

Jan. 8, 1946.

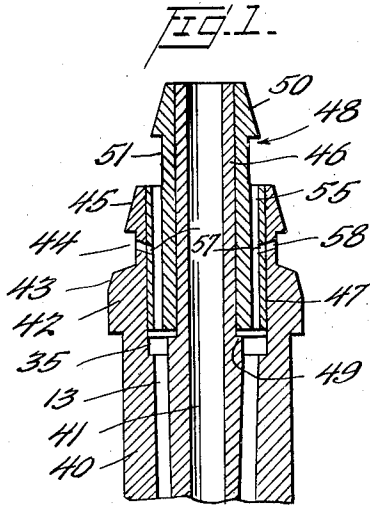
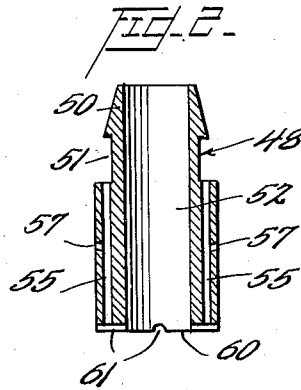
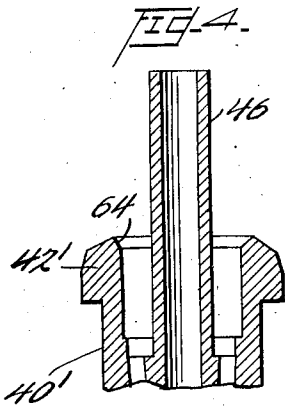
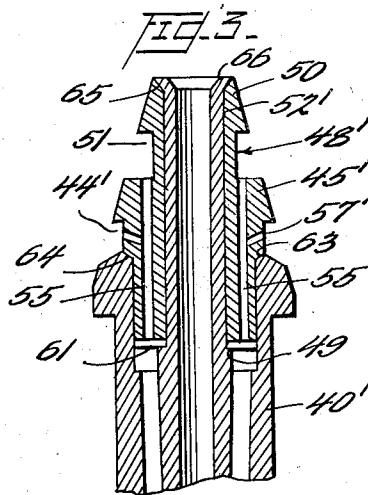
A. F. JENKINS

