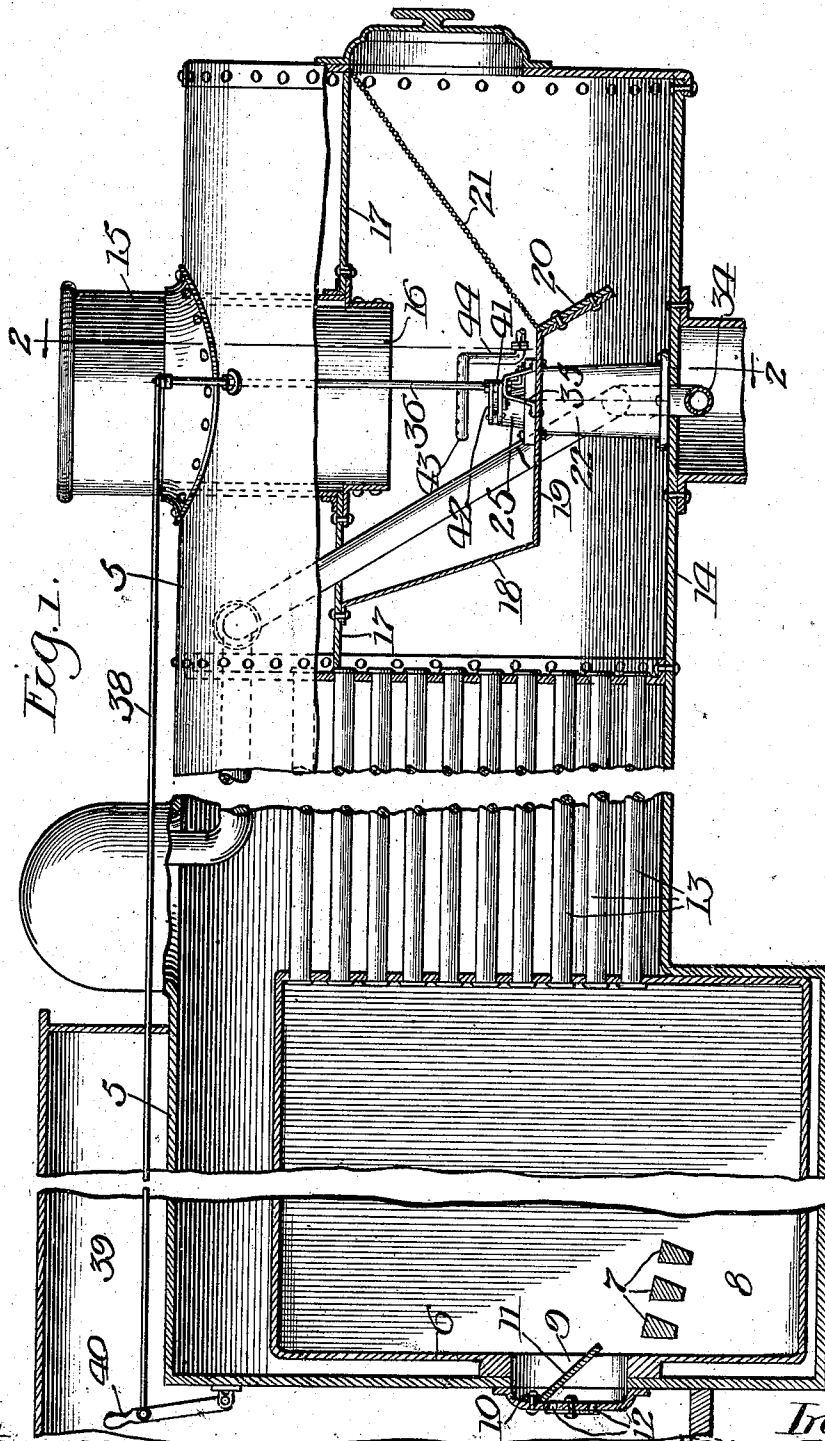


W. T. SUMMERS.
FURNACE.
APPLICATION FILED OCT. 23, 1908.

932,595.

