Aug. 11, 1959 L. M. HOESE ET AL 2,899,536

CLEANING TORCH

Filed March 13, 1957 2 Sheets-Sheet 1

Fig. 1.

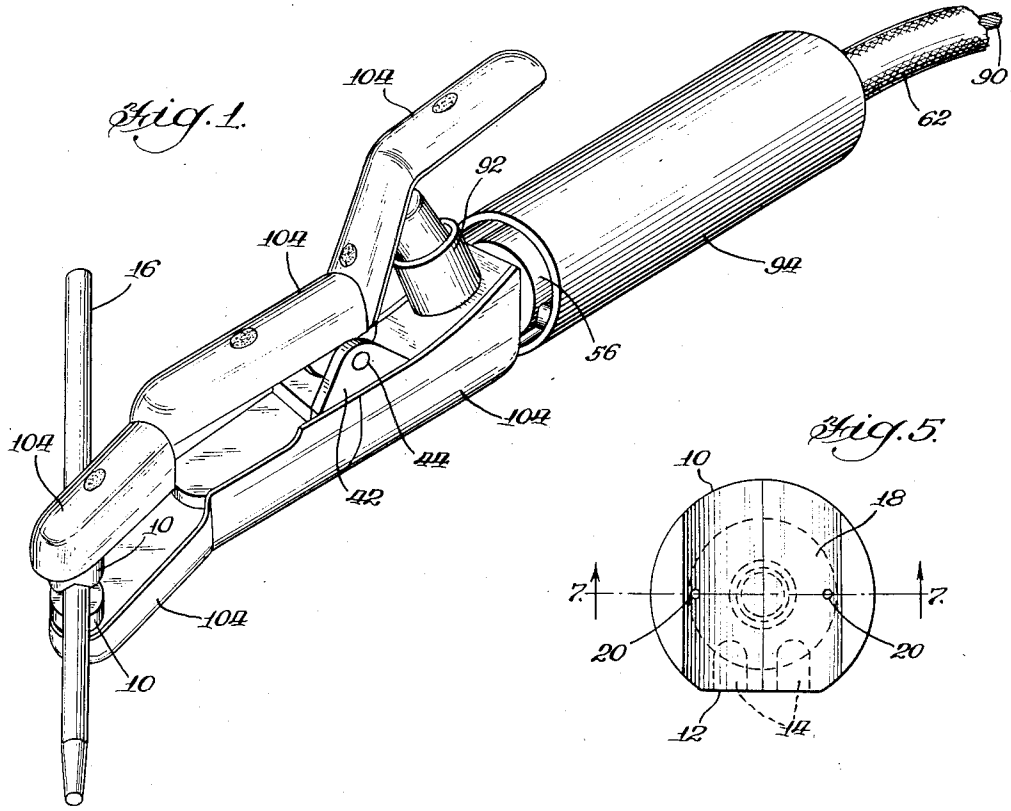
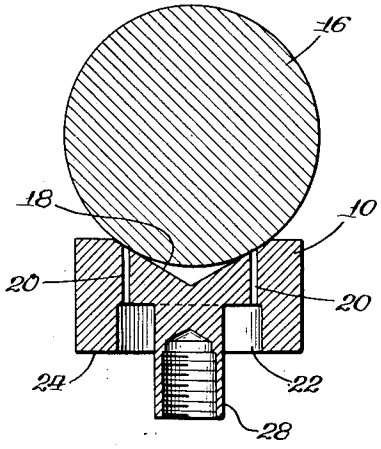


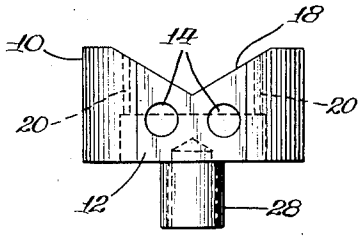
Fig. 5.

Fig. 7.



Witness:

Fig. 6.



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Fig. 2.

