Aug. 15, 1950 F. C. HASSE 2,518,543

MULTIFLAME HEATING HEAD

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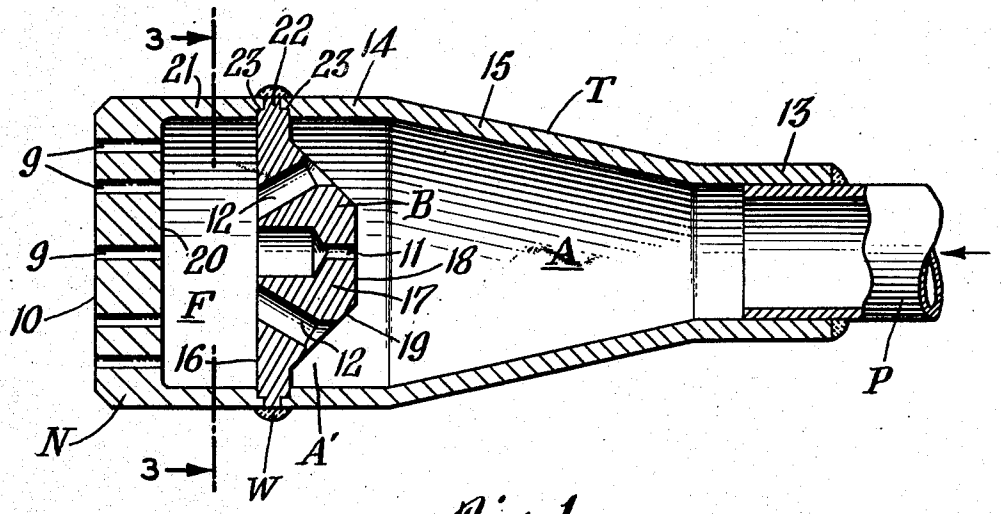


Fig. 1.

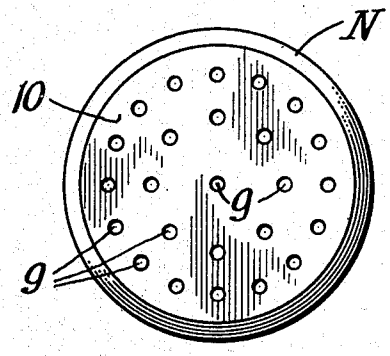


Fig. 2.

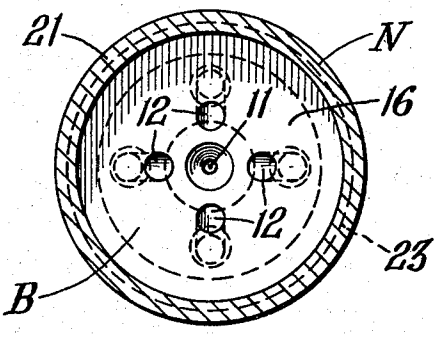


Fig. 3.

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MULTIFLAME HEATING HEAD

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8 Claims. (Cl. 158—27.4)

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This invention relates to heating heads, and more particularly to multi-flame heating heads or nozzles employed in heating large areas of comparatively thick metal plates.

Investigation of the heating action of multi-flame heating heads now in use has demonstrated that the velocity of the flames produced by such heads is too high and that the flame patterns of such heads are not of uniform intensity. Because of the high flame velocity, a large amount of heat is lost through reflection. Furthermore, the driving force of the flame stream creates rapid air currents over the area to be heated and, in the case of heavier plate sections where the rate of conduction is comparatively slow, this condition increases the rate of radiation above that of the heat absorption by the metal plate being heated. Small diameter heating heads do not provide sufficient area contact of the flames on a plate of heavy section, so that much heat which is absorbed by the thick metal plate under the flame is dissipated by conduction to and radiation from the larger unheated surrounding areas. Any increase in the diameter of such heating heads, while permitting an increase in the number of gas discharge ports or flame orifices with a resulting reduced flame velocity and increased contact area, presents a problem of uniformly distributing the combustible gas mixture to all of the gas discharge ports or flame orifices.

The principal object of this invention is to provide an efficient heating head or nozzle capable of producing a large number of flames of substantially uniform intensity for impingement against a considerable surface area of relatively thick metal plate without material heat losses due to reflection, conduction, and radiation.

