

P. J. KELLY.
 COMBINED AUTOMATIC TRAP AND DAMPER CONTROL FOR STEAM HEATING SYSTEMS.
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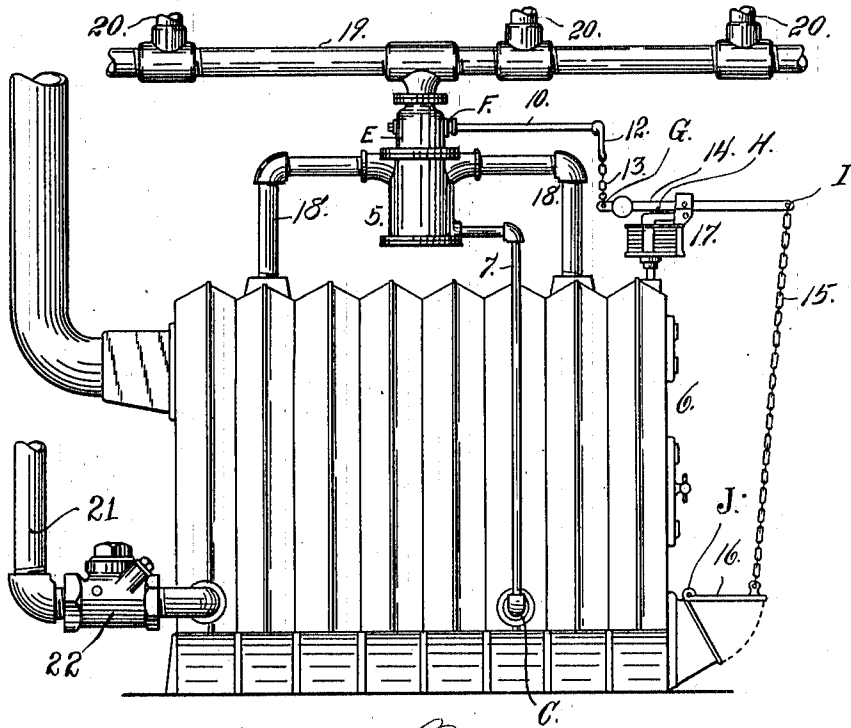


Fig. 1.

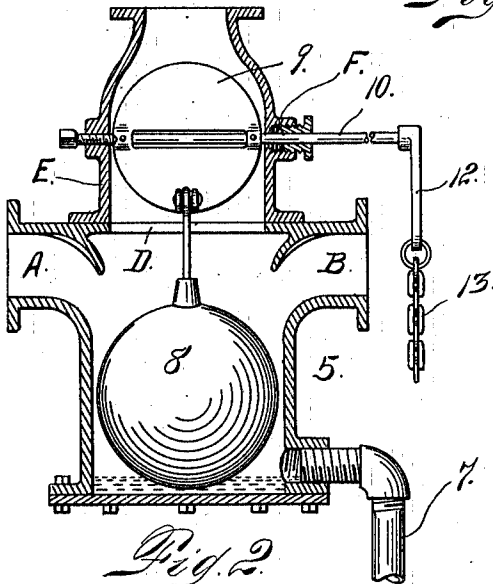


Fig. 2.

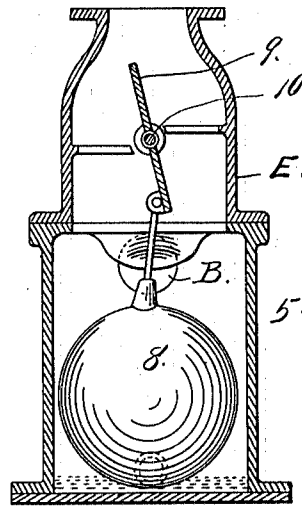


Fig. 3.

Witnesses
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PATRICK J. KELLY, OF DENVER, COLORADO.

COMBINED AUTOMATIC TRAP AND DAMPER CONTROL FOR STEAM-HEATING SYSTEMS.

1,059,302.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, PATRICK J. KELLY, citizen of the United States, residing in the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in a Combined Automatic Trap and Damper Control for Steam-Heating Systems; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

My invention relates to a combined automatic trap and damper control for steam heating systems, my object being to prevent the water in the boilers of steam-heating systems from passing upwardly into the pipes of the system, due to the agitation of the water within the boiler.

