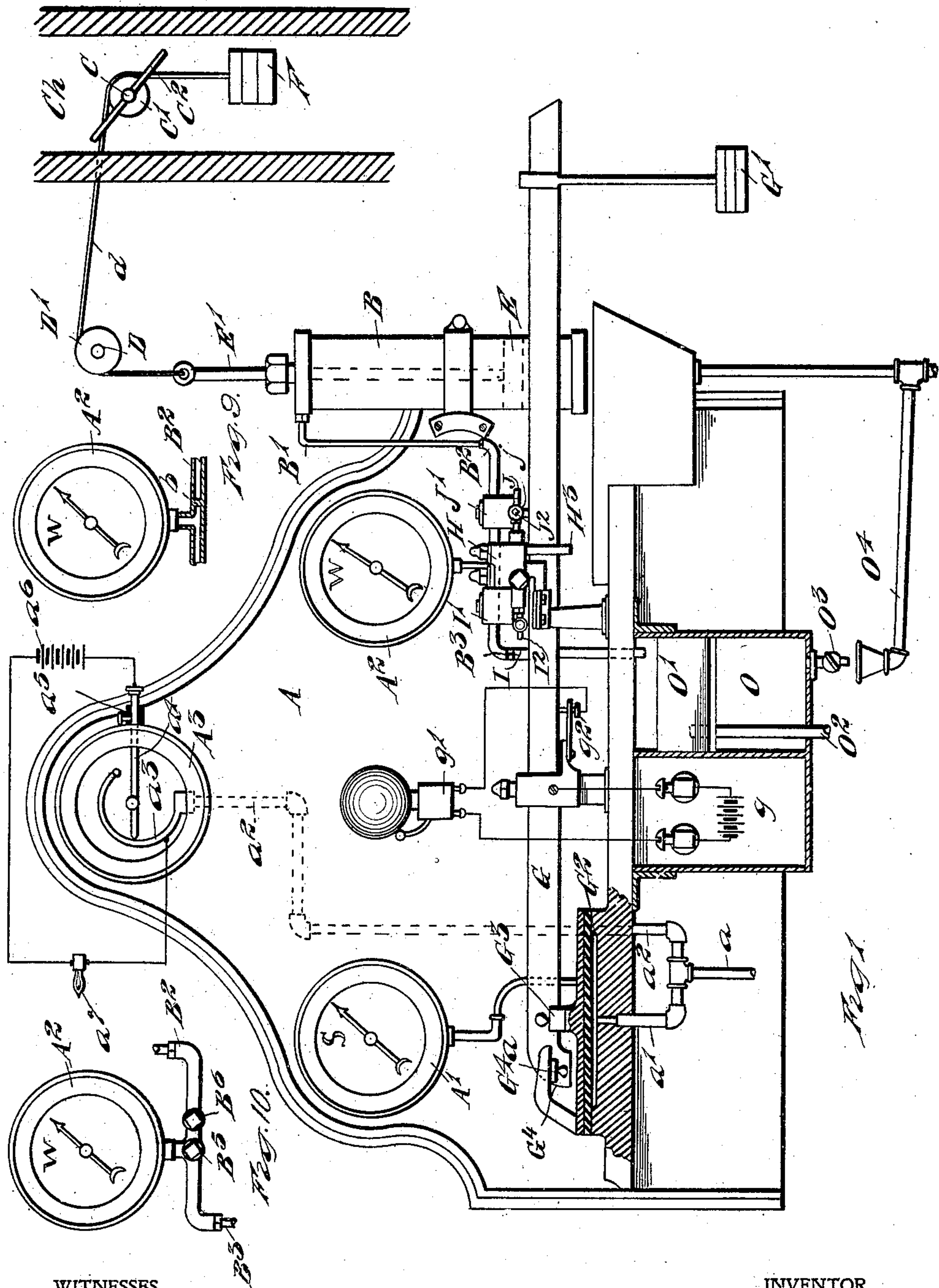


W. D. HODGSON.
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APPLICATION FILED APR. 15, 1907.

917,067.

Patented Apr. 6, 1909.
3 SHEETS—SHEET 1.



