable 7 are connected respectively to the outer ends of the catch-engaging levers 6 and 31. These levers are both pivoted on a stud 8 projecting from the plate 11, the pivotal connections at 66 and 67 being quite near the inner end of each. Slidable weights 17 and 32 are adjustably secured to the levers 6 and 31 respectively on their longer outer members. The shorter inner members 52 and 53 of said levers have rearwardly-projecting pins or studs 54 and 55 respectively at their ends. 23 and 29 are arms respectively pivoted near their upper ends on the studs 24 and 30 projecting from the plate 11. Their lower depending portions being heavier than their shorter portions above said pivots the said arms tend to keep a vertical position. The upper ends of said arms have inwardly curved portions 60 and 56 respectively adapted to serve as catches for the pins 54 and 55 respectively on the levers 6 and 31, when the outer ends of the latter are respectively in their elevated positions.

38 is a long lever medially pivoted on a stud 34 projecting from the plate 11. Its right-hand end is furnished with a clevis or loop 86 whose ends are secured thereto at 64 and 65. This loop 86 incloses that part of the side-rod 40 which lies between the collars thereon and their rubber buffers 37 and 39, so as to movably work against the buffers alternately, as the side-rod moves up or down consonantly with the connected piston 73 in the water-motor 12. Forks 62 and 63 are secured to the left- and right-hand members of the lever 38, respectively, and are curved upwardly and connected near their

ends by pins 61 and 59 respectively. The outer ends of the outer members of the levers 6 and 31 rest alternately respectively upon the pins 61 and 59 between the members of said forks, but when one lever end is resting in the adjacent stirrup so formed the outer end of the other said lever is suspended by its connected chain a distance above its own stirrup, the chain being slack and the lever end being held away from the stirrup by reason of the short inner end being engaged with the inwardly directed hook on the oppositely-placed swinging-arm either 23 or 29 as the case may be.

26 and 35 are rearwardly-projecting studs on the left-hand and right-hand members of the lever 38, respectively, and located appropriately to engage the depending members of the arms 23 and 29 respectively on their outer curved sides to alternately push the latter inwardly according to the position of said lever.

The operation of the regulating device is as follows. The cock 2 having been opened in the pipe 1, water under head passes through the three-way-cock 79 and into the pipe 69, thence under the piston 73, forcing it upwardly. The bell 42 is thus by means of the connections to said piston moved upwardly to draw air into its interior through the pipe 45 and past its puppet-valve 41. The longer right-hand member of the lever 38 is also, by reason of the engagement of its clevis or loop 86 with the buffer 39 on the side-rod 40, moved upwardly, carrying with it the lever 31, while the lever 6 remains stationary. As the right-hand member of the lever 38 moves upwardly and is near its limit of upward movement, its pin 35 contacts with the outer curved edge of the depending portion of the arm 29 and pushes it inwardly, thus tending to detach the curved catch 56 from the pin 54 on the lever 6. The pin 26 is drawn away from the depending portion of the arm 23, permitting the latter to swing to the left under the influence of gravity. The curved catch 60 on the arm 23 then swings inwardly and approaches and engages the pin 55 on the end of the lever 31.

When the piston 73 arrives at the upward limit of its movement, the right-hand member of the lever 38, with the right-hand member of the lever 31 has lifted sufficiently to have caused the pin 55 to pass under and be caught by the catch 60 on the arm 23. At this moment the pin 35 on the lever 38 has pushed over the arm 29 sufficiently to cause it to suddenly release the pin 54, and the weighted member of the lever 6 suddenly falls into the fork or stirrup 62, taking up the slack of the chain 7 and suddenly shifting the valve 78 so as to close the

port 80, and open a communication from the motor 12 to the waste-pipe 68. As the water exhausts from beneath the piston 73, the latter falls with its connected bell 42, forcing air through the pipe 43 into the compressed-air reservoir-bell 27. As the side-rod 40 moves downwardly, it carries with it the lever 38 and the left-hand lever 6 is then carried up by the fork 62 until the piston 73 has arrived at its lowermost position, when the above described action of said parts is suddenly reversed and the chain 10 shifted back again, thus moving the valve 78 to shut off the exhaust and open a communication between the supply-pipe 1 and the motor 12, the whole action being smooth and automatic.

