

No. 724,778.

PATENTED APR. 7, 1903.

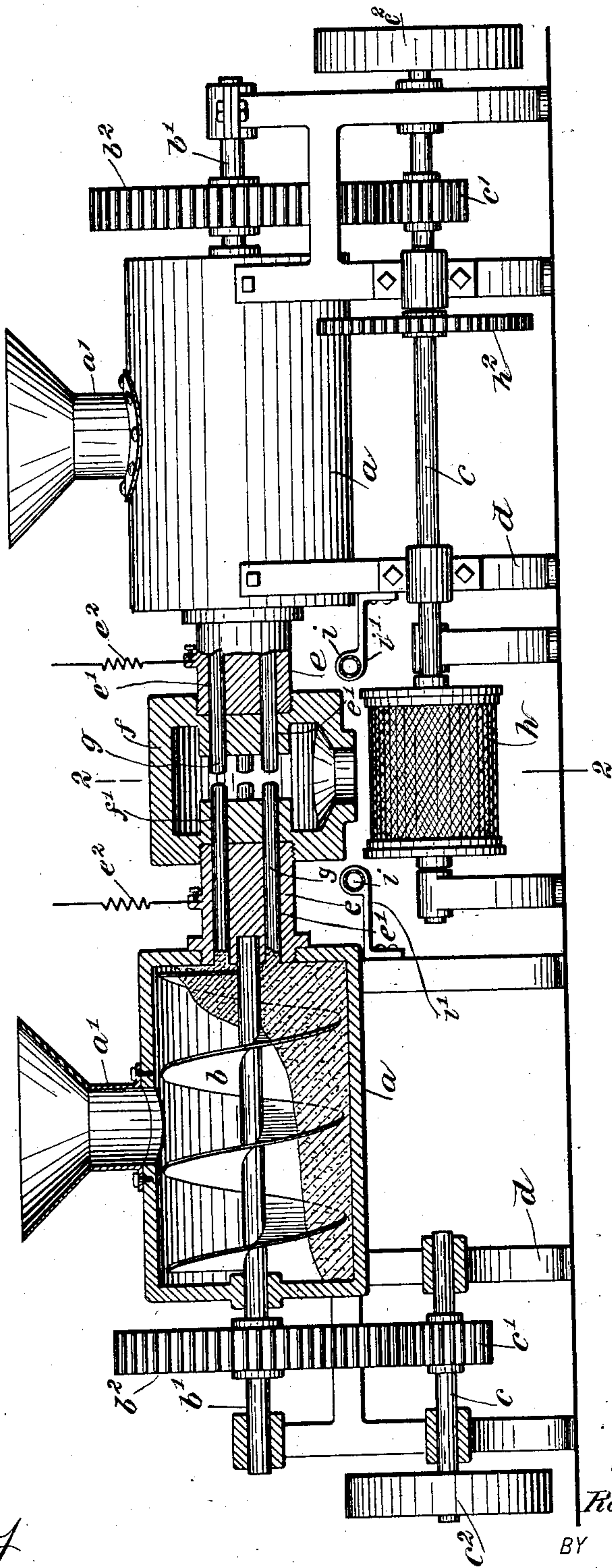
R. L. BARNHART.
ELECTRICAL SMELTING APPARATUS.

APPLICATION FILED MAY 14, 1902.

2 SHEETS—SHEET 1.

NO MODEL.

Fig. 1



WITNESSES:

J. S. Prophy

Isaac B. Owens.