WITNESSES

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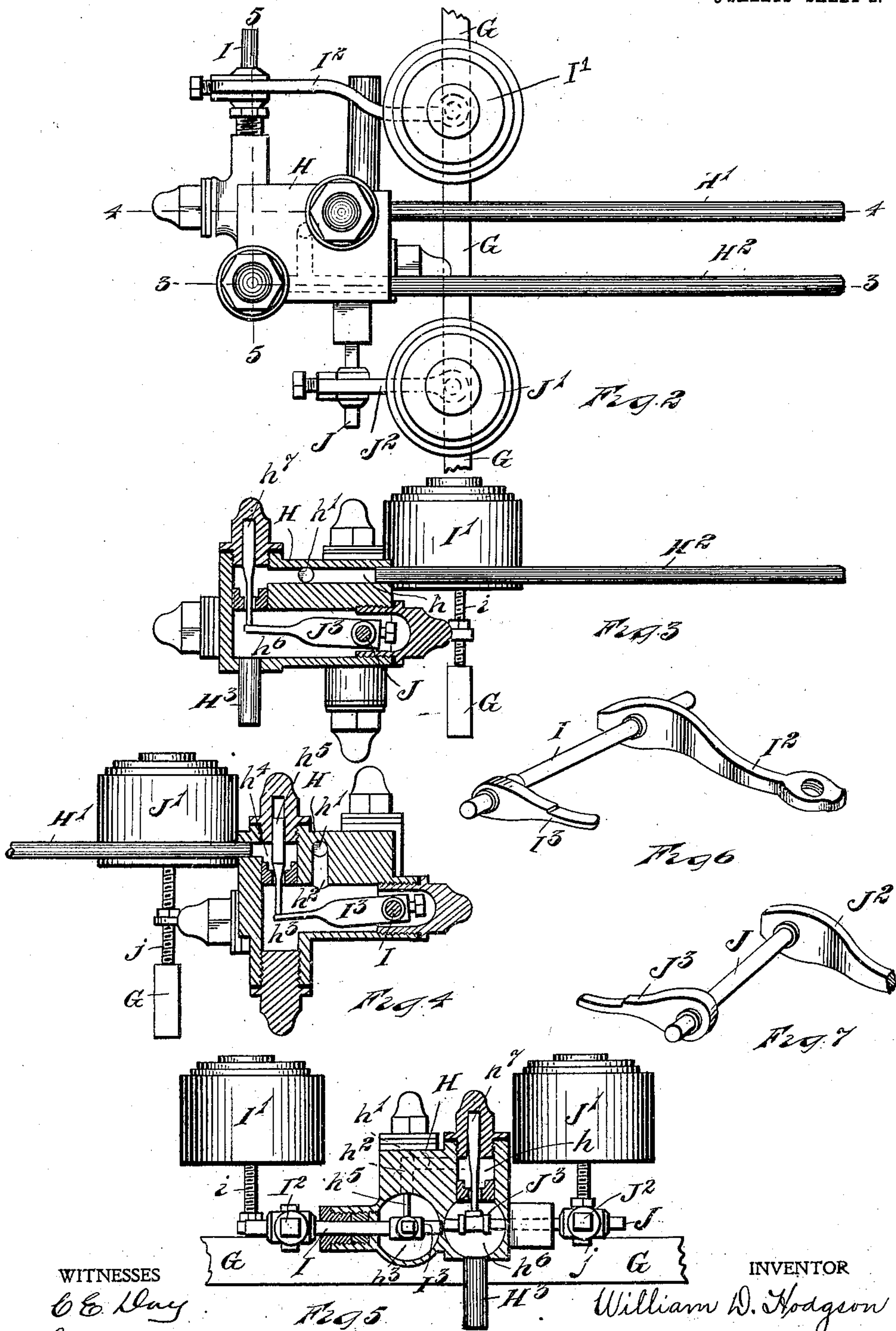