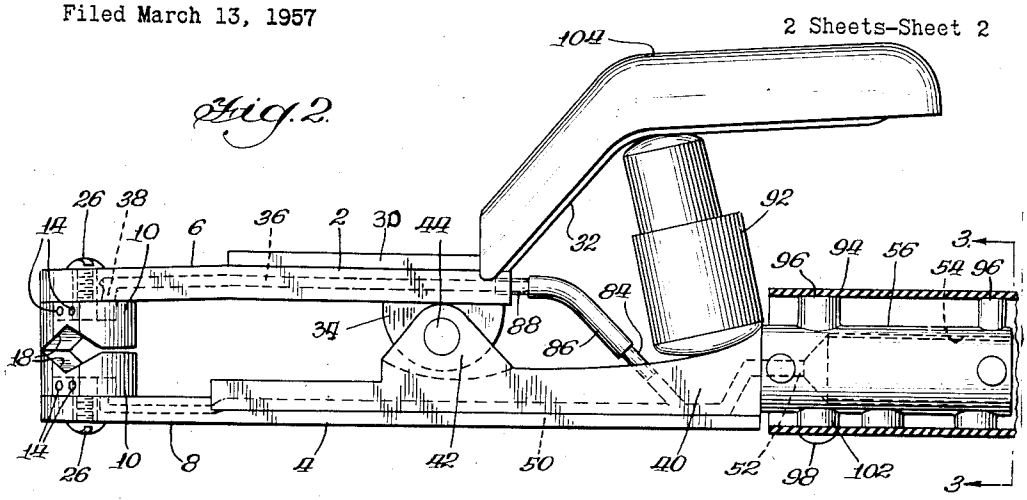


Fig. 3.

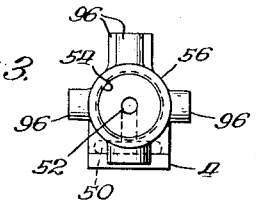


Fig. 4.

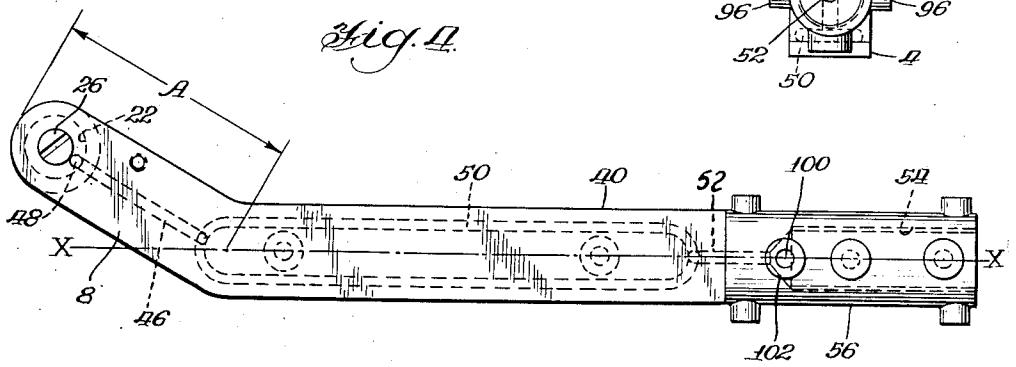
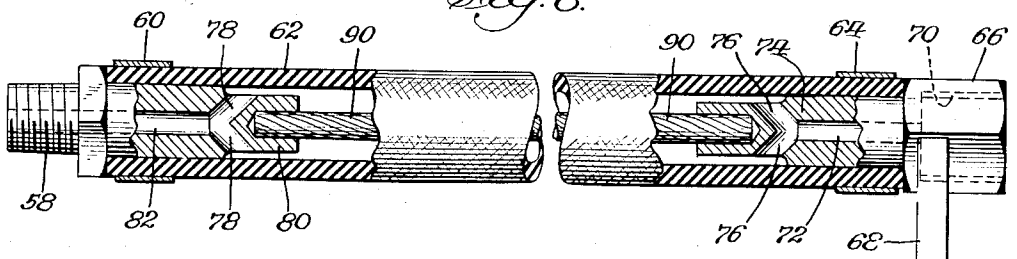


Fig. 8.



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CLEANING TORCH

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Application March 13, 1957, Serial No. 645,838

10 Claims. (Cl. 219—70)

This invention relates to a gun such as is commonly used to hold a carbon electrode and to apply the electrode to a workpiece which is flame washed by an electrical arc struck between the workpiece and the electrode in the presence of a stream of compressed air directed by the gun along the electrode to the arc.

Prior art guns commonly used for this purpose have been notoriously unsatisfactory due to their lack of maneuverability and short service life.

