(No Model.)

2 Sheets—Sheet 1.

S. G. LEYSON.

COMBINATION WATER JACKET FOR FURNACE DOORS AND MOUTHS.

No. 530,539. Patented Dec. 11, 1894.

FIG-1-

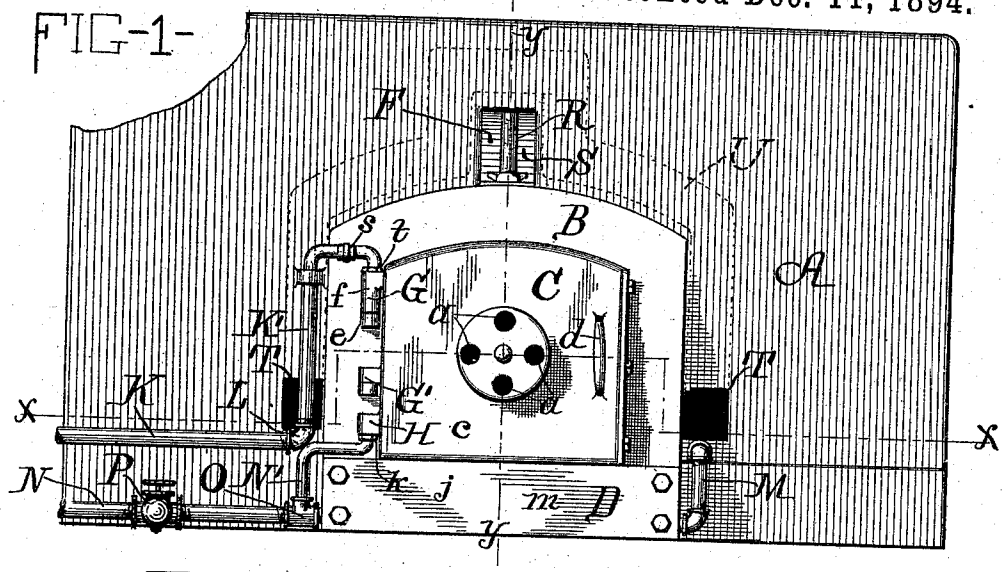


FIG-2-

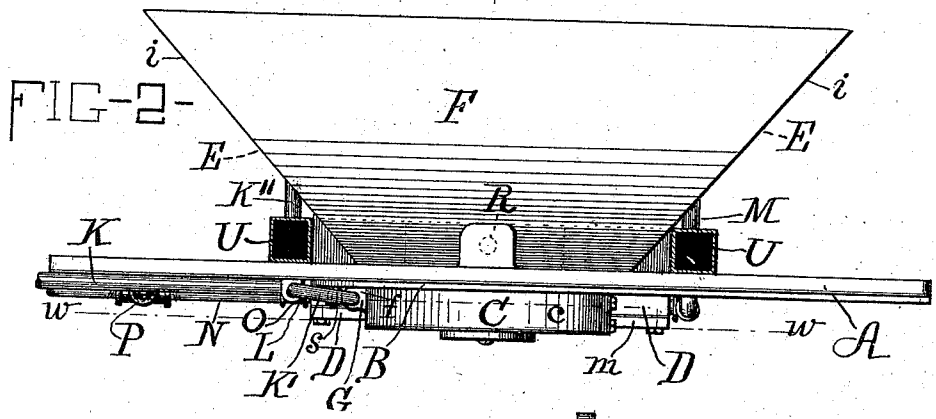
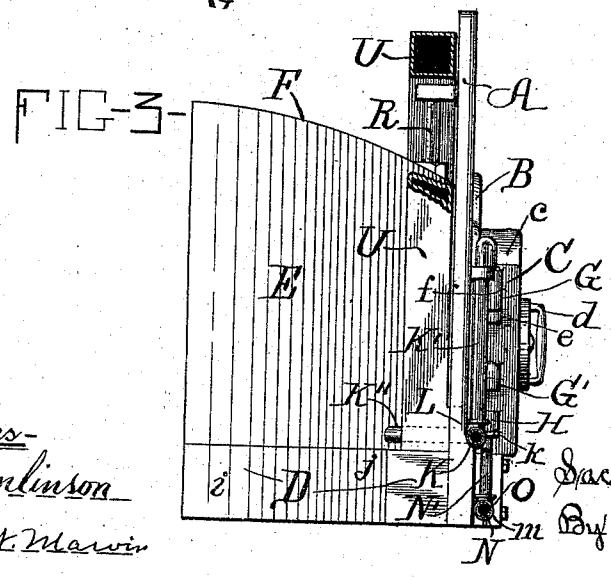


FIG-3-



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.)

