F. A. CARTER.

CASTING MACHINE.

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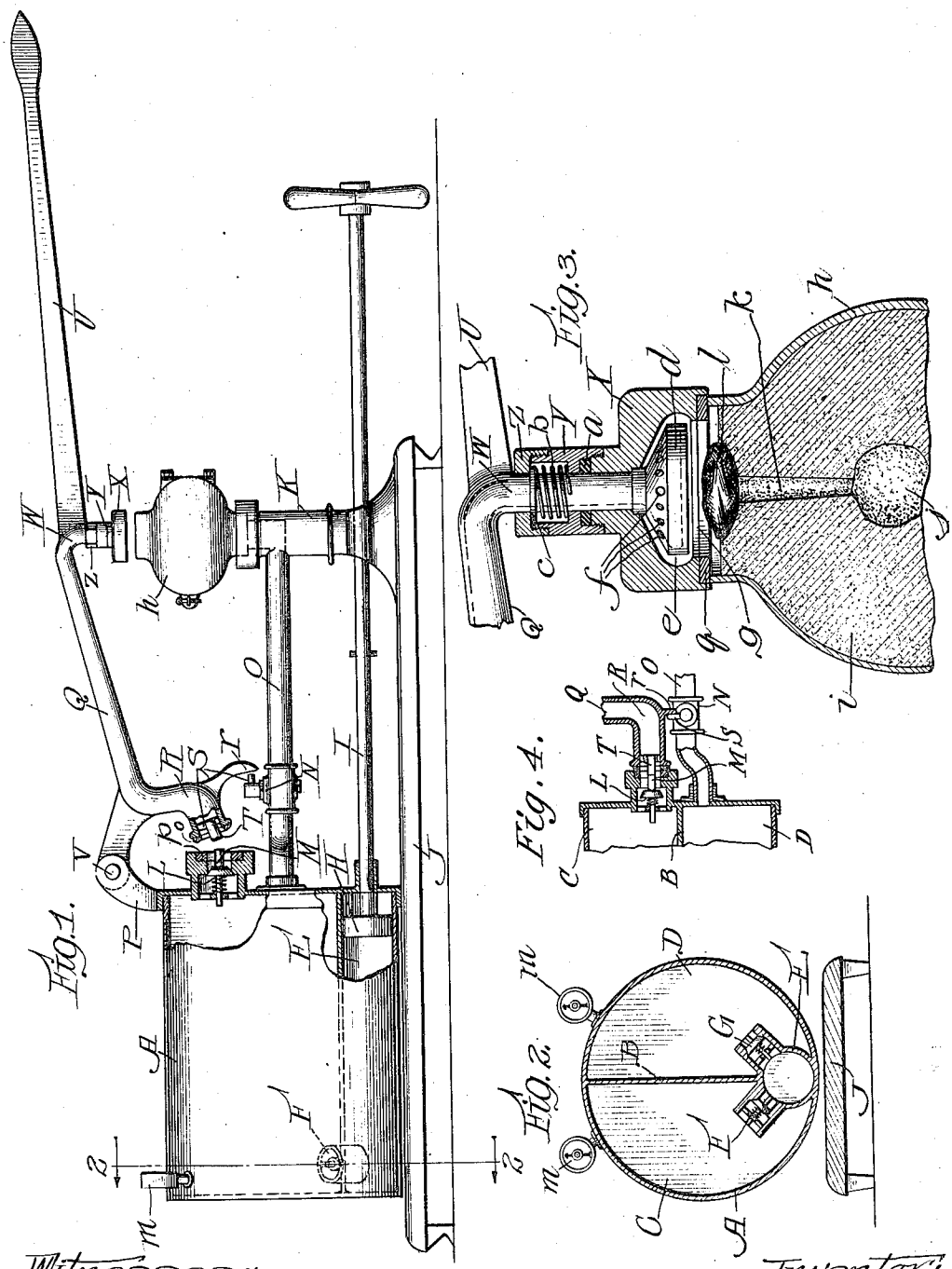
964,212. Patented July 12, 1910.



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UNITED STATES PATENT OFFICE.

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CASTING-MACHINE.

964,212. Specification of Letters Patent. Patented July 12, 1910.

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To all whom it may concern:

Be it known that I, FRANCIS A. CARTER, a citizen of the United States of America, and resident of Chicago, Cook county, Illinois, have invented a certain new and useful Improvement in Casting-Machines, of which the following is a specification.

My invention relates to improvements in dental casting machines, and has for its object the production of a machine in which both vacuum and pressure are utilized in casting an inlay.

A further object is the production of a machine in which certain improved mechanism is utilized for the proper carrying out of the purposes of the invention, thereby producing a cheap and efficient machine of few and simple parts, and one that is little liable to get out of order.