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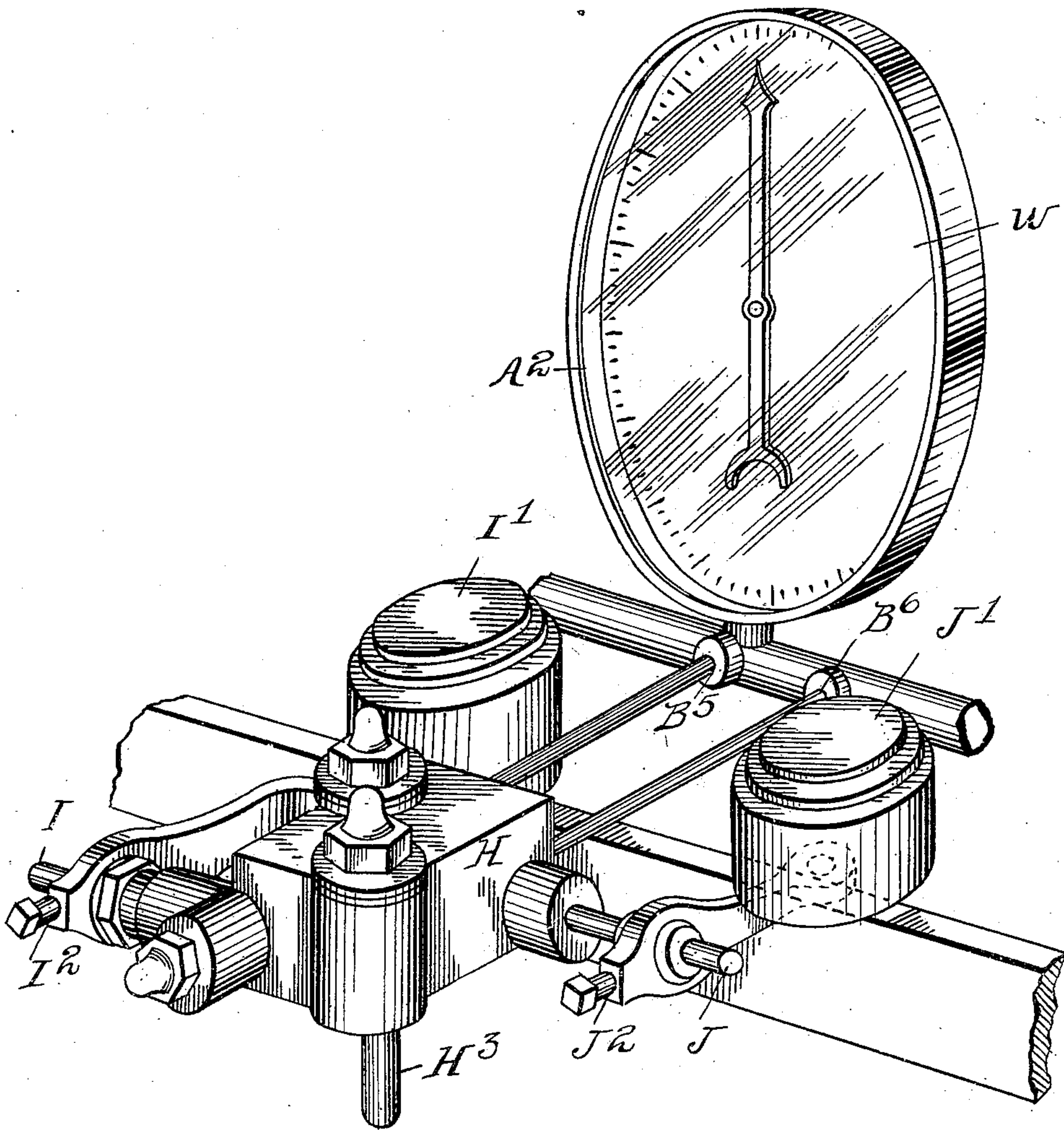