2,392,593

TORCH TIP

Filed Feb. 2, 1944

2 Sheets-Sheet 1



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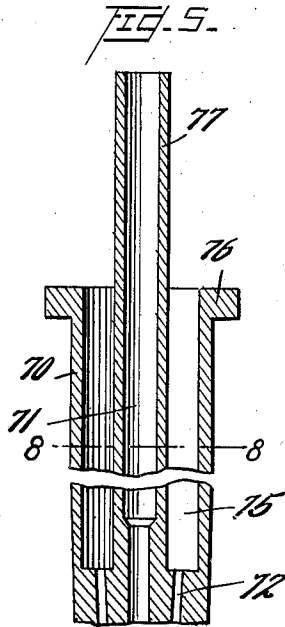
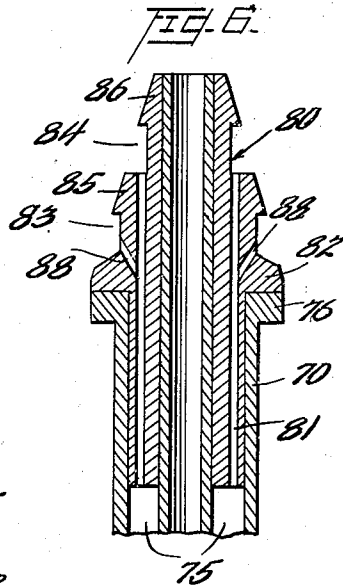
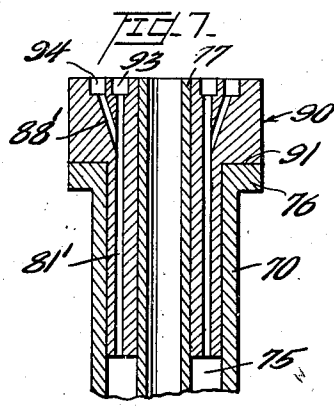
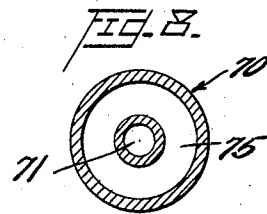
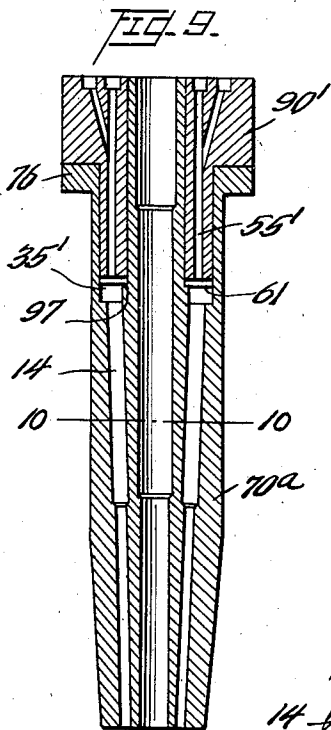
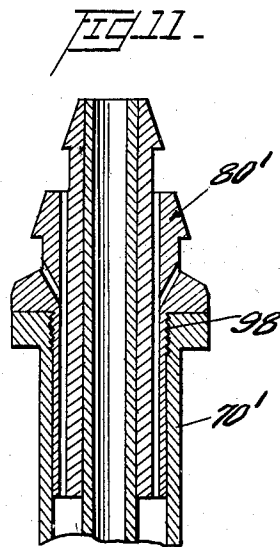
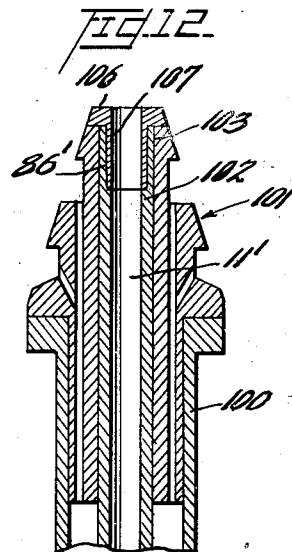
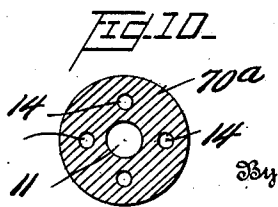
A. F. JENKINS

2,392,593

TORCH TIP

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,392,593

TORCH TIP

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7 Claims. (Cl. 158—27.4)

This invention relates to blowpipes or torches of the type using burning gases for cutting, welding, and other purposes, and has particular reference to the detachable mixing and discharge tips for such torches.

The general object of the invention is to provide novel and improved torch tips which may be easily and economically constructed and maintained in service, which are not likely to foul up, and which will not flash back even under conditions of operation most conducive to that annoying and dangerous contingency.

Another object of the invention is the provision of a torch tip of this character which affords means for mixing the fuel and combustion supporting gases more thoroughly and efficiently, and for expanding them and controlling their flow toward the outlet orifices of the tip.

In prior torch tips, difficulty has been experienced in insuring that all of the multiple passageways for the heating gases are of uniform size, shape, and capacity. Such fine passageways are employed in these tips for introducing and mixing the gases that small burrs left from the drilling operation, or particles of dirt, often cut down the capacity of one or more of the passageways and thus alter considerably the nature of the resulting flame. One of the features of the present invention involves novel provisions for equalizing the flow of the gases issuing from the tip even though one or more of the inlet passageways are obstructed, even to the extent of being completely stopped up.

A further object is to provide a novel and improved insertable part containing all of the minute passageways located at the rear end of the tip, whereby all of the machining and finishing of the more intricate portions of the tip at that end may be done before assembly and with greater facility.

Still another object is to provide a two part tip combination in which a substantially standardized body member may be used, and which may be adapted to a flat end form or a conical shank form by the application of an appropriate interfitting insert member.

Other objects and features of novelty will be apparent from the following specifications when read in connection with the accompanying drawings in which certain embodiments of the invention are illustrated by way of example.

