N. C. LOCKE.

AUTOMATIC REGULATOR FOR DAMPERS.

APPLICATION FILED JUNE 6, 1907.

924,559. **Patented June 8, 1909.**

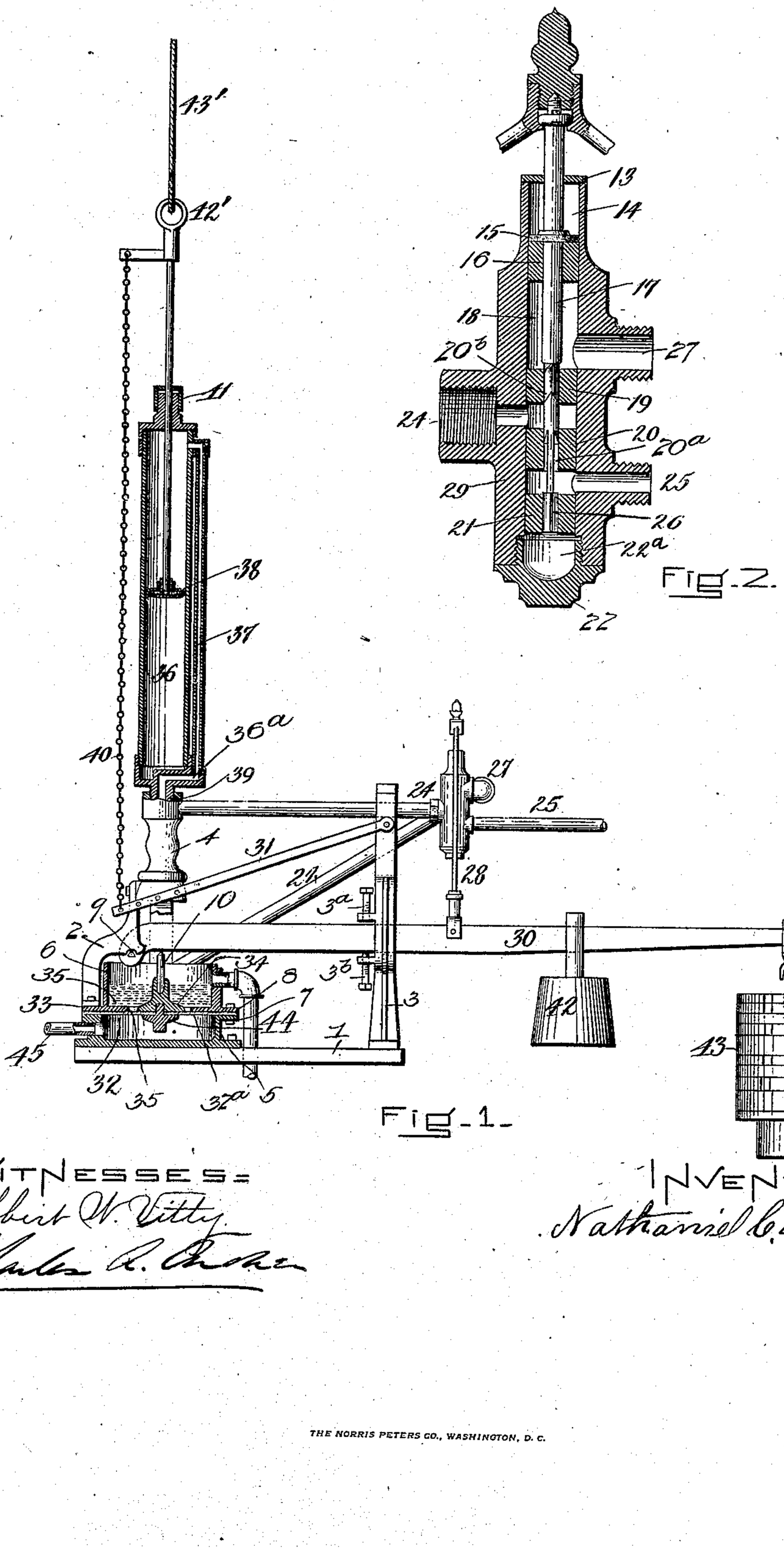

Fig. 1.

Fig. 2.

WITNESSES:

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AUTOMATIC REGULATOR FOR DAMPERS.

No. 924,559. Specification of Letters Patent. Patented June 8, 1909.

Application filed June 5, 1907. Serial No. 377,287.

To all whom it may concern:

Be it known that I, NATHANIEL C. LOCKE, a citizen of the United States, residing at Salem, county of Essex, and State of Massachusetts, have invented a new and useful Improvement in Automatic Regulators for Dampers, of which the following is a specification.