A primary disadvantage of such prior art guns has been the necessity for a heavy electrical cable adequate to conduct the necessary electrical current. Another disadvantage has been bulky construction to provide air passages which are necessary to accommodate flow of air from the gun to the electrode.

Another disadvantage of prior art guns has been their lack of maneuverability due to the fact that in certain positions they are effective only when the electrode is moved in one direction along a workpiece. Another disadvantage is the impossibility of working in corners with a short electrode.

Still another disadvantage of prior art guns has been their short life in service as a result of the great heat developed in the electrode and the gun during flame washing of castings in a production line as, for example, in the finishing of steel castings.

Accordingly, a primary object of the invention is to devise a gun which is compact and light weight in construction and which accommodates an electrical cable of minimum weight.

Another object of the invention is to direct a stream of air along both sides of the electrode so that the electrode may be moved in both directions horizontally and vertically when the gun is held in a position whereat the longitudinal axis of the electrode defines a plane which is approximately vertical.

Still another object of the invention is to offset the noses of the gun jaws which carry the electrode positioners and to arrange such positioners so that the operator may conveniently flame wash the corners of large castings even with a short electrode.

Yet another object of the invention is to minimize the transmission of heat from the electrode to its positioners and thence to the jaws of the gun. This object is accomplished by providing the positioners with novel electrode gripping surfaces and means for cooling the surfaces preferably at their points of contact with the electrode.

The foregoing and other objects and advantages of the invention will become apparent from a consideration of the following specification and the accompanying drawings, wherein:

Figure 1 is a perspective view of a gun embodying a preferred form of the invention;

Figure 2 is a side elevational view of the gun with the handle shown fragmentarily and in section;

Figure 3 is an end elevational view taken from the line 3—3 of Figure 2;

Figure 4 is a bottom plan view of the structure shown in Figure 2;

Figure 5 is a plan view of one of the electrode holders;

Figure 6 is an elevational view of the holder shown in Figure 5;

Figure 7 is a sectional view on the line 7—7 of Figure 5 with the electrode in engagement with the positioner, and

Figure 8 is a side elevational view partly in section of the electrode cable shown in Figure 1.

Describing the invention in detail and referring first to Figures 1 and 2, it will be seen that the novel gun comprises top and bottom jaws **2** and **4** having noses **6** and **8**, respectively, offset or angularly related to the longitudinal center line *x—x* (Figure 4) of the gun. The noses **6** and **8** carry electrode positioners **10**, one of which is illustrated in detail in Figures 5 to 7 wherein it will be seen that the novel positioners are substantially round as seen in the plan view of Figure 5 and each is provided with a flat **12**, intersected by blower ports **14** adapted to direct a stream of compressed air along an electrode **16** to an arc which is between the electrode and an associated workpiece (not shown).

The electrode **16** is ordinarily round in cross-section as shown in Figure 7 and sets against a V-shaped surface **18** of each positioner **10**. Thus the electrode is substantially in line contact with the holders **10** so that transmission of heat from the electrode to the holders is minimized as distinguished from prior art arrangements wherein frequent replacement of positioners and repair of their supporting jaws has presented a serious problem in the art. Also as best shown in Figure 7, the novel positioner **10** is provided with ports **20** interrupting the V-shaped surface **18** and formed and arranged to direct a stream of air against the electrode **16** preferably at points along its line contact with the surface **18**. It has been found that the cooling action of compressed air thus directed against the electrode **16** has been unusually effective to reduce damage to the holders and the jaws.

The ports **20** are preferably substantially smaller in diameter than the ports **14** because it has been found that the relatively smaller cross-sectional area of the port **20** functions as a throttle maintaining adequate back pressure to afford an adequate stream of air from the ports **14** along the electrode **16**. This throttling action, however, permits adequate flow of cool air through the ports **20** to prevent excessive heating of the holder **10**.

The ports **14** and **20** of the holder **10** are connected to an annular air chamber **22** in the form of an annular groove or recess in a flat surface **24** of the holder which snugly engages the related jaw in substantially air-tight engagement therewith. A screw **26** extends through an opening of each jaw and is threaded into a stud **28** (Figures 6 and 7) to frictionally clamp the surface **24** of the holder against a complementary flat surface of the jaw thereby maintaining the substantially air-tight contact therebetween and permitting rotation of the holder **10** about its stud as may be desired by the operator. Such rotation may be accomplished, for example, by pushing the tip of the electrode so that the holders rotate to position the electrode at the angle desired by the operator.

