

Jan. 1, 1946.

S. H. WHITE

2,391,934

BURNER TIP

Filed Feb. 4, 1944

Fig. 1.

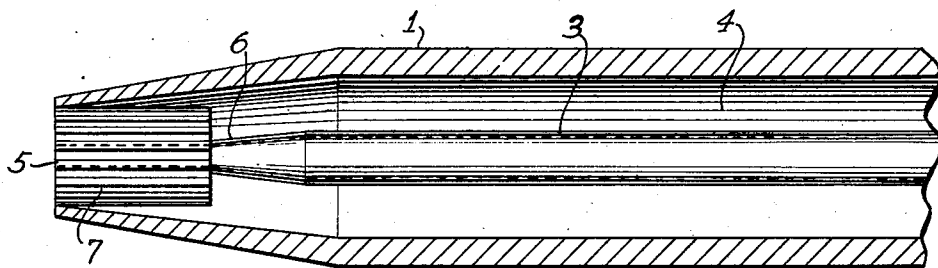
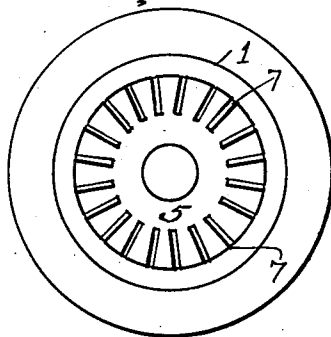


Fig. 2.



Samuel H. White ^{Inventor}

J. H. White
By

Attorney

UNITED STATES PATENT OFFICE

2,391,934

BURNER TIP

Samuel H. White, Lakewood, Ohio

Application February 4, 1944, Serial No. 521,071

3 Claims. (Cl. 158—27.4)

This invention is directed to a burner tip for use in metal cutting, heating, and like operations, and designed more particularly for use with oxygen, liquefied gases, natural and artificial gases, hydrogen, blow gas, oil gas, and similar fuels.

A burner tip of this character to have maximum efficiency and minimum fuel consumption to avoid wastage should be formed to insure thorough mixing of the oxygen and substantially all other gases used in the fuel delivery of the mixture beyond the tip under a sufficient velocity to insure the minimum flame inclosure on the work, to thus more quickly bring the metal to a kindling point with relatively-reduced fuel consumption, and further avoid the use of the conventional cup beyond the tip for confining the fuel delivery; reduce the surface area of the delivery end of the tip to further confine the flame ring without sacrificing other advantages; and permit the use with substantially any and all gases to be mixed with oxygen for fuel purposes.

It is therefore the primary object of the present invention to provide a tip as a unitary structure, integrally formed with specially designed fuel channels, in which, through the channel formation, the fuel constituents are thoroughly mixed, delivered at a materially higher velocity than in other tips, to permit a relative reduced tip delivery end and a consequent reduced flame ring as compared with other tips to save fuel consumption and the development of a quicker kindling-point of the metal.

The invention is illustrated in the accompanying drawing, in which:

Figure 1 is a side elevation of the improved tip, the tip cover or casing being shown in section.

Figure 2 is an enlarged end elevation of the tip and casing.

The present invention is more particularly concerned with the tip proper, it being understood that the tip assembly may otherwise be of any conventional form. Such tip assembly includes a tip-casing 1, to be secured in the fuel service line, the usual head (not shown) being provided, through which the fuel constituents are admitted to the interior of the casing, a stem 3 extending from the head (not shown) within the casing and defining with the casing a mixing chamber 4 surrounding the stem, and a tip proper 5 removably secured to the stem 3. The stem 3 adjacent the tip proper is of reduced convergent form at 6 to provide with the abrupt end of the tip proper a somewhat more thorough mixing of the fuel in said chamber 4.

