Feb. 3, 1931. C. J. COBERLY 1,791,159

DIVERGING JET CUTTING TIP FOR CUTTING TORCHES AND METHOD OF USING SAME

Filed Sept. 29, 1923

Fig. 1.

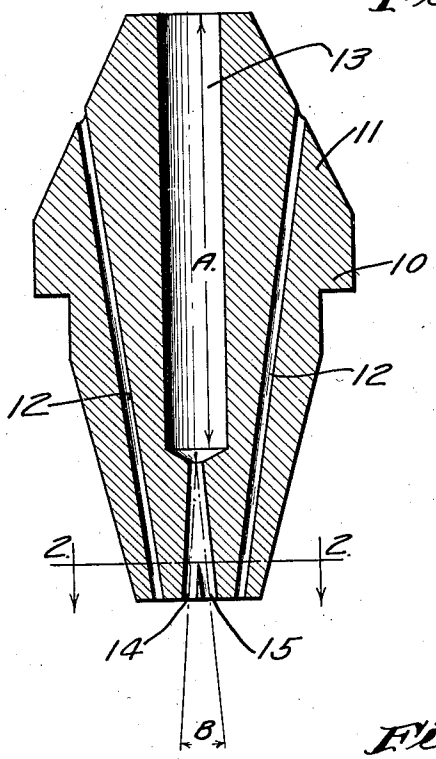


Fig. 3.

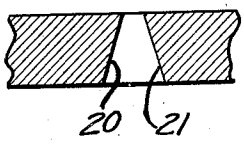
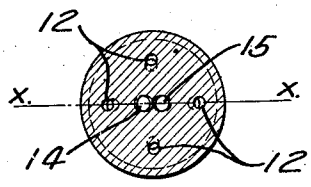


Fig. 2.



INVENTOR:
Clarence J. Coberly,
By
Graham & Davis
ATTORNEYS.

Patented Feb. 3, 1931 1,791,159

UNITED STATES PATENT OFFICE

CLARENCE J. COBERLY, OF LOS ANGELES, CALIFORNIA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO KOBE, INC., OF LOS ANGELES, CALIFORNIA, A CORPORATION OF CALIFORNIA

DIVERGING JET-CUTTING TIP FOR CUTTING TORCHES AND METHOD OF USING SAME

Application filed September 29, 1923. Serial No. 665,647.

My invention relates to the art of cutting slots in metal plates and is particularly applicable to cutting slots in oil well casing. It is generally necessary in the production of oil to provide a steel casing or pipe which extends from the surface of the earth down into the oil sands, and which is perforated where it extends into the oil sands to allow the oil to pass therethrough, the perforations being sufficiently small to exclude the coarse sand and gravel surrounding the casing. It has been found that oil well casing can be economically perforated by means of an oxygen cutting torch, before being placed in the well. It has also been found that it is highly desirable that the slots cut in the casing be of a keystone-shaped section. That is to say that the slots be narrower at the outer surface of the pipe than at the inner.

It is an object of my invention to provide a peculiar form of cutting tip and a new method by which keystone-shaped slots can be produced in oil well casing.

Further objects and advantages will be made evident hereinafter.

Referring to the drawing which is for illustrative purposes only,

Fig. 1 is a cross section of a cutting tip adapted to carry on my invention.

Fig. 2 is a cross section on a plane represented by the line 2—2 of Fig. 1.

Fig. 3 is a cross section of the slot produced by my invention.

In the form of the invention illustrated in the drawing, a tip 10 is provided having a conical head 11 adapted to be secured in the cutting torch in the usual manner. Mixed gas orifices 12 are provided, these orifices being supplied with a mixture of oxygen and some combustible gas. A central oxygen opening 13 is provided, this opening consisting of a counterbored portion "A", into which two divergent orifices 14 and 15 are drilled. The dimensions of the various parts are somewhat important and when cutting slots 3/32 of an inch in thickness on the top and 9/64 of an inch in thickness on the bottom in 7/16 inch material, the dimensions should be as follows: the angle "B" should preferably be 7 degrees and the orifices 14 and 15 should be .028 inch in diameter. An oxygen pressure of 110 pounds per square inch should be used. When a tip of this description is operated on 7/16 inch material, it produces a slot having approximately the dimensions and shape shown in Fig. 3.

The action of the tip is as follows: the jets produced by the orifices 14 and 15 being divergent, form a fan-shaped jet having its greatest width along line x—x which extends transversely across the desired slot at right angles thereto. The spreading action of the jets tends to cut away the slot in the form shown in Fig. 3, and if the tip 10 is moved along the material at a substantially uniform speed, it is possible to cut a slot of the form shown in Fig. 3 of substantially uniform cross section and at a very low cost of operation.

The form of slot shown in Fig. 3 is particularly valuable in oil well work, since the walls 20 and 21 are inclined to each other. Any material entering the slot through the outer narrow opening will pass entirely through the slot without stopping and clogging same.

By forming the slots with a jet of definite form, it is possible to form a slot of uniform width and form throughout its length.

I have found that by cutting slots by my method, not only is a very uniform slot produced, but the action of the cutting jet hardens the surface of the metal and increases its strength.

I claim as my invention:

1. A process of cutting slots in metal which comprises: passing a plurality of oxygen jets through said metal, said jets being projected in close relationship and directed correlatively to intersect a line on the surface of said metal, which line is transversely disposed relative to the longitudinal axis of said slot.

2. A process of cutting slots in metal which comprises: passing a plurality of oxygen jets through said metal, said jets being inclined to each other, projected in close relationship and directed correlatively to accomplish the desired relationship of cut.

3. A process as in claim 1 characterized

by the fact that said jets are mutually diverging as they progress forwardly.

4. A process of cutting keystone-shaped slots in metal which comprises: passing a fan-shaped cutting jet through said metal, said jet diverging toward the metal.

5. A process of cutting keystone-shaped slots in metal which comprises: passing a fan-shaped cutting jet through said metal, said jet being formed by a plurality of diverging jets and moving said fan-shaped jet along the axis of a proposed slot.

6. A process of cutting slots in metal which consists in forming a plurality of oxygen jets lying practically in the same plane which plane is transversely disposed relative to the longitudinal axis of the desired slot, directing said jets into said metal, said jets diverging from each other as they intersect the surface of said metal, and moving said jets in a direction parallel with said axis.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 20th day of September, 1923.

CLARENCE J. COBERLY.