Nov. 28, 1950 J. F. KIERNAN 2,532,103

METHOD AND APPARATUS FOR THERMOCHEMICALLY SCARFING BILLETS AND THE LIKE

Filed April 17, 1947 3 Sheets-Sheet 1

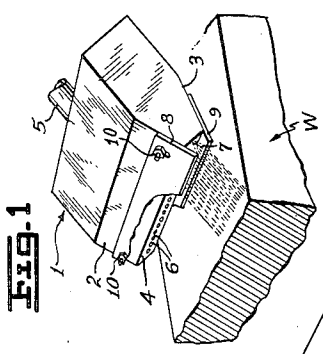

Fig. 1

Fig. 4

Fig. 3

Fig. 2

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Nov. 28, 1950 J. F. KIERNAN 2,532,103

METHOD AND APPARATUS FOR THERMOCHEMICALLY SCARFING BILLETS AND THE LIKE

Filed April 17, 1947 3 Sheets-Sheet 2

Fig. 5

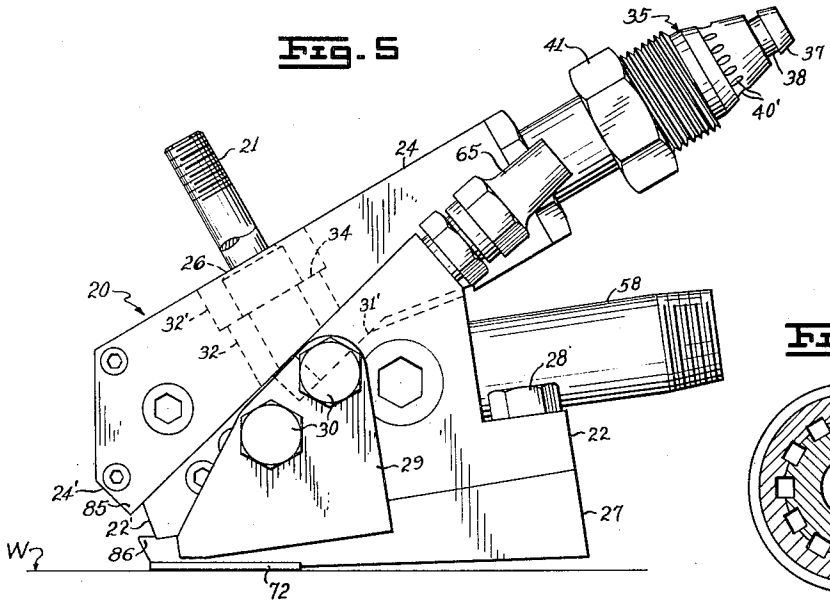


Fig. 7

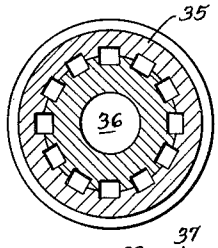
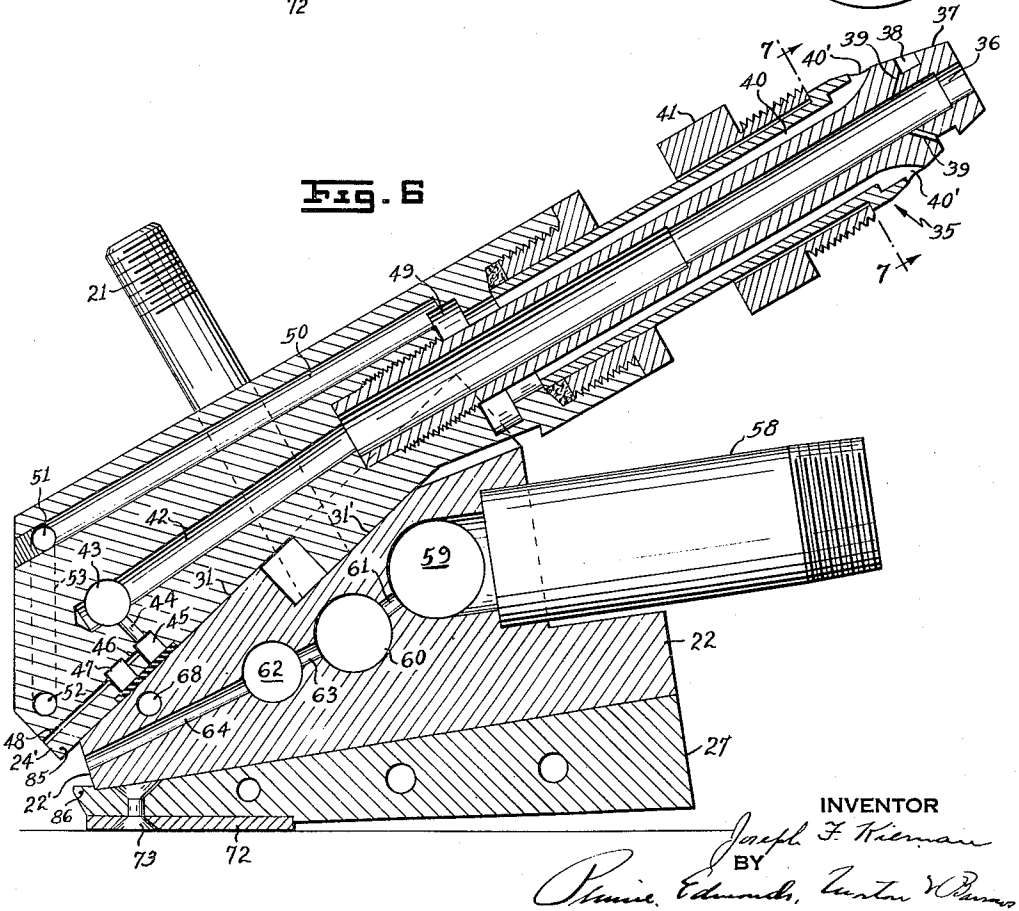