The objects and novel features of the invention will be apparent from the following description when considered in conjunction with the accompanying drawings, in which:

Fig. 1 is a central longitudinal sectional view of a multi-flame heating head embodying the principles of this invention;

Fig. 2 is a front end view of the heating head, showing the arrangement of the gas mixture orifices; and

Fig. 3 is a sectional view of the heating head, taken on line 3—3 of Fig. 1.

As illustrated by the drawings, a preferred form of the improved heating head comprises a nozzle member N having a large number of combustible mixture discharge ports 9 arranged in a suitable pattern and having their outlet orifices in the

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plain front face 10 of the nozzle N. A single central port 9 is arranged coaxially with the central longitudinal axis of the heating head, and two rows of ports 9 are arranged parallel and concentrically relatively to the central port. The discharge ports of the nozzle N open directly into a final gas mixing and distributing chamber F, and the entrance end of each discharge port 9 may be tapered to facilitate free flow of gas into the port and to resist flame propagation back into the chamber F.

The combustible mixture is discharged into the chamber F through a baffle plate B which has a central axial port 11 and a group of inclined ports 12. The inlet ends of the ports in the baffle plate B open directly into an intermediate mixing and distributing chamber A in a tube T which is attachable at its inlet end to the outlet pipe P of a blowpipe or other suitable device (not shown) wherein the gases, such as oxygen and acetylene, are initially mixed to provide the combustible gas mixture to be supplied to the heating head.

The tube T has a rear cylindrical inlet section 13, a front cylindrical section 14 of larger diameter than the section 13, and an intermediate truncated conical section 15 integrally connected to the sections 13 and 14, thereby providing and enclosing the forwardly flaring mixing and distributing gas chamber A in the tube T.

The baffle B has a plain front face 16, and on its rear side and extending rearwardly and axially into the tube T and the chamber A there is an integral rearwardly-tapering boss 17 in the form of a frustum of a cone to provide a plain face 18 and an inclined face 19 surrounding the face 18. The base of the boss 17 has a diameter less than that of the internal diameter of the tube section 14, so that the inclined face 19 and the tube section 14 together provide a trough-shaped inlet chamber A' adjacent and upstream of the entrances of the inclined ports 12 in the baffle B.

The central port 11 in the baffle B extends axially through the center of the baffle B and the boss 17 thereof, and the gas inlet of the port 11 is centrally within the tube T and up-stream of the chamber portion A'. The outlet end of the port 11 that opens into the chamber F is formed larger in diameter than its inlet end in the face 18, as by counterboring the outlet end of the port 11. The four equally spaced inclined ports 12 extend through the baffle B from the inclined face 19 of the frusto-conical boss 17 to the plain face 18, thereby establishing communication between the trough-like chamber A' and the chamber F. The forward ends of the axes of the ports 12 are

equally inclined inwardly so that the extended axes of these ports converge and intersect one another and the central longitudinal axis of the heating head at a point in the chamber F adjacent the center of the inner plain face 20 of the nozzle N, such plain face 20 being parallel to the plain face 16 containing the outlets of the inclined ports 12.

The nozzle N has an integral flange 21 extending rearwardly from the inner face 20, to provide the cylindrical side wall of the chamber F. The periphery of the baffle B has a circumferential lip 22 and adjoining shoulders 23 arranged to interfit gas-tightly with the similarly rabbeted ends of the nozzle flange 21 and the tube section 14. A weld W extends circumferentially of the lip 22 and the joint between the latter and the adjoining ends of the nozzle N and the tube T, to gas-tightly unite the nozzle N, the baffle B, and the tube T to one another. Thus, the tube T provides a wall enclosing the first gas chamber A, the nozzle N provides a wall of the second gas chamber F, and the baffle B provides a wall between and common to both chambers A and F.

The combustible gas mixture supplied to the chamber A is more thoroughly mixed in the latter, and then is distributed to the ports 11 and 12 in the baffle B. The gas streams discharging at equal velocities from the inclined ports 12 will mutually converge or collide with one another and with the gas stream of lower velocity discharging from the central port 11, to further mix the gases in the chamber F and to substantially uniformly distribute the gas mixture in equal volume to the inlets of the ports 9 in the nozzle N, from which the gas jets will discharge at substantially the same relatively low velocity.

