

(No Model.)

2 Sheets—Sheet 1.

R. E. ZELLERS.  
APPARATUS FOR MAKING DENTURES.

No. 454,415.

Patented June 16, 1891.

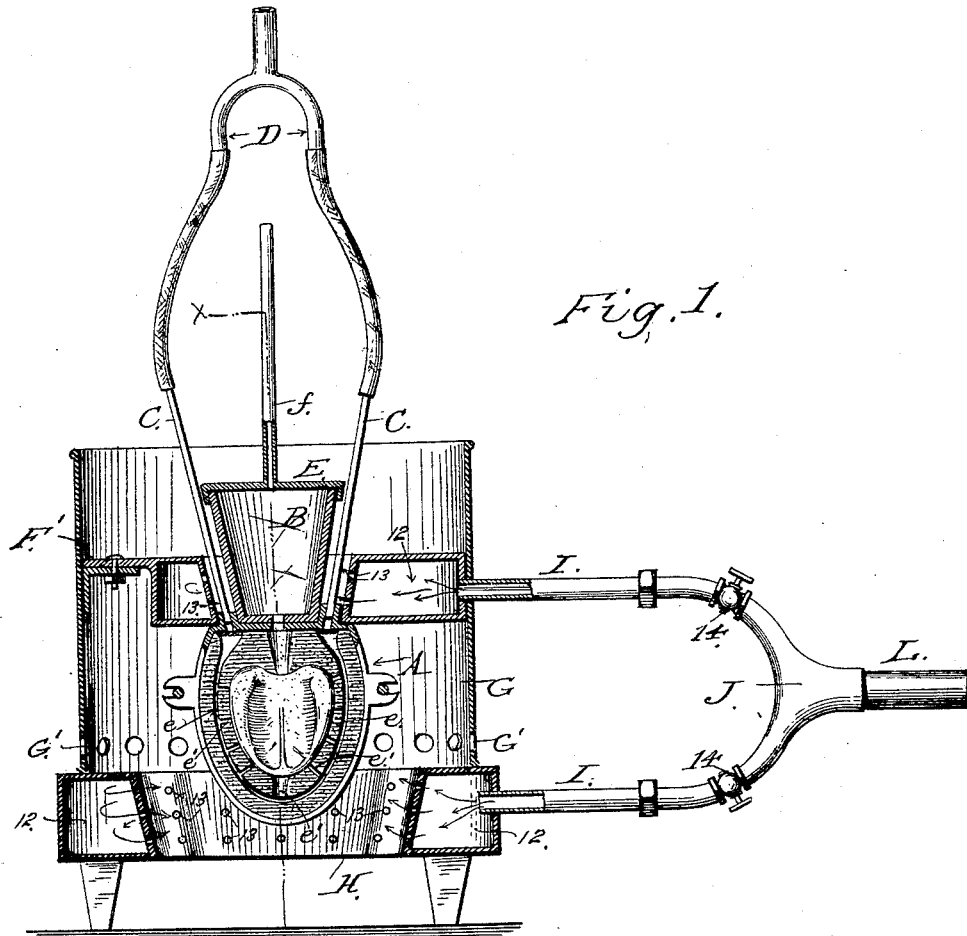
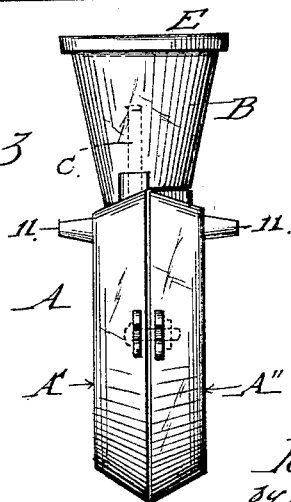


Fig. 1.

Fig 3



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Fig. 2.