Fig 8.

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REGULATING DEVICE.

No. 917,067.

Specification of Letters Patent.

Patented April 6, 1909.

Application filed April 15, 1907. Serial No. 368,258.

To all whom it may concern:

Be it known that I, WILLIAM D. HODGSON, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Regulating Devices, and declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to regulating devices and the mechanism for operating the same, and consists in the improvements hereinafter described and pointed out in the claims.

Referring to the accompanying drawings:—Figure 1, is an elevation of apparatus embodying my invention, some of the parts being shown in section. Fig. 2, is a detail plan view of the valve case and adjacent parts. Fig. 3, is a section on the line 3, 3, Fig. 2. Fig. 4, is a section on the line 4, 4, Fig. 2. Fig. 5, is a section on the line 5, 5, Fig. 2. Fig. 6, is a perspective of a valve operating shaft, and the lever arms attached thereto. Fig. 7, is a perspective view of another valve operating shaft, and the lever arms attached to the latter. Fig. 8 is a perspective view of the valve case and adjacent parts. Fig. 9, is a detail view of the gage A^2 , showing in section a portion of the casting to which said gage is attached. Fig. 10, is a detached view of the gage A^2 , showing in full the casting to which said gage is attached.

A is a vertical plate, or support, to which various parts of my improved apparatus are attached.

B is a cylinder attached to the plate A. E is a piston in said cylinder, and E^1 is a piston rod extending from the piston E, and through a stuffing box in the end of the cylinder B.

D is a stationary arbor, and D^1 is a pulley thereon.

Ch is a flue or chimney. C is a shaft extending through the center of said chimney horizontally. C^2 is a valve on said shaft.

C^1 is a pulley on the shaft C.

d is a cord or chain secured to the piston rod E^1 , extending over the pulley D^1 , and over the pulley C^1 .

F is a weight on the end of the cord d . When the piston E rises, the weight F falls,

opening the valve C^2 by means of the pulley C^1 and the cord passing over the same. When said piston descends, the cord d is drawn along, drawing the weight F upward, and closing the valve C^2 .

I provide a weight G^1 , and make it adjustable along the lever G, so that said lever may be balanced against any required pressure upon the diaphragm G^2 .

g^2 indicates an electric contact, which may be actuated by the lever G to complete a circuit through the bell g^1 , and battery g to cause an alarm to be rung upon said bell.

G is a lever pivoted at G^4 , and provided with trunnions resting upon a bearing G^3 , which bearing is upon a disk above a diaphragm G^2 , covering the mouth of a compression chamber. The bearing G^3 is a steel block, upon which rest the trunnions of the lever G, which are preferably provided with knife-edges where they contact the block. The block G^3 may be turned to present any one of its faces to the knife edge, in case one face becomes worn.

G^{4a} is a steel block similar to G^3 , and serves the same purpose.

A^3 is a Bourdon gage.

a^3 is the tube of the gage A^3 .

a is a pipe communicating with a source of pressure that it is desired to regulate, as, for instance, the steam in the steam space of a boiler.

a^1 is a branch of the pipe a communicating with the chamber under the diaphragm G^2 .

a^2 is a second branch of the pipe a communicating with the tube a^3 of the Bourdon gage A^3 .

a^4 is a rod held in an electrically insulated support a^5 . The rod a^4 is adapted to be moved forward or back to regulate the position of its point relative to the tube a^3 .

a^6 represents a battery, or other source of electricity; a^7 a glow lamp, which is shown in Fig. 1 in circuit, diagrammatically for convenience.

When there is pressure in the pipe a , and its branch a^2 , the Bourdon tube a^3 is moved out of contact with the rod a^4 . When the pressure in the pipes a and its branches a^2 falls beyond a predetermined point, contact is made between the tube a^3 and the rod a^4 , completing the circuit and lighting the lamp, which will call attention to the fact that the pressure has fallen beyond a desired point, and will illuminate the face of the gage, so

that the position of the index pointer will be plainly seen.

B^2 is a casting having formed therein a longitudinal passage or bore divided into two parts by a partition b (see Fig. 9).

H is a valve case. H^1 is a pipe or tube leading into said case, and communicating with a source of liquid pressure not shown.

H^2 is a pipe or tube leading from the valve case H to the casting B^2 , and communicating with the upper end of the cylinder B , through said casting and a pipe B^1 .

B^3 is a pipe leading from the source of fluid pressure and communicating with one end of the casting B^2 . The gage A^2 is attached to the casting B^2 , so that it shall register the fluid pressure from the pipe B^3 .

