INSTRUCTIONS FOR PLASMA ARC CUTTER

BASIC SAFETY PRECAUTIONS

Fumes

During cutting operations, harmful metal dust and fumes are produced. It is therefore recommended to use safety masks and to ensure that working areas are adequately ventilated to guarantee sufficient operator protection. In closed areas it is recommended to instal air extractors underneath the cutting zone. Should halogen grease removers or solvents be present on the material to be cut, it is important that such material be cleaned prior to cutting operations in order to avoid the formation of toxic gases. Some chlorinated solvents are apt to decompose in the presence of radiations emitted by the arc, and generate phosgene gas. Plated metal or metals containing lead, graphite, cadmium, zinc, mercury or beryllium can produce toxic fumes during cutting.

Ultraviolet rays

Rays created during cutting operations have the same effect as those produced by arc welding. To protect against such rays which are harmful to eyes and skin, welding gloves and safety goggles with closed sides and grade 4 or 5 safety lenses should be worn. It is recommended that safety precautions be extended to cover the entire operations area, persons included.

Fire

Precautions should be taken against fire caused by sparks or hot slag:
— all inflammable and combustible materials should be removed from the cutting zone;
— cutting should not be carried out on fuel or lubricant containers, whether full or empty, or on parts with cavities filled with inflammable material;
— fire-fighting equipment should be installed in the vicinity of work stations.

Electric shock

The plasma arc cutter is required for spark starting and during cutting of dangerous voltages. The following safety regulations should therefore be observed:
— parts to be cut should not be directly supported by the operator or held by hand;
— operations should not be carried out in humid or wet areas;
— equipment should not be used should cables or torch parts present damage;
— equipment should always be switched off prior to any substitution of nozzle, electrode or diffuser;
— damaged parts of the torch and torch cables should always be substituted with original material;
— power to the equipment should be cut off prior to any intervention on the torch, cables or the internal part of the generator;
— the power feed line should be provided with an efficient earth plate;
— the work bench should be connected to an efficient earth plate;
— any eventual maintenance should be carried out by qualified personnel only, who are well aware of the risks due to the dangerous voltages required for the equipment to operate.

Burns

The operator should be equipped with fire-proof shoes and clothing to protect against sparks and eventual material slag: normal precautions during any welding operation. The torch flame should not be directed towards persons or foreign bodies.

PUBLICATIONS

The following publications provide additional information on safety precautions:
A) Bulletin No. C5.2-83 «Recommended Safe Practices for Plasma Arc Cutting»
B) American National Standard ANS1Z49.1-83 «Safety in Welding and Cutting»
Both are available from: American Welding Society Inc. - 2501 Northwest 7th Street - Miami, Florida 33125 - Telephone (305) 443-9353
C) OSHA Safety and Healt Standards, 29CFR 1910, available from the U.S. Department of Labor, Washington, D.C. 20210.

SAFETY DEVICES

The equipment is provided with the following safety devices:

Thermic: located on the transformer winding to avoid eventual overloads.

Pneumatic: located on torch feed to avoid insufficient air pressure and signalled by display light **L** (fig. 2).

Electric: located on torch body to avoid the presence of dangerous voltages in the event of removal of nozzle holder.

INSTALLATION AND OPERATION

Mount wheels, support and handle according to the instructions indicated in fig. 1.
Install the equipment in an adequately ventilated area, taking care that there be no obstruction to the input and output of air from the cooling slots.
Predispose the voltage regulator disk located underneath handle **C** for line voltage, as indicated on the panel.
Connect power cable **A** to socket provided with an efficient earth wire. Eventual extension leads should be of adeguate sections.

