Sept. 8, 1942. A. E. SHORTER 2,295,522

BLOWPIPE HEAD

Filed Oct. 10, 1941

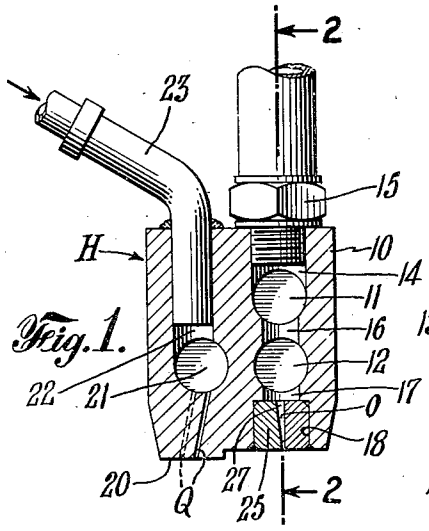



Fig. 1.

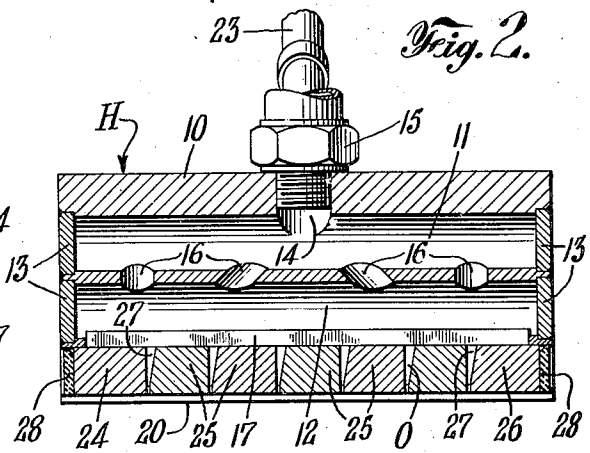



Fig. 2.

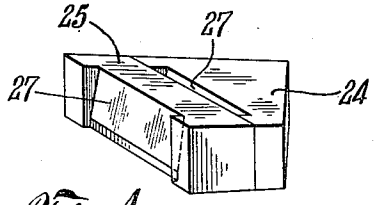



Fig. 4.

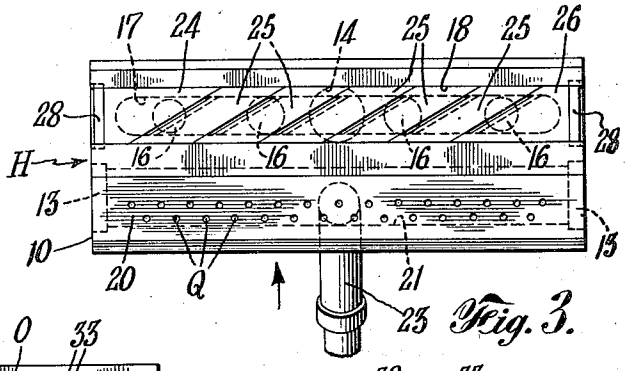



Fig. 3.

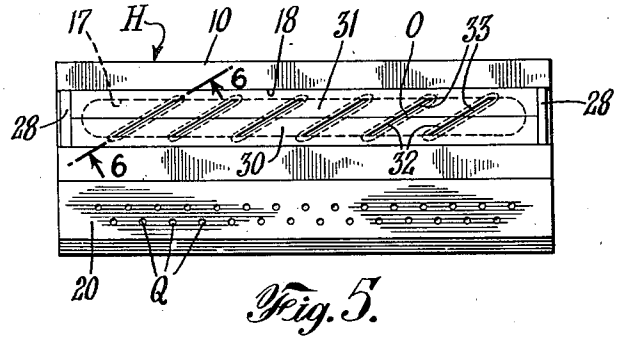



Fig. 5.

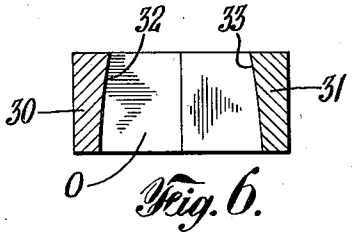



Fig. 6.

