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BLOWPIPE FOR PRODUCING JETS

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This invention relates to blowpipes, and more particularly to blowpipes utilized in heating, or heating and cooling, successive or adjacent portions of metal bodies, as in heat-treating or welding and also to blowpipes which produce relatively wide, elongated gas jets having equalized velocity fronts.

Relatively wide, elongated jets have been produced by directing a gas from a circular delivery tube or conduit through a narrow slot, but jets so produced have had varying velocities over the width thereof principally due to an unequal distribution of gas. When a relatively wide jet of heating gas, having an unequal velocity front, is applied to successive portions of the surface of a metal or steel body, an undesirably uneven heating results.

The objects of this invention are to provide a blowpipe adapted to produce a relatively wide elongated jet having an equalized velocity front; and to provide a blowpipe adapted to direct a relatively wide heating flame upon a metal body, and also to direct a relatively wide jet of cooling fluid upon the metal body. Other objects and novel features of this invention will become apparent from the following description and accompanying drawing, in which:

Fig. 1 is a side view of a blowpipe, constructed in accordance with this invention and adapted to project relatively wide heating and cooling jets upon a metal body;

Fig. 2 is an enlarged end view of the head of the blowpipe of Fig. 1;

Fig. 3 is a sectional view of the head of the blowpipe taken along the line 3—3 of Fig. 2; and

Fig. 4 is a transverse sectional view taken along the line 4—4 of Fig. 2.

A blowpipe constructed in accordance with this invention comprises a handle A and a head H, and is adapted to direct a heating jet F and a cooling jet W upon the surface of a metal body M. The handle A is provided with inlet connections 10 and 11, which may be connected to suitable sources of supply of a combustion supporting gas, such as oxygen, and a fuel gas, such as acetylene. Suitable passages in the handle A lead from the oxygen inlet 10 and acetylene inlet 11 to a mixer 12, the flow thereto being controlled by valves 13 and 14, respectively, and the combustible mixture is lead from the mixer 12 to the head H by a conduit 15. A cooling water conduit 16, leading to the head H, and secured to the handle of the blowpipe by suitable means, such as a clamp 17, is provided with a connection 18, which may be connected to a suitable source of

cooling fluid, such as water. The combustible mixture and the cooling water are directed from the head H onto the metal body M as a relatively wide elongated heating jet or flame F and a relatively wide quenching jet W.

For heat-treating operations, a relative movement of the blowpipe with respect to the metal or steel body M may be effected in the direction of the arrow of Fig. 1, and successive surface portions of the body M are thereby heated and cooled to harden or temper the same. For welding operations, the relatively wide, elongated flame F may be directed along a welding seam to heat the same, and the cooling jet W projected upon a part which tends to be overheated, such as a thin section, the direction of relative movement being transverse to that utilized in heat-treating operations. This method is also applicable to the welding of thick metal bodies to thin ones, as the cooling jet will prevent the thin metal body from becoming overheated. Similarly, the blowpipe may be utilized for preheating or supplementary heating in oxy-gas cutting operations, wherein a thin section of the metal body would tend to become overheated and its structure changed to an undesirable extent.

The head H of the blowpipe B comprises a front block 20, a rear block 21, and a U-shaped gasket 22 having a slot-like opening clamped therebetween. The rear block 21 is provided with an inlet passage 23 to which the conduit 15 is connected. The passage 23, which extends centrally through the block 21 in a direction perpendicular to the inner surface thereof, terminates in a chamber 25 formed between the blocks 20 and 21, the chamber 25 preferably having a concave back surface 26 conforming in shape to a right segment of a cylinder and preferably formed by a cavity in the rear block 21. The inlet passage 23 preferably terminates at a point adjacent the greatest distance between the concave surface and that opposite thereto, and substantially in the center of the concave surface, as shown in Figs. 3 and 4. Leading from the chamber is a relatively thin and wide passage 27 terminating in an elongated orifice 28, the passage 27 being formed between the blocks 20 and 21 by the opening in the U-shaped gasket 22. This opening has parallel sides and preferably extends to a point 29 somewhat beyond the entrance of the inlet passage into the chamber. The width of the elongated orifice 28 may be varied at will by using U-shaped gaskets having openings of various widths.

