(No Model.)

P. & J. ST. MARY.

DAMPER REGULATING APPARATUS.

No. 491,384. Patented Feb. 7, 1893.

Fig. 1.

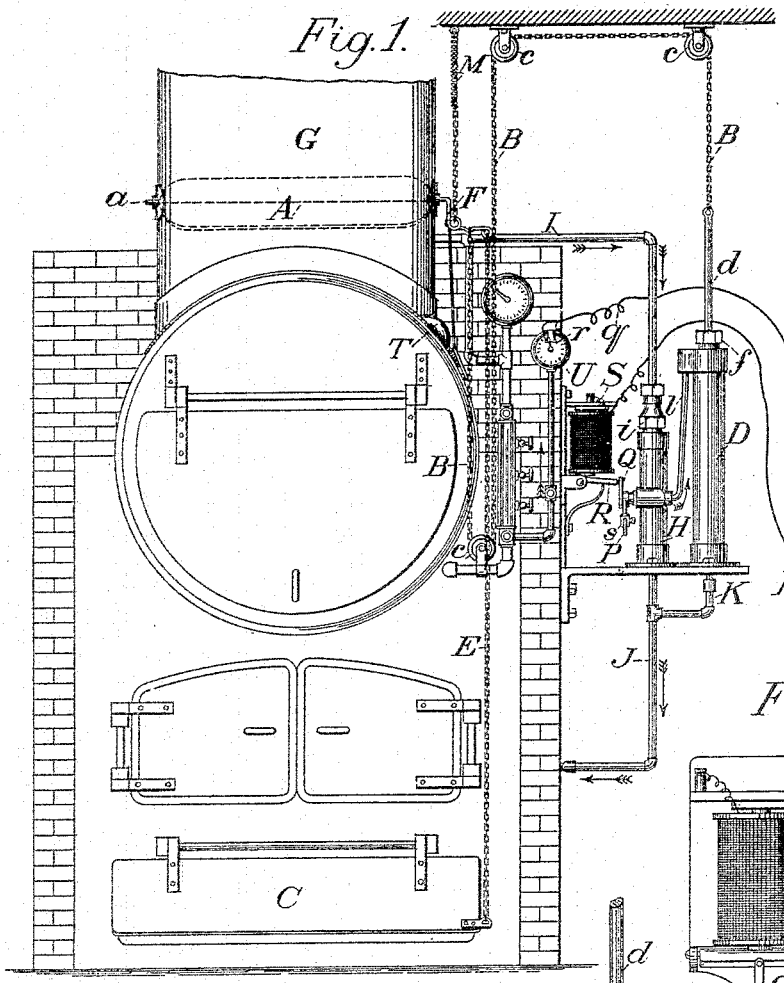


Fig. 2.

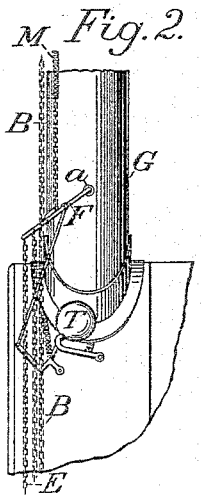


Fig. 5.

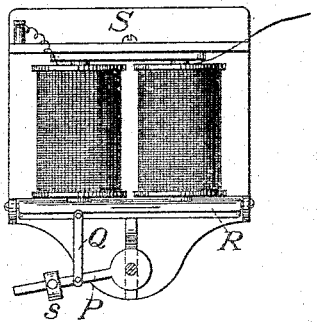


Fig. 4.

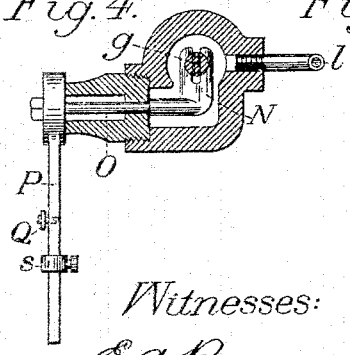
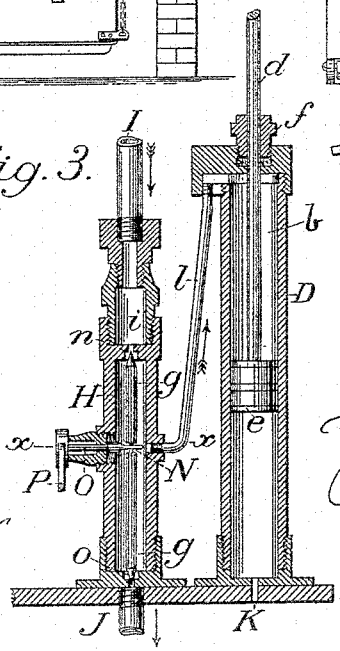


Fig. 3.