Patented Aug. 31, 1909.
2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

Fig. 2.

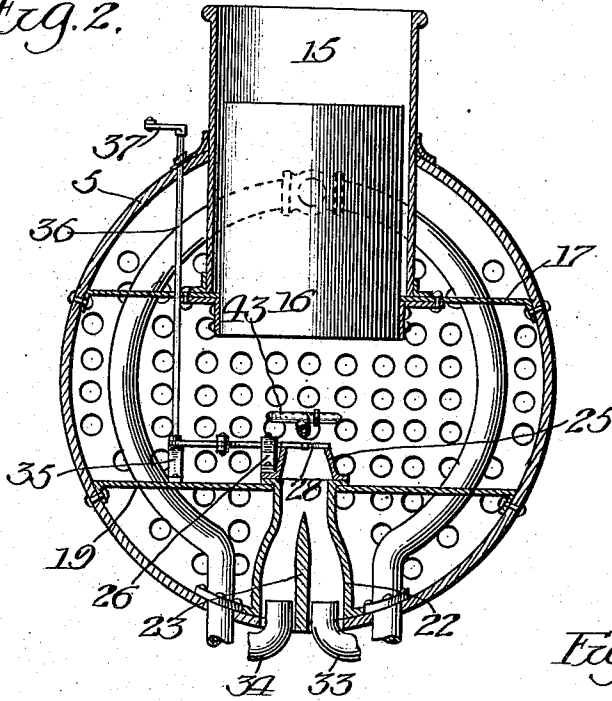


Fig. 4.

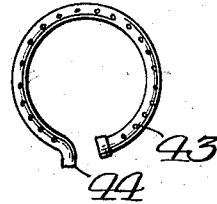
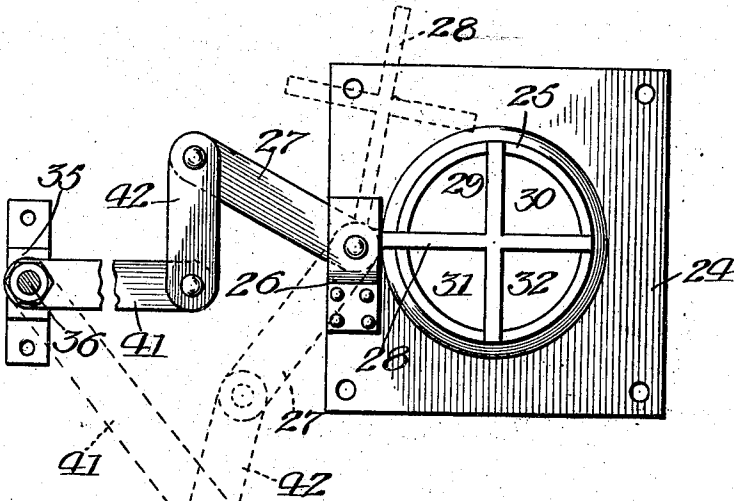


Fig. 3.



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UNITED STATES PATENT OFFICE.

WILLIAM T. SUMMERS, OF CHICAGO, ILLINOIS.

FURNACE.

932,595.

Specification of Letters Patent.

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Application filed October 23, 1908. Serial No. 459,184.

To all whom it may concern:

Be it known that I, WILLIAM T. SUMMERS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Furnaces, of which the following is a specification.

This invention relates to certain new and useful improvements in furnaces, and while it is more especially adapted for use on locomotives and while I have in the present instance shown its embodiment in a locomotive furnace and will hereinafter describe it in connection therewith, yet it is applicable to various kinds of furnaces, and for this reason I do not desire to be understood as limiting myself in its application to any specific form of furnaces or to furnaces for any particular purpose; and it consists in certain peculiarities of the construction, novel arrangement, and operation of the various parts thereof, as will be hereinafter more fully set forth and specifically claimed.

