March 4, 1969 A. F. MANZ 3,431,390

WORK-IN-CIRCUIT ARC STARTING APPARATUS

Filed May 20, 1965

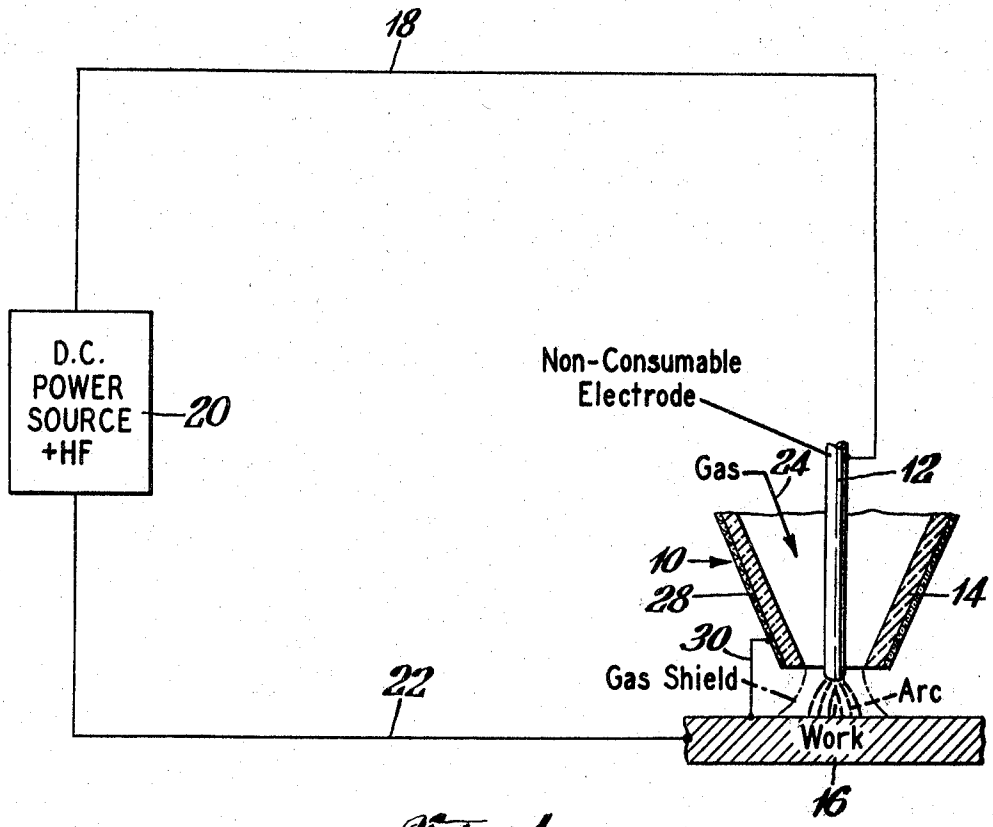

Fig. 1.

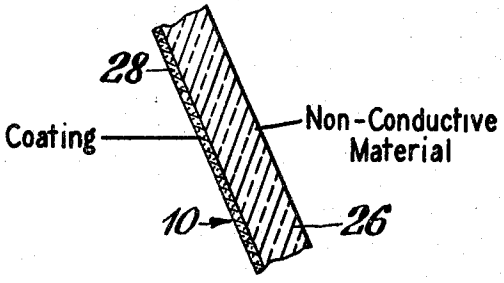

Fig. 2.

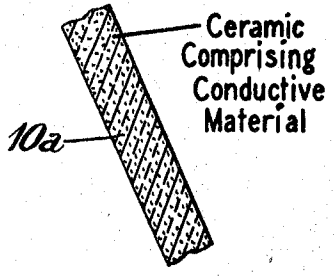

Fig. 3.