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UNITED STATES PATENT OFFICE.

PETER ST. MARY AND JOSEPH ST. MARY, OF SAN FRANCISCO, CALIFORNIA.

DAMPER-REGULATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 491,384, dated February 7, 1893.

Application filed October 15, 1891. Serial No. 408,809. (No model.)

To all whom it may concern:

Be it known that we, PETER ST. MARY and JOSEPH ST. MARY, both of the city and county of San Francisco and State of California, have invented certain new and useful Improvements in Damper-Regulating Apparatus for Steam-Furnaces; and we hereby declare the following specification, with the drawings forming a part thereof, to be a full, true, and exact description of our invention.

Our invention relates to apparatus for automatically opening and closing dampers in the chimneys, flues, or ash pits of steam boilers, so as to control by means of the steam pressure the amount of air admitted and the quantity of steam generated.

The invention consists in the use of an electrical magnet connected with the indicating mechanism of a pressure gage, the magnet moving and controlling the valves to a cylinder and piston, operated by steam or hydraulic pressure and actuating a damper placed in the chimney or flue of a steam boiler, also, when required, operating at the same time a door on the ashpit, or other apparatus to govern the amount of air admitted to the furnace, consequently the intensity of the fires and the amount of steam generated.

The object of our invention is to secure a more uniform generation of steam by causing an instant and positive closing of the dampers, by electrical connection, and without any appreciable amount of force or power required in the preliminary or indicating apparatus.

Referring to the drawings: Figure 1 is a front view of a steam furnace having our improved regulating apparatus applied thereto. Fig. 2 is a partial view of Fig. 1, showing the arrangement of chains for operating the damper and ash door. Fig. 3 is a vertical section through the apparatus employed to operate the damper and ashpit door by means of steam pressure. Fig. 4 is a transverse section on the line *x*—*x*, of Fig. 3, showing in plan the mechanism to operate the valves of the steam actuating apparatus. Fig. 5 shows an electro magnet employed to operate the valves of the actuating steam cylinder.

Similar letters of reference are employed to indicate corresponding parts.

The steam furnace, boiler, fire and flue doors, with other fixed parts, being of ordinary and familiar construction, and not forming any part of our invention, we will not designate them by letters of reference.

Referring first to Fig. 1, the damper A is of the swiveling kind, made to close, or nearly close the uptake or flue G, leading to the chimney. This damper A is operated by a stem *a*, through its center and a cross lever F, to which is attached the chain B; this chain first passing over the pulleys *c*, *c*, *c*, so as to draw the lever F downward, when the piston rod *d*, of the cylinder D, moves in the same direction. The ashpit door C is moved simultaneously with the damper A, by means of a chain E, connecting also to the lever F, so that when the damper A is opened or closed to control the escape of the gases of combustion, the admission of air beneath the grates is regulated accordingly. This is not essential to the operation of my invention, which can be employed to operate the damper A alone, or the ashpit door C alone, but their joint movement and control is preferable in most cases to avoid the escape of smoke when the damper alone is closed, or the inlet of cold air elsewhere about the furnace, if the ashpit door alone is closed.

The chain B, and the parts heretofore described, are operated by the piston *e* and rod *d* in the following manner: D is a steam cylinder containing a piston *e*, fitted on the rod *d*, which slides through the gland *f* in the usual manner; H is a valve chamber containing a spindle or cone-pointed valve *g*, which performs much the same functions as the slide valve of a steam engine, admitting steam above the piston *e*, forcing it downward and then exhausting the steam and permitting the piston to rise by means of the spring M, or in any similar manner most convenient and suitable. Steam passes from the boiler through the pipe I, and enters the valve chamber H, at *i*, as shown in Fig. 3. If the valve *g* is depressed in the position shown, steam rushes into the chamber H and through the pipe *l*, into the cylinder D, above the piston *e*, forcing that down, thereby closing the damper A and door C, as before explained. If the valve *g* is raised, steam is shut off at *n*, and at the same time an exhaust passage is opened at *o*, so that the steam in the chamber *b*, above the

piston *e*, can escape into the waste pipe J, and the piston *e* is then raised by the spring M, acting on the lever F and chain B, so that the damper A and door C are opened and the furnace supplied with draft and air. Any waste water escaping past the piston *e*, or collecting in the bottom of the cylinder D, escapes at the pipe K into pipe J, and is thus carried away.