It is well known that in steam-heating systems the water from the boiler commonly rises into the pipes of the system and produces noises which are disagreeable and annoying, particularly when getting up steam. As the steam rushes from the boiler into the pipes, a partial vacuum is produced causing the water to rise and enter the pipes to a greater or less extent. This water is carried along by the steam and wherever there is a turn or an abrupt bend in the pipes, the water strikes with considerable force, producing a noise resembling pounding upon the pipes. Not only are noises produced in the pipes by the water as aforesaid, but this water also carries impurities into the pipes, such as grease and sand, which also lodge in the radiators and other parts of the system, causing much trouble as well as wear upon the pipes and valves. Furthermore, it often happens that the water is carried out of the boiler into the pipe system on the inlet side to such an extent that the water falls sufficiently in the boiler to allow a considerable area thereof to become red-hot, or heated to such an extent that the return water to the boiler through the return pipe will result in cracking the boiler sections or in producing explosions. Explosions from this cause have sometimes resulted not only in the destruction of property but also in loss of life. As the return water, which is practically cold, rises in the boiler and comes

in contact with the red-hot areas of the latter, a result as heretofore stated follows, similar to that produced by turning cold water into a hot empty boiler.

My object is to overcome this difficulty and when my improved device is employed for this particular purpose, it is mounted in close proximity to the boiler, preferably directly above the same, or at one side thereof, as may be desired. Provision is made whereby, before the water can enter the pipes of the system, it enters a trap in which is located a float. As the water fills the trap, the float rises and closes a valve which cuts off communication between the boiler and the pipes of the system. The stem of the float-operated valve is connected through the instrumentality of a lever and chains or other suitable flexible devices, with a damper, the connection being such that when the float-operated valve closes to cut off water communication between the boiler and the pipes of the system, the damper will also be closed to cut off the draft of the furnace or fire-box used in connection with the boiler. The return pipe is equipped with a check valve to prevent the direct escape of water from the boiler into this pipe when the valve (hereinafter explained) is closed on the inlet side of the system, whereby there is an increase of pressure in the boiler which otherwise might result in the passage of water directly from the boiler to the pipes of the system through the return pipe.

My improved construction is arranged to operate in harmony with a damper-regulator of the expansion class the said regulator being of the bellows form and arranged to expand as the temperature of the boiler rises. This regulator also acts upon the same lever that forms a part of the damper-control in my improvement, but the two may operate entirely independently of each other. For instance, the expansion-regulator constructed on the bellows principle depends entirely upon the steam pressure in the system for its operation to open and close the damper. On the contrary, in my improvement the water may act upon the float in the trap to close the valve and close the damper before the steam pressure is sufficient to act upon the expansion-regulator to close the damper.

My improved trap is interposed between the boiler and the inlet for steam to the system, and is sufficiently sensitive to be op-

erated by a comparatively small amount of water on its way to the pipes of the system.

Having briefly outlined my improved construction I will proceed to describe the same in detail, reference being made to the accompanying drawing, in which is illustrated an embodiment thereof.

In this drawing: Figure 1 is a side elevation of a boiler equipped with my improvement. Fig. 2 is a vertical section taken through the trap, the parts being shown on a larger scale. Fig. 3 is a similar view taken at right angles to Fig. 2.

The same reference characters indicate the same parts in all of the views.

Let the numeral 5 designate a trap or receptacle for water which, as illustrated in the drawing, is supported above the boiler 6 and is provided with openings A and B on opposite sides whereby the receptacle or trap 5 is placed in communication with the boiler through the medium of the angle-shaped pipes 18. Connected with the bottom of the trap is a pipe 7 which communicates with the lower part of the boiler as shown at C whereby the water of condensation, as well as any water which may have accumulated in the trap during the overflow from the boiler, is drained back into the lower portion of the latter.

Above the trap 5 and in communication therewith by a relatively large opening D is a casing E in which is located a disk valve 9, this valve being mounted on a stem 10 journaled in the casing, the stem passing through a stuffing-box at one side of the casing whereby a steam and water-tight joint is formed.

The stem 10 where it extends through the stuffing-box F has its outer extremity connected by means of a crank-arm 12 with a chain 13, the said chain being connected at its lower extremity as shown at G with one arm of a lever 14, which is fulcrumed as shown at H on an expansion-damper-regulator 17, connected with the water of the boiler to be controlled by the temperature of the latter. The opposite arm of the lever is connected as shown at I with a chain 15 which leads to a damper 16 hinged to the furnace as shown at J.

