

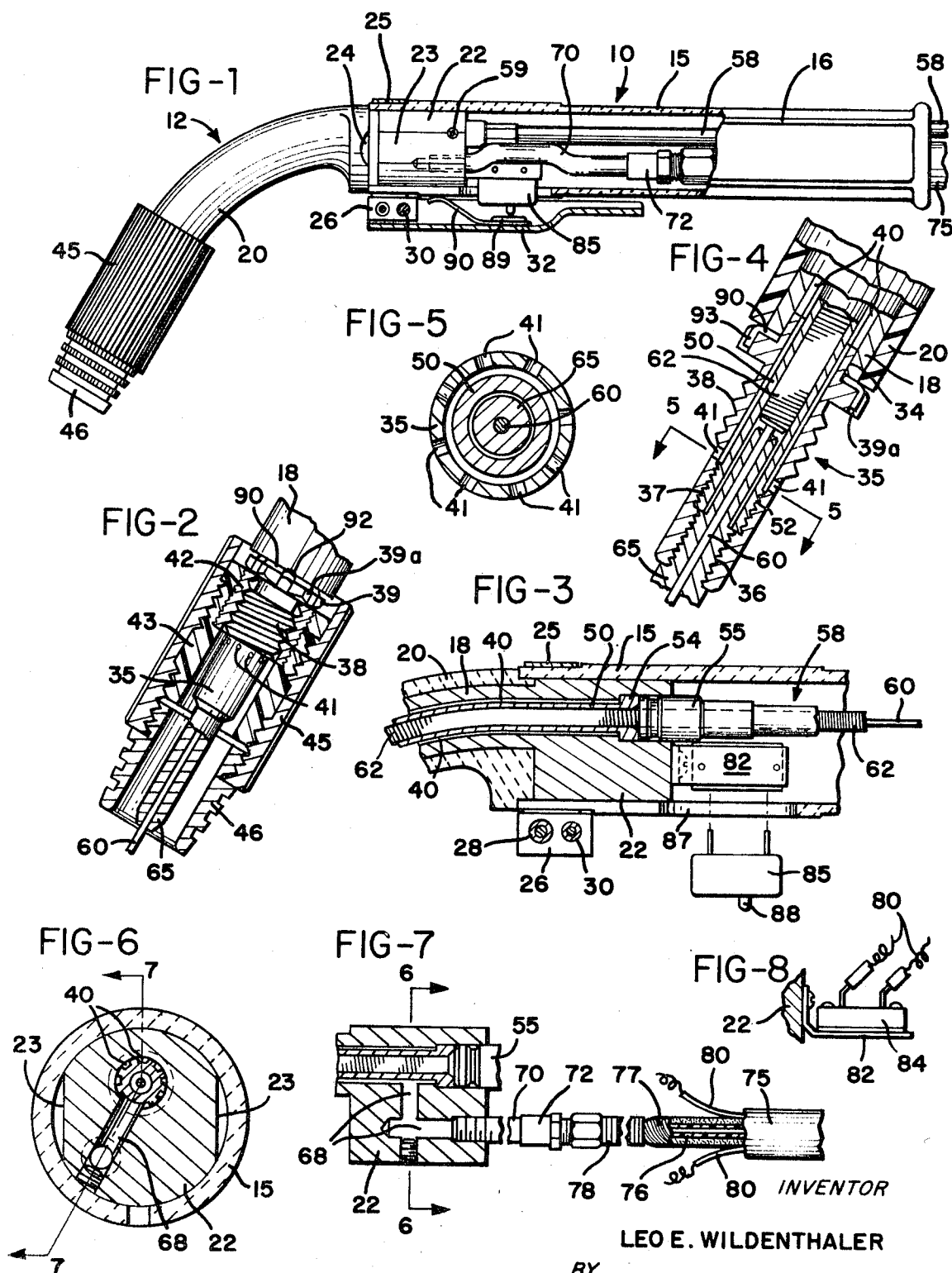
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ELECTRIC ARC WELDING GUN

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ELECTRIC ARC WELDING GUN

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6 Claims

ABSTRACT OF THE DISCLOSURE

An electric arc welding gun includes a head section with sleeve covered by electrical insulation and surrounding a guide passage formed by a tube. Longitudinal slots within the sleeve provide passages for shielding gas. The handle section incorporates a replaceable plug-in control switch and a removable control handle for access to the switch. The handle is fully electrically insulated from the current carrying parts of the gun.

