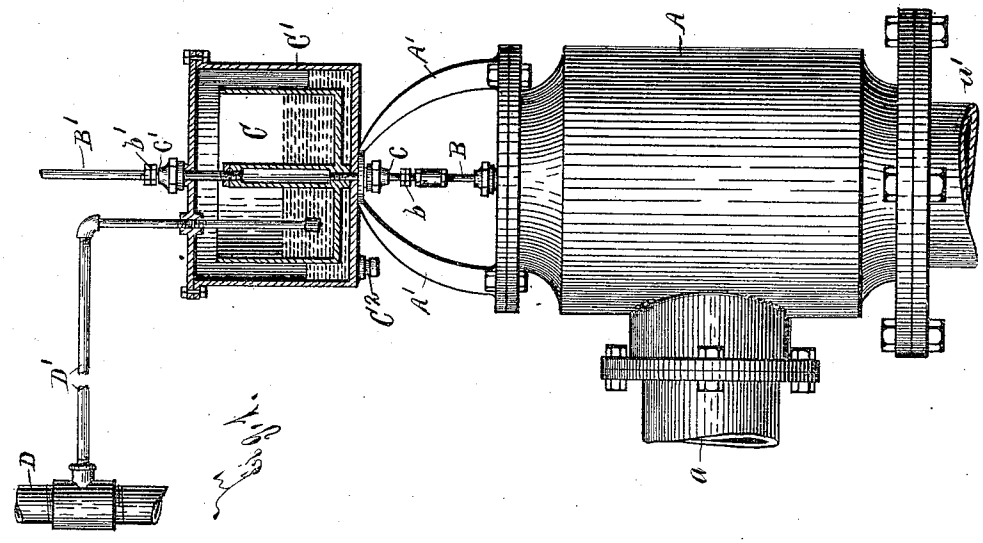
A. B. BENJAMIN.

REGULATOR.

APPLICATION FILED NOV. 7, 1896.

972,496. **Patented Oct. 11, 1910.**

2 SHEETS—SHEET 1.



WITNESSES:

H. C. Chase

F. F. Brewer,

INVENTOR

Allison B. Benjamin.

BY

Ray & Parsons.

ATTORNEYS.

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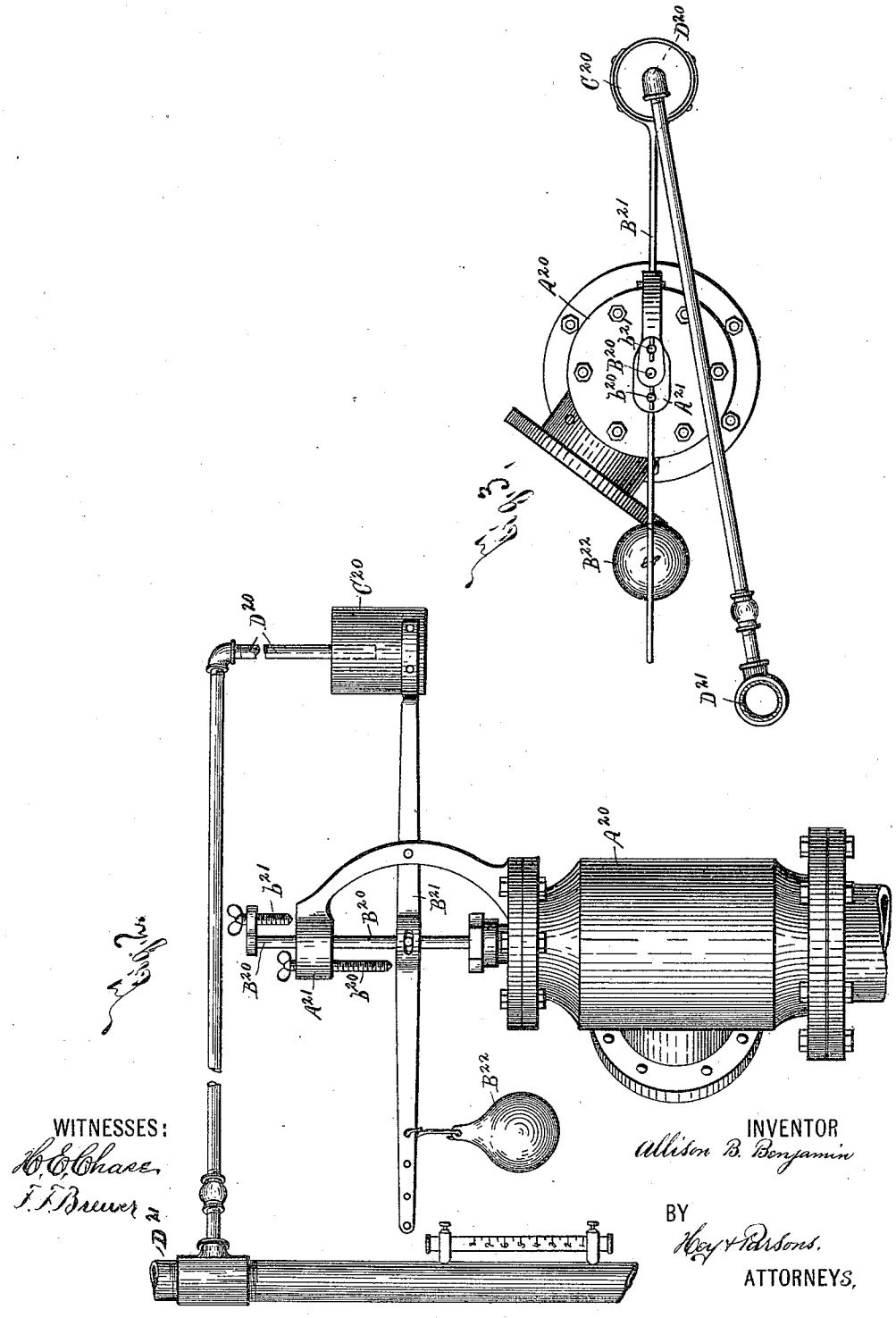

