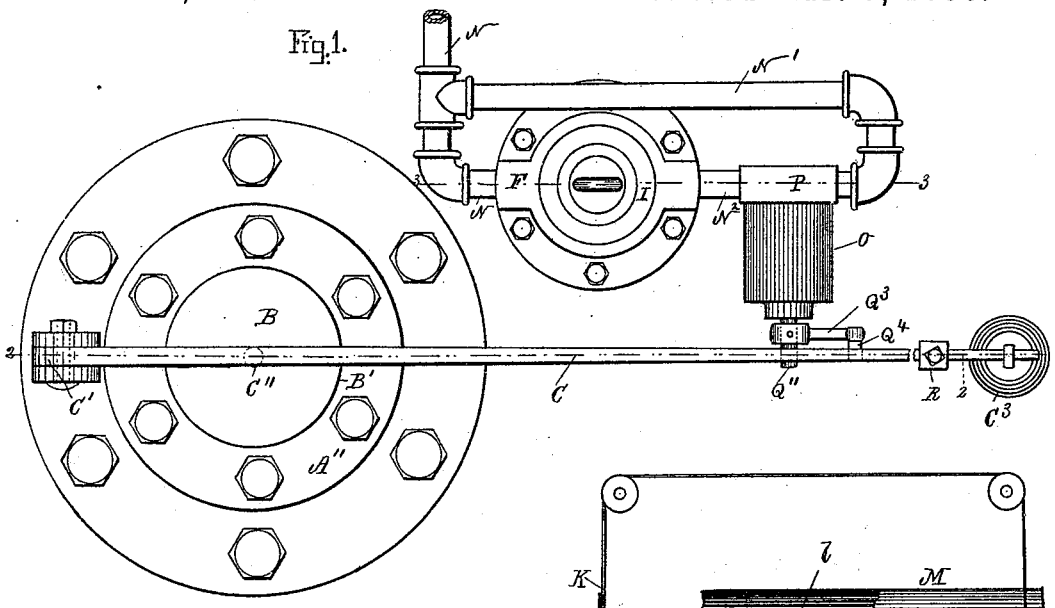
(No Model.) 2 Sheets—Sheet 1.

F. L. T. CARLMAN.

DAMPER REGULATOR.

No. 493,149. Patented Mar. 7, 1893.

Fig. 1.



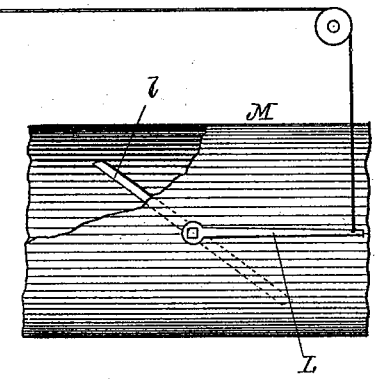
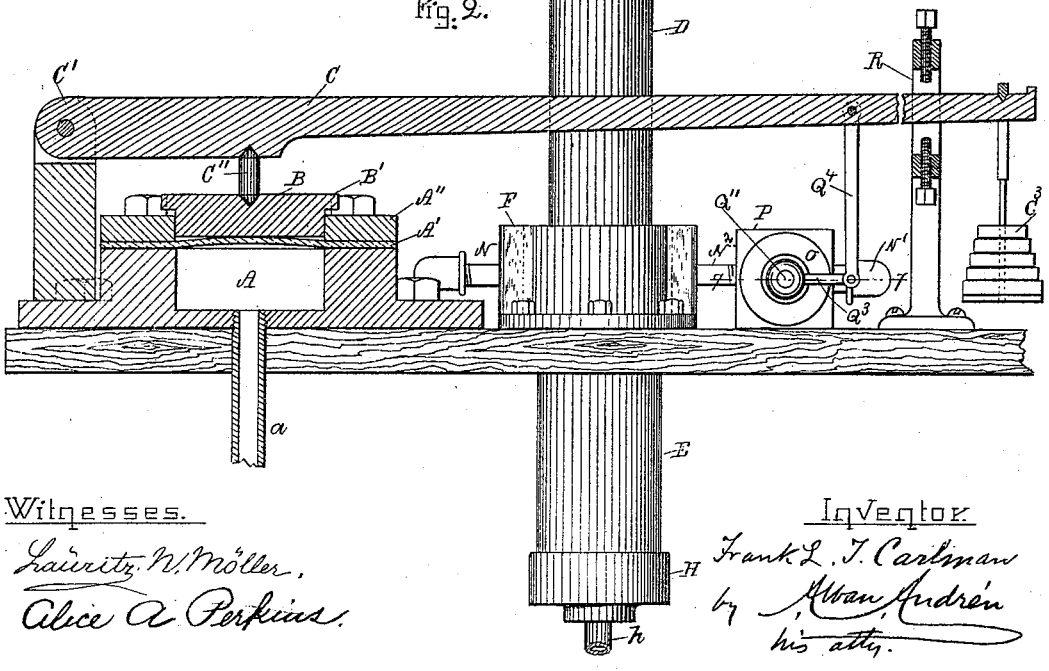


Fig. 2.