INVENTOR

Robert L. Barnhart

BY

Mumford
ATTORNEYS

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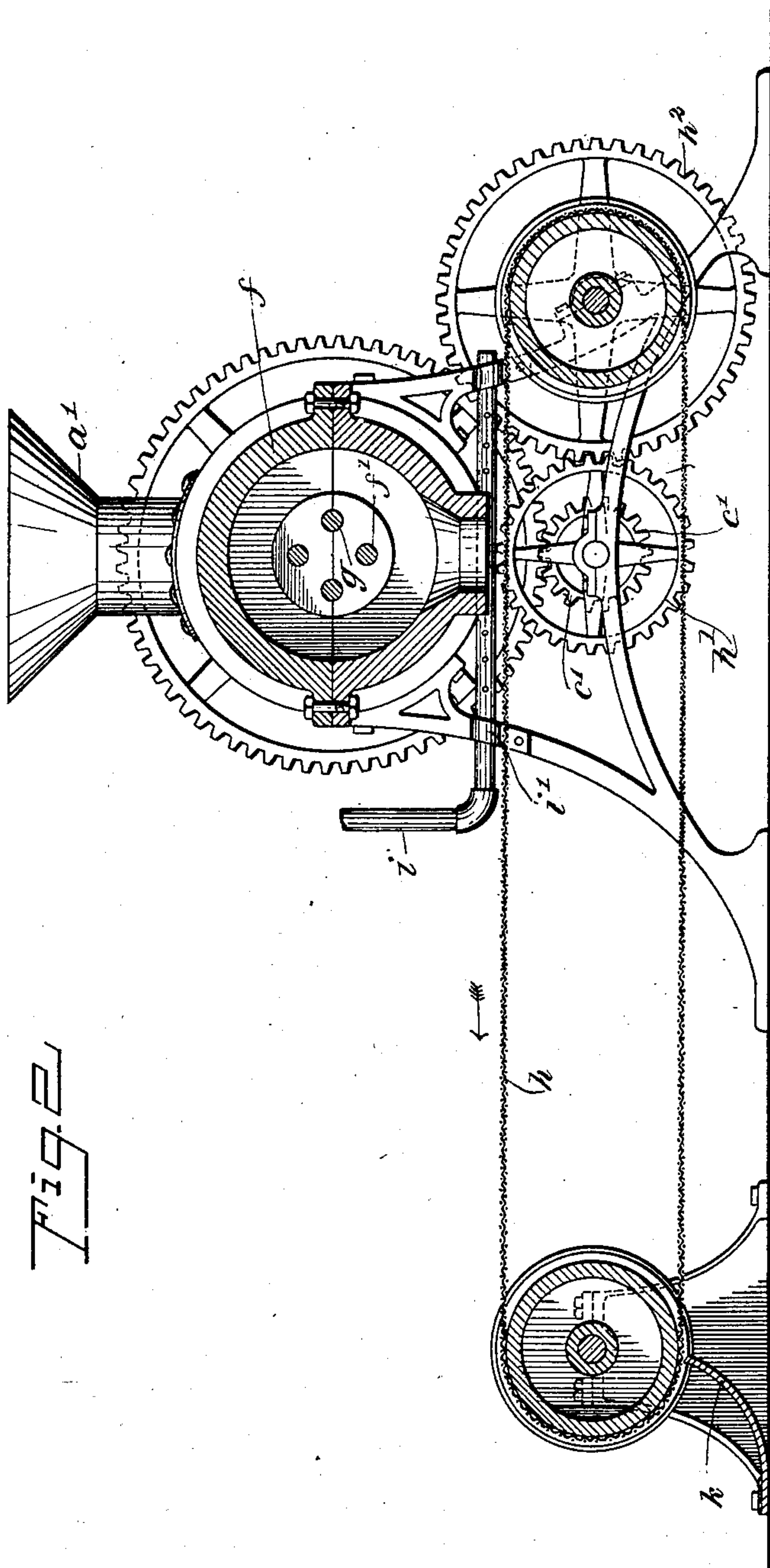


Fig. 2

WITNESSES:

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UNITED STATES PATENT OFFICE.

ROBERT LESSLEY BARNHART, OF CHARLEROI, PENNSYLVANIA.

ELECTRICAL SMELTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 724,778, dated April 7, 1903.

Application filed May 14, 1902. Serial No. 107,223. (No model.)

To all whom it may concern:

Be it known that I, ROBERT LESSLEY BARNHART, a citizen of the United States, and a resident of Charleroi, in the county of Washington and State of Pennsylvania, have invented a new and Improved Electrical Smelting Apparatus, of which the following is a full, clear, and exact description.

This invention relates to mechanism for smelting minerals by the use of the electric arc, the minerals being suitably fluxed and prepared in the form of paste, which is then formed into lengths or bars, so that when electrically charged and brought in contact an arc is formed and the mineral is thereby smelted.

This specification is an exact description of one example of my invention, while the claims define the actual scope thereof.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in both views.

Figure 1 is an elevation view of the invention with parts in section, and Fig. 2 is a section on the line 2 2 of Fig. 1.

a represents two drums, each having a feed-hopper a' . In each drum is placed a worm-screw b , the shafts b' of which are provided with gears b^2 , in mesh with gears c' on drive-shafts c , to which shafts pulleys c^2 are fastened. The drums a are supported in suitable frames d , and these frames, as well as the drums, are insulated from each other—that is to say, they are separated and have no electrical connection between them. The drums a are arranged in axial line, and at their adjacent ends are provided with heads e , formed of metal and provided with passages e' , extending longitudinally through them. Between the heads e is located an insulated box f , of fire-brick or the like, this box having openings f' , registering with the passages e' in the heads e . The heads e are charged with electricity from conductors e^2 , leading thereto, or otherwise, as may be desired. As the shafts c are driven the screws b force the material through the openings e' , forming it into rods or bars, as indicated at g in Fig. 1. These bars come together in pairs, owing to the juxtaposition of the openings e' and f' , and as soon as contact is made

an arc is established which smelts the metal, the matte and slag produced dropping through the opening in the bottom of the box f and falling upon a conveyer-apron h , formed of metallic screening. The conveyer h is driven by connection with one of the shafts c , as shown in Fig. 1, gears h' and h^2 being provided for this purpose. Located between the drums a and at each side of the screw h are spray-pipes i , sustained on the frame by brackets i' and adapted to throw onto the screen sprays or jets of liquid flux, whereby the screen is kept in a fluxed state at all times.

k indicates a scraper located under one end of the conveyer and serving to scrape off the slag.

