

949,147.

3 SHEETS—SHEET 1.

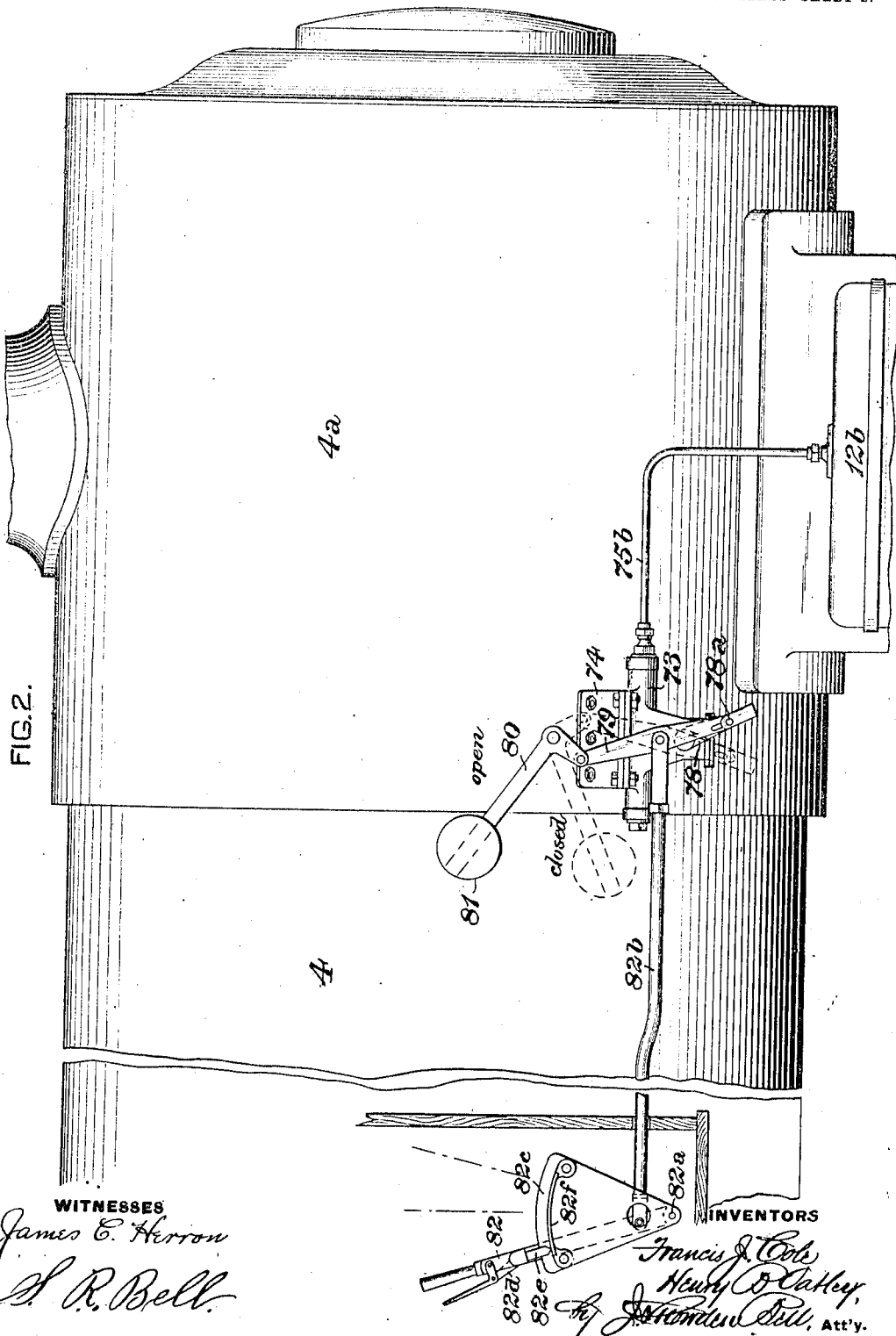


F. J. COLE & H. B. OATLEY.
 STEAM BOILER SUPERHEATER.
 APPLICATION FILED JULY 1, 1909.

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Patented Feb. 15, 1910.

3 SHEETS—SHEET 2.



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3 SHEETS—SHEET 3.

FIG. 3.