These and such other objects as may hereinafter appear are attained by my machine, an embodiment of which is illustrated in the accompanying drawings, in which—

Figure 1 represents a side elevation of my machine, partly in section. Fig. 2 represents a sectional view on line 2—2 of Fig. 1, looking in the direction indicated by the arrows. Fig. 3 represents an enlarged sectional view of a portion of Fig. 1. Fig. 4 represents an enlarged detail showing the tapping of the vacuum chamber.

Like letters of reference indicate like parts in the several figures of the drawings.

Referring now to the drawings, A represents a cylindrical reservoir divided by a wall B into two chambers—a pressure chamber C and a vacuum chamber D. A cylinder E communicates with the two chambers C and D by means of valves F, G. A piston head H mounted on the end of a piston rod I is adapted to travel within the cylinder E, forming an ordinary form of pump. The reservoir A is mounted on a base J, and on the opposite end of the base is mounted a flask support K. A valve L provided with an outwardly projecting stem M communicates with the interior of the pressure chamber C, and a valve N is located in a tube O communicating with the interior of the vacuum chamber D. Mounted on a support P on the reservoir and over the valve L is a bent tube Q the lower end of which R is provided with a spider S having an outwardly projecting stem T. An arm U extends from the outer end of the tube Q forming with it a lever pivotally mounted on the support at V. The outer end of the tube Q is turned downwardly at W just above the flask support K.

Referring now to Fig. 3: It will be noted that the bent end W of the tube Q passes through a casting X on which is mounted a collar Y and a screw cap Z. A packing *a* is interposed between the collar and casting, and a spring *b* surrounds the tube and is mounted on a washer *c* adapted to bear against the inner face of the cap. The tube W terminates in an enlarged receptacle *d* mounted within a chamber *e* within the castings X, and so positioned as to leave a clear space between the outer walls of the enlargement and the inner walls of the chamber. The receptacle is provided with a plurality of openings *f* placed circumferentially in its upper surface by the medium of which air forced through the tube Q will be diffused, as it were, within the chamber *e* and through the open end *g* of the casting X.

In the operation of my machine, an investment flask *h* is filled with investment material *i* in which a wax mold has been absorbed in any well known manner, leaving a mold *j* and a communicating sprue channel *k*. The inlay material *l* is placed within the flask over the sprue opening and melted in any desired manner. The operation of the piston H withdraws air from the chamber D through the valve G, and forces it through the valve F into the chamber C, thus obtaining the desired vacuum and pressure within the respective chambers, as indicated by the gages *m*, *m*.

Let us now describe the operation of the machine: The flask *h* is placed in position and the metal melted ready for casting. The lever U is pressed down until the spring or rubber end *o* of the tube R engages the washer *p* outside the valve L, shutting off communication with the outer air. At this instant, the washer *q* on the bottom of the casting X engages the top of the flask, also closing communication with the outer air. The finger or latch *r* on the bottom of the tube at the same time engages the handle *s* of the valve N, and opens communication between the open bottom of the flask *h* and the vacuum chamber. As the lever is pressed home the spring *b* gives sufficiently to enable the stem T to engage the valve-stem M and open the valve L, thus establishing

communication with the top of the flask through the tube Q and chamber *d*. It will be noted that the opening of the two valves is not simultaneous, but the vacuum is opened first, thus removing all air from below the molten metal, and that in a slight fraction of time the pressure forces the molten metal through the sprue hole and into the mold.

I have illustrated in Fig. 4 a detail showing the valve L open, thus establishing communication between the tube Q and pressure chamber C. The finger *r* has also opened the valve N, establishing open communication between the vacuum chamber D and the tube O. Excellent results may often be obtained by the simultaneous opening of the valves leading to the pressure and vacuum chambers, but I prefer to apply the vacuum first as explained above in detail.

By my method of casting, all liability to imperfect inlays is removed, and perfect results insured. I am aware that inlays have been made heretofore by pressure, and also by the use of vacuum, but the results attained are not equal to those obtained by the use of my improved machine and process. Inasmuch as the castings made for use in dental cavities are in most cases quite small and of quite irregular contour, and it is quite essential that they fit the cavities with minute exactness, any advance in the art by means of which such results are attained is of great utility and value.

I find my machine of especial value in the casting of light metals; for instance, aluminum plates, as by applying the vacuum first and diffusing the air pressure all danger of splashing the metal is avoided. My improved process may also be advantageously used in making small castings of any desired shape or from any material.

While I have shown specific means by which my process may be carried out, I do not limit myself to such means, but many other modifications are possible without departing from the spirit of my invention.

I claim:

1. A machine of the class described, comprising a vacuum chamber, a compressed-air chamber, tubes communicating with said chambers, a flask positioned between said tubes, and automatic means for establishing simultaneously open communication between both of said chambers and said flask.