The principal object of the invention is to provide means for controlling and perfecting the combustion of fuel and fuel-gases in furnaces of various kinds so as to effect a great saving in the fuel consumed, and also to diminish or substantially prevent the formation of black smoke.

Another object of the invention is to provide means of the above-named general character which shall be simple and inexpensive in construction, strong, durable and efficient in operation, and which may be operated by the fireman or engineer at his station at the front of the furnace.

Other objects and advantages of the invention will be disclosed in the subjoined description and explanation.

In order to enable others skilled in the art to which my invention pertains, to make and use the same, I will now proceed to describe it, referring to the accompanying drawings, in which—

Figure 1 is a longitudinal vertical sectional view partly in elevation of a portion of a locomotive furnace and boiler, showing the same shortened for the convenience of illustration, and illustrating the invention applied thereto; Fig. 2 is a cross-sectional view partly in elevation taken on line 2—2 of Fig. 1 looking in the direction indicated by the arrows; Fig. 3 is a greatly enlarged plan view of the upper portion of the exhaust nozzle and nipple therefor, as well as the dis-

tributing bridge or damper, and the means for operating the latter showing by dotted lines the position to which the bridge or damper may be moved when not in use; and 60 Fig. 4 is a detached plan view of the blower.

Like numerals of reference, refer to corresponding parts throughout the different views of the drawings.

The reference numeral 5 designates the boiler casing, which in the present instance is shown as that of a locomotive and as being provided in its front portion with a fire-box 6 having a grate 7 of the ordinary or any preferred construction; and an ash-pit 8 of the ordinary kind. The rear portion of the boiler-casing 5 and fire-box 6 is provided with a door-way 9 for the passage of fuel into the latter and onto the grate 7, which door-way may be opened and closed by means of a door 10 which is provided on its inner surface with a downwardly and inwardly extending deflecting plate 11 for the purpose of causing the air admitted through the apertures 12 of the door 10 to be discharged downwardly against the fuel on the grate. Communicating at their front ends with the rear portion of the fire-box 6 are a series of fire-tubes 13 which communicate at their other ends with the smoke-box 14 of the locomotive. This box is provided with a smoke stack 15 which is extended through the top of the casing 5, and has fitted in its lower portion a petticoat-pipe 16 which, as well as the stack 15, is supported on a horizontally disposed floor 17 in the upper portion of the smoke-box, which floor extends from the front end of said box to the rear end thereof, as is clearly shown in Figs. 1 and 2 of the drawings. Connected at its upper end to the lower front portion of the floor 17 is a downwardly and forwardly extended partition 18 which is provided with a forward extension 19 located horizontally across the smoke-box. The front of the extension 19 is downwardly deflected as at 20, see Fig. 1 of the drawings. Extending transversely of the fire-box and connected at its lower end to the upper portion of the front end of the extension or floor 19 is a screen or sieve 21 which will prevent cinders passing out through the petticoat-pipe and stack. The floor or extension 19 is provided with a central opening in which is located the upper portion of an exhaust nozzle 22 which is mounted on the floor of the smoke-box, and is preferably provided with

a vertical partition 23 which extends from its lower end upwardly into the contracted portion of the nozzle, as is clearly shown in Fig. 2 of the drawings. Fitted on the upper end of the nozzle 22 and resting on the floor or extension 19 is a plate 24 which carries an upwardly tapered nipple or extension 25 which registers with the upper end of the nozzle 22, and is located directly beneath the petticoat-pipe 16 and smoke-stack. Secured to the plate 24 is a bracket 26 which extends upwardly so as to be about level with the upper end of the nipple 25, and has fulcrumed on its upper portion an arm 27 of a distributing bridge or damper 28 which is in the form of a cross, as is clearly shown in Fig. 3, and is rigidly connected to the arm 27 near its fulcrum. The bridge or damper 28 is disposed horizontally just above the nipple 25, and when in use will divide the nipple into four passage-ways 29, 30, 31 and 32 so as to cause the exhaust steam, when discharged through the exhaust-pipes 33 and 34, to pass out of the nozzle and nipple therefor in broken volumes, and first on one side thereof and then on the other and at slight angles with respect to the petticoat-pipe and smoke-stack through which the exhaust steam will be caused to pass. Mounted on the floor or extension 19 at a suitable distance to one side of the bracket 26 is another bracket 35 which has vertically journaled therein the lower end of a rod 36 which is extended through the upper portion of the casing 5, and has on its upper end a crank 37 to which is secured one end of a rod 38 which is extended forwardly of the casing 5 and into the cab 39 of the locomotive. The front end of the rod 38 is pivotally connected to a lever 40 which is fulcrumed on a suitable support in the cab to be conveniently reached by the operator.