From the foregoing description it will be understood that if the water rises from the boiler through the pipes 18, on its way to the pipes of the steam-heating system, it must first enter the trap 5 carrying float 8. As the water fills this trap the float will rise and by virtue of its connection with the disk-valve 9, will close the latter and cut off communication between the trap and the casing E, and consequently cut off communication between the trap and the pipes 19 and 20 of the system, since the casing E is interposed between the trap and the said pipes. As the valve closes, a partial rotary

movement is imparted to the stem 10 whereby the crank 12 is actuated to lift one arm of the lever 14 and depress the other arm, the depressed arm being connected with the damper whereby the latter is allowed to close by gravity. Ordinarily this damper will be closed through the medium of the valve 9 before the expansion damper-regulator would act to close the damper. In any event, the two devices work in complete harmony and may operate either in conjunction or independently of each other.

In order to successfully carry out my improvement, it is in every way advisable, if not absolutely necessary, that the return pipe 21 be equipped just outside of the boiler with a check-valve 22, which, while allowing the water of condensation to return freely to the boiler from the pipe 21, is arranged to prevent the escape of water from the boiler directly into the pipe 21. This is exceedingly important since, when the valve 9 is closed due to the rise of water in the trap 5 whereby the float is actuated to close the valve, the pressure in the boiler will rise due to the closure of the said valve, since such closure cuts off communication between the boiler and the pipe system so far as both water and steam are concerned. Hence, with the check valve from the pipe 21, there would be nothing to prevent the water, under the increased pressure in the boiler, from escaping into the pipe system through the return pipe 21.

Having thus described my invention, what I claim is:

1. The combination in a steam heating system comprising the boiler, its fire-box and the pipes of the system, of a trap in communication with the top of the boiler, a valve interposed between the trap and the steam supply pipes of the system, a float located within the trap, a damper connected with the fire-box of the boiler furnace and an operative connection between the valve and the damper, the valve being connected in operative relation with the float of the trap, substantially as described.

2. The combination with a boiler, its fire-box and the pipes of a steam-heating system, of a trap in communication with the top of the boiler by pipes entering the upper part of the trap, a float within the trap, a valve casing located above the trap and in communication therewith at the bottom, said casing being in communication at the top with the pipes of the system, a float located in the trap, a valve located in the casing above the trap, the float having a stem connected with the valve to close the latter as the float rises in the trap, a stem upon which the valve is mounted, the said stem extending beyond the valve casing, a lever suitably fulcrumed in proximity to the boiler, an operative connection between the said stem and

one arm of the lever, a damper connected with the fire-box of the boiler and an operative connection between the other arm of the lever and the said damper, the connection and arrangement being such that as the float rises and closes the valve to cut off communication between the water of the boiler and the pipes of the system, the damper of the fire-box will also be actuated to cut off the draft, substantially as described.

3. The combination with a steam-heating system comprising a boiler, the furnace thereof and the pipes of the system, of a trap in communication with the top of the boiler, a float located in said trap, a valve casing mounted above the trap and in communication therewith, said casing being also in communication with the steam supply pipes of the system, and a valve located in the casing and connected in operative relation with the float whereby the valve is closed whenever water rises into the trap.

4. The combination with a steam-heating system, comprising a boiler, the furnace thereof having a damper and pipes of the system, of a trap in communication with the top of the boiler, a float located in said trap, a valve casing mounted above the trap and in communication therewith, said casing being also in communication with the steam supply pipes of the system, a valve located in the casing and connected in operative relation with the float, the said valve having a stem extending beyond the casing and an operative connection between the valve stem and the damper of the boiler furnace, whereby if the valve is closed the damper will be actuated, substantially as described.

5. The combination with a boiler, its furnace, and the pipes of a steam-heating sys-

tem, of a trap in connection with the top of the boiler, a valve interposed between said trap and the steam supply pipes of the system, and means connected with said valve and adapted to be acted upon by the rising of water within the trap for closing said valve.

6. In a combined automatic trap and damper control for steam-heating systems, the combination with the boiler, its furnace and the pipes of the system, of a trap interposed between the boiler and the steam supply pipes of the system, a float located in said trap, a valve connected with the float for cutting off communication between the boiler and the steam supply pipes when water rises into said trap, a damper connected with the furnace and in operative connection between the valve and the damper whereby, as the valve is actuated through the medium of the float, a corresponding movement is imparted to the damper.

7. The combination with a furnace, the boiler and the steam supply pipes of a steam-heating system, of a trap, the top of which is in communication with the upper portion of the boiler, a float in said trap, a valve casing interposed between said trap and the steam supply pipes of the system, an operative connection between said float and valve whereby the valve is closed when water rises into said trap, and a return pipe from the bottom of said trap to the boiler.

In testimony whereof I affix my signature in presence of two witnesses.

PATRICK J. KELLY.

Witnesses:

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