Fig. 6



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METHOD AND APPARATUS FOR THERMOCHEMICALLY SCARFING BILLETS AND THE LIKE

Filed April 17, 1947 3 Sheets-Sheet 3

Fig. 8

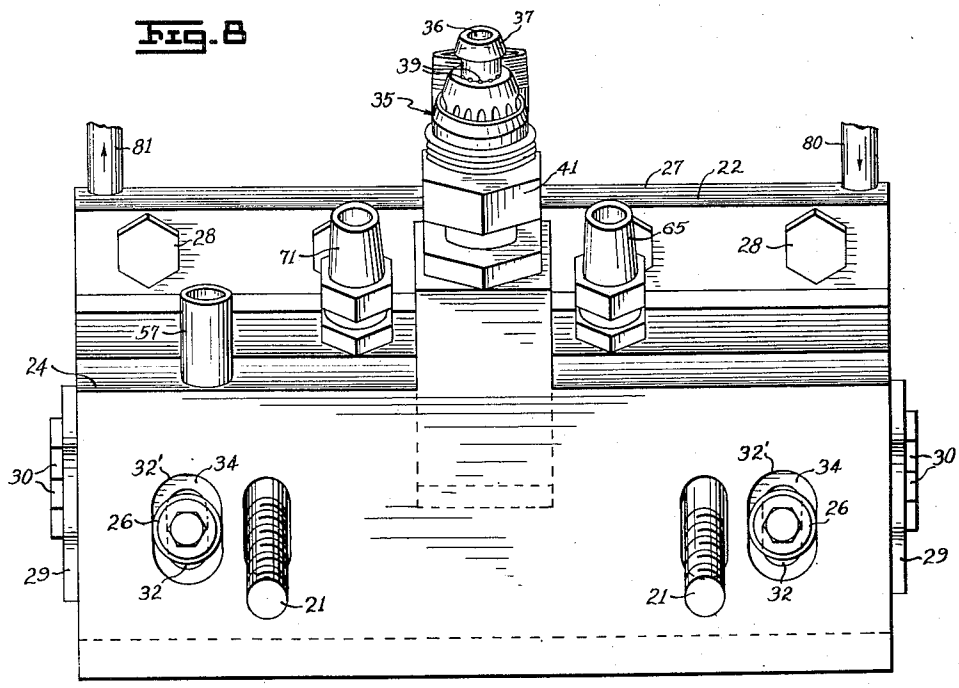


Fig. 9

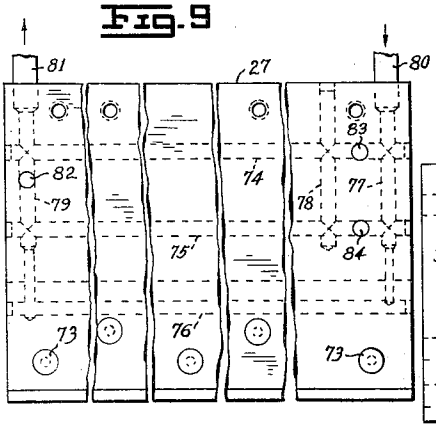
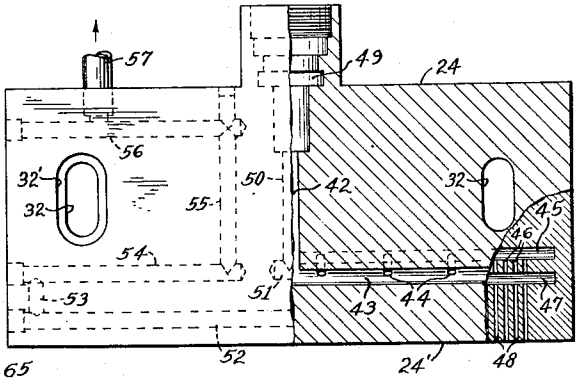


