J. A. JOHNSON & C. M. HEDMAN.

INLAY CASTING MACHINE.

APPLICATION FILED APR. 25, 1908.

Patented Aug. 8, 1911.

999,794.

2 SHEETS—SHEET 1.

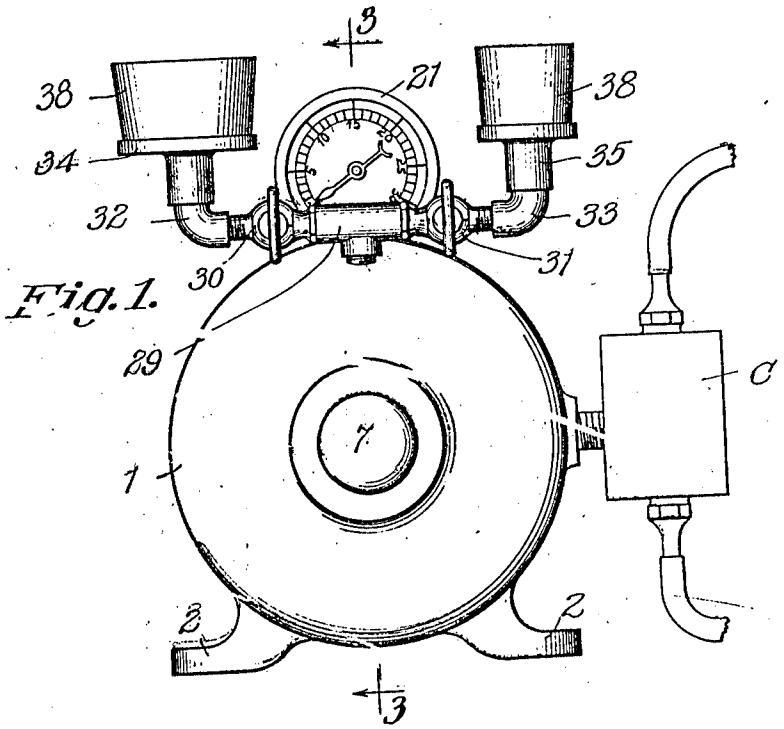

Fig. 1.

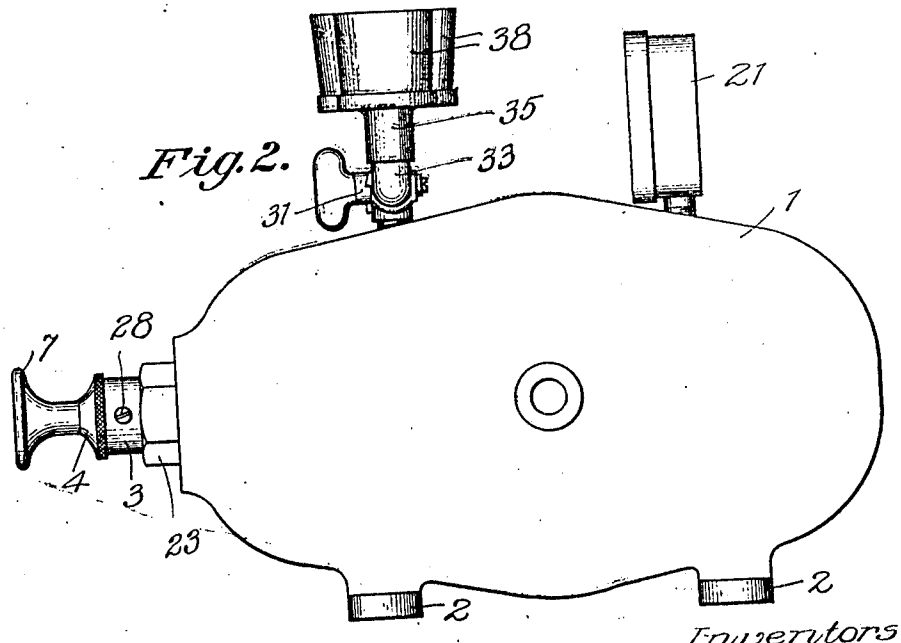

Fig. 2.

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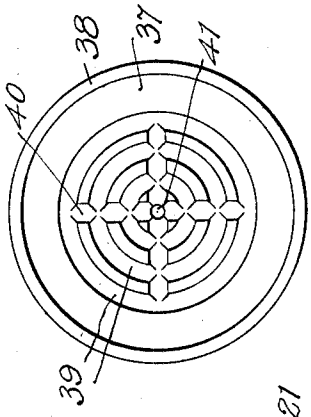

Fig. 4.