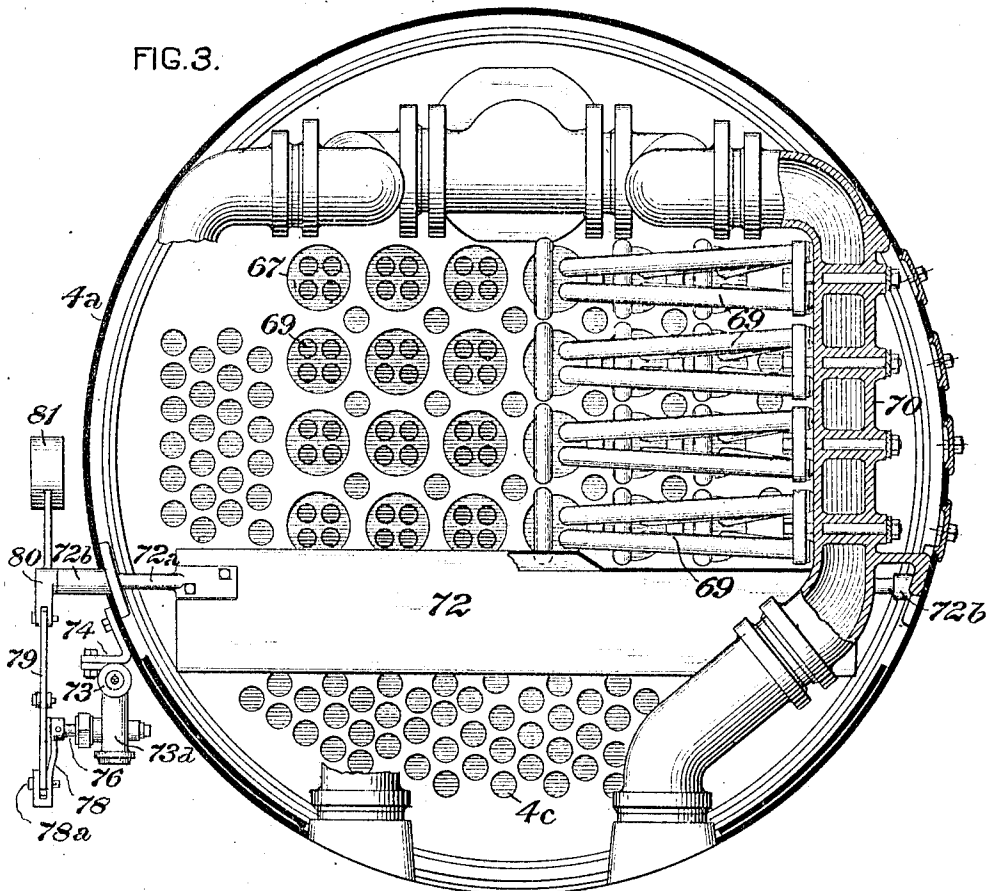


FIG. 4.

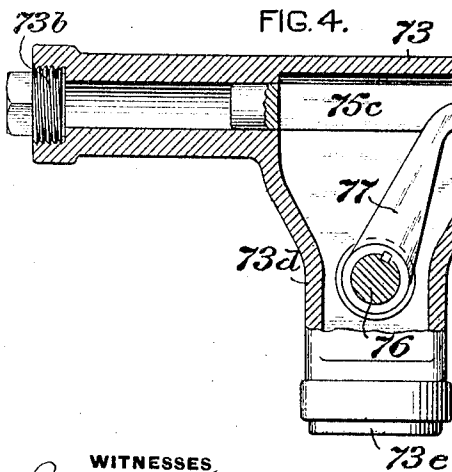
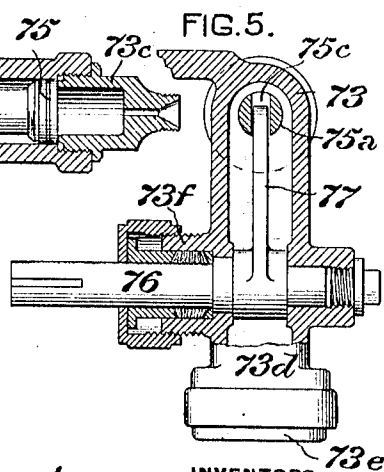


FIG. 5.



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UNITED STATES PATENT OFFICE.

FRANCIS J. COLE AND HENRY B. OATLEY, OF SCHENECTADY, NEW YORK.

STEAM-BOILER SUPERHEATER.

949,147.

Specification of Letters Patent. Patented Feb. 15, 1910.

Application filed July 1, 1909. Serial No. 505,389.

To all whom it may concern:

Be it known that we, FRANCIS J. COLE and HENRY B. OATLEY, both of Schenectady, in the county of Schenectady and State of New York, have jointly invented a certain new and useful Improvement in Steam-Boiler Superheaters, of which improvement the following is a specification.