Thus, the construction and arrangement of the chambers A and A', the baffle B, and the chamber F, in conjunction with the relation and sizes of the ports in the baffle B and the nozzle N, provide an improved heating head wherein the flames produced by burning the gas jets discharging from the ports 9 will collectively serve to uniformly heat a large surface area of relatively thick metal plate without undue loss of heat and wastage of gas.

It will be understood that while a preferred form of the improved heating head is specifically illustrated and described herein, certain novel features of the invention may be embodied in other forms of heating heads without departing from the principles of the invention as set forth in the appended claims.

What is claimed is:

1. A multi-flame heating head comprising two gas mixing chambers; a nozzle having gas discharge ports directly communicating with one of said chambers; and a baffle between said chambers, said baffle having gas ports extending therethrough and so inclined relatively to one another as to discharge converging gas streams into the chamber that communicates directly with said discharge ports, one of the gas ports in said baffle extending axially through said baffle and having its outlet larger than its inlet.

2. A multi-flame heating head comprising two gas mixing chambers; a baffle between said chambers, said baffle having a frusto-conical boss extending into one of said chambers, and gas ports including an axial port extending through said baffle and the boss thereof, said gas ports being so inclined relatively to one another as to discharge converging gas streams into the other chamber; and a nozzle having gas discharge ports communicating directly with said other chamber.

3. A multi-flame heating head comprising two gas mixing chambers; a nozzle having gas discharge ports communicating with one of said chambers; and a baffle between said chambers having a central gas port extending axially therethrough and other gas ports extending therethrough and inclined relatively to and toward the axis of said central gas port.

4. A multi-flame heating head comprising two gas mixing chambers; a nozzle having gas discharge ports communicating directly with one of said chambers and arranged, at least in part, in rows concentrically relatively to the axis of said nozzle; a baffle between said chambers having a frusto-conical boss extending into the other of said chambers, said baffle having a central gas port extending axially through said baffle and the boss thereof, and also having gas ports inclined toward the forwardly extended axis of said central port and extending through said baffle and having their entrances in the inclined surface of said boss, the several ports in said baffle being arranged to discharge converging gas streams into the chamber that communicates directly with the discharge ports of said nozzle.

5. A multi-flame heating head comprising a tube having a forwardly flaring portion and providing a wall of a gas mixing and distributing chamber; a nozzle having concentric rows of parallel gas discharge ports and a flange constituting a wall of another gas mixing and distributing chamber communicating directly with said discharge ports; and a baffle between said chambers having its periphery secured to said flange and to the forward end of said tube, said baffle comprising a frusto-conical boss extending into said tube and having gas ports including an axial gas port extending through said baffle and the boss thereof, said last-named gas ports being so inclined relatively to one another as to discharge converging gas streams from said tube centrally into the chamber that communicates directly with said discharge ports.

6. A multi-flame heating head comprising two gas mixing chambers; a nozzle having gas discharge ports communicating directly with one of said chambers; and baffle means having connecting ports establishing communication between said chambers, said baffle means including a rearwardly-tapering boss extending centrally into the other of said chambers and cooperating with a wall of said other chamber to provide a trough-shaped chamber portion adjacent and up-stream of the inlets of said connecting ports, said boss having an axial gas passage extending therethrough and provided with an inlet up-stream of both said trough-shaped chamber portion and the inlets of said connecting ports.

7. A multi-flame heating head comprising a tube enclosing a first gas chamber; a nozzle having a peripheral portion thereof secured gas-tightly to the forward end of said tube, said nozzle providing a wall of a second gas chamber and having a group of gas discharge ports constituting gas outlets from said second gas chamber into the atmosphere; and baffle means providing a wall between and common to such gas chambers and having ports connecting said first chamber to said second chamber, said baffle means including a boss extending rearwardly and axially into said tube and cooperating with said tube to provide an annular trough-shaped chamber por-

tion within said tube adjacent and up-stream of the inlets of such connecting ports, said boss having a gas passage extending axially therethrough and provided with a gas inlet centrally within said tube and up-stream of said annular chamber portion.

8. A multi-flame heating head as claimed in claim 7 and wherein a portion of said tube flares toward its forward end, and said boss tapers rearwardly.

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The following references are of record in the file of this patent:

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