Figure 1 is a view in vertical section of a tip of the conical shank type to which my invention has been applied;

Figure 2 is a similar view of an insert therefor;

Figure 3 is a sectional view of a modified form of tip of the type shown in Figure 1;

Figure 4 is a fragmentary sectional view of the tip shown in Figure 3 before the insert is applied;

Figure 5 is a longitudinal sectional view of a standardized tip body portion which is adapted for use in providing either a flat top or a conical shank tip;

Figure 6 is a similar view of the rear end of a tip of the conical shank type using the body member;

Figure 7 is a similar view of the rear end of a tip of the flat top type using the standardized body member;

Figure 8 is a transverse sectional view through the intermediate portion of the tip shown in Figures 5, 6, and 7, taken on line 8—8 of Figure 5, and indicating the annular nature of the intermediate mixing chamber;

Figure 9 shows a built-up tip similar to that of Figure 7 but having a short or relatively shallow annular mixing chamber;

Figure 10 is a transverse sectional view taken on line 10—10 of Figure 9;

Figure 11 shows a modified form of the built-up two-part tip of Figure 6; and

Figure 12 is a longitudinal sectional view showing further modification of the conical shank type of tip.

The general provisions for introducing, mixing, and expanding the combustible gases are basically similar to the disclosures in my prior Patent No. 1,869,260, granted July 26, 1932. However, the present tip embodies a radical improvement over the prior constructions in the provision of annular expansion and equalizing chambers of improved design. Such annular passageways provide communication around the tip between all of the forward gas passageways and the fine injection bores in the rear end of the tip, and if any one or more of the bores or passageways become clogged, the gases supplied by the remaining ducts or bores will be distributed among the several forward passageways and there will be little or no change in the character of the flame produced.

Furthermore, the passageways of the present tips are less likely to be obstructed by burrs or imperfections, by virtue of the method of manufacture pursued. The finer passageways through which the gases are introduced are formed in the insert member and are drilled, cleaned out, and carefully finished before the insert member is applied to the tip body.

In Figures 1 and 2 of the drawings, there is shown a tip of the conical shank type to which the principles of the present invention have been applied. This tip is designated by the reference numeral 40 and is provided with the axial oxygen passageway 41 and the series of combustible gas passageways 13. The shank end of the tip is formed with the shoulder 42 which carries the beginning of the frustoconical tapered surface common to such tips, and, as indicated at 43, an annular groove 44 separates the shoulder 42 from the intermediate frustoconical shoulder 45. Centrally of the tip body, there is provided the elongated rearwardly projecting tubular portion 46. Between this axial tubular portion 46 and the outer wall of the tip carrying the shoulders 42 and 45, there is an annular recess 47 into which is forced the insertable member 48. The inner portion of the recess 47 is shouldered as at 49.

The insert 48 is shown in longitudinal section in Figure 2 of the drawings and it will be seen that this element is provided with the frustoconical rear end portion 50, which forms the third and rearmost shoulder of the series on the shank of the tip. The insert is cut away as at 51 to form the second annular groove into which gases may be delivered from the torch body. The interior bore 52 of the insert has a forced fit with the outer wall of the tubular extension 46 of the tip body. An appropriate number of fine bores or mixing passageways 55 are formed in the insert and these bores lead from the gas supplying groove 51 to the forward end of the recess 47 where they are preferably in substantial alignment with the passageways 13. The insert members 48 are drilled diagonally as at 57 to provide lateral communication with the intermediate portions of the bores 55, and these passageways 57 register with similar passageways 58 drilled through the shank of the tip body portion and opening into the first groove 44 which communicates with the oxygen supplying passageways in the torch body member. The forward annular surface 60 of the insert 48, which abuts the shoulder 49 is provided with radial grooves 61 which intersect the respective openings of the bores 55. It has been found that the provision of these grooves or channels 61 improves the operation of the tip especially in connection with the use of the annular equalizing chamber 35. It is thought that these grooves function to provide a slight individual expansion for the gases passing from the bores 55 into the equalizing passageway 35.