Our present invention relates to steam boiler superheaters of the fire tube type, and its object is to provide means whereby the flow of hot gases from the firebox, through the superheating tubes in which the pipes of the superheater are located, will be automatically shut off when the locomotive in which the superheater is applied is "drifting" or running with a closed throttle, and when, consequently, no steam is passing through the superheater pipes, in order to prevent the overheating of the pipes, which, if the application of the heat of the gases is continued under such conditions, is liable to occur.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings: Figure 1 is a vertical longitudinal central section through the forward portion of a locomotive boiler having our invention applied; Fig. 2, a side view, in elevation, of the same; Fig. 3, a vertical transverse section through the smoke box; Fig. 4, a longitudinal central section through the damper cylinder; and, Fig. 5, a transverse section through the same, in the plane of the operating shaft.

Our invention is herein exemplified as applied in connection with the superheater which is set forth in Letters Patent of the United States No. 875,895, granted and issued to Francis J. Cole, under date of January 7, 1908, but is not, in any wise, limited in application to this or any other specific construction of fire tube superheater. The superheater pipes, 69, in the design selected for illustration, extend longitudinally in "superheating tubes", 67, which are of larger diameter than the ordinary fire tubes, 4^e, and are located in the upper and middle portion of the space within the shell of the boiler, 4. After emerging from the superheating tubes, the superheater pipes extend forwardly and laterally to connections with steam headers, 70, on the sides of the smoke box, 4^a, across which the ordinary inclined diaphragm or deflecting plate, 4^e, extends, forward of the front flue sheet, 4^a.

In the practice of our invention, we provide a partition plate, 4^m, which projects forwardly and downwardly from the front flue sheet, 4^a, and extends entirely across the boiler, said plate serving, with the deflecting plate, 4^e, and the boiler shell, to form a discharge chamber or passage way, into which the gases of combustion are discharged from the superheating tubes, 67, and through which they are compelled to pass in their traverse to the smoke box and stack. The opening between the front edge of the partition plate, 4^m, and the deflecting plate, 4^e, which affords exit to the gases from this chamber, is controlled by a plate metal damper, 72, upon the ends of which are secured journals, 72^a, which are mounted and vibratable in bearings, 72^b, secured to the sides of the smoke box. By the appropriate movements of the damper journals in their bearings, the exit opening of the gas discharge chamber may be uncovered fully, (except as to the thickness of the damper), as shown in full lines in Fig. 1, or may be entirely closed, as shown in dotted lines, the latter being the position the damper is intended to occupy when the locomotive is running with steam shut off from the cylinders.

The automatic opening and closure of the damper, when the locomotive is running with the throttle opened and closed, respectively, are effected by the following means. A damper cylinder, 73, is secured to a bracket or support, 74, fixed to one side of the smoke box, 4^a, and is fitted with a piston, 75, formed integral with or fixed to a piston rod, 75^a, which is guided in the end portion of the cylinder farther from the piston and in the bore of a partition, 73^a, adjacent to the middle portion of the cylinder. The end of the cylinder farther from the piston is closed by a screw cap, 73^b, and the end nearer the piston is closed by a screw cap, 73^c, from which a steam supply pipe, 75^b, leads to the valve chest, 12^b, of the steam cylinder on the side of the locomotive on which the apparatus is located. A rocker chamber, 73^d, which is closed at its bottom by a removable cap, 73^e, communicates at its top with, and projects downwardly from, the central portion of the cylinder, 73. An operating shaft, 76, is journaled in transverse bearings in the rocker chamber, and projects through a stuffing box, 73^f, outwardly therefrom in the direction of the smoke box. A rocker, 77,

is keyed on the operating shaft, and projects into a longitudinal slot, 75^a, formed in the piston rod, 75^a, so as to be moved to the left, and to cause the operating shaft to be
 5 rocked in its bearings by the application of pressure to the piston, 75.

An arm, 78, which is secured on and projects downwardly from the outer end of the operating shaft, 76, is coupled by a pin,
 10 78^a, to an upwardly extending link, 79, the pin, 78^a, passing through a longitudinal slot in the link. The upper end of the link, 79, is pivoted to the shorter arm of a bell crank or elbow lever, 80, fixed on the outer end of
 15 the adjacent journal, 72^a, of the damper, 72, and having a counterweight, 81, fixed on the end of its longer arm. A hand lever, 82, is pivoted to swing about a fulcrum, 82^a, in the cab of the locomotive, and is coupled, by a
 20 rod, 82^b, to the link, 79, between the connections thereof to the arm, 78, and the bell crank, 80. The hand lever, 82, traverses a segment, 82^c, at different points on which it may be held by a thumb latch, 82^d, and
 25 carries a pointer, 82^e, which traverses over a segment, 82^f, on which may be marked indications showing the open, closed, and intermediate positions of the connected damper, 72.