2 Sheets—Sheet 2.

S. G. LEYSON.

COMBINATION WATER JACKET FOR FURNACE DOORS AND MOUTHS.

No. 530,539. Patented Dec. 11, 1894.

FIG-4-

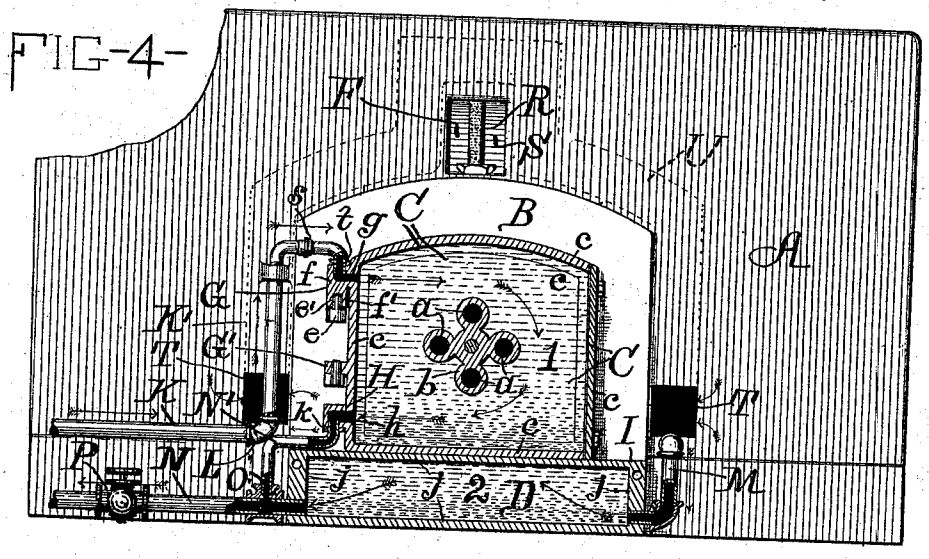


FIG-5-

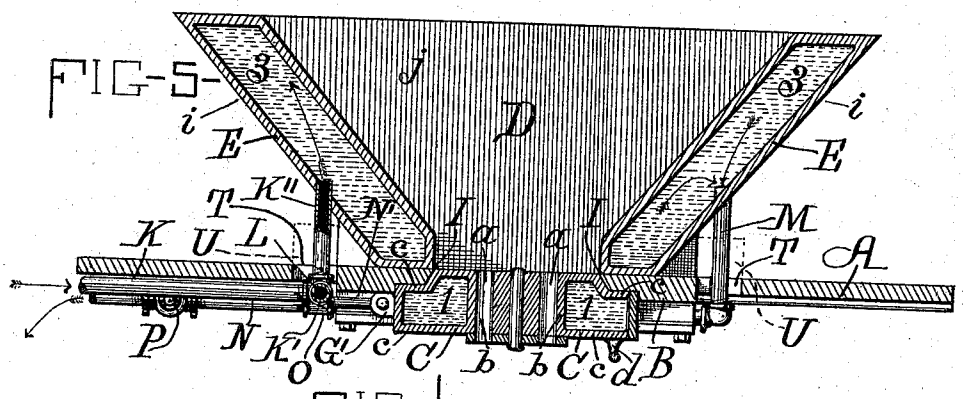


FIG-6-

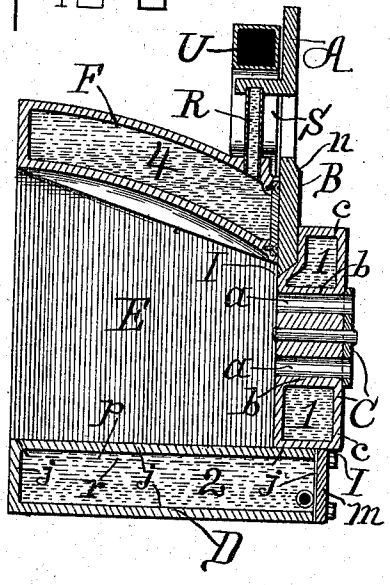


FIG-7-

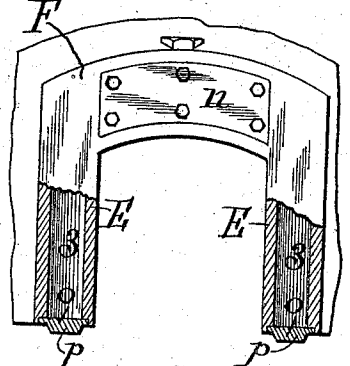
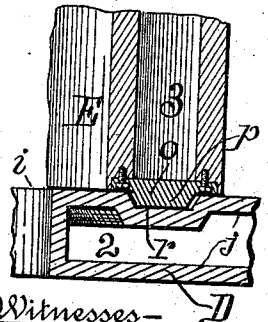


FIG-8-



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UNITED STATES PATENT OFFICE.

SACKVILLE G. LEYSON, OF SYRACUSE, NEW YORK.

COMBINATION WATER-JACKET FOR FURNACE DOORS AND MOUTHS.

SPECIFICATION forming part of Letters Patent No. 530,539, dated December 11, 1894.

Application filed March 8, 1893. Renewed April 21, 1894. Serial No. 508,532. (No model.)

To all whom it may concern:

Be it known that I, SACKVILLE G. LEYSON, a subject of Queen Victoria, residing at Syracuse, in the county of Onondaga and State of New York, have invented certain new and useful Improvements in a Combination Water-Jacket for Furnace Doors and Mouths; and I do hereby 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, in which—

Figure 1 is a front elevation of my device; Fig. 2, a top plan, with portion of cold-air duct or flue in cross-section; Fig. 3, a side elevation with portion of aforesaid duct in cross-section, and partially broken away; Fig. 4, a front elevation representing the door portion in longitudinal vertical section, and the dead plate correspondingly sectional, and portions of the pipes in section also, the sections of the door and dead-plate being taken on dotted line *w*, *w*, Fig. 2 of the drawings; Fig. 5, a horizontal transverse section of my construction taken on dotted line *x*, *x*, Fig. 1; Fig. 6, a central vertical section taken at dotted line *y*, *y*, Fig. 1; Fig. 7, a detail, face view, of the integral jambs and arch formation appertaining to my device, with portions shown broken away and sectional for clearer illustration; and Fig. 8 is a sectional detail of a portion of one of the jambs as seated in position on the dead-plate.

