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T. R. BROWNE.

MECHANISM FOR THROWING SPRAYS OF OIL INTO FURNACES.

(Application filed Apr. 8, 1897.)

(No Model.)

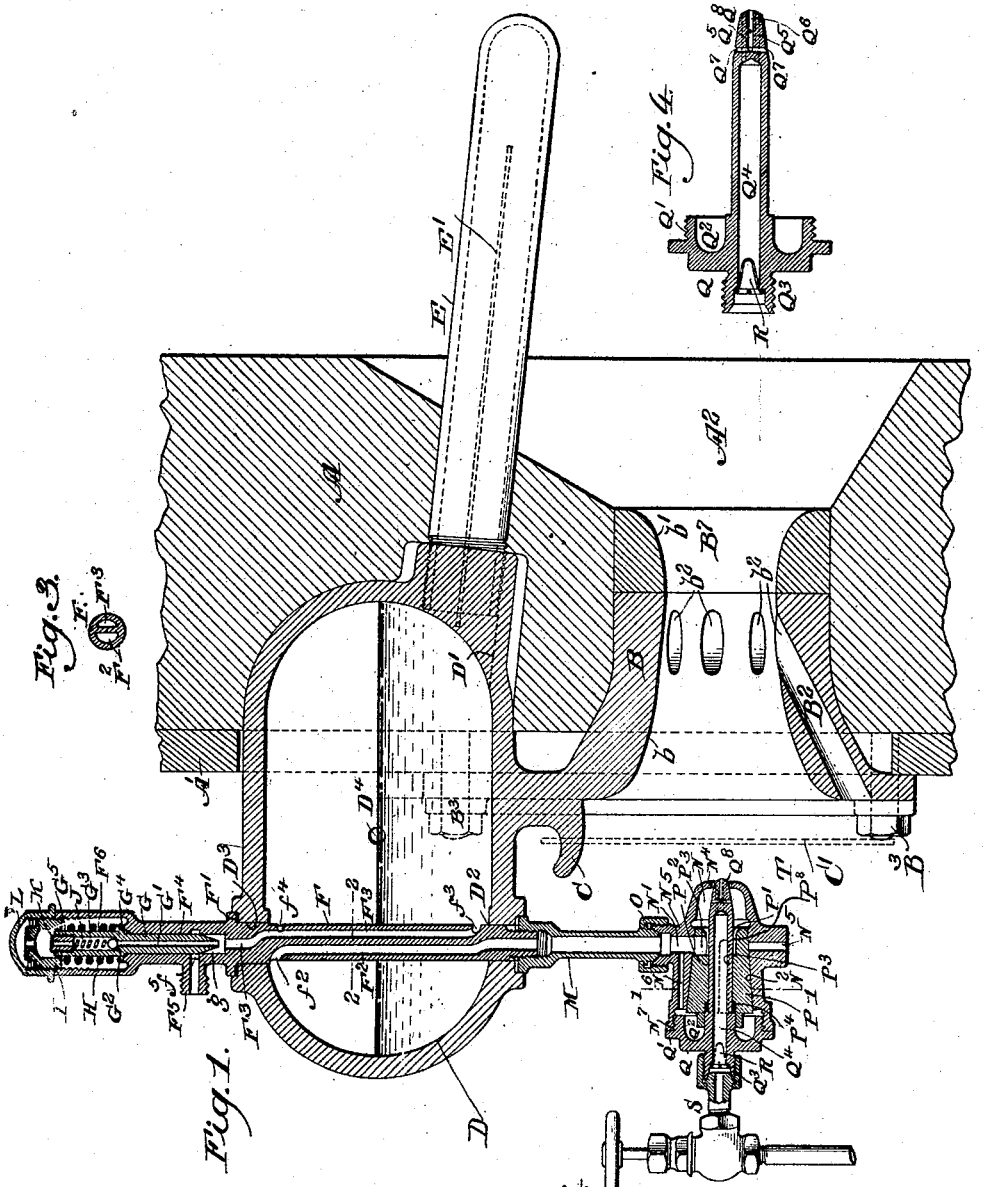

Fig. 1.

Fig. 3.

Fig. 4.

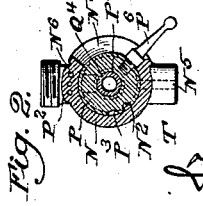

Fig. 2.

Witnesses.

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MECHANISM FOR THROWING SPRAYS OF OIL INTO FURNACES.