30 In the operation of the appliance, the counterweight, 81, drops by its gravity into the position shown in dotted lines in Fig. 2, when steam is shut off from the cylinders of the locomotive, and thereby moves the
 35 damper, 72, into, and holds it in, closed position, during the periods in which the throttle is closed. When steam is admitted to the cylinders, it flows through the pipe, 75^b, into the right hand end of the damper cylinder,
 40 73, and moves the piston thereof to the left, thereby, through the rocker, 77, and the operating shaft, 76, and its connections, turning the damper into full open position, and maintaining it in such position while
 45 the throttle remains open. The closure and the opening of the damper, therefore, are both automatically effected. If, because of obtaining a greater degree of superheat than is proper or desirable, or for any other reason,
 50 it is desired to fully or partially close the damper while steam is being supplied to the cylinders, the hand lever, 82, is moved forward to the appropriate position, as shown by the indications on the scale, 82^f,
 55 and the link, 79, is thereby swung forward upon the pin, 78^a, as a fulcrum, its movement acting, through its connections, to partially or wholly close the damper, in correspondence with the traverse of the hand
 60 lever.

Our improvement attains the substantial practical advantage of obviating the danger and annoyance caused by the escape of steam from the damper cylinder, which, in prior
 65 constructions, was such as to obscure the

view of the engineer, and was found to be a substantial objection, and one that required constant care and supervision to counteract. The pistons of the prior devices acted directly and therefore had to be packed against the full pressure of the steam. In
 70 the construction above described, the operating shaft is rotated in the packing and is never uncovered, so that there is no tendency to the deposition of scale or other foreign matter, and no necessity for frequent attention to or renewal of packing.

We claim as our invention and desire to secure by Letters Patent.

1. The combination, with a steam boiler, of an oscillatory damper controlling the flow
 80 of gases through fire tubes of said boiler, an operating shaft coupled to the damper, fluid pressure mechanism for rocking said shaft in its bearings, a counterweight acting on the damper in opposite direction to said fluid
 85 pressure mechanism, an oscillatory hand lever, and connections coupling said hand lever to the damper.

2. The combination, with a steam boiler, of an oscillatory damper controlling the
 90 flow of gases through fire tubes of said boiler, a damper cylinder having a communicating rocker chamber, an operating shaft journaled in said rocker chamber and coupled to the
 95 damper, a piston fitting in the damper cylinder and open continuously to an avenue of steam supply from the boiler, a rocker fixed on the operating shaft and engaging the rod of the damper cylinder piston, and a counterweight fixed to the damper in position to
 100 exert its gravity in opposite direction to the action of the damper cylinder piston.

3. The combination, with a steam boiler, of an oscillatory damper controlling the
 105 flow of gases through fire tubes of said boiler, a fluid pressure mechanism open continuously to an avenue of steam supply from the boiler, a pivoted link coupling said fluid pressure mechanism to the damper, a counterweight acting on the damper in opposite
 110 direction to said fluid pressure mechanism, an oscillatory hand lever, and a rod coupling said hand lever to the pivoted link.

4. The combination, with a steam boiler, of an oscillatory damper controlling the
 115 flow of gases through fire tubes of said boiler, fluid pressure mechanism for rocking said damper in its bearings, a counterweight acting on the damper in opposite direction to said fluid pressure mechanism, an oscillatory hand lever, a rod connecting said
 120 hand lever with the damper, a segment fixed concentrically with the fulcrum of the hand lever, and a pointer connected to the hand lever and traversing therewith over said
 125 segment.

5. The combination with a locomotive boiler and a cylinder operated by steam therefrom, of a damper journaled in bear-
 130

ings on the smoke box and controlling the
flow of gases through fire tubes of the boiler,
a damper cylinder supported on the smoke
box and having a communicating rocker
5 chamber, an operating shaft journaled in
said rocker chamber, a piston fitting in the
damper cylinder and open continuously to
an avenue of steam supply to the locomotive
cylinder, a rocker fixed on the operating
10 shaft and engaging the rod of the damper
cylinder piston, an arm fixed on the operat-

ing shaft, a link pivoted to said arm and to
an arm on a journal of the damper, a coun-
terweight fixed to the damper, an oscillatory
hand lever, and a rod coupling said hand 15
lever to the link.

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Witnesses:

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