WITNESSES:

E. C. Chase.

F. F. Brewer.

INVENTOR

Allison B. Benjamin

BY

Hoyt & Dickinson.

ATTORNEYS.

UNITED STATES PATENT OFFICE.

ALLISON B. BENJAMIN, OF SYRACUSE, NEW YORK.

REGULATOR.

972,496. Specification of Letters Patent. **Patented Oct. 11, 1910.**

Application filed November 7, 1896. Serial No. 611,322.

To all whom it may concern:

Be it known that I, ALLISON B. BENJAMIN, of Syracuse, in the county of Onondaga, in the State of New York, have invented new and useful Improvements in Regulators, of which the following, taken in connection with the accompanying drawing, is a full, clear, and exact description.

My invention relates to regulating apparatus, especially applicable for use in connection with pumping devices for controlling their operation or speed, and has for its object the production of a mechanism which is particularly efficient, and requires a minimum amount of attention; and to this end, said invention consists, essentially, in the combinations, constructions and arrangements of the component parts hereinafter fully set forth and pointed out in the claims.

In describing this invention, reference is had to the accompanying drawing, forming part of this specification, in which like characters designate corresponding parts in all the views.

Figure 1 is an elevation, partly in section, of a preferable embodiment of my regulating apparatus. Figs. 2 and 3 are, respectively, side elevation and top plan of a modified construction thereof.

A is the casing or outer shell of a suitable regulator, as an ordinary throttle-valve, which controls the passage of a motive-fluid, as steam, air, etc., to the cylinder of any desirable pumping device, as a pump, or engine; and *a a'* are passages communicating with the casing or shell A for permitting the inlet and outlet of said motive-fluid. The valve-piece or movable member, not illustrated, within the casing or outer shell A may be of any suitable form, size, or construction, and is usually provided with a longitudinally-adjustable rod or stem B, which preferably extends through the top of said casing or shell for actuating said valve-piece or movable member.

C is a receptacle, which contains mercury or other material, and is suitably connected to the rod or stem B, for actuating the same and thereby regulating the passage of the motive-fluid and controlling the operation or speed of the pumping device actuated by the motive-fluid.

D is a suction-pipe or conduit having one end thereof adapted to be connected to the pumping device provided with the regulator or throttle-valve, previously described, in order that said device may create a partial vacuum in said pipe or conduit D. The opposite end of the pipe or conduit D is adapted to be connected to a reservoir or chamber, not illustrated, in which a partial vacuum is maintained through said pipe for any desired purpose, as for withdrawing liquid from said reservoir or chamber.