Fig. 10



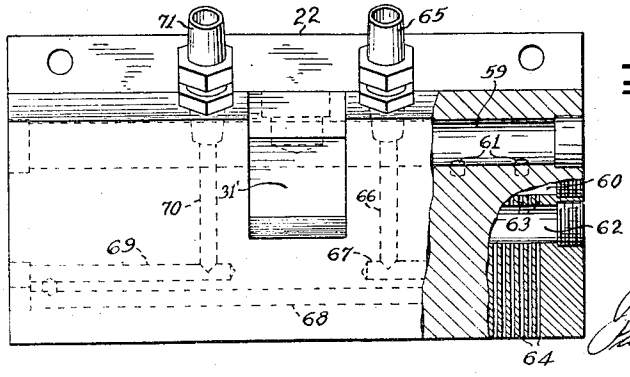


Fig. 11

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METHOD AND APPARATUS FOR THERMO-CHEMICALLY SCARFING BILLETS AND THE LIKE

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Application April 17, 1947, Serial No. 742,011

14 Claims. (Cl. 148—9.5)

1

This invention relates to an improved method and apparatus for scarfing metal bodies such as billets, blooms, ingots, slabs, and the like. By "scarfing" is meant progressively removing surface metal from the work-piece thermo-chemically by projecting a stream of oxygen, or a row of oxygen jets, at an angle against the surface of the work while the surface metal is at kindling temperature and while producing relative movement between the stream or jets of oxygen and the work-piece.

Wide area scarfing, such as the scarfing of a face of a billet, or the like, over its entire width in one pass, is sometimes performed by the use of a torch tip structure having a number of nozzles arranged in a row transversely of the surface which project a row of individual oxygen jets angularly against the work surface across its entire width. It is also performed by the use of a multiple-jet torch tip of the so-called block type having a row of jet passages drilled directly in the block for directing a row of individual oxygen jets at an angle to the surface of the work. In neither case has it been possible to obtain a smooth surface on the scarfed work-piece because the row of scarfing jets gouge a series of longitudinally extending grooves in the surface of the work which leave between them unscarfed ridges of metal, and moreover the scarfing jets tend to form and leave between them strips of molten slag superimposed on the unscarfed ridges which, when hardened, add to the height of the ridges on the scarfed surface of the work.

Another thing that frequently adds to the difficulty of obtaining smooth surface scarfing with either type of apparatus above referred to is that all of the scarfing oxygen jet passages of the row may not have exactly the same angularity with respect to the surface of the work. Even a slight error in the angularity of one of the jet passages is likely to cause the zone at which its scarfing jet impinges on the work surface to be considerably out of transverse alignment with the zones at which the other scarfing jets impinge on the work surface, thereby causing the scarfing jet issuing from the faulty jet passage to remove a greater or lesser amount of metal from the work surface than the other scarfing jets. Such an error in the angularity of one or more of the jet passages is likely to occur in making up an assemblage of individual scarfing nozzles arranged in a row because of the difficulty in mounting the nozzles so that all of the jet passages in the row of nozzles will have exactly the same angularity with respect to the work surface. It is also likely to

2

occur in making a multiple-jet torch tip of the block type with drilled jet passages because of the problems involved in drilling the jet passages so that all of them will have the same angularity with respect to the surface of the work.

In an attempt to obtain smooth surface scarfing it has been proposed to employ a block type torch tip having an elongated slot for conducting the scarfing oxygen to the discharge face of the tip instead of a row of individual jet passages. It was found that such a tip would leave a smooth surface over a substantial part of the width of the scarfed area if the torch tip is supported so that the discharge outlet of the tip is quite close to the work. However, there are mechanical considerations which do not always permit the torch tip to be thus supported, and if the torch tip is supported at the usual level, then by the time the oxygen stream strikes the work surface it has lost its sheet-like form and tends to shape itself into a stream having a somewhat elliptical cross-section, thus causing the scarfed surface to have a concave shape. Moreover, block tips having a slot type jet passage are likely to crack at the corners of the slot due to inadequate provision for heat dissipation and unequal expansion and contraction of the metal.

One object of this invention is to provide an improved method of scarfing which will leave a substantially smooth surface on the scarfed area of the work despite the use of oxygen jets which are discharged as individual jets and despite any accidental difference in the angularity of the jet passages.

Another object is to provide an improved type of torch tip structure adapted to carry out the method.