Rigidly secured to the lower portion of the rod 36 is one end of a link 41 the other end of which is pivotally secured to another link 42 which is pivotally connected to the arm 27 of the distributing bridge or damper. At a suitable distance above the nipple 25 of the exhaust nozzle is arranged a blower 43 which is substantially circular in shape, and has in its upper surface a series of perforations through which steam may be caused to pass when desired. This blower may be supported with its circular portion in a horizontal plane beneath the petticoat-pipe in any suitable manner, and has communication through a pipe 44 with a supply of steam. The upper portion of the pipe 44 is bent substantially into a circle and, as before stated, a series of perforations is made in the upper surface of this circular blower, so that the steam at its highest pressure will pass from the first perforation and the pressure of the jet emerging from the other perforations is

successively less, consequently, the mass of steam which passes from the blower forms a rotating or gyrating current, which I have found to be most effective in promoting the combustion of the fuel so as to effect a great saving in the consumption thereof.

It will be obvious from the above description that the device is susceptible of considerable modification without material departure from the principles and spirit of the invention, and for this reason I do not desire to be understood as limiting myself to the precise form and arrangement of the several parts of the apparatus herein set forth in carrying out my invention in practice, for example, in some instances I may omit the blower or the deflecting plate 11, or both of them, and I may construct the bridge or damper so as to produce any desired number of passage-ways.

In order to operate the distributing bridge or damper 28 it is only necessary to move the lever 40 in the proper direction which, through its connection with the crank 37 on the rod 36, will cause the latter to turn, and by means of the links 41 and 42 and arm 27 of the bridge to move the latter back and forth above the nipple of the exhaust nozzle, as will be readily understood by reference to Fig. 3 of the drawings.

By employing the movable skeleton-frame-bridge or damper over the exhaust nozzle, it is apparent that the draft will not only be greatly increased thereby, but that the passage way from the nozzle will be divided into a plurality of compartments, and thus greatly facilitate the combustion of the coal or fuel, especially when it is of an inferior quality or when the engine has been leaking.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters-Patent, is—

1. The combination with a furnace having a smoke-box or compartment, of a stack leading therefrom, an exhaust-nozzle located below the lower end of the stack and contracted at its upper portion, an upwardly contracted nipple mounted on the upper portion of the exhaust-nozzle, a partition located in the nozzle and extended from its lower portion upwardly, a skeleton-frame-bridge pivotally mounted near the upper end of the nipple and adapted to move in a horizontal plane over the top thereof and consisting of a series of radially disposed members, means to operate said bridge, and a blower arranged between the lower end of the stack and the top of the nipple and being provided with a substantially circular horizontal portion closed at one end and provided with a series of steam ports in its upper surface.

2. The combination with a furnace having a smoke-box or compartment, of a stack

leading therefrom, an exhaust nozzle located below the lower end of the stack and contracted at its upper portion, an upwardly contracted nipple mounted on the upper portion of the exhaust nozzle, a skeleton-frame-bridge pivotally mounted near the upper end of the nipple and adapted to move in a horizontal plane over the top thereof and consisting of a series of radially disposed members, means to operate said bridge, and a blower arranged between the lower end of the stack and the top of the nipple and being provided with a substantially circular horizontal portion closed at one end and provided with a series of steam ports at its upper surface.

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