D' is a branch suction-pipe or conduit connected to the pipe or conduit D intermediate of its ends and communicating with the receptacle C. As the vacuum within the pipe or conduit D increases, the mercury is withdrawn from the receptacle C into the pipe or conduit D', and when the vacuum decreases, the mercury flows from the pipe or conduit D' into the receptacle C. This variation in the level of the mercury or other material within the receptacle C effects the desired movement of the valve-piece or movable member of the throttle-valve for controlling the passage of the motive-fluid to the pumping device which maintains a partial vacuum in the pipe or conduit D.

The receptacle C is usually fixed to the rod, or stem B, and is preferably movable in a substantially vertical plane in a liquid in a closed shell C' having an opening in its bottom through which the rod or stem B is reciprocally movable. The shell C' is usually provided at its base with a normally-closed depending pipe C^2 to which the branch pipe or conduit D' may be connected instead of to the reservoir C, and is supported upon the casing A by a suitable standard A' rising therefrom. The movement of the receptacle C and the valve-piece or movable member actuated thereby effected by variations in the level or amount of mercury or other material within the receptacle C is limited by suitable stops *b*, *b'*, which usually consist of shoulders adjustably mounted on the rod or stem B, and upon a rod B' projecting from the receptacle C through the top of the shell C' and forming essentially a continuation of said rod or stem B. The stops or shoulders *b b'* may engage suitable stop-faces *c c'*, as the ends of hubs or stuffing boxes projecting from the bottom and top of the shell C', and in case said shell is dispensed with, the stops or shoulders *b b'* may engage any desirable fixed stop-faces. Said stop or shoulder *b'* is preferably so arranged that the valve-

piece or movable member in the casing A does not entirely shut off the passage of the motive-fluid and therefore the pumping device actuated by said fluid is not entirely stopped, although such a result may be effected, if desired.

At Figs. 2 and 3, I have shown a modified construction of my invention in which the rod, or stem B^{20} is connected to a lever B^{21} provided at one end with a weight B^{22} and at its opposite end with a receptacle C^{20} for receiving mercury or other material. A branch suction-pipe or conduit D^{30} communicates with the receptacle C^{20} for varying the level or amount of the material within said receptacle, and is connected to the suction-pipe or conduit D^{31}. In this modification of my invention, a stop-screw b^{20} is fixed to a standard or arm A^{21} rising from the valve-casing a^{20} for engaging the lever B^{21} and limiting the downward movement of the receptacle C^{20}, and a second stop-screw b^{21} is fixed to the rod, or stem B^{20} for limiting the downward movement of said rod or stem.

The construction and operation of my invention will now be readily understood upon reference to the foregoing description and the accompanying drawing, and it will be particularly noted that I do not herein specifically limit myself to the exact detail construction and arrangement of the component parts of my regulator.

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

1. The combination of a liquid-containing shell, a receptacle movable in the liquid in said shell and adapted to contain a fluid, such as mercury, a conduit in which suction is created, said conduit communicating with the fluid-containing receptacle, and a regulator having its valve-piece or movable member provided with a rod or stem fixed to the movable receptacle, substantially as and for the purpose set forth.

2. The combination with a conduit in which suction is created; of a receptacle adapted to contain a fluid, such as mercury, communicating with the suction-conduit and movable in a substantially vertical plane, a regulator having its valve-piece or movable member provided with a rod or stem fixed to the movable receptacle, and stops or shoulders on the rod or stem for limiting the movement of said valve-piece or movable member, substantially as and for the purpose set forth.

3. The combination with a regulator, a liquid-containing shell, a fluid-containing receptacle movable in the liquid in said shell, a rod or stem movable through a wall of the shell and connected to the fluid-containing receptacle and to the valve-piece or movable member of the regulator, and a conduit communicating with the fluid-containing receptacle for withdrawing the liquid from the receptacle and discharging the same into said receptacle, substantially as and for the purpose described.

4. The combination of a regulator for controlling the passage of a motive fluid to a pumping device, a rod or stem provided on the valve-piece or movable member of the regulator, a liquid-containing shell, a receptacle movable in the liquid in said shell and connected to the rod or stem for actuating the valve-piece or movable member, a pipe or conduit communicating with the receptacle for varying the amount of material therein, a second pipe or conduit connected to the former pipe or conduit and adapted to be connected to the pumping device, and means for limiting the movement of the receptacle, substantially as and for the purpose specified.

In testimony whereof I have hereunto signed my name in the presence of two attesting witnesses, at Syracuse, in the county of Onondaga, in the State of New York, this 1st day of August 1896.

ALLISON B. BENJAMIN.

Witnesses:
E. A. WEISBURG,
K. H. THEOBALD.