Like letters and figures of reference indicate similar parts throughout the various views of the drawings.

My invention relates to furnaces or fire-boxes, and has specific reference to the forward or mouth portions thereof, customarily comprising front-plate, door-casing, door, dead-plate or plates, jambs, arch, and other usual essentials thereof.

The purpose of my invention is, to so construct and combiningly arrange the parts afore referred to as insure the maintenance thereto of a minimum, non-excessive, non-injurious temperature or heat, whereby no warping, cracking or burning of the aforesaid is possible, and as a natural consequence, no renewal of the parts (under ordinary average conditions) required; non destructibility of the various parts being practically insured, by reason of their novel construction and co-relation and their communication one with the other by means of pipes insuring ingress and proper circulation of cold water in the parts hereinbefore mentioned.

Furthermore the purpose or object of my invention is the construction of a combination device of the characteristics set forth, so co-arranged and formed as will necessarily prevent escape of gas, or steam, or blast outwardly upon the opening of the furnace-door or doors. Additionally the production of a device that is ready of construction and erection in operative position, virtually inexpensive of formation and maintenance in working order, taking into consideration the great outlay necessitated in the construction and reconstructions and renewals of salient parts in the commonly constructed forms, wherein door-hinges, dead-plates, jambs and arches speedily become useless from effects of intense heat; and finally in such novel and improved formation as to permit of the ready detaching apart of certain portions to permit of access to the interiors for the removal of incrustation or scale that may form therein.