BACKGROUND OF THE INVENTION

The invention relates to so-called guns for electric arc welding with a continuous consumable electrode. The operation in which such guns are most commonly employed is often referred to as semi-automatic welding. Various guns of this type have been known for some time, a typical one being illustrated in U.S. Pat. No. 3,112,392, issued to the assignee of this application. The usage of such guns has increased substantially within the past few years, to the point where the business of selling and repairing then is becoming increasingly competitive, and this increased usage also results in handling of the equipment by less skilled personnel, in which case the guns are subjected to rough handling.

SUMMARY OF THE INVENTION

The present invention relates to an improved electric arc welding gun which is of a sturdy and inexpensive design, which can readily be repaired or replaced with a minimum of difficulty and downtime, and which incorporates improved guidance for the continuous consumable electrode which is fed through the gun.

The objects of the invention are to provide such a gun which is novel construction, as herein after set forth in detail.

Other objects and advantages of the invention will be apparent from the following description, the accompanying drawings and the appended claims.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a side elevation view of the novel gun provided by the invention, with a part of the handle section and the control lever broken away and shown in section;

FIG. 2 is an enlarged cross-sectional view of the tip, heat exchanger, and forward part of the head section and gun;

FIG. 3 is an enlarged cross-sectional view of the handle section and its joint with the head section, with the control switch shown in exploded view form, and with the control handle removed;

FIG. 4 is a sectional view of the tip configuration, on an enlarged scale of FIG. 2;

FIG. 5 is a cross-sectional view taken generally on line 5—5 in FIG. 4;

FIG. 6 is an enlarged cross-sectional view taken through the joint part between the head section and handle section as shown in FIG. 3;

FIG. 7 is a detail view showing a part of the rear end of the head section in cross-section, with the electrical

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power and gas connections illustrated in detail, such view being taken generally along line 7—7 in FIG. 6; and

FIG. 8 is a detail view of the mounting socket and bracket for the control switch.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawing, and particularly to FIG. 1, for purposes of explanation the novel gun can be considered as generally divided into a handle section 10, which is gripped by the operator during use, and a head section 12 which extends from the handle section to and including the tip, and which generally takes various curved configurations, one typical form being shown in FIG. 1. It should be understood, however, that the invention is not limited to use of a curved head section. The handle section 10 is of generally hollow tubular form, such as the member 15 which includes one or more ribs 16 on its outer surface, and which is molded or otherwise formed of a suitable electrical insulating material. The forward end of the handle section 10, the left in FIG. 1, receives the rear end of the head section 12.

This head section is provided by a relatively lightweight aluminum inner sleeve 18 which is incorporated in an outer electrical insulating cover 20 that may be suitably molded to the inner aluminum part. The rear end of the sleeve 18 is formed as a relatively large cylindrical shank 22 shaped generally to conform with the inner configuration of the handle tube 15, and having suitable flats 23 (FIG. 6) formed on its opposite sides to provide ventilating passages for ambient air. It will be noted from FIG. 3 that the insulating outer cover 20 on the head section extends within the end of the insulating body tube 15 thus providing in the assembled gun a complete exterior electrically insulating surface. Recesses 24 in cover 20 coincide with flats 23. The parts are constructed for a close sliding fit, and they are retained to each other by a clamp 25 which surrounds the forward end of handle body 15, and terminates in a pair of opposed ears 26, one of which is shown in FIGS. 1 and 3. Through these ears a conventional bolt and nut fastener 28 is extended, operating to tighten the clamp 25 about the exterior of the body 15 and clamp the head section in position. The ears also provide a convenient mounting for the pivot pin 30 of the control handle 32.

Referring to FIG. 4, the forward end of the sleeve 18 has a counterbore 34 which receives an end fitting 35 that is threaded internally, to different sizes, at 36 for a tip mounting, inwardly at 37, and externally at 38. The fitting 35 also has a number of outwardly extending ears 39 which define slots 39a between them.