The tip proper comprises a cylindrical solid

body of appropriate material formed with axial parallel slots or channels 7 open through the ends and peripheral surface of the body. The formation-proportions of these channels constitute an essential feature of the present invention. The channels are identical being .010 inch in width and from .025 to .030 inch in depth. These proportions are critical and can not be substantially varied and secure the desired results.

It is further noted that the delivery end of the tip proper is coincident with the end of the casing 1, and that the conventional cup extension of the casing beyond the end of the tip to prevent the spread of the flame is avoided, being for reasons later explained not only unnecessary but decidedly objectionable.

For best results it has been found, and such forms a detail of this invention, that for heavy work, the flame end of the tip should be approximately $\frac{1}{8}$ of an inch in diameter, while for lighter work, the diameter should be approximately $\frac{3}{8}$ of an inch. In the larger tip, there should be twenty-eight gas channels 7, while in the smaller diameter, the channels should be twenty in number.

The above specifically-recited details appearing as arbitrarily chosen dimensions are for reasons which will now be explained of vital importance and of great value from a commercial as well as a technical standpoint.

In the first place, it is admitted as well known to form tips of this character with relatively wide channels (corresponding to the channels 7 of the improvement) of square, round or V cross section. The experts in the industry early recognized the lack of desired efficiency of such tips, and many attempts have been made to increase the tip efficiency by reforming and changing the sectional form of the channels. Many patents have been issued to such end, but such constructions have been found lacking in that recognized desirable efficiency.

In the present tip, the exact and substantially-critical proportions of the channels 7 have been found in many actual tests of the tip to produce a more thorough and complete mixing of the gas and oxygen constituents passing through the channels and more particularly increase the velocity of the travel of the gas and oxygen to and beyond the flame end of the tip. Where the proportions are as defined, tests have proven that the mixing is substantially complete and that by reason of the increased velocity of flow, the combustion of the flame is more intense and is materially limited in spread as compared with other

tips, and hence a smaller area of the metal is included in the flame circle, therefore the metal is brought to a kindling point more rapidly, and less gas and oxygen is required to reach this end.

In the light of the relatively increased velocity of the fuel mixture at the flame end of the tip, and the complete mixture of the gas and oxygen, the extension of the casing 1 to form a cup beyond the tip is entirely unnecessary. The cup, heretofore conventional, is for the purpose of preventing the undue spread of the flame and prevent the blowing off of the flame in prior tip formations and was objectionable in that the metal of the cup absorbed a considerable amount of heat and the cup also becomes more or less clogged with slag and the like, requiring frequent cleaning.

With the increased velocity of gas flow at the flame end of the tip, the spreading of the flame area and the blowing off of the flame at the tip end is avoided to an entirely practical extent. If the diameter of the flame end of the tip is enlarged over the stated proportions, the flame impinging area on the metal is increased, slower preheating results, and an unnecessary and therefore wasted quantity of gas and oxygen is required for the same result.

If the same number of channels 7 is used in a larger diameter tip, with the channels correspondingly wider, a larger quantity of gas is required

without any faster preheating, resulting in gas wastage.

The improved tip is thus in the substantially critical and vital proportions of its parts productive of a more confined flame on the metal, a more thorough mixing of the gas constituents, and a decided saving in fuel to secure the same result as previous tips. Furthermore, by reason of the described formation, the tip may be effectively used with practically all types of gas mixture, where heretofore different types of tips were required for radically different gas mixtures.

What is claimed is:

1. A tip for metal burners and the like, comprising a cylindrical body having axially parallel channels of substantially .01 inch in width and .025 inch in depth.

2. A tip assembly including a casing, a tip unit in said casing and including a tip having longitudinally ranging channels opening through its end and peripheral surfaces with such channels having a width of .01 of an inch and a depth of at least .025 of an inch, with the flame end of the tip being coincident with the similar end of the casing.

3. A construction as defined in claim 2, wherein the casing closes the outer margins of the channels at the extreme end of the tip and is otherwise spaced from such channels.

SAMUEL H. WHITE.