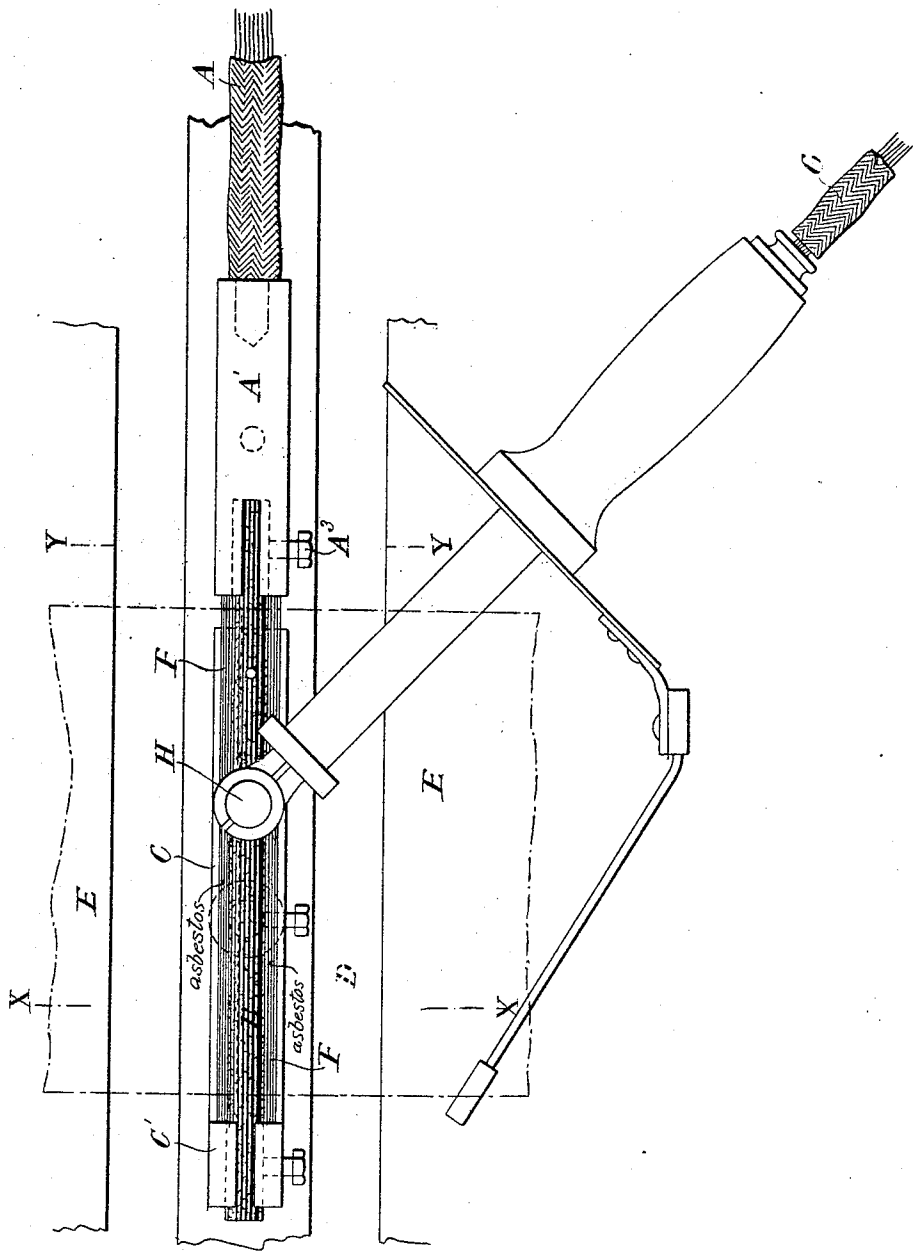
(No Model.) 2 Sheets—Sheet 1.

H. HOWARD.

HEATING AND WELDING BY ELECTRICITY.

No. 473,003. Patented Apr. 19, 1892.

Fig. 1.



Witnesses.
B. Washington Miller.
Baltus De Long.

Inventor.
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Baldwin Davidson & Wright.

(No Model.) 2 Sheets—Sheet 2.