The sleeve 18 is preferably formed of a lightweight metal, such as aluminum, which can be extruded, and the interior of the sleeve 18 is thus provided with longitudinally extending slots 40 (FIG. 5) which extend from the shank 22 down to the counterbore 34. Beyond the thread 38 there are radially extending passages or openings 41 in fitting 35 which open into the region around the tip mounting section. The exterior thread 38 has threaded to it a metal bushing 42 which is in turn mounted in an electrically insulating resinous material 43 bonded to the interior of a finned heat exchanger body 45. This body likewise may suitably be formed of extruded aluminum or the like. It will be apparent from FIG. 2 that the heat exchanger body is readily removable and replaceable, but is electrically insulated from the sleeve 18 and other current carrying parts in the head section. Various types of nose pieces 46 can be threaded into the outer end of the heat exchanger body, it being understood that these pieces are available in different shapes and lengths, depending upon the desired configuration for a particular type of job.

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Within the sleeve 18, extending essentially its full length, is a brass tube 50, which includes an externally threaded exit tip 52 that engages the thread 37 in fitting 35. The entrance end of the tube (see FIG. 3) includes an enlarged head 54 received within the member 22 at the handle end of the head section. This enlarged end 54 includes a suitable countersunk end adapted to receive the fitting 55 on the electrode wire feeding and guide assembly 58. The fitting 55 is held in place by a set screw 59 (FIG. 1) which projects from the part 22 into an external groove on the fitting 55.

In FIGS. 2 and 3, a length of continuous consumable electrode 60 is shown entering the guiding and feeding assembly 58, being guided within a flexible liner 62 that projects through and beyond the fitting 55, through the tube 50, and terminating at the end 52 of the tube, where is spaced from the inner or entrance end of the tip 65 by approximately 0.010 inch. The tip is mounted through thread 36 to the interior of the fitting 35, and extends down into the nose piece 46. The electrode 60 leaves the continuous internal guiding surface of the feeding assembly 58 only as it enters the tip 65, being continuously guided by the liner 62 from the feeding mechanism (not shown) directly to the tip 65.

The longitudinal passages provided by the grooves 40 form a shielding gas passage from the shank or handle end 22 of the head section to the forward end of the gun. The openings 41 provide outlets for shielding gas directed into the space around fitting 35 and the interior of the heat exchanger assembly, i.e., within the insulating sleeve 43. By this arrangement the shielding gas is effectively spread about the entire periphery of the tip and emerges from the gun around the tip and within the nose piece 46, completely surrounding the arc between the electrode and the workpiece. The supply of shielding gas is connected through a cross passage 68 (FIG. 7) in the shank 22 to a short section of supply tube 70 (FIGS. 1 and 7) which has an outer threaded fitting 72 that connects to the power and gas supply cable 75. This cable includes an internal flexible gas supply tube 76, surrounded by an electrically conductive power supply cable 77 which terminates in the cable end fitting 78 that threads to the fitting 72, thus shielding gas from the tube 76 is supplied to the cross passages 68, while electrical power is supplied through fittings 72 through 78 and the metallic conductive tube 78 to the shank 22 of the head section. Preferably the cable 75 also incorporates at least a pair of insulated electrical wires 80 which is a form of control circuit, and the entire assembly is surrounded by insulating material.

Within the handle section, mounted on and extending rearward from the shank portion 22, there is a bracket 82 (FIGS. 3 and 8) which mounts a switch socket 84, and the control wires 80 are connected to this socket. A replaceable plug-in switch unit 85 is mounted in the socket 84, being readily plugged into and removed from the socket. The switch housing extends into a slot 87 formed in the handle body 15, generally in alignment with the operating handle 32, and the switch includes an operator member such as the extending pin 88 which in normal position rests against a pad 89 on the inside of the handle 32. This pad also serves to anchor a leaf spring 90 to the handle, with the other end of the spring pressing against the body 15 immediately rearward of the clamp ends, as shown in FIG. 1. The spacing of the parts is such that handle 32 will contact the handle body 15 before moving far enough to over-drive switch 85 and cause internal damage to it.

This control switch arrangement is of particular value in that a faulty switch can quickly be replaced by the operator of the gun, without need to return the gun to a maintenance shop. It is only necessary to loosen and remove the handle pivot pin 30, and thereby provide for removal of the handle 32, after which a faulty switch 85 can be unplugged and a replacement part immediately plugged into its place. This substitution can be made in a

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few minutes with only simple hand tools, such as a screw-driver. The plug-in switch arrangement does not require that any electrical connections be disturbed, such as the connections between the control wires 80 and the socket 84, hence there is no requirement for such maintenance work to be done by a qualified electrical repairman, as would be the case if these wires had to be disconnected.