This invention relates to automatic regulators for dampers, of the type wherein the damper operating motor or piston is moved in one direction by water or other non-compressible liquid, the flow of water to or from the motor being controlled by a valve actuated from a pressure chamber or motor communicating with the steam space of the generator, the present invention being designed as an improvement on the devices described in my United States Letters Patent Nos. 335,080, January 26, 1886, and 393,164, November 20, 1888.

One of the objects of my present invention is to provide a device that can readily be made to conform to the differing conditions of high or low pressure generators.

Another object of the invention is to provide a damper operating motor of greater power and efficiency.

A further object of the invention is to provide a controlling valve of improved construction and operation.

With these and other objects in view, my invention consists in the matters to be hereinafter described and claimed.

In the accompanying drawings, wherein similar reference numerals are used to indicate corresponding parts in the different views, Figure 1 is a side elevation, partly in section, of a device embodying my invention; and Fig. 2 is a detail sectional view of the valve casing, on a larger scale.

My device as an entirety comprises, as in my aforesaid Patent No. 393,164, to which reference is made for fuller description and operation of parts forming no essential feature of my present invention, a base 1 and supporting frame 2, 3 and 4, a pressure chamber 32 being secured to the base, which is in communication by piping 45, with the steam space of a boiler (not shown) or other source of power which it is desired to regulate or control.

The upper wall of the pressure chamber 32 is formed of a flexible diaphragm 32^a secured to the upper margins of its cylindric supporting shell 5, by a cylindric shell or casting 35, said shells 5 and 35 being provided with outwardly extending flanges 7 and 8, between which the margins of the diaphragm are secured steam tight in well known manner.

A scale beam 30 is fulcrumed at 9, on the upright 2 of the frame, and carries at its outer end an adjustable and stationary weight 42 and 43 respectively, the scale beam resting on a strut 10 closely adjacent to its fulcrum, said strut 10, being carried by a stout metal flange disk 34, secured centrally to the diaphragm 32^a, all as fully described in my prior patent herein referred to, and serving the same functions. The scale beam is limited in its movements by the screws 3^a and 3^b, located in lugs on the standard 3, as described in said patent, and connected with the scale beam between the weights and fulcrum is a yoke 28, connected at top with the valve rod 17 of the valve casing 29.

As stated in my prior patent No. 393,164, before referred to, the valve rod 17 is raised by the upward movement of the scale beam or lever 30, due to excess of pressure in the pressure chamber 32, to permit the flow of water from a source of supply under pressure through pipe 25, passage 20^a, and pipe 24 to the damper controlling motor 36 to move its piston 38 in a direction to close a weighted damper of a furnace flue (not shown) through connections 42 and 43, and lowered upon reduction of said excess of pressure to close the passage 20^a and open the passage 20^b to permit the escape of water from the damper motor 36, through pipe 24, passage 20^b and waste pipe 27.

For extreme closeness of operation when the apparatus and its motor 36 are used as a damper motor to regulate the pressure of steam in the boiler, it is desirable to modify the action of the valve by slightly moving the valve casing 29, and in order to accomplish this the piston rod of the damper motor is connected by cord or chain 40 with a lever 31, provided at its fulcrum with a cam designed to move the pipe 24 and valve casing upward, to modify the action of the valve, all as fully described in my prior patent No. 393,164.

In this class of devices it is important that

the valve be so constructed, arranged and manipulated as to be extremely sensitive, and from the condition of its use be practically free from sticking due to sediment or grit in the fluid controlled. To this end my present invention involves a valve casing 29, cast with lugs which are cored or bored to form ports 24, 25 and 27, and reamed longitudinally to receive centrally planed annular plugs 16, 19, 20 and 21, which are seated therein with a driving fit, the first, 16, at the upper end of the casing, above the port 27, the next, 19, in the space between the ports 27 and 24, the next, 20, in the space between the ports 24 and 25, and the last just below the supply port 25. The lower end of the valve body is threaded and provided with a cupped cap 22, which forms a chamber 22ª, at the lower end of the structure.