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3,431,390

Patented Mar. 4, 1969

3,431,390

WORK-IN-CIRCUIT ARC STARTING APPARATUS

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Filed May 20, 1965, Ser. No. 457,388

U.S. Cl. 219—130 6 Claims

Int. Cl. B23k 9/00, 9/10

ABSTRACT OF THE DISCLOSURE

This invention provides for improving main arc starting by incorporating into the torch a substantially electrically non-conductive gas cup which is located about the electrode, the cup comprising both nonconductive and conductive material and being directly grounded to the work for inhibiting undesirable arc starting blocking potential.

This invention relates to work-in-circuit arc starting apparatus, and more particularly, to non-consumable electrode-inert gas shielded arc welding.

The invention provides for improving main arc starting by making the substantially electrically non-conductive gas nozzle or cup at least partially electrically conductive and grounding the latter to the work, so that undesirable blocking potential is prevented from accumulating on the cup, thus assuring starting of the arc even with high frequency.

Prior to the invention, the use of high frequency in starting the main arc presented a problem in that the arc occasionally failed to start.

The main object of this invention is to solve such problems by simple and economical means.

This object is accomplished either by coating a cup that is composed of relatively electrically non-conductive material with material that is conductive, or by providing a cup that is composed of a combination of conductive material as well as non-conductive material, and electrically connecting such conductive material on or in the cup to the work to be welded, by an auxiliary circuit. This bleeds undesirable arc blocking potential from the cup and results in more reliable starting of the main arc.

In the drawing:

FIGURE 1 is a circuit diagram of apparatus illustrative of the invention; and

FIGURES 2 and 3 are enlarged sections of modifications of the cup.

As shown in such drawing, a torch **10** comprising a tungsten electrode **12** and a gas cup **14** is located above the work **16** to be welded in the usual way. Such electrode is connected by lead **18** to a power source **20** that is provided with high-frequency arc starting means. The other terminal of such source **20** is connected to the work **16** by a ground lead **22**. Inert gas, such as argon **24**, is supplied to the torch **10** and flows through cup **14** to protect the operation from the atmosphere.

The cup **10**, FIGURE 2, is composed of material **26** that is substantially electrically non-conductive, such as alumina, having an annular coating **28** composed of electrically conductive material, such as graphite. Such coating **28** is connected to the work **16** by a "pigtail" conductor **30** that is held by place at one end on the cup by a spring clip, not shown.

In operation, the coating **28** and conductor **30** act to bleed from the cup any electrical charge which tends to accumulate thereon to the work while also acting as a relatively high impedance to the main arc, thereby preventing any undesirable main arc current from flowing therethrough.

Thus, even with the aid of high frequency to start the main arc between the electrode **12** and work **16** in the inert gas stream, undesirable arc starting blocking potential buildup on the cup is inhibited, assuring more reliable starting of the main arc, even under repetitive starting conditions.

As shown in FIGURE 3, the cup **10***a* is made by mixing conductive material, such as graphite, or metal, in the form of powder with the alumina powder of the cup, before molding and baking the latter. Thus, the cup contains conductive as well as non-conductive material, and is grounded to the work as pointed out above for the same purpose.

What is claimed is:

1. A non-consumable electrode gas shielded arc working system comprising a torch, the electrode of which is connected in circuit with an arc energizing power source, and the work, which power source includes electrical means for starting such arc, said torch being provided with a substantially electrically non-conductive cup surrounding said electrode for directing the gas about such arc to shield the operation from the atmosphere, said cup being directly grounded to said work for inhibiting undesirable arc starting blocking potential.

2. A system as defined by claim **1**, in which said arc starting means comprises high frequency.

3. A system defined by claim **1**, in which said cup comprises a non-conductive core and a coating of conductive material.

4. A system as defined by claim **3**, in which said core comprises a ceramic.

5. A gas cup for non-consumable electrode inert gas shielded arc torches, consisting of a composite material of a substantially homogeneous mixture of electrically conductive particles and electrically non-conductive particles.

6. A gas cup as defined by claim **5**, in which the non-conductive particles comprises a ceramic.

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U.S. Cl. X.R.

219—135