My invention consists in the novel features of construction, combination, and co-action of parts, operation, and adaptability hereinafter described, and enumerated in the claims hereunto annexed.

The construction is substantially as follows:

A denotes the vertical front-plate or front casting of the furnace or fire-box, which plate, as well as all the portions (except a water-gage) entering into the embodyment of my invention, is metallic, all being formed of cast, wrought or other suitable metal while B is the door casing; C, the furnace door pivotally disposed within the door-way created by said casing, and D indicates the horizontal dead-plate located beneath the door-way of the furnace and projecting outward slightly beyond the forward face of the front-plate A, and extending rearwardly therefrom some distance and having (back of the front plate) bordering its sides, jambs E, E, standing vertically therefrom that terminate in an inte-

gral arch portion F spanning the space, existent between the said jambs and the lower disposed dead-plate.

The front plate A (practically solid throughout) of which the door casing B is an integral or rigidly connected part, is of satisfactory thickness, and in length and height of any desired suitable dimensions, and rests at its bottom edge on any satisfactory surface or foundation.

The furnace door C pivotally hung in the doorway centrally formed in the front plate A is hollow, thus creating interiorly a water chamber or jacketed portion 1, that occupies all the internal portion of the door except centrally where the usual draft-openings *a*, perforate the door, whereat a circuitous thickness of metal surrounds the aggregated draft-openings creating a dividing wall *b* between the same and the circumferentially surrounding water-chamber 1, which chamber is bounded front, back and edgewise by the walls *c* creating the shell of the door.

d indicates the usual door-handle.

G, G′, are the door-hinges or pivotal bearings located at that vertical edge of the door C removed from the handle, the hinge G comprising a lug or knuckle *e*, standing out from the door-casing and having a pintle *e′* entering the cavity or pintle-seat *f″* in the knuckle or lug *f* integral with the door, whereby the upper part of the door is duly supported; and *g* denotes a round opening or channel of suitable shape lengthwise, entering the outer face of the knuckle *f* continuing through the same on a plane above the pintle-cavity and entering into the water-chamber 1 of the furnace door. The hinge G′ located beneath the aforementioned one, is of the customary form of construction.

Located slightly below the aforementioned hinge (adjacent bottom of the door) is a lug H integral with the door-casting or rigid therewith, and provided with a round opening or channel *h*, starting from its outside and communicating direct with the water compartment 1 of the door C.

The dead-plate D projecting forwardly a short distance out from the front-plate A, and lying directly underneath the door C, by its passing through a large rectangular opening I left in the front plate, whereby contiguity of the forward portion of the dead-plate to the bottom portion of the door is attained, extends a satisfactory distance rearward from the door and front-plate, the side boundary edges gradually diverging from where it meets the front-plate to its back termination, as indicated at *i*, *i*. Said dead plate is hollow throughout, its shell formation *j* creating interiorly a cold water chamber or apartment 2, as clearly illustrated.

Contiguous the divergent sides of the dead-plate aforesaid and suitably seated upon its upper face bordering said sides, are the vertically standing jambs E, E, priorly briefly referred to, which starting at either side of the doorway of the door C and abutting the inner face of the dead-plate A, rise to a height slightly above the top of the door or doorway and conjointly terminating at their top portions in an arch F integral or practically integral therewith, which jambs and arch, substantially a single casting, are hollow throughout, the shell construction thereof creating cold-water chambers 3, 3, in the jambs and a similar water chamber 4 in the connecting arch portion F, the chambers so fully communicating as to create to all intent and purposes a single water compartment.

K is a cold-water feed-pipe leading from any suitable pressure source of supply, having a three-way T or coupling L, contiguous the front face of the dead plate at a side of the door casing, from which T extends vertically or otherwise a branch feed-pipe K′ (provided near its extremity with a suitable union *s*) connected with the knuckle portion *f* of the door-hinge G, so as to communicate with the opening *g* therein, said pipe at its point of connection being provided with a suitable packing-box *t* whereby leakage of water passing into the door C at its upper hinged part is rendered impossible. Rearwardly from the T-connection L there extends through an aperture in the front-plate a branch cold-water feed-pipe K″ of somewhat larger diameter than the other branch pipe, which horizontal pipe continues rearwardly to the outside of an adjacent hollow jamb E and by suitable connection thereat communicating with the interior water-chamber thereof. From the opposite standing companion jamb E (communicating with its internal chamber) extends an angular pipe M leading to and suitably connected with the water chamber of the hollow dead plate, exteriorly the front plate and at that front portion of the dead-plate located nearest thereto; said pipe obviously serving two functions, *i. e.*, a discharge or outlet pipe for the water circulating in the jambs and arch, and as a supply pipe for the feeding of the water from the aforementioned into the underlying dead-plate.