The top jaw **2** may be integral with or attached as by silver solder to a lug **30** on a handle **32** and to a hinge lug **34**, and the jaw **2** comprises an air passage **36** extending from the rear extremity of the jaw to a port **38** therein, said port communicating with the annular passage **22** of the related holder **10**.

The lower jaw **4** may be integral with or fixedly attached as by silver solder to a handle support **40** having a pair of hinge lugs **42** which receive the hinge lug **34** therebetween and are pivoted or hinged thereto as by a pin or rivet **44**. The nose **8** of the lower jaw com-

prises an air passage 46 having a port 48 connected to the annular chamber 22 of the related holder 10. The passage 46 is also connected to a slotted groove 50 in the bottom of the handle support 40 which may be integral with the lower jaw 4 or attached thereto as above mentioned by solder or other suitable means to seal the connection between the support 40 and the lower jaw 4 around the perimeter of the groove 50. The groove 50 is connected at its rear extremity to an air passage 52 of the support 40 and the passage 52 is in turn connected to a threaded socket 54 formed in a boss or lug 56 of the support 40 at its rear extremity. The socket 54 is adapted to receive a threaded pipe nipple 58 in threaded engagement therewith, said nipple being attached by a clamp 60 to a hose 62. The hose is also attached by a clamp 64 to a pipe coupling 66 having a connector 68 for convenient attachment to a source of compressed gas, such as, for example, compressed air which flows through the coupling 66 into a passage 72 of a cable fitting 74, which is preferably formed as part of the coupling 66. The compressed air flows from the passage 72 through ports 76 of the fitting 74 and thence through hose 62 and the ports 78 of a fitting 80 having an air passage 82 connected to the port 78 to convey air therefrom through the nipple 58 from which the air flows into the before mentioned passage 52 and groove 50. The grooves 50 is connected by a conduit 84 such as a section of copper tubing to a flexible rubber hose 86 which is in turn connected to another conduit 88 such as a section of copper tubing which is connected to the before mentioned air passage 36 in the top jaw 2. Thus air delivered to the hose 62 from the coupling 66 is delivered to the air chambers 22 of both electrode holders 10 for the purposes heretofore described.

The fittings 74 and 80 within the hose 62 are connected in any conventional manner, as by soldering, to an electrical cable 90 (Figure 8) which affords an electrical connection between the connector 68 and the support 40 which is electrically connected to both the top and bottom jaws 2 and 4 which are electrically connected by means of the electrode holders 10 to the electrode 16.

The jaws 2 and 4 are preferably biased to closed position as, for example, by means of a conventional compression spring unit 92 which is compressible by and between the handle 32 and the handle support 40, as best seen in Figure 2.

The insulated handle 94 (Figure 1) is in the form of a sleeve and is slidably fitted over the bosses 56 and is snugly seated against lugs 96 thereof to define an air space within the handle 94 around the boss 56. The handle is attached in any convenient manner, as for example, by a screw 98 (Figure 2) received within a threaded opening 100 (Figure 4) in a lug 102 of the boss 56.

The handle 32, as well as the top and bottom jaws 2 and 4, including their noses 6 and 8, is preferably covered by complementary sections of insulation 104 as best seen in Figure 1. This insulation may be secured in any desired manner as, for example, by screws covered with sealing wax.

It should be emphasized that the noses 6 and 8 of the top and bottom jaws 2 and 4 are offset or angled from the longitudinal center line x—x (Figure 4) of the novel gun. In actual practice it has been found that an angle of from about 30 to 45 degrees greatly facilitates the work of the operator, particularly with a short electrode. In this connection it has also been discovered that the distance between the end of each nose and its point of connection to the related jaw, as indicated by A in Figure 4, is preferably greater than the length of the electrode contacting surface 18 of the holder 10. The best results have been obtained when the distance A is greater than twice the length of the surface 18. For example, with a 30 degree offset it has been found that the distance A is preferably about 2½ inches with the holder 10 having a 1⅛ inch diameter; and with a 45 degrees offset the distance A is preferably about 3¾ inches with a 1⅞ inch diameter holder.