In accordance with this invention, the com-

bustible mixture is led into the chamber 25 by the inlet passage 23 and is projected therefrom, in a direction angular to that of its inlet, through the relatively wide and thin passage 27 and the elongated orifice 28, thereby forming a relatively wide, elongated jet extending across the width of the orifice 28 and producing a flame having an inner cone of substantially uniform height. Preferably, the angle between the inlet passage 23 and the passage 27 is approximately 90°. A similar construction may be utilized in blowpipe heads for producing relatively wide, elongated jets of gaseous fluids other than combustible mixtures in any instance in which a jet having an equalized velocity front is desirable.

The rear block 21 is provided with a cooling fluid inlet 30 to which the conduit 16 is connected. Two branch passages 32 and 33, one on each side of the combustible mixture inlet passage 23, lead from the cooling inlet 30 to a chamber 34 disposed within the rear block 21 adjacent the orifice or lower end thereof. The chamber 34 may be a hole drilled from the side of the block, the outer end thereof being closed by suitable means, such as a plug 35.

To direct a wide jet of cooling fluid upon a surface previously heated, as in heat-treating a metal or steel body, or upon a portion adjacent that upon which the heating flame F is being directed for welding or other purposes, a plurality of fluid discharge passages 36 terminate in a row of discharge orifices 37 spaced from and preferably parallel to the combustible mixture orifice 28, and desirably sufficiently close together so that the several cooling jets merge into a wide stream having substantially the same width as the heating flame F. The fluid discharge passages 36 are preferably inclined away from the combustible mixture discharge passage, suitably at an angle of approximately 5°, to prevent the cooling fluid, after being directed upon the surface, from interfering with the heating flame. The cooling fluid, when utilized in the above manner, not only prevents the blowpipe head from becoming overheated, but also, in heat-treating operations, applies a wide stream against and cools previously heated portions of the metal body M.

The front block 20 and rear block 21 are provided with a plurality of holes 38 in which bolts 39 are inserted to clamp the gasket 22 tightly between the blocks.

It is to be understood that a blowpipe head may be constructed without the cooling fluid discharge passages 36, in which case a suitable conduit, similar to the conduit 16, is connected to the chamber 34 instead of the plug 35, in order to provide for a return flow of cooling water. It is to be further understood that the blowpipe may be disposed in positions other than that shown, and that other changes may be made without departing from this invention.

In my co-pending application, Serial No. 160,576, filed concurrently herewith, there is disclosed and claimed a method of heat-treating a corner of a hardenable metal or steel body or die, in which relatively wide, elongated heating flames

are utilized, and the apparatus of the present invention is particularly applicable to such procedure, as well as to other operations above described.

What is claimed is:

1. In a blowpipe head, the combination of a pair of blocks, at least one of said blocks being hollowed out to form a chamber between said blocks; and a gasket disposed between said blocks and having a slot-like opening adapted to form a relatively wide and thin passage leading from said chamber.

2. A blowpipe comprising a head having a chamber formed in the interior thereof; an inlet passage formed in said head and connecting with said chamber, the axis of said inlet passage being inclined at a sufficient angle to the longitudinal axis of said chamber to produce a relatively abrupt change in the direction of flow of a gaseous fluid passing from said inlet passage through said chamber; a relatively wide and thin passage formed in said head and leading from said chamber substantially in the direction of the longitudinal axis of said chamber, said latter passage terminating in an elongated orifice; and means connecting with said inlet passage for delivering a gaseous fluid thereto.

3. A blowpipe as defined in claim 2, in which said chamber has a substantially flat surface and a concave surface disposed oppositely thereto and the axis of said inlet passage is substantially perpendicular to the longitudinal axis of said chamber, said inlet passage connecting with said chamber adjacent the point of greatest distance between said flat surface and said concave surface.

4. A blowpipe head comprising a block having a substantially plane surface and a cavity disposed centrally of said surface, said cavity having an inner concave surface; an inlet passage leading from said cavity to an opposite surface of said block; a relatively thin gasket adapted to fit against said plane surface and having an opening therein extending from said cavity to an outer edge of said block; a second block having a substantially plane surface adapted to fit against said gasket; and means for clamping said gasket between said blocks.

5. In a blowpipe head, the combination of a pair of blocks; a gasket disposed between said blocks to maintain said blocks spaced a predetermined distance apart, said gasket having a cut away central portion to provide with said blocks, walls defining a chamber, said gasket having also a portion of predetermined width cut away to form a slot-like passage from said cut away central portion to the outer edge of said gasket and provide a relatively wide and thin outlet passage between said blocks leading from said chamber.

6. A blowpipe head, as claimed in claim 5, including a gas inlet passage in one of said blocks for directing gas into said chamber at an abrupt angle to the plane of said outlet passage.

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