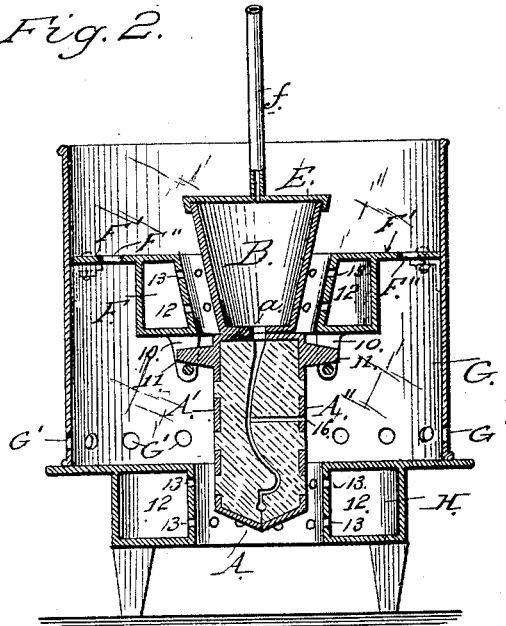
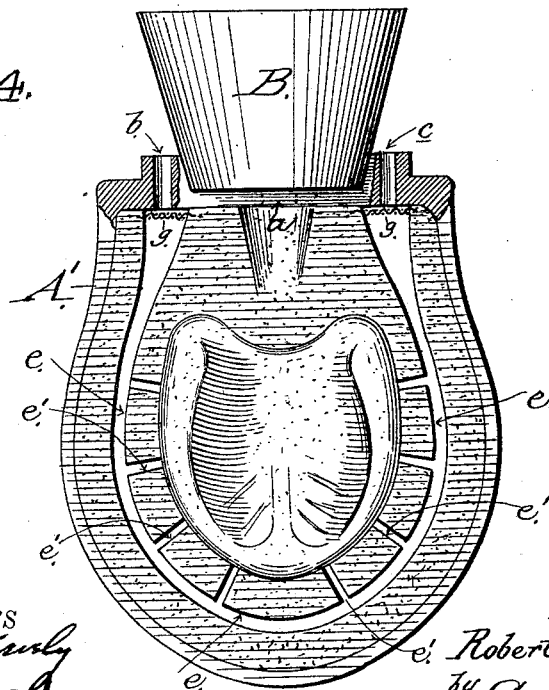


Fig. 4.



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# UNITED STATES PATENT OFFICE.

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## APPARATUS FOR MAKING DENTURES.

SPECIFICATION forming part of Letters Patent No. 454,415, dated June 16, 1891.

Application filed October 6, 1890. Serial No. 367,192. (No model.)

*To all whom it may concern:*

Be it known that I, ROBERT EMANUEL ZELLERS, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for Making Dentures, of which the following is a full and clear description, reference being had to the accompanying drawings forming part of this specification, in which—

Figure 1 is a vertical sectional view of my improved apparatus. Fig. 2 is a cross-sectional view of the same on the line *xx* of Fig. 1. Fig. 3 is a detail showing in elevation the crucible and two-part flask. Fig. 4 is an elevation of the flask and crucible, showing one section of the flask removed.

My invention relates to an apparatus for making cast dentures of magnesium, aluminum, or aluminum alloys or analogous material; and it consists in the constructions and combinations of devices, which I shall hereinafter fully describe and claim.

Referring to the drawings for a more complete explanation of my apparatus, A indicates a flask formed, preferably, of two sections A' and A'', united together by bolts, one of said sections A' being cast integral with a crucible B, as shown in Fig. 2. The flask A is designed to contain the model made of plaster-of-paris or analogous material and taken from an impression of either jaw in the usual manner. The section A' of the flask has its upper wall formed with three holes *a*, *b*, and *c*, the former of which is centrally disposed and leads up through the center of the bottom of the crucible, while the two others are outside of the crucible, one on each side. In the mold is cut a canal or passage *e*, which extends around the mold, as shown, and has its ends communicating with the holes *b* and *c*, and from said canal or passage extend a series of lateral branch canals or passages *e'*, which lead direct to the mold, the short canal or passage at the bottom of the mold being slightly larger than the others, and the main and branch canals forming an air space or passage leading from the exterior direct to the mold. The holes *b* and *c*, before mentioned, are adapted to receive metal tubes C, to the upper ends of which is attached a

forked mouth-piece D, or, if preferred, a rubber bulb may be substituted for the mouth-piece, the purpose of which will be hereinafter stated. The crucible is provided with a top or cover E to prevent the escape of heat therefrom, and said top or cover is provided with a tube *f*, forming a passage for the escape of hydrogen and gas while the mold is drying.

From the description thus far given it will be seen that when the ingot of metal is fused in the crucible and the tubes C are inserted in the holes *b* and *c* the operator exhausts the air in the mold (through the canals or passages before described) by an inhalation of the lungs or by the rubber bulb and thereby creates a vacuum in the mold. When the vacuum is thus created, the fused metal instantly begins to flow through the opening *a* from the crucible into the mold. When metal of a heavier specific gravity than aluminum is used, it is desirable to insert a plug in the hole in the bottom of the crucible until the metal is fused, the said plug to be withdrawn as the vacuum is created, and to arrest the flow of metal into the tubes connected with the mouth-piece I secure over the inner ends of the air holes or passages *b* and *c* fine wire-gauze *g* or like material. (See Fig. 5.) The burner F has an open center to receive the crucible, whereby the latter is heated, and from the bottom of the burner project suitable spaced lugs, which are designed to receive and form bearings for suitable trunnions 11, projecting from the sides of the flask and held within the bearings by means of removable pins or like devices, whereby the flask and crucible are held in position within the burner, the crucible being centrally held within the open center of the burner and the flask below the same, as shown. A sheet-metal cylinder G is bolted to and surrounds the burner projecting above and resting upon the lower burner H, so that the flask as well as the crucible is practically within the burner, so as to receive heat therefrom equally on all sides, each burner having a hollow passage 12, with a series of outlets 13 leading therefrom, the lower burner H having an oblong opening in its center, in which the lower portion of the flask lies, as