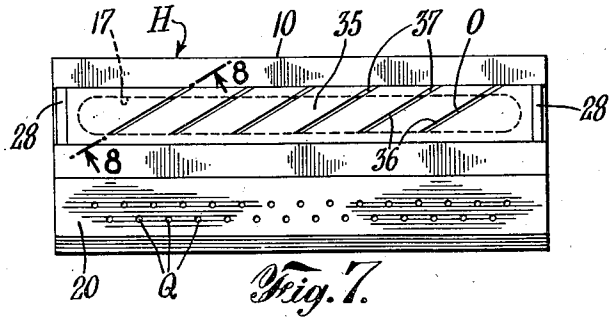



Fig. 7.

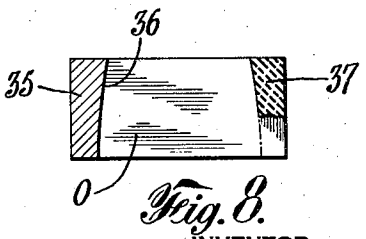



Fig. 8.

INVENTOR
ALBERT E. SHORTER
BY
E. Greenewald
ATTORNEY

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## BLOWPIPE HEAD

Albert Edward Shorter, Sheffield, England, assignor to The Linde Air Products Company, New York, N. Y., a corporation of Ohio

Application October 10, 1941, Serial No. 414,487
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9 Claims. (Cl. 158—27.4)

This invention relates to blowpipe heads and more particularly to blowpipe heads for heating uniformly relatively wide surfaces, as in flame hardening, descaling, flame cleaning and other heating operations. By a relatively wide surface is meant a surface which cannot be covered by a single heating flame issuing from a single circular outlet.

Among the objects of this invention are to provide a blowpipe head for producing high temperature heating flames—from a combustible mixture of gases, such as a mixture of oxygen and acetylene—to heat uniformly a relatively wide surface; to provide such a blowpipe head in which the tendency for flashbacks to occur is minimized; to provide such a blowpipe head capable of being used in conjunction with one or more similar or identical heads, to heat uniformly a surface having a greater width than any one of the heads is capable of heating; to provide a blowpipe head, for flame hardening and similar operations, which will heat and also cool uniformly a relatively wide surface; and to provide such a head which is simple in construction and economical in operation. Other objects and novel features of this invention will become apparent from the following description and accompanying drawing, in which:

Fig. 1 is a vertical cross-section of a blowpipe head constructed in accordance with this invention, such head being particularly adapted to be utilized in flame hardening operations;

Fig. 2 is a vertical sectional view of the head taken along line 2—2 of Fig. 1;

Fig. 3 is a bottom view of the head of Fig. 1;

Fig. 4 is an enlarged perspective view of a pair of blocks utilized in the construction of the head of Fig. 1;

Fig. 5 is a bottom view of a modified head constructed in accordance with this invention and comprising a second embodiment thereof;

Fig. 6 is a partial oblique sectional view taken along line 6—6 of Fig. 5;

Fig. 7 is a bottom view of a head constructed in accordance with this invention and comprising a third embodiment thereof; and

Fig. 8 is an oblique vertical sectional view taken along line 8—8 of Fig. 7.

In accordance with this invention, a blowpipe head H is provided with a row of relatively long and narrow outlets O from which a combustible mixture of gases is discharged, to form a plurality of heating flames. Each outlet O converges downwardly from top to bottom, i. e. decreases in cross-sectional area, so that a relatively high velocity will be imparted to the heating flame jets and the danger of flashbacks will be minimized. Outlets O are disposed in substantially parallel relation, and are inclined at an angle with respect to the sides of the head. In addition, outlets O have sufficient length so that each outlet tends to overlap the surface portion traversed by the adjacent outlet, when a relative traversal of the surface is effected in the direction of the arrow of Fig. 3, and thereby heat uniformly a relatively wide surface. The outlets are preferably inclined at an angle of substantially 30° with respect to the sides of the head, or the center line or principal axis of the row of outlets. Also, though only one row of outlets is shown, it will be understood that a plurality of rows may be used if desired.

When the width of surface is greater than a single head can cover, two or more heads are placed side by side. In such case, it is desirable to incline the ends of the heads with respect to the sides and make the ends substantially parallel to outlets O. With the rhomboidal shaped heads so produced, outlet O at the edge of each head is spaced closely to the edge, so that the distance between two outlets on either side of the abutting edges between two heads will be precisely the same as between any other two adjacent outlets in either head.