N is a water discharge pipe communicating with the water-chamber of the dead plate at its front portion at that side opposite to where the water enters it, which pipe N leads from the aforesaid to any desired or suitable place.

N′ denotes a branch discharge pipe leading downward from its connection with the opening *h* in the lug H of the door, (connected thereto by a suitable packing-box *k*,) and communicating with the main water discharge pipe N by a satisfactory coupling O.

The main discharge-pipe (located contiguous alongside the forward face of the front plate, adjacent the main water feed-pipe) is outwardly from the point of junction therewith of its branch pipe N′ provided with a valve P, for regulating the discharge flow of

water from the various chambered portions of my jacketed device.

R is a glass water-gage, vertically erected centrally adjacent the front plate upon the top of the arch portion F spanningly connecting the jambs E, E, which glass communicates with the water chamber of the arch and rises a slight distance above it, and enabling one to readily determine by the height of water there may be in the gage the level of the water in the jacketed portions of the furnace, and S is an observation port formed centrally the front-plate A directly over the door-casing, and directly facing the water gage, which port is of sufficient size to admit of the entire glass being readily observed by a person standing forward of the front-plate of the furnace.

As is observable, my construction affords a sufficient area of air space, about the water gage to insure its not becoming unduly heated and possibly cracking. The top of the water gage is securely closed and held in position by a suitable bracket or other ordinary means.

T T are ports or openings formed in the front plate A at its lower portion at either side of the door casing B, and respectively communicating with a cold air duct or flue U erected against or nearly against the rear face of the front plate, and extending at either side portion vertically upward a distance at either side of the forward terminations of the jambs, continues over the front portion of the arch F, and thence upward borders the gage observation port and joins directly over said opening.

The purpose of the aforesaid cold air duct is to permit of a constant circulation of cold air from the outside along the inner face of the front plate and retaining same normally cool.

m is a cleaning plate closing an opening in the front of the dead-plate, which plate having suitable interposed packing is tightly secured in position by machine-screws or other desired means.

n denotes a cleaning plate thoroughly closing a front opening in the forward vertical wall of the arch portion F of the jambs E, E, said plate firmly secured in place (packing being interposed) by countersunk machine screws or other effective fastenings.

o, *o*, are cleaning plates tightly closing openings at the bottom of the respective jambs E, E, which plates are secured in position by counter-sunk machine screws. Longitudinally each plate aforesaid is centrally protuberant as shown at *p* and thus adapted to loosely fit in the depressed seats *r* formed therefor in the top of the dead-plate contiguous the side boundary edges thereof.

My object in having the seats for the protuberant portions of the cleaning plates *o*, *o*, slightly wider than the same is to allow for any transverse expansion that may occur; while the depressed seat ways with the bottoms of the jambs lying therein necessarily prevent any lateral displacement of the jambs and integral arch portion from proper position.

The object of the openings aforementioned and cleaning plates closing the same is, to permit of the ready cleaning of the interior chambers from scale, &c., whenever deemed advisable, by simply removing the plates. As the dead-plates, front-plate and combined jambs and arch are detachable and removable one from the other without material difficulty, when the furnace or fire box is cold, it is readily apparent how easily the cleaning plates may be taken off and any required scraping of the accessible parts of the water-chambers performed.

Obviously all the cleaning plates afore referred to are by suitable means so tightly secured over the otherwise free openings as to prevent any injurious leakage of water thereat.