The valve proper consists of a long spindle 17, the lower end of which is dressed on four sides to leave four narrow guiding webs to move in contact with the bore of the plug 21; the advantage of this construction being two-fold; first it affords clearance for any grit or suspended matter in the water controlled while forming an efficient guide, and second, it permits the free passage of water under pressure downward into the high pressure chamber 22ª, thus admitting of water pressure on the squared lower end of the spindle 17, thereby assisting in the prompt action of the regulator. The spindle is cut away at opposite sides to a point just below the upper end of the bore of plug 20, and from below the lower edge of plug 19 to the shoulder at the lower end of the larger diameter of the spindle, thus in the position shown in the drawings, closing communication from the pressure pipe 25 to pipe 24 and so to the damper motor, and making communication from said pipe 24 through the passage of plug 19 to the exhaust or waste pipe 27. The upper part of the spindle works liquid tight through the plug 16, the valve casing extending above the plug and constituting an oil cup 14, through which the spindle works. Preferably a felt washer 15 is secured to the upper face of the plug and a cap or cover 13 is preferably employed to exclude dust from the oil cup. The valve is connected to the damper motor by a pipe 24 leading to a channel 36ª in the base of the cylinder, and rising from said channel is a pipe 37 communicating at its upper end with the interior of the motor cylinder near the top, whereby water is admitted to the cylinder above the piston, moving it downward to close the weighted damper more or less, the piston rod being connected at its upper end to a cord or rope 43′, the other end of which is connected to the damper as in my prior patents before referred to. When the valve shifts to shut off pressure water the weighted arm of the damper will raise the piston, thus discharging water from above it, through pipe 37, pipe 24, the passage in valve plug 19, and waste pipe or exhaust 27.

To provide for control of either high or low pressure in the generator by practically the same machine, I employ a flat disk diaphragm 32ª for the upper wall of the pressure chamber 32, said diaphragm being secured between the top flange 7 of the side walls of said chamber by the corresponding flange 8 of the superposed shell 35. This shell I construct of uniform sizes exteriorly, but provide interiorly inwardly extending flanges 35ª of different widths extending a greater or less distance over the top of the diaphragm toward the center thereof, in order that the diaphragm may have greater or less support against the pressure from the generator over more or less area. These shells 35 are of uniform size and interchangeable, so that the same device may be economically fitted to control the damper of a generator of either high or low pressure. The diaphragm is clamped centrally between two disks, 34 and 44, the upper one of which, 34, carries the strut or post 10, which moves the scale beam or lever 30.

In applicant's former patent No. 393,164, the bottom chamber of the valve was an exhaust chamber having no pressure, and a passage leading from it in the wall of the valve communicating with the exhaust chamber 18. The bottom chamber in the casing in the present application is a high pressure chamber with the full pressure of the water acting upon the lower end of the valve spindle 17. The power heretofore that was necessary to be exerted upon this valve spindle to move it when there was some considerable friction, caused a variation of pressure on the machine as there was obliged to be a decrease of pressure to force the spindle down and an increase to raise it up but with the water acting below the spindle, this trouble is obviated and the regulator works very much closer.

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

1. In a pressure controlling device, the combination with a water motor, a valve controlling the passage of fluid under pressure to said motor, a pressure chamber communicating with a generator formed of the shells clamping a diaphragm between them, the upper shell being interchangeable with others and having a flange of greater or less width extending over the diaphragm, and means for actuating the valve by the movement of the diaphragm.

2. In a pressure controlling device, the combination with a damper motor and pressure chamber, of a valve comprising a casing having an upper exhaust port, a lower inlet port, an outlet port intermediate of said

ports, a discharge chamber communicating with the upper exhaust port, a high pressure chamber at the lower end of the casing, two intervening chambers between the discharge chamber and the high pressure chamber, one communicating with the lower inlet port and the other with the intermediate outlet port and the high pressure chamber, and a valve spindle extending through the upper discharge chamber and the two intervening chambers and having valved portions controlling the passages between said chamber and the inlet and outlet ports and the exhaust port, the lower end of said valve spindle being located in a guide passage way between the high pressure chamber at the bottom of the casing and the lower intervening chamber and constructed and arranged to permit the free passage at all times of fluid through said guide passage way between the lower intervening chamber and the high pressure chamber.

3. In a pressure controlling device, the combination with a damper motor and pressure chamber, of a valve comprising a casing having an upper exhaust port, a lower inlet port, an outlet port intermediate of said port, an oil chamber at the top of the casing, a high pressure chamber at the bottom of the casing, a discharge chamber below the oil chamber and communicating with the upper exhaust port, two intervening chambers between the upper discharge chamber and the high pressure chamber, the upper intervening chamber communicating with the intermediate outlet port, and the lower intervening chamber communicating with the lower inlet port, and the high pressure chamber, and a valve spindle extending through all of said chambers to the high pressure chamber and having valved portions controlling the passages between the discharge chamber and the intervening chamber and the inlet and outlet ports, the lower end of said spindle being located and movable in the passageway communicating between the high pressure chamber and the lower intervening chamber and provided with means for centering the end of the spindle in said passage way and permitting the passage of fluid at all times between the high pressure chamber and the lower intervening chamber.

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

NATHANIEL CHASE LOCKE.

Witnesses:

A. P. SWASEY,

A. W. VITTY.