More specifically, the head H comprises a body 10, as in Figs. 1 to 3 inclusive, having formed therein a substantially cylindrical combustible mixture chamber 11 and a distributing passage 12 parallel thereto, the ends of each being closed by suitable means, such as plugs 13. To supply a combustible mixture of gases, such as oxygen and acetylene thereto, body 10 is also provided with an inlet 14, to which a connection 15 may be attached. The combustible mixture is supplied through connection 15 from a suitable source, such as a blowpipe (not shown), and flows through inlet 14 to chamber 11. From chamber 11, the combustible mixture flows through distributing holes 16 into distributing passage 12, and thence through a slot 17 to outlets O. Distributing holes 16 are preferably so arranged that the combustible mixture will not flow directly from inlet 14 into any of the outlets O, the two central holes 16 being oblique, as shown, for that purpose. Slot 17 may be milled or otherwise formed in the body 10, to provide a connection between distributing passage 12 and a groove or channel 18 which receives suitable means for forming outlets O in

accordance with this invention, as will be hereinafter explained.

Head H is also provided with a plurality of quenching outlets Q, disposed in staggered relation in two parallel rows—each row of quenching outlets preferably being parallel to the sides of the head or principal axis of the row of heating gas outlets O. The quenching outlets, as in Fig. 1, are preferably inclined at an angle away from the heating outlets, to prevent interference by the quenching liquid with the heating flames. In addition, the quenching outlets terminate in a ledge 20, formed on the bottom of head H, and which prevents the quenching liquid from creeping along the under surface of the head and interfering with the heating flames.

For cooling purposes, body 10 is provided with a substantially cylindrical cooling fluid distributing passage 21, drilled lengthwise through the body 10, and having the ends closed by suitable plugs. An inlet 22 receives a pipe 23, which is suitably secured to head 10 as by welding or brazing, and conducts a suitable cooling medium, such as water, to passage 21. From passage 21, the cooling medium is discharged through quenching outlets Q to quench successive surface portions heated by the flames directed from outlets O, when the surface is traversed through relative movement of the head in the direction of the arrow of Fig. 3.

Outlets O may be formed, in accordance with this invention, in the manner illustrated in Figs. 1 to 4, inclusive. In this modification, an end block 24, a plurality of center blocks 25, and an end block 26 are placed in groove or channel 18. End blocks 24 and 26 are trapezoidal in shape but are asymmetric, i. e., conform in reverse relation to each other; while center blocks 25 are rhomboidal in shape. As is more clearly evident from Fig. 4, each block is provided with a cutaway portion or groove 27, produced by milling, broaching or in any other suitable manner. Each groove 27 forms, in cooperation with the abutting side of the adjacent block, one of the outlets O, and grooves 27 thus conform in shape with outlets O. Blocks 24, 25 and 26 are welded or brazed to each other and/or to the sides of channel 18, the space at each end of channel 18 being filled with welding or brazing material 28—or the blocks may be secured to channel 18 in any other suitable manner—to produce a gas-tight seal at each joint around each block, as well as to hold the blocks firmly in position.

A second blowpipe head constructed in accordance with this invention comprises the construction illustrated in Figs. 5 and 6. In this construction, a pair of elongated blocks 30 and 31 are laid longitudinally in channel 18, and secured therein and to each other in substantially the same manner as the blocks 23, 24 and 25 of Figs. 1 to 4, inclusive, as by welding or brazing to secure each block gas-tightly to an abutting or adjacent block and to the walls of the channel by metallic bonding material. A plurality of slots 32 are milled or otherwise suitably formed in block 30, and a plurality of corresponding slots 33 are similarly formed in block 31, so that each pair of slots 32 and 33 will form a continuous slot or outlet O when the blocks 31 and 32 are assembled in longitudinally abutting relation. Since slots 32 and 33 are milled from the side, the problem of providing the upper end of each slot with a greater width than the lower end is not difficult, and downwardly converging outlets are thereby relatively easily produced.

A third blowpipe head is exemplified by the construction illustrated in Figs. 7 and 8, wherein a single block 35 is secured in channel 18, in a manner similar to that previously explained. Block 35 is provided with a plurality of slots 36, milled at an angle from one side of the block, or otherwise suitably produced. To produce outlets O of the desired extent, each slot 36 is partially filled, as at 37 in Fig. 8, by welding or brazing material deposited therein.