The novel construction of the head section is most useful in providing a sturdy but inexpensive gun. The outer diameter of the threaded tip 52 on tube 50 is dimensioned to slide through the sleeve 18. These parts can be initially straight, then assembled, shaped to the desired curve, and the outer cover bonded to or cast around the assembly. The slotted interior of sleeve 18 supports tube 50 during shaping, preventing collapse or distortion of the tube, and the extruded slot configuration maintains continuous gas passages between these parts.

Preferably the fitting 35, once threaded onto the end of tube 50, is locked against reverse rotation by a lock ring 90. This ring has outwardly deformed parts 92, which engage in corresponding depressions in the end face of sleeve 18 and its cover 20. This prevents the ring from rotating once the fitting is tightened. Then tabs 93 on the ring are bent into corresponding ones of the slots 39a. This prevents the fitting from rotating while tips, radiator bodies, or nose pieces are replaced.

While the form of apparatus herein described constitutes a preferred embodiment of the invention, it is to be understood that the invention is not limited to this precise form of apparatus, and that changes may be made therein without departing from the scope of the invention.

What is claimed is:

1. A gun assembly for electric arc welding with a continuous consumable electrode fed through an electrode feeding liner, said assembly comprising:

a hollow handle section, a head section having a rear end fitted to and extending from one end of said handle section,

an inner electrically conductive sleeve extending the length of said head section,

a guiding and contact tip having an entrance end including a seat located at the other end of said sleeve opposite from said handle section and means forming a longitudinal through passage in said tip of a size to contact an electrode pushed therethrough,

said handle and head section presenting a continuously electrically insulating outer surface,

a heat exchanger body mounted in electrically insulated relation on said other end of said head section and surrounding said tip,

a tube extending through said sleeve defining a continuous guiding passage through said sleeve from the interior of said handle section to said seat at the entrance end of said tip, said passage being sufficiently large to receive a substantial length of the exit end of an electrode feeding liner whereby the electrode is continuously supported by the liner within the gun assembly up to its entrance into said tip,

said tube having an entrance end located within said one end of said head section and an exit end providing a mounting for said tip,

and said entrance end of said tube together with the surrounding rear end of said head section forming a locating socket for a retainer member carried on the liner at a location spaced from the exit end of the liner by a distance equivalent to the spacing between said socket and said tip.

2. A gun assembly as defined in claim 1, wherein said sleeve and said tube have adjoining walls thereof and portions of said walls in spaced relation over all but the terminal ends thereof to form a gas passage therebetween, a gas supply conduit formed in said one end of said head section including a connector for a gas supply line and a connecting passage to said gas passage,

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and a gas outlet means at the other end of said sleeve leading from said gas passage to the space between the exterior of said tip and the interior of said heat exchanger body.

3. A gun assembly as defined in claim 2, wherein said connector for a gas supply line also forms an electric conductor for welding current supplied to said sleeve and tube.

4. A gun assembly as defined in claim 1, including a control switch mounted in said handle section and having an operator accessible from the exterior thereof,

a clamp surrounding said one end of said handle section and retaining said sections together, and a switch control handle pivoted on said clamp and arranged to move said switch operator.

5. A gun assembly for electric arc welding with a continuous consumable electrode, comprising:

a hollow handle section having an outer surface portion of electrically insulating material,

a head section including one end fitted to said handle section,

said head section incorporating an interior conductor for electric current and passage means for the consumable electrode,

a tip having an entrance end fastened to the other end of said head section and having a longitudinal through passage for the end of the electrode supplied through said passage means,

a control switch mounted in said handle section,

a switch operator extending from said switch and accessible from the exterior of said handle section,

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a clamp surrounding the exterior of said handle section and said one end of said head section and providing a clamping force on said handle section retaining the sections in assembled relation,

and a switch control handle mounted on said clamp and including a lever portion in contact with said switch operator to activate said switch.

6. A gun assembly as defined in claim 5, wherein said handle section has an opening underlying said lever portion, said control switch including a receptacle mounted in said handle section, and a removable plug-in switch member in said receptacle and carrying said switch operator extending through said opening whereby the plug-in switch can be replaced by release of said clamp to allow movement of said switch control handle sufficient for withdrawing and replacing of said switch member through said opening.

References Cited

UNITED STATES PATENTS

3,155,811	11/1964	Adamson et al.	219—130
2,659,796	11/1953	Anderson	219—130
3,249,734	5/1966	Meyer	219—130

FOREIGN PATENTS

1,094,703	12/1967	Great Britain.
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