According to the improved method a row of individual oxygen jets are directed toward the surface of the work while the metal is at kindling temperature, and before the jets impinge on the surface of the work they are baffled to convert the individual jets into a more sheet-like form. Preferably the baffling is such that the scarfing jets are formed into a sheet of oxygen in which the oxygen is substantially uniform in density throughout an extent of the oxygen stream which corresponds to the width of the work area being scarfed. This uniformity in density of the oxygen does not exist in the case of a row of individual oxygen jets projected against the work surface in accordance with prior practice and where the jets are unaltered from the time they leave the discharge orifices to the time they impinge on the work surface because throughout the row of

jets there are regions between them that have relatively low oxygen density. Preferably both the upper and lower portions of the jets are baffled, but even when only the upper portions of the jets are baffled a substantial improvement can be obtained in the smoothness of the scarfed surface over prior practices. The baffling may be effected by passing the individual oxygen jets between upper and lower baffle plates, or baffling portions on the tip structure, which form a slot-like opening that converts the individual jets into the desired sheet-like stream. The extent to which the jets should be baffled will depend upon various circumstances, but when the passages from which the jets issue are of circular cross-section the baffling of the upper portion of the jets will in most cases not have to exceed that amount which is obtained when the upper baffle overlaps the discharge orifices of the jet passages approximately one-third of the radius of the discharge orifices, and the same is true of the baffling of the lower portion of the jets. The baffling of the oxygen jets regardless of their cross-sectional shape is effected preferably after the oxygen jets have expanded practically to atmospheric pressure, or have at least expanded a substantial amount after leaving their discharge orifices. Too great a degree of baffling, or premature baffling, tends to cause the jets to spray out and establish conditions that are undesirable so far as the contemplated results are concerned. The effect of the baffling is to displace the oxygen that forms the upper and lower crests of the jets and to fill the spaces between adjacent jets by such displaced oxygen to thereby produce a sheet-like oxygen stream in which the oxygen is substantially uniform in density throughout an extent of the oxygen stream which corresponds to the width of the work area being scarfed.

The improved method and apparatus adapted for use in carrying it out are illustrated in the accompanying drawings, in which:

Figures 1–3 illustrate the principle of the invention, both as to the method and the apparatus, Figure 1 being a broken perspective view of a simple form of block-type torch tip, minus the usual means for preheating the surface metal of the work-piece to kindling temperature, but provided with baffles for baffling the scarfing oxygen jets in accordance with the method, and Figures 2 and 3 being explanatory views illustrating the action of the baffles on the oxygen jets;

Fig. 4 is a perspective view, partly in section, of a block-type tip structure complete with means for preheating the surface metal of the work-piece to kindling temperature and that is adapted for use in carrying out the method;

Fig. 5 is a side elevation of the torch tip shown in Fig. 4;

Fig. 6 is a vertical longitudinal section through the torch tip shown in Fig. 4;

Fig. 7 is a transverse section taken on the line 7—7 of Fig. 6;

Fig. 8 is a top plan view of the torch tip shown in Fig. 4;

Fig. 9 is a plan view of the shoe that forms one section of the torch tip shown in Fig. 4 but drawn to a smaller scale;

Fig. 10 is a plan view, partly in section, of the preheat section of the torch tip shown in Fig. 4 but drawn to a smaller scale; and

Fig. 11 is a plan view, partly in section, of the scarfing section of the torch tip shown in Fig. 4 but drawn to a smaller scale.

Referring first to Figure 1, a torch tip of the block type is represented at 1. It has a nose portion formed by upper and lower sloping faces 2 and 3 which converge toward a front face 4 that constitutes the discharge face of the tip. Scarfing oxygen is delivered to the tip through an inlet pipe 5 and is distributed to a number of jet passages in the tip in a manner well understood in the art. The jet passages terminate in a row of discharge orifices 6 in the discharge face 4. The scarfing oxygen issues from these discharge orifices as individual oxygen jets one of which is represented at 7. The simple form of torch tip illustrated in Figure 1 has no provision for heating the surface metal of the work-piece to kindling temperature and therefore in the form shown would not be suitable for carrying out a scarfing operation. However it can be assumed that the surface metal of the billet or other work-piece to be scarfed, and represented at W, is heated to kindling temperature by any suitable preheating means positioned above the tip and arranged to project preheating flames against the surface of the work-piece above the upper baffle 8. The torch tip is supported so that the oxygen jets will be directed angularly against the surface of the work-piece as shown, and when the work-piece is moved under the torch tip in a direction opposite to that in which the oxygen jets are directed, or the torch tip is moved along the work-piece in the same direction as that in which the oxygen jets are directed, the surface metal will be progressively removed from the work-piece thermo-chemically, as is well understood in the art.