From the foregoing description, it will be evident that this invention provides a simple and economical manner of forming the plurality of outlets O. In one example of a blowpipe head constructed in accordance with this invention, the greatest thickness of outlets O was only 0.010 inch, whereas the depth of the outlets O, i. e. the thickness of the blocks or inserts, was 0.375 inch, the ratio between the depth and the greatest thickness of outlets O thus being approximately 37.5 to 1.

It will also be evident that the blowpipe heads constructed in accordance with this invention provide an advantageous flexibility in manufacturing methods, due to the lesser number of machining operations necessary for block 35 of Figs. 7 and 8, and the lesser amount of welding or brazing necessary for blocks 30 and 31 of Figs. 5 and 6. Again, if equipment for milling slots 32 and 33 or 36 is not readily available, or use thereof is subject to cost disadvantages, blocks 24, 25 and 26 can be produced on an ordinary shaper or broaching machine. Thus, the method of constructing the blowpipe head of this invention can be altered to take into account varying conditions.

It will be understood that head H may be used for suitable heating operations merely by omitting outlets Q and providing a suitable drain or return flow for the cooling medium, from passage 21. Additional passages for circulation of cooling medium may be provided, if desired, or cooling may be dispensed with altogether if conditions warrant it.

It will be further understood that various changes may be made in the method of securing the blocks in the head; that the size and shape of the head and various passages therein—including outlets O and Q—may be varied within wide limits; and that other changes may be made without departing from the spirit and scope of this invention.

What is claimed is:

1. A blowpipe head for heating uniformly a relatively wide surface, comprising a body having a channel in a face thereof and a combustible gas distributing passage opening into said channel; and a plurality of blocks secured in said channel and having mutually abutting and substantially parallel inclined sides, at least one of each pair of abutting sides being provided with a tapered groove, said blocks and the grooves therein being constructed and arranged to form a row of relatively long and narrow outlets having a decreasing cross-sectional area away from and leading from said combustible gas distributing passage.

2. A blowpipe head as defined in claim 1, wherein said blocks at the ends of said channel are substantially trapezoidal but asymmetric in shape and said blocks intermediate said end blocks are substantially rhomboidal in shape.

3. A blowpipe head for heating uniformly a relatively wide surface, comprising a body having a channel in a face thereof and a combustible

gas distributing passage opening into said channel; a block secured in said channel, said block being provided with a plurality of slots extending from and at a substantially common angle to one edge thereof; and deposited metal filling a portion of each slot, thereby forming a row of relatively long and narrow outlets leading from said gas distributing passage and having a length less than the length of said slots.

4. A blowpipe head as defined in claim 3, in which a side of each slot and the deposited metal in each slot are so shaped that each slot is longer adjacent its inner than at its outer end, to form a plurality of outlets of decreasing cross-sectional area away from the gas distributing passage.

5. A blowpipe head for heating uniformly a relatively wide surface, comprising a body having a channel in a face thereof and a combustible gas distributing passage communicating with said channel; a plurality of blocks disposed in abutting relation in said channel, each block being provided with at least one cut-away portion, said blocks and the cut-away portions thereof being constructed and arranged to cooperate to produce a plurality of relatively long and narrow outlets disposed in substantially parallel relation and inclined at an angle to the sides of said channel; and metallic bonding material securing each block gas-tightly to an abutting block and to the walls of said channel.

6. A blowpipe head for heating uniformly a relatively wide surface, comprising a body having a channel in a face thereof, a combustible gas distributing passage within said body communicating with said channel, at least one block secured in said channel and defining a plurality of relatively long and narrow substantially parallel outlets having a decreasing cross-sectional area in the direction away from said passage and inclined at an angle to the side walls of said channel, metallic bonding material closing gas tightly all openings from said channel excepting said slots and the communication between said channel and said passage and deposited metal substantially filling the channel adjacent each end thereof.

7. A blowpipe head as defined in claim 6, in which each outlet is longer adjacent its inner than at its outer end.

8. A blowpipe head for heating uniformly a relatively wide surface, comprising a body provided with a plurality of relatively long and narrow outlets leading from a combustible gas passage, said body having a channel formed in the face thereof and connecting with said passage, and said outlets being formed by cooperating slots extending into a pair of blocks relatively permanently secured in said channel and to each other by metallic bonding material, said slots extending from and at an angle to the mutually abutting longitudinal edges of said blocks.

9. A blowpipe head as defined in claim 8, in which the mutually abutting longitudinal edges of said blocks are disposed substantially parallel to the sides of said head.

ALBERT EDWARD SHORTER.