There is illustrated in Figures 3 and 4 of the drawings a conical seating tip of the same general character as the one shown in Figures 1 and 2. This tip is designated generally by the reference character 40' and the passageways in the forward body portion thereof are the same as those shown in the preceding two figures. However, the shank end of the body of this tip is formed differently, the intermediate frustoconical shoulder as well as the rearmost shoulder being carried by the insert. The forward shoulder of the tip is designated 42' and the rearward tubular extension 46 is substantially the same as the corresponding one in Figure 1. The insert 48' carries the rear shoulder 50 and an intermediate shoulder 45' between which the groove 51 is located. The intermediate portion of the insert is extended forwardly to the point where its shoulder 63 abuts a corresponding shoulder 64 on the body portion. At this intermediate portion the groove 44' is formed and the diagonal

passageway 57' connects the groove 44' with each bore 55. In this embodiment especially long bores are provided, giving a very thorough injecting and mixing effect. The forward end of the insert abuts the shoulder 49 and radial grooves 61 intersect the openings of the bores 55 as in the case previously described.

In order to secure the insert 48' firmly to the body portion of the tip, and to seal off the joining surfaces of the bore 52' and the tubular portion 46, the rear end of the bore 52' is bevelled or countersunk as at 65 and the rear end 66 of the tubular extension 46 is spun over the bevelled portion, all as clearly shown in Figure 3 of the drawings.

Not the least important feature of the invention is the provision of tips of this general character which comprise a more or less standardized body portion to which selected inserts may be applied to provide either a flat end shank or a conical seating shank. In Figure 5 of the drawings such a standardized body portion is shown at 70. A central oxygen passageway 71 is provided extending through the tip. The forward tapered end of the tip is provided also with somewhat convergent discharge passageways 72 which lead from the elongated annular mixing and equalizing chamber 75. Near the rear end of the tip the shoulder 76 is formed and extending further rearwardly is the central tubular portion 77. In Figure 6 of the drawings, there is shown the conversion of this body portion into a conical seating torch tip and insert 80 is used to accomplish this adaptation. The forward tubular portion of the insert 80 extends for a considerable distance into the annular chamber 75 and is provided with the combustion gas bores 81. A rather wide forward shoulder 82 is formed on the insert and this shoulder is coextensive with and adapted to contact closely the rear face of the shoulder 76 on the tip body. The two shoulders 76 and 82 provide the first partly conical enlargement of this type of tip. Both of the gas grooves 83 and 84 and the other two shoulders 85 and 86 are formed upon the insert, and the diagonal oxygen supplying bores 88 are also formed completely in the insert to connect the groove 83 with the mixing bores 81. The body portion 70 is shown converted to a flat end tip in Figure 7 of the drawings. The insert 90 accomplishes this transformation, it being necessary, however, to cut off a portion of the rearwardly extending tubular element 77 of the tip body. A shoulder 91 of the insert abuts the shoulder 76 of the body portion, the insert is provided with the gas conducting and mixing bores 81' and the oxygen introducing passageways or bores 88' are formed in the rear part of the insert. The gas bores 81' communicate with the groove 93 and the passageways 88' connect with the groove 94.

From this it will be seen that a supply of blank tip bodies can be made from uniform specifications and then converted to either type of tip desired. Furthermore, the tip shown in Figures 5 to 8 inclusive retains one of the basic features of the invention, namely, the annular expansion and equalizing chamber, which in this case, however, is considerably elongated in an axial direction.

In Figures 9 and 10 of the drawings there is shown a two part interchangeable tip made under the same general principles governing the construction of the forms shown in the immediately preceding figures, but retaining the equalizing and expansion features of the tips shown in Fig-

ures 1 and 3. The expansion chambers 14 are retained and the rearward recess of the body portion of the tip is shouldered as at 97. The insert 90' is similar to the insert 90 shown in Figure 7 but is provided with the radial grooves 61 intersecting the discharge ends of the ducts 55'. The annular equalizing chamber 35' performs the same function as the equivalent chambers earlier described.