Witnesses.

Laurits N. Möller.

Alice A. Perkins.

Inventor.

Frank L. T. Carlman

by Albert Andrén

his atty.

(No Model.) 2 Sheets—Sheet 2.

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DAMPER REGULATOR.

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Fig. 3.

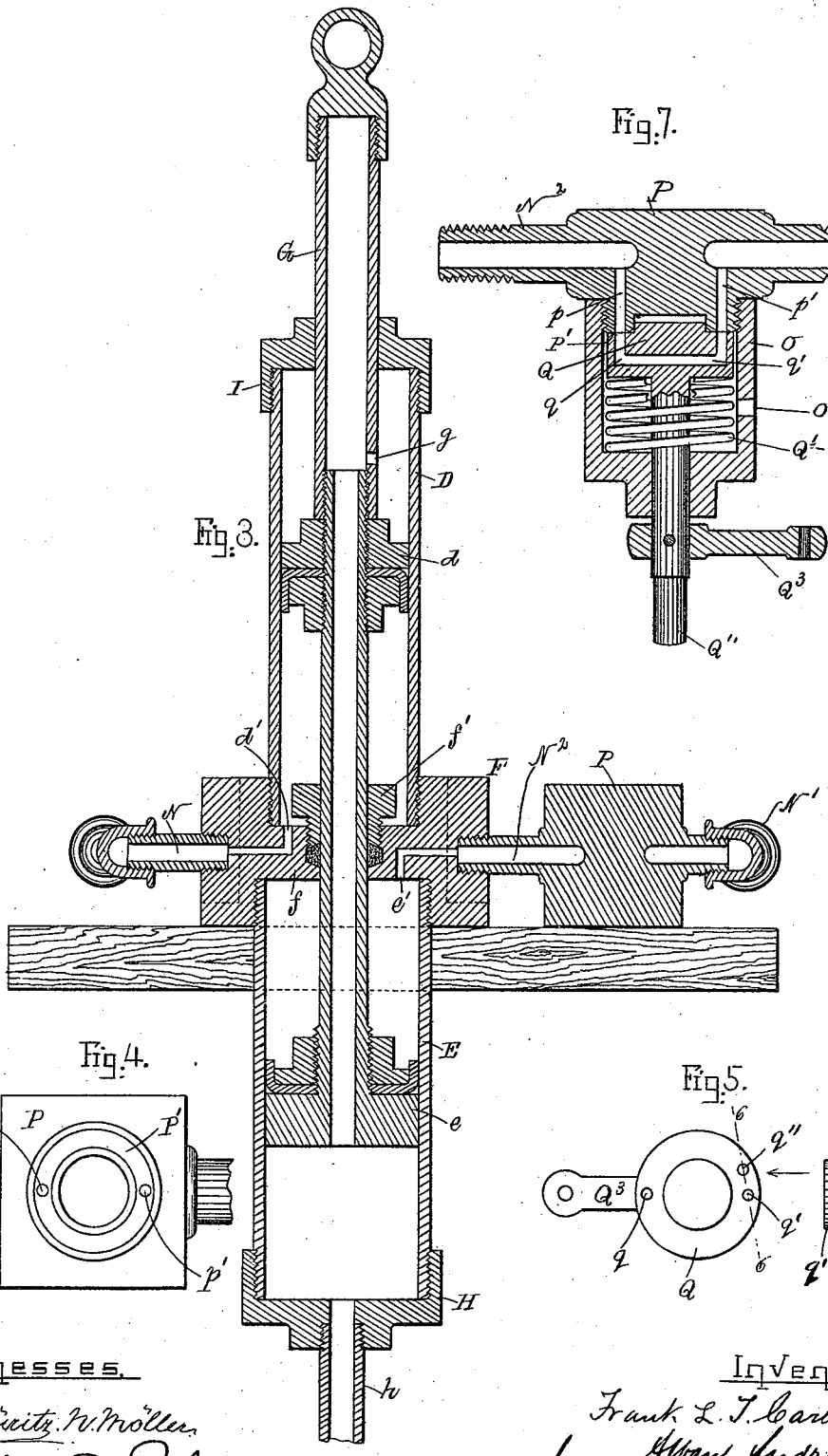
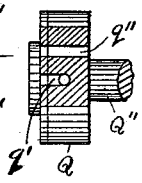


Fig. 7.