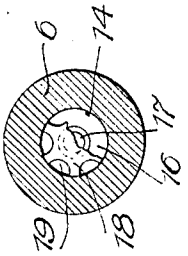

Fig. 6.

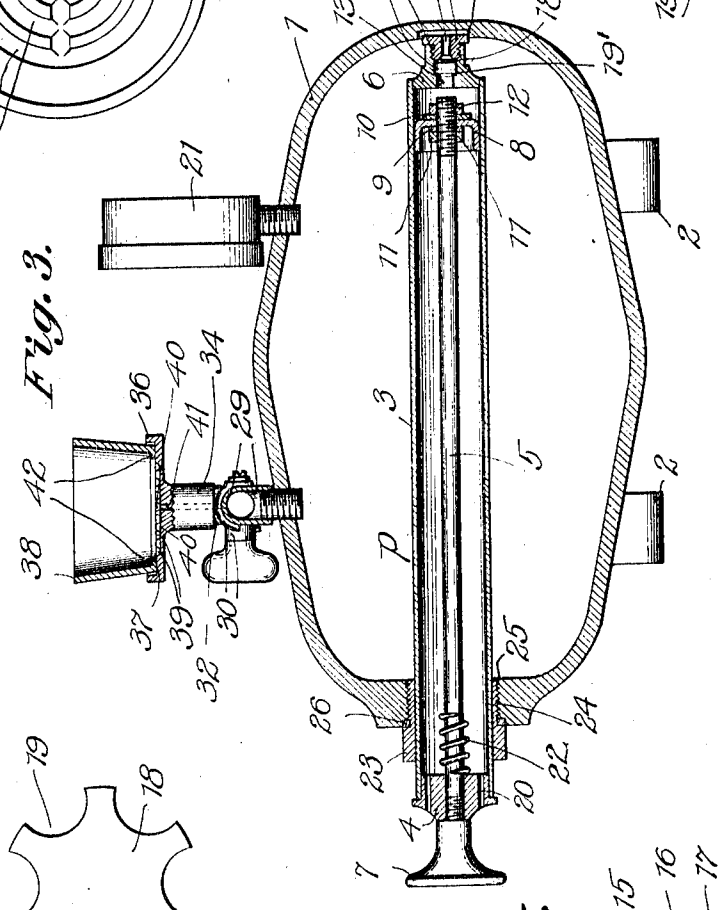

Fig. 3.

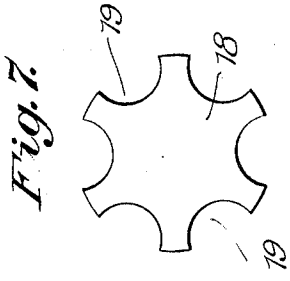

Fig. 7.

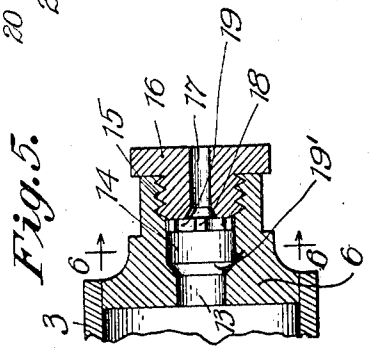

Fig. 5.

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UNITED STATES PATENT OFFICE.

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INLAY-CASTING MACHINE.

999,794. Specification of Letters Patent. Patented Aug. 8, 1911.

Application filed April 25, 1908. Serial No. 429,142.

To all whom it may concern:

Be it known that we, JOHN A. JOHNSON and CARL M. HEDMAN, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Inlay-Casting Machines, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

Our invention relates to casting machines, particularly to machines for casting inlays for dental work.

The object of our invention is to provide a better arrangement for the various parts constituting an inlay casting outfit. In prior outfits of this kind the various parts are separated, the pressure tank being connected with a pump by hose. The pressure tanks in these prior devices are also very light and unstable.

One of the main features of our invention is the arrangement of the pump which is carried by the pressure or vacuum tank to form a unitary outfit, the tank being also heavy and more stable. The tank is substantially cylindrical, or barrel-shaped, and the pump preferably extends axially through the tank and secured therein, only the handle part being at the outside.