B^5 is an opening through which the pipe or tube H^1 communicates with the casting B^2 at the left of the partition b , that is, on the side of said partition upon which is the pressure from the pipe B^3 . B^6 indicates an opening through which the tube or pipe H^2 communicates with the casting B^2 upon that side of said partition which is in communication with the cylinder B through the pipe B^1 .

There are glands surrounding the pipes or tubes H^1 , H^2 , where they pass into the openings B^5 , B^6 . The pipe or tube H^1 opens into a chamber h^4 (Fig. 4); below said chamber is a second chamber h^3 , and there is a passage forming a communication between the chambers h^4 and h^3 .

h^5 is a puppet valve, seating from above upon a valve seat surrounding the upper end of the passage forming a communication between the chambers h^4 and h^3 .

h is a chamber in the casing H , with which communicates the pipe H^2 .

h^6 is a chamber below the chamber h . There is a communicating passage between the chambers h and h^6 .

h^7 is a puppet valve seating from above upon a valve seat surrounding the upper end of the passage between the chambers h and h^6 .

H^3 is an exhaust or outlet pipe from the chamber h^6 .

h^2 is a passage rising upward from the chamber h^3 , and h^1 is a passage forming a continuation of the passage h^2 and communicating with the chamber h (Figs. 3, 4, and 5).

I is a shaft pivoted in and extending, through the wall of the casing H , into the chamber h^3 .

I^3 is a lever arm upon the shaft I , extending beneath the valve h^5 , and adapted to contact with an extension from said valve to lift said valve from its seat.

P^2 is a lever arm secured on the outer end of the shaft I , and extending to a position above the lever G .

I^1 is a weight having a screw threaded

stem i , which engages through a screw threaded opening in the end of the lever arm I^2 , and rests upon the upper edge of the lever G . The position of the lever arm I^2 , and consequently of the shaft I and lever arm I^3 , may be regulated to some extent by screwing the weight I^1 up or down. It will be observed by reference to Fig. 6, that the arm I^3 extends in the same direction as the arm I^2 .

J is a shaft pivoted in a bearing in the wall of the case H , and extending into the chamber h^6 .

J^3 is a lever arm upon the shaft J within the chamber h^6 , extending beneath the valve h^7 and adapted to contact an extension from said valve to raise said valve from its seat.

J^2 is a lever arm extending from the outer end of the shaft J to a point above the lever G .

J^1 is a weight entirely similar to the weight I^1 , and similarly connected to the lever arm J^2 , and contacting the upper edge of the lever G in the same way as above described, with reference to the weight I^1 .

O is a settling chamber, in which is placed an inclined shelf O^1 .

O^2 is a pipe from a source of fluid pressure.

The settling chamber O is interposed between the pipes O^2 , and B^3 , so that solid matter shall be retained in said chamber and shall not pass to the valves.

O^3 is a cock by which the contents of the chamber O may be withdrawn.

O^4 is a pipe extending beneath the cock O^3 to receive the discharge from the chamber O .

When the pressure to be governed reaches the predetermined point, the pressure upon the diaphragm G^2 raises the lever G , which raises the weights I^1 , and J^1 , and the lever arms I^2 , J^2 . As the lever I^2 is raised, the shaft I is oscillated, raising the free end of the lever arm I^3 , and pressing the valve h^5 from its seat, thus opening communication between the chambers h^4 and h^3 ; the fluid under pressure then passes through said passage, into the passage h^2 , through the passage h^1 , into the chamber h , and through the tube or pipe H^2 into the casting B^2 , and through the pipe B^1 into the upper end of the cylinder B , pressing down the piston E and closing the valve C^2 , thus diminishing the draft. When the valve h^5 is upon its seat, the pressure is above it, forcing it down. When it is raised from its seat, the pressure is relieved, and therefore the lever G , lever arm I^2 , and lever arm I^3 rise more freely, lifting the valve h^5 still farther from its seat, and causing a prompt and decisive action of the apparatus. The pressure in the chamber h acts to hold the valve h^7 still closer to its seat. When the pressure in the pipe a and below the diaphragm G^2 has fallen, the lever G descends, the lever arm I^2 falling and also the lever arm