I do not intend to confine myself to the use of any particular valve in the valve-chamber for governing the communication between the supply and waste-pipes and the water-motor cylinder, since any approved or suitable means may be adopted in place of the three-way-cock shown for that purpose. Provided that such valve or valves are so constructed and arranged as to be operated by means of the automatic trip or reversing device shown, any such valve or cock may be used without departing from the ideas involved in my invention.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is:

1. In a gas apparatus, in combination, a water-motor having a movable piston, a supply-pipe containing a fluid under pressure, a waste-pipe, both said supply- and waste-pipes having means of communication with one end of said water-motor by way of a valve-chamber, a suitable valve or valves in said chamber adapted to be shifted to govern the communication between said pipes and said water-motor, means for actuating said valve or valves, consisting of a pivoted lever one member of which is supplied with a linking-connection to said piston, oppositely-projected arms mounted to rock independently, means of connection between each of said arms and said valve or valves, each of said arms being adapted to be contacted and moved in one direction by the adjacent member of said pivoted lever below only when such adjacent member has arrived at a certain stage of its progress in one direction.

2. In a gas apparatus, in combination, a water-motor containing a movable piston, a supply-pipe containing a fluid under pressure, a waste-pipe, both said supply- and waste-pipes having means of communication with one end of said water-motor by way of a valve-chamber, a valve-chamber, a suitable valve or valves in said chamber adapted

to be shifted to govern the communication between said pipes and water-motor, a shifting-arm operatively connected to said valve or valves, a chain or cord connected to said shifting-arm and having its opposite ends oppositely directed and supported, a pivoted lever connected by linking-means to said piston, oppositely-projected arms pivotally mounted above said pivoted lever, the outer end of each arm being connected to the adjacent end of said chain or cord, a weight secured to the outer member of each arm, each of said arms being adapted to be contacted and moved in one direction only by the adjacent end of said pivoted lever below at a certain stage only of the progress of the latter in one direction.

3. In a gas apparatus, in combination, a water-motor having a movable piston, a supply-pipe containing a fluid under pressure, a waste-pipe, both said supply- and waste-pipes being in communication with one end of said water-motor by way of a valve-chamber, a valve-chamber, a suitable valve or valves in said chamber adapted to be shifted to govern the communication between said pipes and water-motor, a shifting-arm operatively connected to said valve or valves, a chain or cord connected at its middle point to said shifting-arm, idler-pulleys, each part of said chain or cord being carried over and supported by the idler-pulley immediately adjacent thereto, a pivoted lever swiveled at one end to linking-means connected to said piston, upwardly-projecting forks or stirrups on each member of said pivoted lever, independently-movable pivoted levers mounted above said first-mentioned lever each with its outer end connected to the adjacent end of said chain or cord and the outer member of each of said levers adapted to be carried upward by the stirrup of the adjacent member of the first-mentioned lever only when such latter member has reached a certain stage of its progress in its upward course, a lug or pin projecting from the end of the inner member of each of the last or second-mentioned levers, a weight on the outer member of each of said second-mentioned levers, pendulums each hung to swing from a pivot located above its center of gravity and each provided with an inwardly-projecting catch on its upper member, the catch on each pendulum being adapted to engage and hold the pin on the inner end of the oppositely-located second-mentioned lever and slacken the chain connected thereto when the outer member of the latter is elevated to a certain height by the contacting fork or stirrup of the adjacent member of the first-mentioned lever, and a catch projecting from each member of said first-mentioned lever

into the path respectively of the adjacent
lower part of the nearest pendulum, each of
said catches being located and adapted to
engage and lift the lower member of the
5 contacting pendulum only when said water-
motor piston is nearing one limit of its
stroke, to a point where the pin on the end
of the oppositely-located second-mentioned
lever will become suddenly detached from

the catch on the upper member of said pen- 10
dulum.

Signed at Waterloo, Iowa, this 23rd day
of Sept. 1908.

ARA P. RICKMIRE

Witnesses:

G. C. KENNEDY,
O. D. YOUNG.