Another feature of our invention involves the construction of the flask supporting cups. In prior devices these cups have beveled flanges for receiving the correspondingly beveled ends of the flasks. The center part of these cups is also dished, or cupped out, so that when the filled flask is set on the cup, there will be an air space below the entire investment material within the flask.

In the use of the casting outfit, a mold of wax is first taken, for instance of a tooth to be inlaid. This wax is suspended in a flask, and investment compound or material, such as plaster of Paris, is poured about the mold or pattern. The material is allowed to set, and is thoroughly heated until it becomes hardened and the wax pattern entirely absorbed thereby. The flask is then set on a cup, and gold or other material melted on top of the flask to find its way to the cavity left by the pattern, suitable channels or gates having been provided thereto. After the inlay material has been heated sufficiently, the cup is connected with the vacuum tank and the molten substance is sucked down into the cavity to fill every niche and crevice and to form a perfect duplicate of the wax pattern and of the tooth cavity. The vacuum pressure exerted on a flask is considerable, and where the cup flanges are beveled, as in the prior art, the flask is apt to become very tightly wedged in the cup and it is very difficult to subsequently remove it; also, where the center of the cup is dished, the center of the investment material is unsupported and is apt to be drawn bodily out of the cup. The binding objection we overcome by making the flanges of the cup straight, and to insure a perfect fit between flask and cup, we turn a section of the cup and the edge of the flask so that the flask can be placed on the cup to make an airtight connection. Also, instead of dishing the center of the cup, we leave the floor of the cup horizontal, and provide intersecting radial and concentric grooves therein, which are all connected with the passageway leading to the vacuum tank. Thus, the pressure is accessible to all parts of the flask, and still the investment material is perfectly supported. In the accompanying drawings of our invention, it is clearly illustrated.

Figure 1 is a front view; Fig. 2 is a side view; Fig. 3 is a sectional view taken on vertical plane 3, of Fig. 1; Fig. 4 is a large top view of one of the cups; Fig. 5 is an enlarged view of the end section of the pump, showing the valve mechanism; Fig. 6 is a sectional view taken on plane 6, 6, of Fig. 5, and Fig. 7 is an enlarged plane view of the valve disks which we employ.

The pressure vacuum tank 1 may be cylindrical, or more or less barrel-shaped, as shown, being provided with feet 2, 2 by means of which it may be rigidly secured to a support, if desired. The cylindrical pump *p* which we employ comprises the pump barrel 3 having the guide head 4 for the piston rod 5, and at its other end closed by the valve frame 6. The outer end of the piston rod terminates in the handle or knob 7, while at the other end is secured the leather plunger 8 between outer and inner washers 9 and 10 and nuts 11 and 12. The valve frame 6 has the inner bore section 13, the intermediate bore section 14 of larger diameter, and the outer threaded bore section 15. A nut 16 engages this threaded portion, and has the passageway 17. With-

in the bore part or compartment 14 is the valve disk 18, whose form is best shown in Fig. 7. This disk is formed by cutting semi-circular sections or segments from the edge of a circular disk, to leave the by-passes 19. When the pump rod is pulled out, air is withdrawn from the tank into the pump barrel, the valve disk during this outward movement of the plunger resting against the shoulder or seat 19', at the left end of valve compartment 14, and the air can flow from the tank through the by-passes 19 and into the pump barrel. When the plunger comes to rest or is moved rearwardly, the valve disk is thrown against the inner face of the nut 16, this face being within the by-passes 19, so that the passageway 17 will be closed, the reduced pressure in the tank being thereby maintained. The air which was drawn into the barrel upon outward movement of the plunger will pass by the flexible plunger edges when the plunger is moved inwardly. Upon outward movement of the plunger, any air in front thereof escapes to the outside through passageways 20 through the head 4. Thus as the pump is operated, the air will be exhausted from the tank, the pressure therein being indicated by a pressure gage 21 suitably mounted on the tank. A buffer spring 22 encircles the pump rod and acts as a cushion for the plunger when the plunger reaches the outer end of the barrel. The valve mechanism for the pump which we have described is very simple and very efficient. Brazed to the front end of the pump barrel is a sleeve 23 having a threaded portion 24 for engaging in the threaded opening 25 through the front head of the tank, the outer portion of the sleeve being polygonal, so that a wrench may be applied. A washer 26 of lead or other suitable material is interposed, in order that an airtight fit will result. The rear end of the pump extends into and is supported in a niche 27 in the rear head of the tank. The entire pump structure can readily be unscrewed bodily from the tank, and upon removing the screw or screws 28, the head 4 can be withdrawn and the stem and plunger removed. By unscrewing the nut 16, the valve can be removed.