In Figure 11 of the drawings there is shown a slightly modified form of the invention comparable to the embodiment illustrated in Figure 6 and adapted for use in the interchangeable tip assemblies. The various parts are the same as shown in Figure 6 except for the provision of the screw threaded connection 96 between the insert 80' and the tip body 70'. This threaded connection serves to secure the parts together more firmly, and may in some cases be preferred to a driving fit.

In Figure 12 of the drawings a tip of the conical seating type is shown which comprises a modification of the arrangements shown in Figures 3 and 6 of the drawings. The body portion 100 is quite similar to the portion 70 of Figure 6 and the insert 101 corresponds in many details with the insert 80 of Figure 6. However, in order to effectively seal off the meeting surfaces of the inner tubular portion 102 of the body 100 and the rearward portion 103 of the insert, certain novel provisions are made. Both of these portions are cut off a short distance from the ultimate end of the tip and the central oxygen bore 11' of the body portion is recessed as at 105 for a short distance from its rearward end. A cap member 106 having a frustoconical rear end forming the tapered continuation of the shoulder 88' of the insert, and a tubular portion 107, is applied to the end of the tip. This cap element may have either a forced fit with the other parts with which it contacts or it may be soldered into place. In either case, it serves effectually to seal off the rear contacting surfaces of the parts of the tip, streamlining the gas contacting surfaces and preventing gas seepage and deterioration at the other contacting points.

Various changes or modifications may be made in the embodiments illustrated and described herein without departing from the scope of the invention as defined in the subjoined claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A torch tip of the class described comprising, in combination, a main one-piece body portion provided with an axial oxygen passageway and an annular series of combustion gas passageways opening through discharge orifices in the front end of the tip, an annular recess formed in the rear end of the tip body from which said gas passageways lead, the central portion of the tip body extending rearwardly beyond the radially outer portions of said body as a relatively narrow tubular projection, an annular insertable member fitting snugly within the recess but terminating short of the forward end thereof whereby an annular chamber is provided forwardly of the member, said member being provided with a series of gas admission passageways leading to said chamber, whereby the distribution of gases from said admission passageways to the gas passageways in the tip body portion may be equalized, the insertable member also extending rearwardly beyond the radially outer portions of the body of the tip and fitting the tubular axial projection

of the body tightly and being coterminous therewith.

2. A torch tip of the class described comprising, in combination, a main one-piece body portion provided with an axial oxygen passageway and an annular series of combustion gas passageways opening through discharge orifices in the front end of the tip, an annular recess formed in the rear end of the tip body from which said gas passageways lead, the central portion of the tip body extending rearwardly beyond the radially outer portions of said body as a relatively narrow tubular projection, an annular insertable member fitting snugly within the recess but terminating short of the forward end thereof whereby an annular chamber is provided forwardly of the member, said member being provided with a series of gas admission passageways leading to said chamber whereby the distribution of gases from said admission passageways to the gas passageways in the tip body portion may be equalized, the insertable member also extending rearwardly beyond the radially outer portions of the tip body and fitting the tubular axial projection of the body tightly, and being coterminous therewith, the rearwardly extending portion of the insertable member being formed with flanges and grooves adapted to interfit with complementary parts of a torch body for segregating the gases and conducting them to the proper passageways.

3. A torch tip of the class described comprising, in combination, a main one-piece body portion provided with an axial oxygen passageway and an annular series of combustion gas passageways opening through discharge orifices in the front end of the tip, an annular recess formed in the rear end of the tip body from which said gas passageways lead, the central portion of the tip body extending rearwardly beyond the radially outer portions of said body as a relatively narrow tubular projection, an annular insertable member fitting snugly within the recess but terminating short of the forward end thereof whereby an annular chamber is provided forwardly of the member, said member being provided with a series of gas admission passageways leading to said chamber whereby the distribution of gases from said admission passageways to the gas passageways in the tip body portion may be equalized, the insertable member also extending rearwardly beyond the radially outer portions of the tip body and fitting the tubular axial projection of the body tightly, and being coterminous therewith the rearwardly extending portion of the insertable member being formed with frustoconical flanges and laterally opening grooves adapted to interfit with complementary parts of the conical socket of a torch body for segregating the gases and conducting them to the proper passageways.