The double-end spindle valve *g*, having but a small area at its ends, requires but little force to move it, and is controlled in the following manner: Near its center is applied a crank or lever N, on the oscillating stem O, operated by a second crank or lever P. This lever P is connected by a link Q, with a hinged armature R, of an electro-magnet S. This electro-magnet S is connected to one pole of an electric battery W, by means of the wire *p*. The other pole of the battery W is connected by a wire *q*, with the index pointer *r*, of the pressure gage U, and insulated in the usual manner, so that the current is open until this index pointer *r* comes in contact with some conductor.

In the face of the pressure gage U, and corresponding to the steam pressure desired, is placed a metallic pin, or other connection, so that when the pointer *r* moves around and comes in contact with this pin, or connection, the circuit is closed. The armature R then instantly rises by action of the electro-magnet S, raising, at the same time the lever P, by means of the link Q, and depressing the spindle valve *g*. Steam then rushes into the cylinder D, above the piston *e*, moving that downward and closing the damper A, and door C, by means of the chain B, and other mechanism, before described. As soon as the steam pressure has fallen so that the pointer *r* moves back out of contact, the electric circuit is broken, the armature R falls by reason of its weight, aided by the weight *s*, the spindle valve *g* closes at *n* and opens at *o*, releasing the steam from the cylinder D, and the piston *e* rises by reason of the spring M, again opening the damper A and door C. This action is repeated each way by a very slight change in the steam pressure, requiring only movement enough of the pointer *r* to break the electric contact or connection with the wire *q*.

It will be understood, that instead of insulating the pointer *r*, and employing it to close the circuit, this pointer could be arranged to break the circuit and thus reverse the action of the armature R and piston *e*, so that the steam pressure could be employed to open that instead of close the damper A and door C. The operation of closing would then be performed by the spring M, a weight or some opposing force, sufficient for that purpose. We however prefer to close the damper and ashpit door by the steam pressure in the cylinder D, because that operation demands more positive action, and the force at control can be arranged accordingly. It will thus be seen that by our invention the control of the damper A and ashpit door C, is brought within the limit of closing and opening an electric circuit by the index pointer *r*, and may be so set and arranged that the slightest change of pressure in a boiler will govern the fire accordingly.

If desirable, an alarm gong T can be connected with the apparatus and operated by the lever F, so as to give an audible signal of the opening or closing of the damper A and the door C.

Having thus explained the nature and object of our invention, what we claim as new and desire to secure by Letters Patent, is:

1. In a damper regulator, the combination of a steam generator having a chimney flue, an adjustable damper therein, a steam cylinder containing a piston, fitted on a piston rod, a lever F connected to the stem of the aforesaid damper, a chain connection B, connecting the lever F with the piston rod, a valve chamber H located alongside of the steam cylinder and having a chamber *i* in one end thereof, a steam pipe I running from the steam boiler to the chamber *i*, a double pointed valve *g* within the chamber H, and the pipe *l* running from the valve chamber H to the steam cylinder and the waste pipe J, substantially as described.

2. In a damper-regulating apparatus, the combination of the double-ended spindle valve *g*, the valve chamber H having the ports *n* and *o*, the waste pipe J running from the chamber H, the lever or crank N applied to the center of the valve *g*, together with the steam generator having a chimney flue, an adjustable damper therein, a steam cylinder containing a piston fitted on a piston rod, a pipe connecting the valve chamber and the steam cylinder, a lever F connected to the stem of the aforesaid damper, the connection B connecting the lever with the piston rod and the steam pipe I entering the valve chamber H, substantially as and for the purpose specified.

In testimony whereof we have hereunto affixed our signatures in the presence of two witnesses.

PETER ST. MARY.
JOSEPH ST. MARY.

Witnesses:
GEO. T. JONES,
A. J. STEVENS.