The operation of my device is substantially as follows: Cold water, from a suitable pressure source of supply enters and passes along the main feed pipe, and by one branch of the feed-pipe enters the water chamber of the door at its upper inlet-hinge G, and filling the chamber circulates therein and discharges therefrom at the lower perforated lug portion H entering the branch outlet pipe communicating with the main outlet or discharge pipe, whence it is conveyed away. While by the branch feed or supply pipe connected with and leading right angularly rearward from the main feed pipe, concurrently the cold water flowing in that branch pipe flows and enters into the water-chamber of the connected hollow jamb E, filling the same, and the communicating water chambers of the arch and companion jamb F, and E respectively, circulate about the same and discharge from that hollow jamb opposite to the one where it entered, thence feeding through its discharge therefrom into the water-chamber of the underlying dead-plate filling same and circulating therein, and from whence the water (now evidently some warmer) discharges into the main outlet pipe at opposite side of the dead plate, and is by said duct carried away to such location as desired.

It is important that the several chambers, forming the jacketed portions, should be maintained entirely full of water, and in case the discharge of water should prove too excessive for proper maintenance of the complete occupancy of the chambers by the circulating cold water, the valve on the main outlet pipe may be so regulated whenever desirable so as to retard the discharge of the water to any satisfactory degree, or occasionally if need be, entirely shut off the discharge for brief periods of time.

Although I have herein shown by way of exemplification a certain arrangement of the feed and outlet pipes for concurrently filling the water-chambers and causing circulation

of cold water therein thus forming water-jackets of the hollowed portions afore fully described, yet as is clearly apparent, the pipes may equally as well be so arranged as to feed direct into the bottom of my device and discharge at the top portion, such variation of detail arrangement being merely a reversal of disposition of the supply and outlet pipes necessary for the attainment of the objects sought by my invention.

As is obvious, my construction, arrangement of parts, and co-operativeness thereof create a practically automatically working device; all that is requisite therefor being a supply of water forced by pressure or gravity from a satisfactory source. The cold water entering, filling and circulating in and through the water-chambers necessarily maintains the metallic portions at a minimum non-injurious temperature incidental to the presentation of the parts to the effects of intense heat from the furnace or fire box, and by the comparative coolness insured by the water jacketing thereof, entirely obviates all possibility of the warping, cracking or burning of the parts, and clearly under average conditions, no renewal of the heat-subjected portions necessitated, thus actually insuring a practically non-destructible device, and proving of immeasurable value from the fact that no expense for new door linings, dead-plates, jambs, arch, rebricking, &c., is entailed by the utilization of my invention. Moreover my construction obviates possibility of escape of gas, steam of blast (should blast be used) through the furnace door or doorway outwardly injuriously affecting the fireman for the reason that no cracks are formed for said escape, the jacketed portions being so completely resistant to heat that no appreciable expansion or contraction thereof or contiguous portions can result, and thus no cracks formed.

The immeasurable utility and advantage of my invention as applied to furnaces and fire-boxes are readily discernible and cannot but be thoroughly appreciated by all those persons conversant with the drawbacks and expenditures for repairs and renewals entailed by furnaces, fire boxes, &c., as ordinarily constructed.

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

1. The combination, with the boiler front-plate A, of a hollow dead-plate secured to the said front-plate, the rearwardly-diverging hollow jambs E resting on the said dead-plate and connected by the hollow arched portion F, water pipes connected to one jamb and to one end of the dead-plate, and a pipe connecting the other jamb with the other end of the dead-plate, substantially as set forth.

2. The combination, with the boiler front-plate A, and the door-frame; of the hollow door hinged to the said frame, the hollow dead-plate secured to the said front-plate, the rearwardly-diverging hollow jambs E resting on the dead-plate and connected by the hollow arched portion F, the water pipes K, M and N whereby water is circulated through the said jambs, arch and dead-plate, and branch pipes connecting the said pipes K and N with the said door, substantially as set forth.

3. The combination, with the boiler front-plate A having air holes T therein, of a hollow dead-plate, the hollow jambs and arch supported on the dead-plate around the door opening, and a hollow arch-shaped casting U inclosing the aforesaid jambs and arch and communicating with the said air holes, substantially as and for the purpose set forth.

In testimony whereof I affix my signature, in presence of two witnesses, this 3d day of January, 1893.

SACKVILLE G. LEYSON. [L. S.]

Witnesses:

WM. C. RAYMOND,

A. CLINTON SIDEMAN.