Fig. 4.

Fig. 5.

Fig. 6.



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UNITED STATES PATENT OFFICE.

FRANK. L. T. CARLMAN, OF SALEM, MASSACHUSETTS.

DAMPER-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 493,149, dated March 7, 1893.

Application filed July 8, 1892. Serial No. 439,375. (No model.)

To all whom it may concern:

Be it known that I, FRANK. L. T. CARLMAN, a citizen of Sweden, and a resident of Salem, in the county of Essex and State of Massachusetts, have invented new and useful Improvements in Damper-Regulators, of which the following, taken in connection with the accompanying drawings, is a specification.

This invention relates to improvements in damper regulators for the purpose of automatically adjusting the position of the damper in the smoke flue or chimney according to variations of the steam pressure in the boiler so as to retain any desired standard pressure in such boiler or steam generator.

The invention is carried out as follows, reference being had to the accompanying drawings, wherein—

Figure 1 represents a plan view of the improved damper regulator. Fig. 2 represents a section on the line 2—2 shown in Fig. 1. Fig. 3 represents a section on the line 3—3 also shown in Fig. 1. Fig. 4 represents an end view of the valve seat for conducting the water pressure to the lower, larger cylinder of the motor. Fig. 5 represents an end view of the valve for said valve seat. Fig. 6 represents a cross-section on the line 6—6 shown in Fig. 5; and Fig. 7 represents a cross-section on the line 7—7 shown in Fig. 2.

Similar letters refer to similar parts wherever they occur on the different parts of the drawings.

The pressure device which is connected with the live steam in the boiler is constructed as follows: It consists of a box or chamber A connected to the steam space of a boiler by means of the pipe *a* as shown in Fig. 2; the box A is covered by a flexible diaphragm A′ secured to it by means of a ring A″ as usual. On top of the said diaphragm rests a cap plate B having an annular peripheral lip or flange B′ adapted to rest on the stationary ring A″ when the pressure in the boiler reaches the normal desired one or falls below it so as to prevent undue strain and downward pressure on said diaphragm.

C is a weighted lever hung at C′ and pressing on the cap plate B and its diaphragm by means of the piece C″ interposed between said lever and cap plate as shown in Fig. 2. To the free end of said lever is hung a series of weights C^3 C^3 as usual in devices of this kind. Said lever is connected to a rocking valve by means of which water pressure is admitted to the larger lower cylinder of the motor for the operation of the damper as will hereinafter be more fully described.

The motor is fully shown in section in Fig. 3 and it is constructed as follows: It consists of two independent cylinders, namely: an upper smaller cylinder D and a lower larger one E, which are separated from each other by a wall *f* preferably forming a part of a shell or casting F as shown in which the ends of the cylinders D and E are preferably screwed.

d and *e* are packed pistons of any well known form adapted to fit within the respective cylinders D and E; said pistons are secured to a preferably hollow stem or piston rod G, which passes through a central perforation in the division wall *f* and a stuffing box *f′* arranged at such place so as to prevent the water under pressure in the upper cylinder from getting into the lower one and vice versa.

g is a perforation in the side of the hollow piston rod G just above its piston *d* for the purpose of allowing any water that may leak into the cylinder D above its piston, to escape downward into the lower cylinder E below its piston and to escape through the drip pipe *h* attached to the cover H at the lower end of the cylinder E. Said drip pipe also serves as an escape for any water that may leak from above the piston *e* into the lower part of the cylinder E.

I is a cover secured to the upper end of the cylinder D, said cover having a central perforation through which passes loosely the piston rod G to the upper end of which is suitably attached a chain K connected in a suitable manner to the weighted damper lever L which is suitably secured to the damper *l* arranged within the flue or smoke stack M as shown in Fig. 2.

From the above it will be seen that the downward motion of the piston rod G causes the damper to be opened and vice versa.

N is a pipe leading from any ordinary or desired water pressure such as the street main or a head of water of any kind according to location and circumstances. This pipe leads by means of a port *d′* into the lower portion

of the cylinder D and is always in open connection with said cylinder. A branch pipe N′ of said pipe N leads to a valve casing P and a branch pipe N^2 from said valve casing leads by means of a port e' into the upper part of the cylinder E and the flow to and from the latter is regulated by a valve mechanism controlled by the pressure lever C as follows: The valve case or body P is provided with a circular seat P′ through which are made ports p and p' communicating with the pipe N as shown in Figs. 4 and 7. To the case P is secured a cylindrical cup shaped shell O having an exhaust opening O′ as shown in Fig. 7. Inside the shell O is located a cylindrical valve Q, the face of which is held in contact with the valve seat P′ by means of a coiled spring Q′ shown in Fig. 7.