SPECIFICATION forming part of Letters Patent No. 646,352, dated March 27, 1900.

Application filed April 8, 1897. Serial No. 631,248. (No model.)

To all whom it may concern:

Be it known that I, THOMAS REATH BROWNE, a citizen of the United States of America, residing in Altoona, in the county of Blair, in the State of Pennsylvania, have invented a certain new and useful Improvement in Mechanism for Throwing Sprays of Oil into Furnaces, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My invention relates to the construction of mechanism adapted to throw a spray of oil, preferably mixed with steam, into furnaces, and has for its object particularly to provide the oil-spraying device with a small boiler from which it can receive an impelling-jet of steam, a part of which extends into the furnace immediately above the oil-jet, so as to be heated thereby. I have also made the construction of the receiving-nozzle of the oil-jet and of the spraying device itself so as to materially increase the efficiency, while at the same time simplifying the construction of the various parts of the apparatus.

The nature of my improvements will be best understood as described in connection with the drawings in which they are illustrated, and in which—

Figure 1 is a vertical section taken through the boiler, the spraying device, the receiving-nozzle, and a wall of the furnace. Fig. 2 is a cross-sectional view taken on the section-line 1 1 of Fig. 1; Fig. 3, a cross-sectional view taken on the section-line 2 2 of Fig. 1, and Fig. 4 an enlarged view of one member of the oil-spraying mechanism.

A is the wall of the furnace, A′ indicating an iron front plate upon the outside of the wall, and A^2 a perforation formed in the wall for the admission of the oil-jet.

B is the receiving-nozzle of the jet, preferably made of cast-iron and provided with a separable terminal portion b', which can be renewed from time to time as it burns out. The perforation of the receiving-nozzle B is formed with an outer converging portion b and an inner diverging portion b', the junction of the two portions forming the most contracted part of the nozzle perforation or passage. The portion b' should be shaped to correspond substantially with the natural form of the jet. Air-passages B^2 are preferably formed in the walls of the nozzle B, through which air may be drawn in by the jet. Such passages enter around the margin of the portion b and open into the contracted portion of the nozzle, as indicated by the apertures b^2 in Fig. 1, near the point where the converging and diverging surfaces b and b' meet each other, this being the point where the vacuum created by the jet thrown into the nozzle is greatest and the consequent suction through the small air-passages B^2, resulting in an energetic impingement of the air drawn through them into the oil-jet, so that said air mixes freely with the oil-spray in the diverging portion of the nozzle. The means for furnishing steam to the oil-spraying fixture consists partly of a steam-box D, sustained outside the heating-chamber of the furnace, and partly of steaming-tubes E, projected from the inner end of such steam-box into the furnace, where they are exposed to the heat generated by the burner. The steam-box is preferably made of a casting integral with the receiving-nozzle B, and B^3 indicate bolts holding the nozzle and the steam-box upon the front plate A′ of the furnace.

The steaming-tubes E project through the walls of the furnace immediately above the receiving-nozzle B, where they are exposed to the heat of the burning gases. Preferably these tubes are provided with partitions E′, so as to facilitate the circulation of water and the delivery of steam into the steam-box. As shown, the steam-box is also provided with an opening in its bottom at D^2 and an opening in its top at D^3, immediately above the opening D^2, while a valve-opening is made in the steam-box at D^4, approximately at the intended water-line. This last opening will be closed by a stop-cock and is intended for use particularly in starting the apparatus and as a means for drawing off any surplus of water above the water-line.

F in the design shown is a double conduit having in it a passage F^2, opening at the top of the boiler and extending down, as shown; also, a passage F^3, opening at f^3, near the bottom of the boiler, and at f^4, near the top of the boiler and extending up through the conduit F, as shown. This conduit F has a shoulder F′, which rests upon the top of the opening