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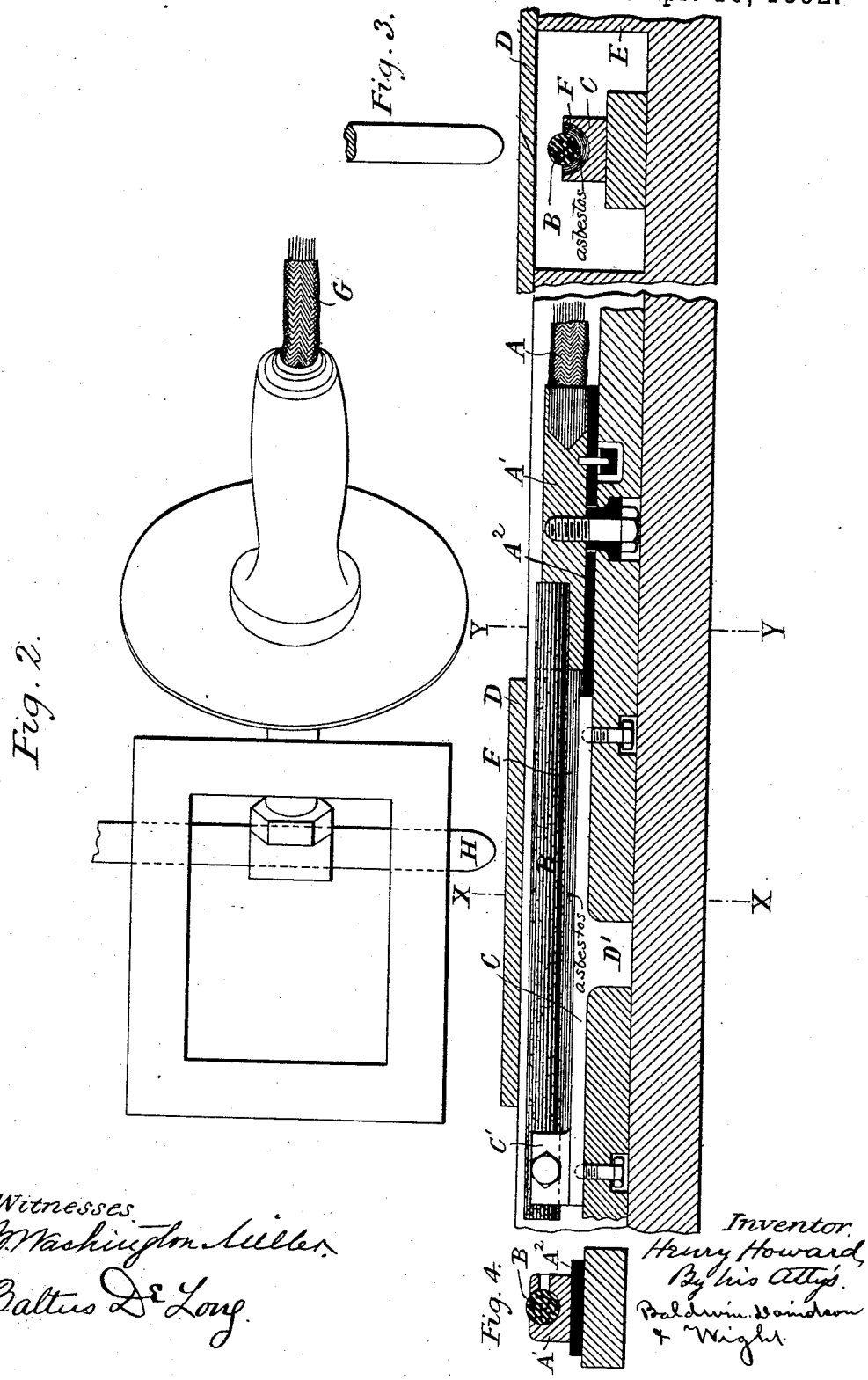

Witnesses.
W. Washington Miller.
Baltus De Long.

Inventor.
Henry Howard,
By his Attys.
Baldwin Hazlehurst & Wright.

UNITED STATES PATENT OFFICE.

HENRY HOWARD, OF HALESOWEN, NEAR BIRMINGHAM, ENGLAND.

HEATING AND WELDING BY ELECTRICITY.

SPECIFICATION forming part of Letters Patent No. 473,003, dated April 19, 1892.