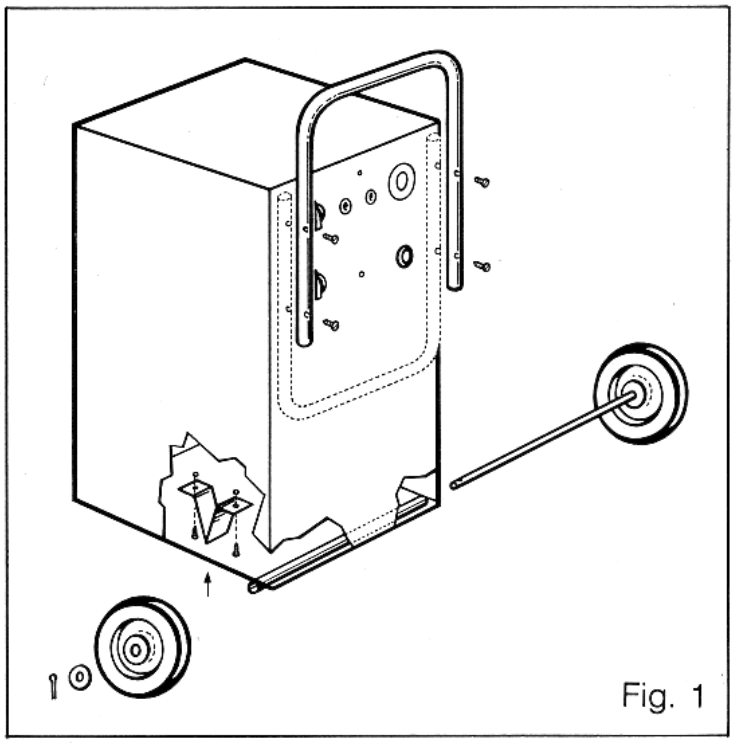

Fig. 1

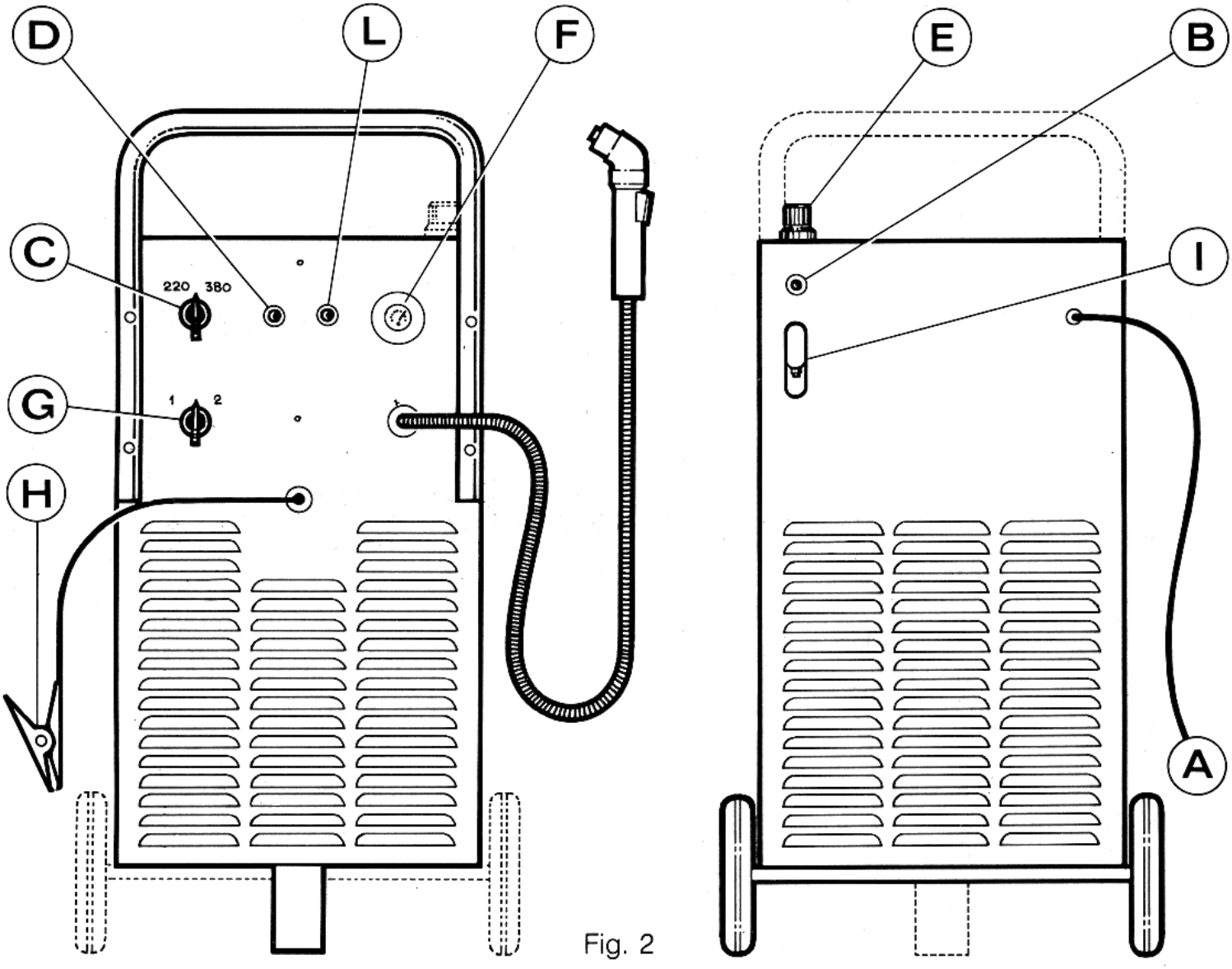

Fig. 2

Connect air feed to connector **B** and ensure that pressure be at least 75 PSI with a minimum yield of 250 SCFH.
Lift knob **E** and regulate pressure to 66-70 PSI byusing gauge **F** and then stop knob **E** by pressing it downwards. Switch on equipment by setting dial **C** to desired voltage. Indicator light **D** should come on and a jet of cooling air should be emitted by the torch nozzle.
Set dial **G** to **1** or **2** according to cutting requirements.
Connect earth clamp **H** to part to be cut, ensuring that there be a good electrical contact, especially in the case of painted or oxidized sheet metal or sheet metal with insulation coatings.
Turn on pilot arch by pressing torch button. Arc comes on due to a high voltage pulse of duration 0,2 sec.
Bring torch towards part and carry out cutting operation keeping nozzle supported without exercising pressure.
N.B. Avoid arc switched on while in the air to avoid useless consumption of electrode, nozzle and diffuser.
Should the air in the system contain considerable quantities of humidity or oil, use of the special drier is recommended to avoid excessive wear of consumable parts and damage to the torch.

TORCH MAINTENANCE

Power to the equipment should be cut off prior to any intervention on the torch.

1) **Substitution of consumable parts** (fig. 3).

Parts subject to wear are the electrode **A**, the diffuser **B** and the nozzle **C**. Nozzle holder **D** must first be unscrewed before any of these parts can be substituted.
Nozzle holder **D** should be sufficiently tightened after such substitution and a manual check be done to ensure that nozzle **C** not rotate.

2) **Substitution of torch body E** (fig. 3).

Remove handgrip **F** from body **E**. Remove leads from safety contacts **G** and **H**. Remove the connection **L**. Unscrew union **I** and remove tube **M** from torch body. Mount new torch body, carrying out previous operations in reverse order.
Before inserting handle, ensure that cables be well separated and connections well tightened.

3) **Substitution of complete torch** (fig. 3).

Remove side covering from equipment. Remove the two faston contacts **N** and **O**. Remove red lead **P** from terminal board. Unscrew union **Q**. Remove torch. Mount new torch, carrying out previous operations in reverse order.

4) **Substitution of cable R** (fig. 3).

Substitution of the cable may be carried out by following the operations indicated in 2) and 3) and carrying out connection **S**.
N.B.: Connection **S** must be carefully insulated.