2. In a machine of the class described, a cylindrical shell comprising a vacuum chamber, a compressed-air chamber, tubes communicating with said chambers, a flask positioned between said tubes, and valves automatically controlling the passage of air between said chambers and flask.

3. A machine of the class described, comprising a vacuum chamber, a compressed-air chamber, tubes communicating with said chambers, a flask positioned between said tubes, valves controlling the passage of air between said chambers and flask, and means whereby the opening of one of said valves opens the other valve immediately thereafter.

4. A machine of the class described, comprising a vacuum chamber, a compressed-air chamber, tubes communicating with said chambers, a flask positioned between said tubes, a lever connected with one of said tubes and adapted to close communication between said tube and one end of said flask, and means for simultaneously opening communication between said tube and its connected chamber, together with means for opening communication between the opposite end of said flask and the second chamber.

5. A machine of the class described, comprising a vacuum chamber, a compressed-air chamber, tubes communicating with said chambers, a flask positioned between said tubes, a lever connected with one of said tubes and adapted to close communication between said tube and one end of said flask, and spring means for simultaneously opening communication between said tube and its connected chamber, together with means for opening communication between the opposite end of said flask and the second chamber.

6. A machine of the class described, comprising a vacuum chamber, a compressed-air chamber, tubes communicating with said chambers, a flask positioned between said tubes, a lever connected with one of said tubes and adapted to close communication between said tube and one end of said flask, means for simultaneously opening communication between said tube and its connected chamber, and means carried by said lever for opening communication between the opposite end of said flask and the second chamber immediately thereafter.

7. A machine of the class described, comprising a vacuum chamber, a compressed-air chamber, tubes communicating with said chambers, a flask positioned between said tubes, a lever connected with one of said tubes and adapted to close communication between said tube and one end of said flask, spring means for simultaneously opening communication between said tube and its connected chamber, and means carried by said lever for opening communication between the opposite end of said flask and the second chamber immediately thereafter.

8. A machine of the class described, comprising a vacuum chamber, a compressed-air chamber, tubes communicating with said chambers, a flask positioned between said tubes, a lever connected with one of said tubes and adapted to close communication between said tube and one end of said flask,

means for simultaneously opening communication between said tube and the compressed-air chamber, and means for opening communication between the opposite end of said flask and the vacuum chamber.

9. A machine of the class described, comprising a vacuum chamber, a compressed-air chamber, tubes communicating with said chambers, a flask support, a flask mounted thereon and positioned between said tubes, and automatic means for establishing simultaneously open communication between both of said chambers and said flask.

10. A machine of the class described, comprising a vacuum chamber, a compressed-air chamber, tubes communicating with said chambers, a flask positioned between said tubes, automatic means for establishing open simultaneously communication between both of said chambers and said flask, and means for producing the required pressure and vacuum within said chambers.

11. A machine of the class described, comprising a reservoir, a vacuum chamber, a compressed-air chamber and a pump cylinder mounted in said reservoir, valves between said cylinder and said chambers, means for simultaneously withdrawing the air from said vacuum chamber and forcing it into said compressed-air chamber, means for registering the pressure within said chambers, tubes communicating with said chambers, valve means for controlling the communication with said chambers, a molding flask mounted between said tubes, and means for subjecting the contents of said flask to the action of the pressure from the compression chamber and the vacuum within said vacuum chamber.

12. A machine of the class described, comprising a reservoir, a vacuum chamber, a compressed-air chamber and a pump cylinder mounted in said reservoir, valves between said cylinder and said chambers, means for simultaneously withdrawing the air from said vacuum chamber and forcing it into said compressed-air chamber, means for registering the pressure within said chambers, tubes communicating with said chambers, valve means for controlling the communication with said chambers, a molding flask mounted between said tubes, and means for opening communication between the lower end of said flask and the vacuum chamber, together with means operated by said first-named means for opening communication between the upper end of said flask and the compression chamber.

13. A machine of the class described, comprising a reservoir, a vacuum chamber, a compressed-air chamber and a pump cylinder mounted in said reservoir, valves between said cylinder and said chambers, means for simultaneously withdrawing the air from said vacuum chamber and forcing it into said compressed-air chamber, means for registering the pressure within said chambers, tubes communicating with said chambers, valve means for controlling the communication with said chambers, a molding flask mounted between said tubes, and means for opening communication between the lower end of said flask and the vacuum chamber, together with means operated by said first-named means for opening communication between the upper end of said flask and the compression chamber immediately thereafter.

Signed by me at Chicago, Illinois, this 15th day of January, 1910.

FRANCIS A. CARTER.

Witnesses:
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S. LEWIS.