Application filed October 21, 1891. Serial No. 409,433. (No model.)

To all whom it may concern:

Be it known that I, HENRY HOWARD, manufacturer, a subject of the Queen of Great Britain, and a resident of Coomb's Wood Tube Works, Halesowen, near Birmingham, England, have invented certain new and useful Improvements in Apparatus for Heating and Welding by Electricity, of which the following is a specification.

This invention relates to heating and welding by the electric arc, where the work forms one pole and a pencil the other pole. I interpose in the circuit and in proximity to the work a block of carbon or other comparatively bad conductor of electricity, which by reason of its greater resistance becomes heated, and thus heats the work by radiation. The positive pole of the battery or other source of electricity is connected to this block of carbon, which may rest upon or be partially surrounded by asbestus or similar insulating refractory material, and the current is led from thence by a conductor to the work or to the support on which the work rests, while the negative pole is connected to a pencil of carbon situated on the other side of the work, an electric arc being formed between the pencil and the work, so that the work is heated on one side by the arc and on the other by radiation from the heated block.

Figure 1 is a plan, and Fig. 2 a side elevation, of the apparatus; and Figs. 3 and 4 are sections on the lines X X and Y Y, Figs. 1 and 2, respectively.

A is the conductor from the positive pole of the battery or other source of electricity, the end of which is connected to the metal clip A′, resting on the insulating-block A^2. The other end of this clip is furnished with jaws, in which a rod B of carbon is held, the jaws being tightened on the carbon by the screw A^3. The other end of the carbon rod B is held in a similar clip C′ at the end of the metal bar C.

D′ is a conductor connecting the bar C to the work D or to the support E, on which the work rests.

F is a jacket of asbestus or other refractory insulating material partially surrounding the carbon rod B. The carbon rod B should be placed as near as is practicable to the work; but care must be taken that the current is not short-circuited by forming an arc between the rod B and the work.

The length and sectional area of the rod B must be properly proportioned to the current being employed. If too large, the rod will not become properly heated, while if too small it will become overheated and destroyed. A suitable current for a rod fifteen millimeters in diameter and two hundred millimeters long would be about seventy volts and three hundred ampères.

The negative pole of the battery or other source of electricity is connected by the conductor G to the carbon pencil H, which is held in a support, as shown, by which it may be moved over the work.

What I claim is—

1. An apparatus for heating or welding by the electric arc, in which the work forms one pole, comprising a pencil forming the other pole, a generator of electricity, circuit connections between the pencil and the generator and between the generator and the work, and a resistance so proportioned in size to the current as to be heated without being consumed interposed in the circuit and arranged in proximity to the work to heat it by radiation.

2. An apparatus for heating or welding by the electric arc, in which the work forms one pole, comprising a pencil forming the other pole, a generator of electricity, circuit connections between the pencil and the generator and between the generator and the work, and a resistance so proportioned in size to the current as to be heated without being consumed interposed in the circuit between the generator and the work to heat the work by radiation while being also heated by the electric arc.

3. An apparatus for heating or welding by the electric arc, in which the work forms one pole, comprising a pencil forming the other pole, a generator of electricity, circuit connections between the pencil and the generator and between the generator and the work, and a resistance interposed in the circuit and arranged in proximity to the work, but at a suitable distance therefrom to avoid short-circuiting, and adapted to heat the work by radiation while being heated by the electric arc, and means for moving the pencil over the work.

4. An apparatus for heating or welding by the electric arc, in which the work forms one pole, comprising a pencil forming the other pole, a conductor connecting the pencil with a source of electricity, a resistance so proportioned in size to the current as to be heated without being consumed and arranged at a suitable distance from the work to avoid short-circuiting, arranged to heat that side of the work opposite the side on which the arc is formed, a conductor connecting the resistance with the source of electricity, and a conductor or conductors connecting the resistance with the work.

5. In apparatus for heating and welding by the electric arc, where the work forms one pole and a pencil the other pole, the combination of a conductor leading from the positive pole of the source of electricity, a metal clip connected to the conductor, a carbon rod, one end of which is held in the clip, a second clip holding the other end of the carbon rod, a conductor connecting the second clip to the work or to the support on which the work rests, and a pencil connected by a conductor to the negative pole of the source of electricity.

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