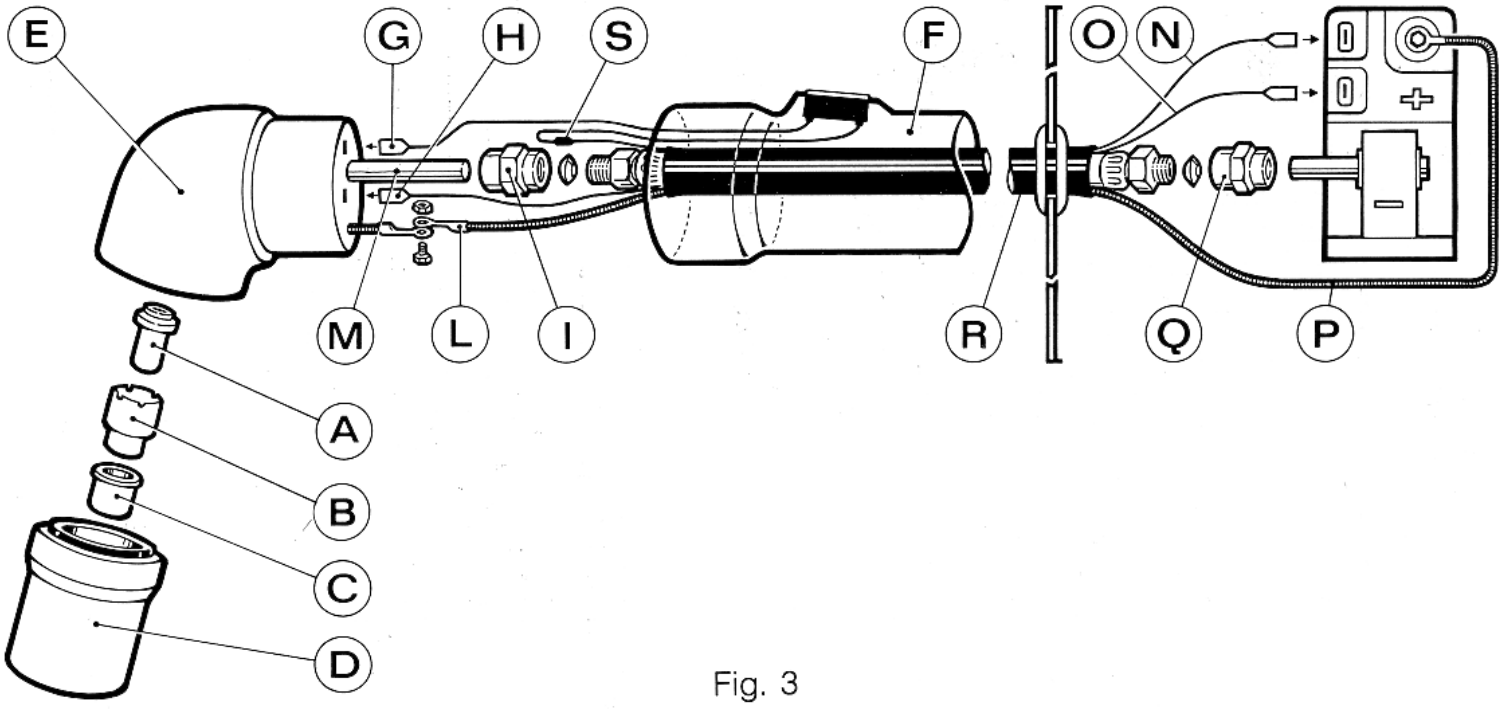

Fig. 3

CUTTING PROBLEMS

1) **Insufficient penetration**

This problem may be caused by:
— high speed. At correct speed the path of the arc under the part forms an angle of about 5°-10° (fig. 4);

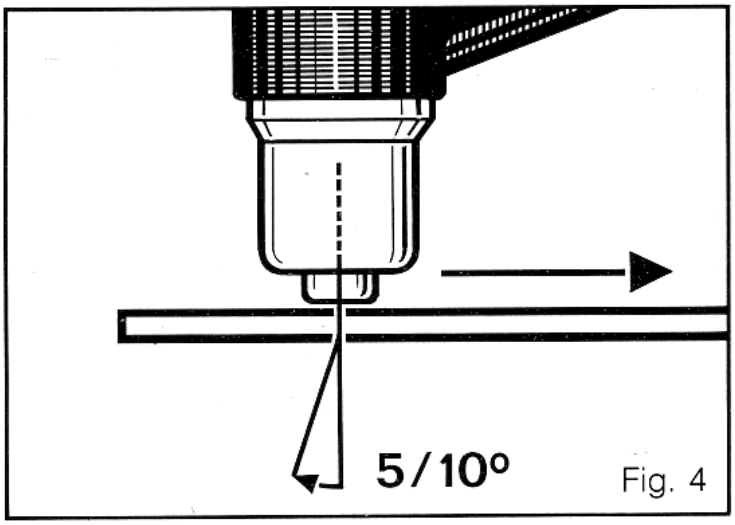

Fig. 4

— excessive thickness of part;
— dial **G** (fig. 2) on **1** instead of **2**;
— low power voltage;
— earth clamp **H** not in good electrical contact with part.
N.B.: When arc does not cut, molten metal slag obstructs nozzle.

2) **Cutting arc is extinguished**

This problem may be caused by:
— worn nozzle, electrode or diffuser;
— excessive air pressure.

MAINTENANCE AND CHECK-UP

Power to the equipment should be cut off prior to any intervention.
The nozzle should be periodically cleaned of any slag, using a steel brush. Pointed bodies should not be used in that they could cause damage to nozzle hole.
Although the equipment is provided with an automatic device for the discharge of condensate, which functions whenever air feed is shut off, it is recommended that periodical checks of the container visible through slot **I** (fig. 2) be carried out to ensure the absence of any trace of condensate.

Remember: correct operation and maintenance of your **PLASMA** will ensure best results.