As the matte and slag fall on the screen h they are acted on by the flux and the matte adheres to the screen, the slag being scraped off by the scraper k . When the screen becomes sufficiently charged with matte, the screen should be taken off of the machine and subjected to the refining process, while a new screen should be applied to the machine. In practice a suitable receptacle will be provided at the scraper k for the slag.

This apparatus while useful in very numerous branches of smelting is especially intended for the reduction of gold, silver, and copper ores. In treating ore containing any or all of these substances a suitable flux may be made of sal-ammoniac, borax, and a saturated solution of zinc chlorid. On about one thousand pounds of ore the proportions should be as follows: ten pounds of sal-ammoniac, five pounds of borax, two gallons of saturated solution of zinc, ten to fifteen gallons of water, the whole to be mixed with the ore while being prepared for the smelting apparatus. For fluxing the screen the same composition may be used, with the addition of one to two pints of glycerin.

Various changes in the form and details of my invention may be resorted to at will without departing from the spirit of my invention. Hence I consider myself entitled to all forms of the invention as may lie within the intent of my claims.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination of two oppositely-situ-

- ated orificed heads adapted to be charged with electricity and insulated from each other, means for forcing the plastic minerals through said orificed heads, forming meeting rods or bars of the minerals, for the purpose specified, and an insulating-box lying between the heads and covering the adjacent ends of the said heads.
2. The combination of two drums, orificed heads respectively for said drums, the heads lying opposite to each other, means for forcing a plastic mineral from the drums through the heads, for the purpose specified, and an insulated box lying between and covering the adjacent ends of the heads.
3. The combination of an orificed head formed of electric conducting material, means for forcing plastic material through the orifice in the head to form said material into a rod or bar, a mass of non-conducting material lying against the said head and orificed to register with the orifice in the head whereby to admit the passage of the said rod or bar, and an electric circuit including the said head and the rod or bar of plastic material and forming an arc at the end of said rod or bar outward from the said mass of non-conducting material.
4. The combination of means for forming a mass of plastic material into a rod or bar and for feeding said rod or bar longitudinally, an orificed mass of non-conducting material through the orifice of which the said rod or bar is projected and an electric circuit including the rod or bar of plastic material and forming an electric arc at the end of the plastic rod or bar just outward from said mass of non-conducting material, for the purpose specified.
5. The combination of two drums, oppositely-situated orificed heads for said drums, the heads being formed of electric conducting material, means for forcing a plastic material from the drums through the orifices of the heads to form said material into meeting rods or bars for the purpose specified, an insulating-box extending between the adjacent ends of the heads and inclosing the meeting ends of said rods or bars of plastic material, said box having an outlet in its bottom, a metallic conveyer receiving the discharge from said box, means for supplying a flux to the conveyer, said means for supplying the flux being located immediately adjacent to the outlet of the said insulating-box, and a scraper past which the conveyer runs.
6. The combination of a fusing means having an outlet for the substances fused, a metallic conveyer receiving said substances, and means at each side of said outlet for spraying a liquid flux onto the screen in the immediate locality of the said outlet for the substances fused.
7. The combination of a fusing means having an outlet for the substances fused, a metallic conveyer receiving said substances from said outlet, and a means for depositing a flux onto the screen, said means being located in the immediate vicinity of the outlet to the fusing means to supply the flux to this point.
8. The combination of a fusing means, comprising an outlet for the substances fused, a metallic conveyer-screen running under said outlet to receive the products therefrom, a spray-pipe located at each side of the conveyer and disposed longitudinally thereof in the immediate vicinity of the outlet of the fusing means, said spray-pipes serving to deliver a liquid flux onto the screen, and means for mounting said pipes.
9. The combination of two oppositely-situated orificed electric conducting-heads, means for forcing a plastic electric conducting substance through the orifices of said heads to form meeting rods or bars of said plastic conducting substances, for the purpose specified, and an insulating-box lying over and covering said heads and having orifices registering with the orifices therein, said box forming an inclosed insulating-chamber between the heads.
- In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.
- ROBERT LESSLEY BARNHART.
- Witnesses:
FRANKLIN C. ROBERTS,
L. P. FLICKINGER.