D^3, while its lower end passes through the opening D^2 and is held in place by the conduit M, which screws upon the lower end of the conduit F and forms a continuation of its passage F^2. The passage F^3 merges into a cylindrical passage F^4 at the top, into which, at f^5, opens a feed-water passage F^5, while a regulating-valve G fits tightly in the cylindrical passage F^4 and is pressed down by the action of a spring H, acting against a shoulder G^4 and against a nut I, screwing into the enlarged upper end F^6 of the conduit F. The lower end of the regulating spindle or valve G is reduced in diameter, as indicated at g, so that when the spindle rises under the pressure of steam entering the passage F^3 at f^4 water will flow in at f^5 and passing down through the passage F^3 enter the boiler at f^3. As shown, the spindle G has a longitudinal passage G′ formed in it closed at top by a valve G^2, which is normally pressed to its seat by a spring J, acting against a perforated nut K, screwing into the enlarged upper end G^3 of the spindle G. The nut I is also perforated, as shown, as is also the binding and covering nut L, and in case the steam-pressure in the boiler exceeds the determined amount regulated by the tension of the spring J the valve G^2 will open, serving as a safety-valve to permit the escape of steam from the steam-box. In the present construction the pipe F^5 requires a supply or head of water in excess of the normal steam-pressure in the boiler; but it is obvious that the boiler may be supplied with water by any convenient means. The steam from the steam-box D passes off through the channel F^2 and into the conduit M, upon the end of which is secured, by the clamping-nut O, the oil-spraying fixture, (indicated at T.) In the design shown this oil-spraying device is of a novel and efficient construction, comprising a casing N, having a receiving-chamber N′ for the impelling fluid, a conical bore N^2 opening at the rear, a block fitted to the casing and the casing having a chamber N^3 at its front end with an orifice N^4, through which the impelling-jet issues. The casing N is also provided with an exhaust-passage N^5 and with one or more channels N^6, communicating with the receiving-chamber N′ and running back through the casing to the rear end thereof, as shown, and at the extreme rear end of the casing N it is threaded, as indicated at N^7.

P is the plug, fitting in the conical bearing of the casing N and formed with a central longitudinal perforation P^5 to receive the oil-conduit, hereinafter to be described. Near the front end the plug P is formed with a recess P^3 and is provided with a passage P^2, leading into this recessed portion and adapted to communicate with the receiving-chamber N′ of the casing N. Near the rear end of the plug it is chambered, as indicated at P^4, to receive packing, and it is in my preferred form of construction provided with a peripheral longitudinal passage P^3, extending from a point where it can be brought to registry with the exhaust-port N^5 back to the rear of the plug. A handle P^6 extends out from the side of the plug P and through a slot N^8 in the casing N. The casing is furnished with an end piece Q, which is threaded, as indicated at Q′, so as to screw upon the casing N, and is formed so as to provide the chamber Q^2 in the rear of the plug P, and into which open the channels N^6 of the groove P^3. Extending from the center of the end piece Q is the conduit or oil-delivery pipe Q^4, which extends through the perforation P^5 of the plug P and through the chamber N^3 until it registers with the orifice N^4. The extreme end of the conduit Q^4 is, as shown, made solid, excepting for oil and steam passages Q^5 and Q^6, leading through its end Q^8. The steam-channel Q^6 leads through the center of the end Q^8 and receives steam from the chamber N through a transverse passage Q^7. An annular channel is formed between the walls of the orifice N^4 and the end Q^8 of the oil-conduit, and the steam issues therefrom and also through the central channel Q^6. The rear end piece Q is secured, as indicated, to an oil-pipe S, R indicating a strainer which may be conveniently used to prevent the entrance of dirt into the pipe Q^4.

It will be noticed that by the construction described the steam will pass freely through the passages N^6 into the chamber Q^2 and act to press the plug P firmly to its seat. As the pressure against the end of the plug acts against a smaller surface, the steam-supply is cut off and admitted to the spraying device at will by turning the plug P, which may be conveniently done by means of the handle P^6; but, irrespective of the position of the plug, there is, it will be observed, always steam-pressure in the chamber Q^2. By providing the longitudinal peripheral groove P^3, I can by moving the cock to one position throw the chamber Q^2 into direct communication with the exhaust-passage N^5, which enables me to observe the steam-pressure existing in the boiler, this indication being of course cut off when the plug is turned to admit steam directly to the spraying-fixture.

The arrangement of the oil-spraying fixture in front of and at some distance away from the receiving-nozzle, the specific construction of the end Q^8 of the oil-pipe, and the general construction by which the oil-jet is made to converge after leaving the nozzle and then diverge in passing into the receiving-nozzle form the subject-matter of my former application, filed May 5, 1896, Serial No. 590,371, and are therefore not claimed in the present application.

It will of course be understood that my device as illustrated can be varied in construction within considerable limits without departure from the spirit of my invention, and I do not, therefore, wish to be considered as

limiting myself to the specific details of construction except where they are specifically referred to in the claims.