Q″ is the stem of the valve Q which stem projects through a perforation in the outer end of the shell O and has attached to it, a lever Q^3 which is connected to the weighted lever C preferably by means of a link Q^4 as shown in Fig. 2. The face of the valve Q has two ports q and q' which are in communication with each other through the body of the valve as shown in Fig. 7.

The position of the ports q and q' on the valve seats is such as to be capable of being brought directly opposite the respective ports p and p' in the valve seat P′ when the water pressure is to be conveyed into the lower cylinder E.

q'' is an exhaust port through the valve Q which is capable of being brought opposite to the port p in the valve seat P′ when the lower cylinder E is to be exhausted. Thus it will be seen that by oscillating the valve Q the pressure of water from the pipe N can according to the position of said valve be conveyed to the upper end of the lower cylinder E, and when the port q'' is brought opposite to the port p, the port p' is closed by the solid part of the valve, shutting off the water supply and allowing the water in the lower cylinder E (during the upward motion of its piston caused by the constant pressure upward on the piston in the upper cylinder D) to escape through ports e', p, q'' into valve shell O and out through the exhaust opening O′.

R is a suitable post or bracket provided with adjusting stop screws for limiting the movement of the lever C as is common in devices of this kind.

The operation of this my improved damper regulator is as follows: If the steam pressure in the steam boiler should rise above the normal one, the pressure lever C will be raised causing the valve Q to be turned until the exhaust port q'' in the valve coincides with the port p in the valve seat by which the water pressure is shut off from the lower cylinder E and its exhaust opened, causing the piston rod G to be raised by the constant upward pressure on the smaller piston d in the upper cylinder D and such upward motion of the said piston rod causes the water above the lower piston e to be forced out through the open exhausts above mentioned. Such upward motion of the piston rod in the motor relieves the strain or tension on the chain K and causes a closing movement of the damper by the influence of the weighted lever L, until the pressure in the boiler is reduced to the desired normal one. In case the pressure in the boiler falls below the normal one, the pressure lever C will gradually descend by the influence of its weights C^3, causing the valve Q to be turned until the ports p, q and p', q' coincide by which the water pressure in pipe N is conducted through the valve to the upper end of the lower larger cylinder E by which the piston rod G is moved downward on account of the piston e being larger than the piston d, and such downward motion of the piston rod, causes the damper to be gradually opened until the pressure in the boiler again rises to the desired normal one and so on.

Having thus fully described the nature, construction, and operation of my invention, I wish to secure by Letters Patent, and claim—

1. The combination in an automatic damper regulator, of a damper motor composed of a pair of pistons of unequal diameters arranged in independent cylinders upon a single piston rod which is connected with the damper, a fluid conducting pipe for delivering fluid under pressure into the cylinders, a valve for controlling the flow of fluid through the conducting pipe and having a passage by which fluid under pressure is conveyed to the lower cylinder and an exhaust port by which the fluid is permitted to flow from said lower cylinder, a pressure lever operated by pressure in the boiler, and a connection between the pressure lever and the valve, substantially as and for the purposes described.

2. The combination in an automatic damper regulator, of a damper motor composed of a pair of pistons of unequal diameters arranged in independent cylinders upon a single piston rod connected with the damper, a fluid conducting pipe for delivering fluid under pressure into the cylinders, a rotary valve having a passage by which fluid under pressure is conveyed to the lower cylinder and an exhaust port by which the fluid is permitted to flow from said lower cylinder, a pressure lever operated by the pressure in the boiler, and a connection between the pressure lever and the valve by which the latter is turned by the movement of the lever, substantially as described.

3. The combination in an automatic damper regulator, of a damper motor composed of a pair of pistons of unequal diameters arranged in independent cylinders upon a single piston rod connected with the damper, a fluid conducting pipe adapted to deliver fluid under pressure into the cylinders and provided with a valve seat having opposite ports p, p', a rotary valve fitting said valve seat and provided with a passage q, q' by which fluid un-

der pressure is conveyed to the lower cylinder and an exhaust port q^2 by which fluid is permitted to flow from said lower cylinder, a pressure lever operated by the pressure in the boiler, and a rod connection between the pressure lever and the rotary valve by which the latter is rotated by the movement of the lever, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 2d day of July, A. D. 1892.

FRANK. L. T. CARLMAN.

Witnesses:
ALBAN ANDRÉN,
THEKLA ANDRÉN.