In accordance with the invention the torch tip is provided with a baffle 8 for baffling the upper portion of the oxygen jets 7, and preferably also with a lower baffle 9 for similarly baffling the lower portion of the jets. The upper baffle is attached to the upper sloping face 2 of the torch tip and the lower baffle is secured to the lower sloping face 3 of the torch tip. The upper baffle is adjustably connected to the tip so that it can be adjusted to vary the extent to which it projects beyond the discharge face 4 of the tip by any suitable means such as bolt and slot connections shown at 10. The lower baffle may also be adjustably connected to the torch tip in a similar manner. The baffles project beyond the discharge face 4 far enough so that their edges form a slot-like opening through which the oxygen jets pass after they have expanded practically to atmospheric pressure. The expansion of the jets to substantially atmospheric pressure is represented in Fig. 1 by the diverging character of the jets prior to the time they reach the edges of the two baffles. As previously stated the baffles displace oxygen from the upper and lower portions of the jets and cause the displaced oxygen to fill the voids between adjacent jets so that after the oxygen leaves the slot-like opening between the edges of the baffles it is in the form of a sheet in which the oxygen is substantially uniform in density in all parts of the stream.

The effect that the baffles have on the oxygen jets is represented diagrammatically in Figs. 2 and 3. The dark areas shown at 11 in Fig. 2 represent the discharge orifices in the torch tip where the scarfing oxygen is still in its compressed state. The lighter surrounding regions shown at 12 represent the less dense oxygen in the jets during and after the expansion of the jets. It is evident that without any baffling the oxygen jets tend to retain their individual character rather than blend or mingle with adjacent

jets, and this causes ridges to be left on the scarfed work surface as previously explained. The baffles 8 and 9, whose lower edges are represented by the lines 8' and 9' in Fig. 2, are adjusted so that they project the desired distance into the oxygen jets as depicted in this figure. The oxygen displaced from the upper portion 13 of each of the jets by the upper baffle and the oxygen displaced from the lower portion 14 of each of the jets by the lower baffle will then be caused to fill the spaces 15 between the oxygen jets. Thus the jets are mingled by the baffles into a sheet-like stream in which the oxygen is substantially uniform in density throughout the stream as represented in Fig. 3.

Figs. 4–11, inclusive, illustrate a somewhat more elaborate torch tip embodying the invention and adapted for use in carrying out the improved method. The torch tip shown in these figures is also of the block type but the tip block is a composite one made up of three principal sections, namely, a scarfing section having a discharge face from which the scarfing oxygen jets issue, a shoe section below the scarfing section, and a preheat section above the scarfing section adapted to direct preheating flames against the work to bring the surface metal to kindling temperature. The shoe section and the preheat section have edge portions which project beyond the discharge face of the scarfing section to form baffles corresponding to the baffles previously described.

Referring first to Fig. 4, the torch tip in its entirety is designated 20. It is shown in scarfing relation to a billet or work-piece W. The torch tip 20 is secured to a supporting structure, not shown, by threaded studs 21.

The scarfing section of the tip is shown at 22. Scarfing oxygen is delivered to and passes through this section of the tip by the means hereinafter described and issues from its discharge face 22' as a series of individual oxygen jets.

The preheat section is shown at 24. A combustible gas mixture delivered to the preheat section 24 issues from a row of discharge orifices in its discharge face 24' and when ignited produces a row of preheating flames some of which are shown at 25. The preheat section is secured to the scarfing section by bolts 26.

The shoe section is shown at 27. It is secured to the scarfing section by means of bolts 28. Plates 29 welded along their lower edge portions to the end faces of the shoe section are secured to the side faces of the scarfing section by bolts 30 and thereby support the forward portion of the shoe section. Only one of these plates appears in Fig. 4 but both of them are shown in Fig. 8.

The preheat section 24 rests on the upper surfaces 31 and 31' of the scarfing section as shown in Fig. 6. It is capable of limited forward and rearward adjustment on these surfaces. To permit this adjustment the stem portions of the bolts 26 pass through slots 32 (Fig. 8) in the preheat section and the head portions of the bolts are received by larger slots 32'. At the bottom of the larger slots there is a shoulder 34 (Figs. 5 and 8) with which the bolt heads cooperate in clamping the preheat section to the scarfing section. The position of the shoulders 34 is such that the tops of the bolts 26 lie substantially flush with the top surface of the preheat section as best shown in Fig. 4.