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

1. An oil-spraying device comprising the receiving-nozzle B and the steam-box D attached rigidly together and having the steaming-tubes E extended from the steam-box in front of and above the nozzle, and an oil-spraying fixture supported on the steam-box in line with the nozzle, and in communication with the upper part of the steam-box, substantially as herein set forth.

2. The combination, with a furnace having front plate with opening formed therein for the injection of oil-spray, of the spray-receiving nozzle B inserted in such opening, the steam-box D formed integral with the nozzle B and supported outside of the furnace, an extension of the steam-box (as the steaming-tubes E) lying in front of and above the nozzle within the furnace, and an oil-spraying fixture connected with the bottom of the steam-box by pipe M and communicating with the upper part of the steam-box by passage within the same, the whole arranged and operated as herein set forth.

3. The combination, with a furnace having front plate with opening formed therein for the injection of oil-spray, of the spray-receiving nozzle B inserted in such opening, the steam-box D formed integral with the nozzle B and supported outside of the furnace, an extension of the steam-box (as the steaming-tubes E) lying in front of and above the nozzle within the furnace, an oil-spraying fixture connected with the bottom of the steam-box by pipe M, and the double conduit F having the passage F^2 connecting the pipe M with the upper part of the steam-box, and the passage F^3 connecting the lower part of the steam-box with the feed-water passage F^5, the whole arranged and operated substantially as herein set forth.

4. The combination, with a furnace having front plate with opening formed therein for the injection of oil-spray, of the spray-receiving nozzle B inserted in such opening, and having the converging portion b upon its outer end and the diverging portion b' upon its inner end with the converging air-passages B^2 entering around the margin of the portion b, and opening into the contracted portion of the nozzle, such nozzle being combined with the steam-box D and tubes E extended into the furnace, and with the spraying-fixture supported upon the steam-box in line with the nozzle, the whole arranged and operated substantially as herein set forth.

5. An oil-spraying nozzle having an external casing provided with a delivery-opening N^4 and lateral passages N′ and N^5 for the admission and exhaust of steam, an oil-conduit in the center of the casing forming an annular steam-passage within the delivery-opening N^4 and having within the same the oil-passages Q^5 and the steam-channels Q^7 and Q^6, and a plug rotatable within the casing to supply steam around the oil-conduit, or to discharge it from the exhaust-opening N^5, as and for the purpose set forth.

6. An oil-spraying nozzle having an outer casing N provided with a delivery-opening N^4 conical open-ended seat N^2, receiving-chamber N′ and passage or passages N^6 leading from chamber N′ to the chamber Q^2 in the rear of the casing in combination with the conical plug P having passage P^2 adapted to register with chamber N′ and lead the impelling fluid into chamber N^3 formed in front of casing N, said plug P having also a central longitudinal perforation P^5, and the head Q adapted to be secured to the end of casing N and to form a chamber Q^2 in the rear of plug P, said head having attached to it the oil-conduit Q^4 adapted to extend through the perforation P^5 of the plug and into the orifice N^4 of the casing.

7. An oil-spraying nozzle having an outer casing N provided with a delivery-opening N^4 conical open-ended seat N^2, receiving-chamber N′, slot N^8, and passage or passages N^6 leading from chamber N′ to the chamber Q^2 in the rear of the casing in combination with the conical plug P having passage P^2 adapted to register with chamber N′ and lead the impelling fluid into chamber N^3 formed in the front of casing N said plug P having also a central longitudinal perforation P^5 and handle P^6 extending through slot N^8, and the head Q adapted to be secured to the end of casing N and to form a chamber Q^2 in the rear of plug P, said head having attached to it the oil-conduit Q^4 adapted to extend through the perforation P^5 of the plug and into the orifice N^4 of the casing.

8. An oil-spraying nozzle having an outer casing N provided with a delivery-opening N^4 conical open-ended seat N^2 receiving-chamber N′, exhaust-port N^5, slot N^8, and passage or passages N^6 leading from chamber N^8 to the chamber Q^2 in the rear of the casing in combination with the conical plug P having passage P^2 adapted to register with chamber N′ and lead the impelling fluid into chamber N^3 formed in the front of casing N, said plug P having also a central longitudinal perforation P^5, peripheral longitudinal slot P^3 and handle P^6 extending through slot N^8, and the head Q adapted to be secured to the end of casing N and to form a chamber Q^2 in the rear of plug P said head having attached to it the oil-conduit Q^4 adapted to extend through the perforation P^5 of the plug and into the orifice N^4 of the casing.

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Witnesses:
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