A T-member 29 is screwed into the top of the front end of the tank, and at its ends engages with valve members 30 and 31 terminating in elbow members 32 and 33, respectively. Mounted on elbow 32 is the cup member 34, and mounted on elbow 33 is the cup member 35. Each cup member has a vertical flange 36 and a planed horizontal annular section 37, forming a seat for a flask frame 38, whose lower edge is also planed to form an airtight joint with the cup surface 37. The inner section of the cup base has concentric grooves 39 an intersecting radial grooves 40, these grooves being all in connection with the passageway 41 leading through the cup member and through the various connecting members with the tank when the corresponding valve is open. The lower edge of each flask also extends inwardly a slight distance, to give greater bearing surface and also to form a ledge 42 for assisting to hold the investment material within the flask. After the pattern or mold has been suspended in the flask and the compound sufficiently dried and hardened, the flask is placed on its cup and heated, to cause absorption of the wax. Gold or other suitable inlaying material is then laid at the entrance of the passageways to the cavity left by the melted wax, and is thoroughly heated to a liquid state, when the corresponding valve is opened and the cup connected with the low pressure. This low pressure connects at all parts of the base of the compound through the grooves 39 and 40, and the melted material is sucked and forced into the cavity to form an exact duplicate of the wax pattern and of the cavity to be filled. The ribs remaining in the cup bottom between the grooves support the investment compound and prevent its removal from the flask due to the low vacuum pressure. After the inlay has been formed, the valve is again closed and the flask can be readily removed from the cup. We have shown two cups for accommodating two different sizes of flasks, but of course any number of cups could be provided. We thus have a unitary self-contained outfit, all the parts necessary for forming inlays being united. The outfit can be made sufficiently heavy to be stable. The tank can also be fastened to a support by means of screws or nails passing through the feet. In dental work, many other appliances are used during work on a patient, such as a carbureter, for instance, for supplying gas. Devices of this kind are usually small and easily misplaced, besides being very unstable. Our tank body would form a very efficient support for devices of this kind, Fig. 1 showing a carbureter C supported from one side of the tank.

We do not wish to be limited to the exact construction which we have shown and described, as changes and modifications are possible which will come within the scope of our invention, the main features of which being the rigid connection of the pump directly with the tank and the improved form of cup and flask.

Having thus described our invention, we desire to secure the following claims by Letters Patent:

1. In a device of the class described, the combination of a tank, means for adjusting the pressure within said tank, a supporting cup, valve mechanism for controlling the

connection of said cup with the tank, and intercommunicating radial grooves in the base of said cup.

2. In a device of the class described, the combination of a tank, means for adjusting the pressure in said tank, and a supporting cup adapted for connection with the tank, the base of said cup being horizontal and provided with intercommunicating grooves having connection with the passageway and thereby with the tank.

3. In a device of the class described, the combination with a vacuum tank, of a cup supported on said tank and adapted for communication therewith through a passageway, the base of the cup being in a horizontal plane and provided with concentric and radial intercommunicating grooves connected with the passageway and thereby with the tank.

4. In a device of the class described, the combination of a vacuum tank, a flask supporting cup mounted on said tank and having connection therewith through a passageway, the base of the cup being in a horizontal plane, the outer section of said cup being planed and finished to be engaged with airtight fit by the finished edge of a flask supported by the cup, the inner section of the base being provided with grooves having connection with said passageway.

5. In combination, a vacuum tank, a supporting cup, and a valve for controlling the connection of said cup with the tank, said cup having intercommunicating radial grooves in the base thereof.

6. In combination, a vacuum tank, a supporting cup, and a valve for controlling the connection of said cup with the tank, the base of said cup being substantially horizontal and provided with intercommunicating grooves having connection with the tank.

7. In combination, a vacuum tank, a supporting cup, and a valve for controlling the connection of said cup with the tank, said cup having inter-communicating grooves in the base thereof.

8. In combination, a vacuum tank, a supporting cup, and a valve for controlling the connection of said cup with the tank, said cup having grooves in the base thereof.

In witness whereof, we hereunto subscribe our names this 18th day of April, A. D. 1908.

JOHN A. JOHNSON.
CARL M. HEDMAN.

Witnesses:
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GEORGE E. HIGHAM.