Thus it will be understood that the novel gun is compact, economical and light weight in construction and has greater maneuverability than prior art guns. Moreover, the service life of the holders 10 and the jaws 2 and 4 of the novel gun is much greater than any such prior art device.

We claim:

1. A gun of the class described comprising hinged jaws with each comprising an electrode holder and a related gripping surface, and a port in at least one of said holders to direct compressed gas along an associated electrode in contact therewith in a stream approximately parallel to its longitudinal axis, said holder having another port intersecting said surface to direct said gas against contacting surfaces of the electrode and holder.

2. A gun of the class described comprising V-shaped jaws having electrode holders with mutually facing electrode contacting surfaces, an associated electrode substantially in line contact with said surfaces, a port in at least one of said holders interrupting its electrode contacting surface to direct a stream of compressed gas against said associated electrode at points along the line of contact between said electrode and surfaces, and another port connected to the first mentioned port, said other port opening at one side of said surface and formed and arranged to direct a stream of compressed gas along the electrode.

3. A gun of the class described comprising jaws having electrode holders, at least one of said holders having a substantially V-shaped electrode gripping surface, ports interrupting said surfaces at opposite sides thereof to direct a compressed gas against an associated electrode, and another port connected to the first mentioned port and opening at one side of said surface to direct a stream of said gas along the electrode substantially parallel to its longitudinal axis.

4. A gun of the class described comprising jaws having electrode holders, at least one of said holders having a V-shaped electrode engaging surface and having a flat area approximately normal to said surface at one end thereof, ports interconnected with each other and intersecting the surface and rear of said holders, respectively, and means for delivering a compressed gas to said ports.

5. A gun of the class described comprising jaws having mutually facing electrode clamping surfaces in contact with an associated electrode located therebetween, means associated with said jaws for clamping said surfaces against said electrode, ports at corresponding ends of said holders for directing a stream of gas adjacent and substantially parallel to said electrode, at least one port in each of said holders interconnected with said ports, said one port intersecting the clamping surface of the related holder to accommodate a flow of gas directly against the electrode whereby transmission of heat from the electrode to the holder is minimized.

6. A gun of the class described comprising jaws having electrode holders with mutually facing electrode clamping surfaces, means associated with said jaws for clamping said surfaces against an electrode, ports in said holders at corresponding ends thereof to direct a stream of gas substantially parallel to the electrode towards the end of the electrode remote from the holders, other ports interconnected with the first-mentioned ports, said other ports intersecting the clamping surfaces of the holders to direct a stream of said gas against said electrode intermediate said holders, said last-mentioned ports being of smaller cross-sectional area than the other ports, and means to deliver said gas to said ports.

7. A gun of the class described comprising hinged jaws having substantially parallel noses offset at least

about 30 degrees from the longitudinal center line of said jaws, holders at the ends of said noses remote from said jaws, said holders having mutually facing electrode contacting surfaces, a port in at least one holder intersecting a portion thereof at one end of its surface to direct a stream of compressed gas along an associated electrode, an annular chamber in each of said holders, said port being connected to said chamber, another port connected to said chamber, said other port intersecting the related contacting surface to thereby direct a stream of gas at the perimeter of an associated electrode, and means for delivering said gas to said chamber.

8. A gun according to claim 7, wherein the distance from the free end of each nose to its point of connection with its related jaw is greater than the length of the electrode contacting surface of the holder carried by said nose.

9. A gun of the class described comprising jaws having mutually facing electrode gripping surfaces in line contact with an associated electrode, an air passage extending through one of said jaws and open at one end of its surface to direct a stream of compressed gas along said associated electrode clamped by said surfaces, another air passage extending through said one jaw and being interconnected with said one passage, said other

passage intersecting the related gripping surface at a point along the line of contact between said jaw and electrode, a flexible conduit detachably connected to said passage for delivering said gas thereto, and a flexible electrical connector extending through the conduit and having an electrical connection to said jaw.

10. A gun of the class described comprising hinged jaws, electrode holders carried by respective jaws and having mutually facing electrode gripping surfaces, air passages through respective jaws, ports in respective holders connected to the related air passages and opening at one end of their respective surfaces to direct streams of compressed gas along an associated electrode clamped by said surfaces, a flexible conduit interconnecting the air passages of respective jaws and means for delivering said gas to one of said passages.

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