The preheat section 24 is provided with an inlet connection 35 (Figs. 5 and 6) having a central passage 36 for the preheat oxygen. The end of the inlet connection is tapered or conical as shown at 37 and is provided with an annular recess 38 from which a number of diagonal passages 39 lead to the central oxygen passage 36. The inlet connection is also provided with a number of cooling water passages 40 surrounding the central oxygen passage 36 and having inlet openings 40' in the conical surface 37 of the inlet connection. The conical end of the inlet connection is adapted to be clamped by means of a nut 41 in a conical seat in a head that forms part of gas and water supply means (not shown) and having suitable supply passages for supplying preheat oxygen to the central passage 36, acetylene or other fuel-gas to the annular recess 38, and cooling water to the passages 40. The fuel-gas supplied to the annular recess 38 passes through the diagonal passages 39 and mixes with the preheat oxygen in the central passage 36 to form a combustible gas mixture which is delivered by means of a passage 42 in the preheat section to a distributing chamber 43 (Figs. 6 and 10) which extends longitudinally of the preheat section. The gas mixture passes from this chamber through a number of passages 44 into a second distributing chamber 45. From the second distributing chamber the gas mixture passes through a number of passages 46 to a third distributing chamber 47. This chamber distributes the gas mixture to the jet passages 48 which deliver it to the discharge face 24' of the preheat section where it issues as a row of jets which, when ignited, produce the preheating flames 25 (Fig 4).

The cooling water supplied to the passages 40 in the inlet connection passes into an annular chamber 49 in the preheat section (Fig. 6), then into a passage 50 which conducts it toward the forward end of the preheat section to a longitudinal passage 51 (Fig. 10). This passage conducts the cooling water toward the right end of the preheat section as viewed in Fig. 10 where a connecting passage (which does not show in Fig. 10) delivers it to another longitudinal passage 52 which conducts it to the opposite end of the tip. The cooling water then passes through a connecting passage 53, similar to the connecting passage at the right end of the preheat section, to a return longitudinal passage 54, then through passages 55 and 56 to a discharge tube 57. Of course, any other suitable arrangement of cooling passages could be used.

Scarfing oxygen is supplied to the scarfing section 22 through an inlet nipple 58 (Fig. 6). It first passes into a longitudinal distributing chamber 59 (Figs. 6 and 11), then into a second longitudinal distributing chamber 60 through a series of passages 61, and then into a third longitudinal distributing chamber 62 through a series of passages 63. The three distributing chambers 59, 60 and 62 are preferably successively smaller in cross-sectional area. The third distributing chamber 62 distributes the scarfing oxygen to a row of jet passages 64 which deliver it to the discharge face 22' of the scarfing section from which it issues as the previously described scarfing jets.

The scarfing section is also preferably provided with a cooling system which may comprise an arrangement of cooling water passages similar to that used in the preheat section. As best shown in Fig. 11, cooling water is introduced through an inlet connection 65 and then passes

successively through passages 66, 67, 68, 69 and 70 to an outlet connection 71.

Attached to the underside of the shoe 27 is a plate 72 (Fig. 6) made of wear-resistant material. It extends longitudinally along the forward edge portion of the shoe and is secured in place in any suitable way as by means of the rivets 13. The plate rides on the surface of the work-piece and protects the other parts of the torch tip from wear.

The shoe section may also be provided with a cooling system, if desired, formed by any suitable arrangement of cooling water passages. Fig. 9 shows one arrangement that may be employed. The shoe is drilled longitudinally to provide three parallel passages 74, 75 and 76 which are plugged at their ends. The shoe is also drilled from its rear face to provide three parallel passages 77, 78 and 79 extending at right angles to the longitudinal passages. The passage 77 communicates at its rear end with a water inlet tube 80. This passage intersects all three of the longitudinal passages. The passage 78 is plugged at its rear end and intersects only two of the longitudinal passages, namely, passages 74 and 75. The passage 79 communicates at its rear end with an outlet tube 81 and intersects all three of the longitudinal passages, but a plug 82 closes off the passage 79 at a point between the longitudinal passages 74 and 75. A plug 83 closes off the longitudinal passage 74 at a point between the inlet passage 77 and the adjacent passage 78, and a plug 84 similarly closes off the longitudinal passage 75 at a point between the passages 77 and 78. There is thus provided a tortuous and continuous path through the shoe for the cooling water as follows: inlet 80, passage 77, passage 76, forward portion of passage 79, passage 75 as far as the plug 84, passage 78, that part of passage 74 to the left of plug 83, and the rear portion of passage 79 to the outlet 81.

As best shown in Figs. 5 and 6 a portion of the preheat section projects forwardly beyond the discharge face 22' of the scarfing section to provide a projecting lip 85, and a portion of the shoe section similarly projects forwardly beyond the discharge face of the scarfing section to provide a projecting lip 86. The edges of these two lips correspond to the forward edges of the baffle plates described in connection with Fig. 1 and act on the oxygen scarfing jets issuing from the jet passages 64 to produce the result hereinbefore described. The baffling effect that the edges of the projecting lips 85 and 86 have on the scarfing jets may be varied by adjusting the preheat section forwardly or rearwardly on the scarfing section and also, if necessary, by replacing the shoe section with another one having a lip 86 which projects a greater or lesser distance beyond the discharge face of the scarfing section.