shown, and the upper burner having a flange F', provided with holes F'' for the passage of the heat from the lower burner, while the sheet-metal cylinder is formed with openings 5 G' to provide for a proper circulation of air. From each burner extends a pipe I, to which is attached a forked tube J, provided with valves or cocks 14, and said forked tube is connected with a single tube L, which in turn 10 is suitably connected with a suitable source of heat—such as a gas-supply—the flow of which to the burners is regulated and controlled by the valves or cocks 14 in the forked tube. By this means the gas may be equally distributed to both burners at the same time, or 15 a greater or less amount may be conducted to one than to the other, or one burner may be cut off and the whole flow of gas or any portion thereof may be conveyed to a single burner. I am thus enabled to concentrate 20 the heat at any desired part and prevent any material loss of the same by providing the crucible with the top or cover before mentioned. I also dispense with the heretofore objectionable furnaces and connect my apparatus directly with the gas-supply. From 25 this description it will be observed that when the operator wishes to make a cast he will first shut off the flow of gas by means of the valves or cocks, after which he will insert the air-tubes attached to the mouth-piece or bulb, remove the top or cover from the crucible, so as to obtain the natural air-pressure, then exhaust the air, and create the vacuum, as before 30 mentioned, when the cast is made.

I will now describe the process of casting solid dentures of aluminum or of other metal. An operator skilled in the well-known rubber work may produce the above. The first step 40 will be to select the desired size and shape of teeth, and then proceed as in the rubber work, investing in that portion of the flask which is integral with the crucible with the palate side down. He will now cut the air-canals, varnish and oil, and let dry, after which he will cover the plate and teeth with the investment material, then fill the other side or section of the flask, and close and lock the sections of the flask, so that the surplus investment material will escape through the openings 50 15 in the sides of the flask. After the material has "set" or hardened the flask is opened, and the paraffine plate and teeth are picked out or removed by any of the well-known means, thereby forming a mold for a solid plate of any metal desired.

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

60 1. In an apparatus for making dentures, the combination, with suitable burners connected with a source of heat-supply, of a two-part flask within one of said burners having air canals or passages formed therein, air-tubes communicating with said canals for exhausting the air therefrom, a crucible within 65 the other burner, and a passage therefrom to

the interior of the mold, substantially as herein described.

2. In an apparatus for making dentures, 70 the combination, with suitable burners connected with a source of heat-supply, of a two-part flask within one of said burners having openings b c in its upper wall, an air canal or passage formed in the flask having branch 75 canals or passages leading to the mold within the flask, a crucible in the other burner having an outlet leading to said mold, and air-tubes let into the openings b c and connected with means for exhausting the air and creating a 80 vacuum in the mold, substantially as herein described.

3. In an apparatus for making dentures, the combination, with burners and means for supplying heat thereto, of a two-part flask 85 within one of said burners, a crucible within the other burner formed integral with one of said parts, means for locking the sections of the flask together, the air-tubes communicating with the interior of the flask for exhausting the air therefrom, and a passage leading 90 from the crucible to the mold, substantially as herein described.

4. In an apparatus for making dentures, the combination of a flask for containing the 95 mold, a crucible integral with the flask and communicating with its interior, the lower burner within which the flask is suspended, the upper burner for receiving the crucible, pipes leading from said burners to a source 100 of heat-supply, and valves or cocks in said pipes for directing and regulating the flow of heat, substantially as herein described.

5. In an apparatus for making dentures, the combination of the flask, a crucible integral therewith, a cover for said crucible to 105 prevent the escape of heat therefrom, the upper and lower hollow burners having open centers for receiving the crucible and flask, respectively, a forked pipe connected with a 110 source of gas-supply, having a branch pipe leading to each burner, and valves or cocks in said pipe for directing and regulating the flow of gas, substantially as herein described.

6. In an apparatus for making dentures, 115 the combination of a flask having a crucible formed integral therewith, the hollow lower burner having an open center to receive the flask, the hollow upper burner having an open center to receive the crucible and having a 120 surrounding flange provided with openings for the escape of heat from the lower burner, a cylinder surrounding the upper burner, flask, and crucible, and pipes leading from the burners to a source of heat-supply and having 125 valves or cocks by which the heat is directed and controlled, substantially as herein described.

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Witnesses:

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