I³, allowing the valve *h*⁵ to come gradually back to its seat. At the same time the weight J¹ carries down the lever arm J² and raises the lever arm J³, pressing the valve *h*⁷ away from its seat and opening a passage between the chambers *h* and *h*⁶. As soon as the valve *h*⁷ rises from its seat, the pressure holding it down is relieved, and the weight J¹ is the more free to press said valve upward, leaving the passage between the chambers *h* and *h*⁶ entirely free and causing a prompt action of the parts. The piston E now rises, drawn upward by the weight F, and the water flows out of the cylinder B, through the pipe B¹, through the tube or pipe H², into the chamber *h*, thence into the chamber *h*⁶, and is discharged through the pipe H³ into a receptacle *x*.

It will be observed that the overflow pipe O² has its mouth beneath the shelf O¹.

The casting B², with the openings B⁵ and B⁶ and glands adjacent to said openings, in conjunction with the valve casing H, provided with the tubes H¹, H², adapt said casing to be readily removed and replaced, should it be desirable to clean or fix the valves.

The steel blocks G³ and G^{4a} may be held in place by friction, and should one surface become worn or rough that block may be turned over to present a new surface. The weights I¹, and J¹, resting on the upper edge of the lever or bar G, always remain free to move and cannot clamp the lever.

What I claim is:—

1. The combination of a casing provided with an inlet and an outlet passage communicating within said casing, an outwardly opening puppet valve controlling the inlet, an inwardly opening puppet valve controlling the outlet, a pipe communicating with a source of fluid pressure and with said inlet passage outside of the valve controlling the same so that the pressure, or motion, of the fluid in said pipe and inlet passage shall tend to close said valve, an apparatus adapted to be actuated by fluid pressure, a pipe adapted to convey fluid under pressure to said apparatus to actuate the same, said last named pipe communicating with the interior of said casing between said valves so that the pressure, or motion of the fluid in said pipe and casing shall tend to close the valve controlling the outlet, and means for operating the valve controlling the inlet while the valve controlling the outlet is closed so as to cause fluid pressure to be conveyed to said apparatus to operate the same and for

closing the same, and means for operating the valve controlling the outlet, substantially as and for the purpose described.

2. The combination of a casing provided with an inlet and an outlet passage communicating within said casing, an outwardly opening puppet valve controlling the inlet, an inwardly opening puppet valve controlling the outlet, a pipe communicating with a source of fluid pressure and with said inlet passage outside of the valve controlling the same so that the pressure, or motion, of the fluid in said pipe and inlet passage shall tend to close said valve, an apparatus adapted to be actuated by fluid pressure, a pipe adapted to convey fluid under pressure to said apparatus to actuate the same, said last named pipe communicating with the interior of said casing between said valves so that the pressure, or motion of the fluid in said pipe and casing shall tend to close the valve controlling the outlet, a part G adapted to be actuated automatically, a weighted means for actuating the valve controlling the inlet resting because of its weight upon the part G, and arranged so that the raising of the part G shall actuate said means to open its valve, and the weight shall actuate said means to close its valve when the part G falls, and a similar but reversely acting means for operating the valve controlling the outlet.

3. The combination of a casing H, a puppet valve *h*⁵ opening outward relative to said casing, a puppet valve *h*⁷ opening inward relative to said casing, a pipe H¹ communicating with a source of fluid pressure and opening into said casing above the valve *h*⁵, an apparatus B adapted to be operated by fluid pressure communicating with the interior of said casing between said valves, a part G adapted to be actuated automatically, a weighted lever adapted to operate each of said valves when oscillated and resting their weights upon said automatically actuated part, one of said levers I² being adapted to lift one of said valves when said part is raised, and the other of said levers J² being adapted to lift the other of said valves when said part falls, substantially as and for the purpose described.

In testimony whereof, I sign this specification in the presence of two witnesses.

WILLIAM D. HODGSON.

Witnesses:

ALICE TOWNSEND,
ELLIOTT J. STODDARD.