While the baffling effect is preferably obtained in a three piece composite torch tip of the kind shown in Figs. 4–11 by integral portions of the preheat section and the shoe section which project forwardly beyond the discharge face of the scarfing section, as above described, it may be obtained if desired by plates or shims inserted between the three sections of the tip and projecting forwardly beyond the discharge face of the scarfing section.

The preheating flame jets are preferably directed toward substantially the same area of the work surface as the oxygen scarfing jets. Adjustment of the preheat section to vary its baffling effect on the scarfing oxygen jets does not change this condition because the adjustment of the preheat section does not alter the angular relationship between the preheating flame jets and the scarfing jets. Moreover, it will be observed that baffling of the oxygen scarfing jets by the projecting portion of the preheat section is accomplished without in any way interfering with the preheating flame jets since they issue from a discharge face which lies above the baffling edge on the preheat section.

The provision of two baffles is not always necessary. In some cases a single baffle acting only on the upper portions of the oxygen scarfing jets and mingling them into a more sheet-like form may be sufficient to produce a scarfed surface on the work-piece having the desired degree of smoothness.

The turbulence produced in the oxygen scarfing jets by the baffle or baffles gives better heat distribution throughout the oxygen stream due principally to the fact that the oxygen stream is already turbulent when it comes under the heating influence of the preheating flames. This also contributes toward smoother scarfing.

Not only does the invention make it possible to obtain a smoother scarfed surface on the work-piece than heretofore but it effects a considerable saving in the consumption of scarfing oxygen.

I claim:

1. Apparatus for scarfing metal bodies comprising a torch tip structure having a plurality of scarfing oxygen jet passages terminating in a row of discharge orifices, means for supplying scarfing oxygen to said jet passages for issuance from said discharge orifices as a row of scarfing jets, and baffling means common to all of the jets of said row and acting on the jets forwardly of said discharge orifices to mingle the jets into a more sheet-like form.

2. Apparatus for scarfing metal bodies comprising a torch tip of the block type having a discharge face and having a plurality of scarfing oxygen jet passages drilled into the block and terminating in a row of discharge orifices in said discharge face, and means for supplying scarfing oxygen to said jet passages for issuance from said discharge orifices as a row of scarfing jets, said tip having baffling means common to all of the jets of said row and acting on the jets forwardly of said discharge orifices to mingle the jets into a more sheet-like form.

3. Apparatus for scarfing metal bodies comprising a torch tip structure having a plurality of scarfing oxygen jet passages terminating in a row of discharge orifices, means for supplying scarfing oxygen to said jet passages for issuance from said discharge orifices as a row of scarfing jets, and means extending throughout the length of said row of discharge orifices and positioned at least partially in the path of jets of scarfing oxygen issuing from said discharge orifices and forming a slot-like opening located forwardly of said discharge orifices at such a distance and having such width that the scarfing jets pass through said opening after they have expanded a substantial amount after leaving the discharge orifices and are thereby converted into a sheet-like stream of oxygen in which the oxygen is substantially uniform in density throughout an extent of the oxygen stream which corresponds to the width of the work area being scarfed.

4. Apparatus for scarfing metal bodies comprising a torch tip having a scarfing section and

a preheat section above the scarfing section, the scarfing section having a discharge face and a plurality of jet passages terminating in a row of discharge orifices in said discharge face and further having means for supplying scarfing oxygen to said jet passages for issuance from said discharge orifices as a row of scarfing jets, said preheat section having a discharge face and a plurality of jet passages terminating in a row of discharge orifices in the discharge face and further having means for supplying a combustible gas mixture to the jet passages for issuance from the discharge orfices as a row of jets of combustible gas which when ignited produce a row of preheating flames, and the preheat section having a portion which projects forwardly beyond the discharge face of the scarfing section an edge of which is adapted to be engaged by the oxygen scarfing jets after they have expanded a substantial amount to mingle them into a more sheet-like form.

5. Apparatus for scarfing metal bodies in accordance with claim 4 in which the jet passages in the scarfing section and those in the preheat section lie in planes which intersect substantially at the work surface.

6. Apparatus for scarfing metal bodies in accordance with claim 5 having means by which the preheat section is adjustable on the scarfing section substantially in the plane of the preheat jet passages.