4. A torch tip of the class described comprising, in combination, a main one-piece body portion provided with an axial oxygen passageway and an annular series of combustion gas passageways opening through discharge orifices in the front end of the tip, an annular recess formed in the rear end of the tip body from which said gas passageways lead, the central portion of the tip body extending rearwardly beyond the radially outer portions of said body as a relatively narrow tubular projection, an annular insertable member fitting snugly within the recess but terminating short of the forward end thereof whereby an annular chamber is provided forwardly of the member, said member being provided with a series of gas admission passageways leading to said cham-

ber whereby the distribution of gases from said admission passageways to the gas passageways in the tip body portion may be equalized, the insertable member also extending rearwardly beyond the radially outer portions of the tip body and fitting the tubular axial projection of the body tightly, and being coterminous therewith, the opening in the rear end of the annular insertable member being flared and the projecting tubular part of the tip body being spun outwardly into the flared portion of said opening to seal the parts together.

5. A torch tip of the class described comprising, in combination, a main one-piece body portion provided with an axial oxygen passageway and an annular series of combustion gas passageways opening through discharge orifices in the front end of the tip, an annular recess formed in the rear end of the tip body from which said gas passageways lead, the central portion of the tip body extending rearwardly beyond the radially outer portions of said body as a relatively narrow tubular projection, an annular insertable member fitting snugly within the recess but terminating short of the forward end thereof whereby an annular chamber is provided forwardly of the member, said member being provided with a series of gas admission passageways leading to said chamber whereby the distribution of gases from said admission passageways to the gas passageways in the tip body portion may be equalized, the insertable member also extending rearwardly beyond the radially outer portions of the tip body and fitting the tubular axial projection of the body tightly, and being coterminous therewith the rearwardly extending portion of the insertable member being formed with frustoconical flanges and laterally opening grooves adapted to interfit with complementary parts of the conical socket of a torch body for segregating the gases and conducting them to the proper passageways, the extreme coterminous rear ends of the insert member and the tubular projection of the body being transversely cut off and the inner wall of the tubular part being recessed, and a sealing cap applied to the thus altered rear end of the tip, said cap having a frustoconical flange overlying the end of the tip and a tubular projection oc-

cupying the recessed portion of the tubular body projection.

6. A torch tip of the class described comprising, in combination, a main one-piece body portion provided with an axial oxygen passageway and an annular series of combustion gas passageways opening through discharge orifices in the front end of the tip, an annular recess formed in the rear end of the tip body from which said gas passageways lead, the central portion of the tip body extending rearwardly beyond the radially outer portions of said body as a relatively narrow tubular projection, an annular insertable member fitting snugly within the recess but terminating short of the forward end thereof whereby an annular chamber is provided forwardly of the member, said member being provided with a series of gas admission passageways leading to said chamber whereby the distribution of gases from said admission passageways to the gas passageways in the tip body portion may be equalized, the insertable member also extending rearwardly beyond the radially outer portions of the tip body and fitting the tubular axial projection of the body tightly, and being coterminous therewith and cooperating threaded portions on the insertable member and the body of the tip for securing these parts together.

7. A torch tip blank comprising a standardized one-piece body member to which selectable shank elements may be secured, said member being approximately cylindrical but with a radial flange adjacent its rear end providing a shoulder by means of which the tip may be clamped to a torch body, an axial oxygen passageway in the member, an annular series of gas passageways surrounding the oxygen passageway, an annular recess in the member opening rearwardly thereof and in communication with said gas passageways, said recess being spaced radially from said axial oxygen passageway the central portion of the member within the recess being continued rearwardly beyond the radially outer portions to form a relatively narrow tubular projection, said recess being adapted to receive the selected shank element, whether for flat or conical socket torch bodies.

ALEXANDER F. JENKINS.