7. Apparatus for scarfing metal bodies including a torch tip comprising a scarfing section provided with a discharge face and having means for projecting a row of individual jets of scarfing oxygen from such discharge face at an angle to the work surface, and a preheat section located above the scarfing section and having means for projecting preheating flames at an angle against the work surface, said preheat section having a portion which projects forwardly beyond the discharge face of the scarfing section and which is adapted to be engaged by the scarfing jets after they have expanded a substantial amount to mingle them into a more sheet-like form.

8. Apparatus for scarfing metal bodies including a torch tip comprising a scarfing section provided with a discharge face and having means for projecting a row of individual jets of scarfing oxygen from such discharge face at an angle to the work surface, a preheat section located above the scarfing section and having means for projecting preheating flames at an angle against the work surface, and a shoe for supporting the scarfing section on the work, the preheat section and the shoe having portions projecting forwardly beyond the discharge face of the preheat section and which are arranged to be engaged by the scarfing oxygen jets after they have expanded a substantial amount to convert them into a sheet-like stream of oxygen.

9. Apparatus for scarfing metal bodies including a torch tip comprising a scarfing section having a discharge face and means for projecting a row of oxygen scarfing jets from such discharge face at an angle to the work surface, said means including jet passages arranged in a plane inclined with respect to the work surface, a preheat section above the scarfing section and having means for projecting preheating flames at an angle to the work surface, said last-named means including jet passages arranged in a plane inclined with respect to the work surface so that the preheating flames impinge on the work surface substantially at the same region as the scarfing jets, said preheat section having a portion which projects forwardly of the discharge face on the scarfing section and which acts on the scarfing jets after they have expanded a substantial amount to mingle them into a more sheet-like form, and said preheat section being adjustable on the scarfing section substantially in the plane of the preheat jet passages.

10. Apparatus for scarfing metal bodies comprising a torch tip structure having a plurality of scarfing oxygen jet passages terminating in a row of discharge orifices, means for supplying scarfing oxygen to said jet passages for issuance from such discharge orifices as a row of scarfing jets, and a baffle common to all of the jets of said row and acting on the jets forwardly of said discharge orifices to mingle the jets into a more sheet-like form, the baffle being adjustable forwardly and rearwardly to vary the extent of the baffling action of the baffle on the jets.

11. Apparatus for scarfing metal bodies comprising a torch tip structure having a plurality of scarfing oxygen jet passages terminating in a row of discharge orifices, means for supplying scarfing oxygen to said jet passages for issuance from said discharge orifices as a row of scarfing jets, and means extending throughout the length of said row of discharge orifices and positioned at least partially in the path of jets of scarfing oxygen issuing from said discharge orifices and forming a slot-like opening located forwardly of said discharge orifices and through which all of the oxygen jets pass and which acts on the jets to mingle them into a more sheet-like form.

12. The method of scarfing metal bodies which comprises projecting flame jets against the surface of the work to heat the surface metal to kindling temperature, discharging oxygen from a row of discharge orifices to produce a row of individual oxygen jets and directing said oxygen jets toward the surface of the work while the surface metal is at kindling temperature, and in addition to any action which the flame jets may have on the oxygen jets baffling the oxygen jets after the oxygen forming them leaves the discharge orifices and before the oxygen jets impinge on the surface of the work to mingle the oxygen jets into a more sheet-like form.

13. The method of scarfing metal bodies which comprises projecting flame jets against the surface of the work to heat the surface metal to kindling temperature, discharging oxygen from a row of circular discharge orifices to produce a row of individual oxygen jets which are initially of circular cross-section and directing said oxygen jets toward the surface of the work while the surface metal is at kindling temperature, and in addition to any action which the flame jets may have on the oxygen jets baffling the upper portion of the oxygen jets after they leave the discharge orifices and before the oxygen jets impinge on the surface of the work to mingle the oxygen jets into a more sheet-like form.

14. The method of scarfing metal bodies which comprises projecting flame jets against the surface of the work to heat the surface metal to kindling temperature, discharging oxygen from a row of circular discharge orifices to produce a row of individual oxygen jets which are initially of circular cross-section and directing said oxygen jets toward the surface of the work while the surface metal is at kindling temperature, and in addition to any action which the flame jets may have on the oxygen jets baffling the upper and lower portions of the oxygen jets after they

leave the discharge orifices and before the oxygen jets impinge on the surface of the work to convert the oxygen jets into a flattened sheet in which the oxygen is substantially uniform in density throughout an extent of the oxygen sheet which corresponds to the width of the work area being scarfed.

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REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
1,676,564	Lausen	July 10, 1928
2,058,388	Rendleman	Oct. 20, 1936
2,290,295	Scheller	July 21, 1942
2,347,758	Walker et al.	May 2, 1944
2,356,196	Barnes et al.	Aug. 22, 1944
2,356,197	Jones et al.	Aug. 22, 1944
2,398,884	Crowe	Apr. 23, 1946