H. V. HART.

DENTAL CASTING APPARATUS.

APPLICATION FILED DEC. 8, 1913.

1,105,425.

Patented July 28, 1914.

2 SHEETS—SHEET 1.

Fig. 1

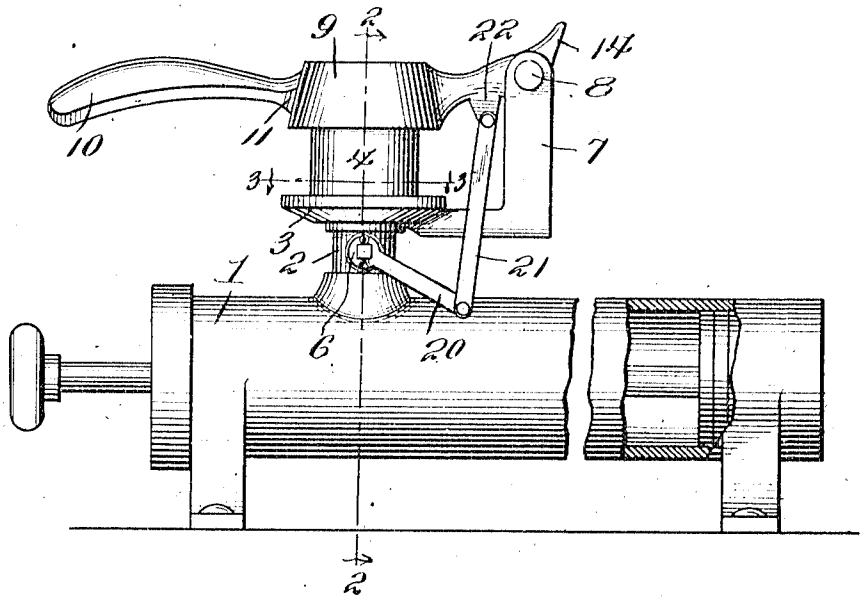


Fig. 2.

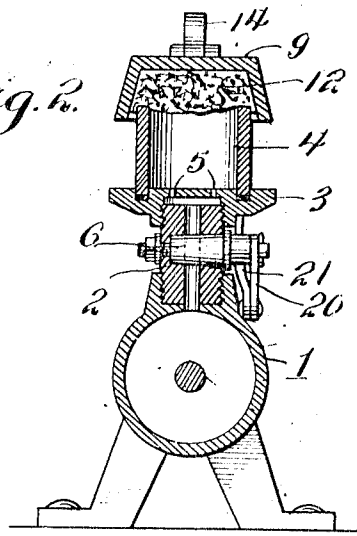
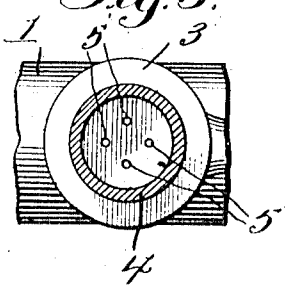


Fig. 3.



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2 SHEETS—SHEET 2.

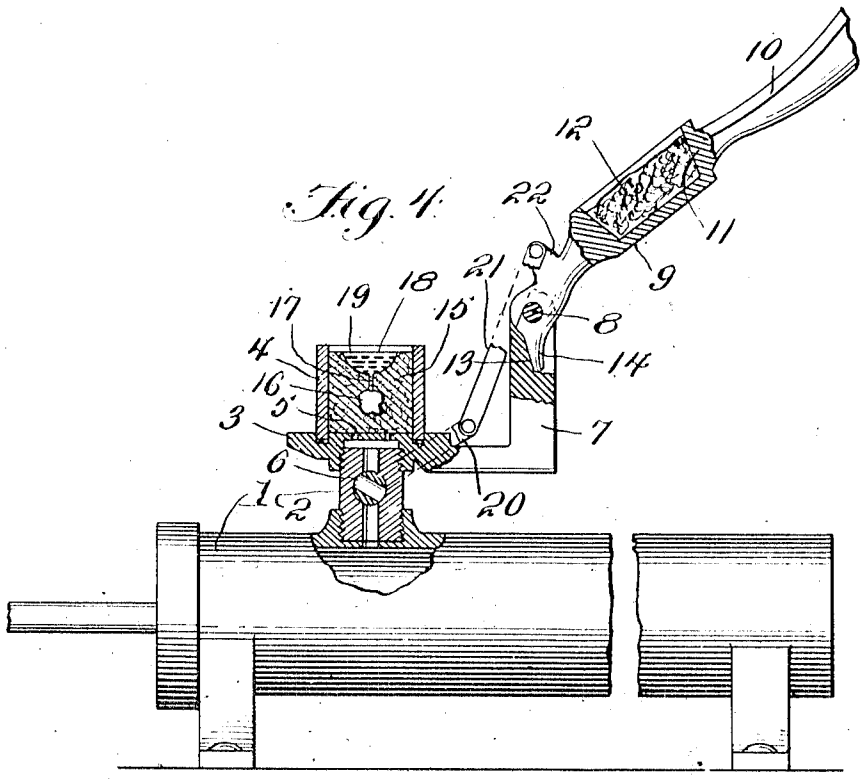


Fig. 4.

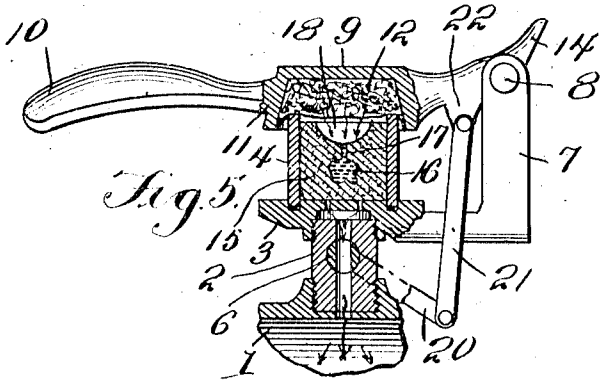


Fig. 5.

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UNITED STATES PATENT OFFICE.

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DENTAL CASTING APPARATUS.

1,105,425. Specification of Letters Patent. Patented July 28, 1914.

Application filed December 8, 1913. Serial No. 805,263.

To all whom it may concern:

Be it known that I, HARRY V. HART, a citizen of the United States, residing at Quincy, in the county of Adams and State of Illinois, have invented certain new and useful Improvements in Dental Casting Apparatus, of which the following is a specification.

This invention relates to an apparatus for casting dental fillings of the character known as inlay fillings and the like, the object of the invention being to provide a casting apparatus which will combine in a single structure the principles of the vacuum inlay and steam pressure machines, and give in a single operation a forcing pressure upon the liquid gold or other material from which the casting is to be made, so that the metal will conform in the most accurate degree to the mold cavity and produce a very dense or solid and accurately shaped casting.

A further object of the invention is to provide a casting apparatus embodying a mold or flask, a vacuum pump, and a manually operable steam generating and pressure producing element, together with a valve mechanism automatically operated by the movement of the steam generating pressure element to operative position to open communication between the mold or flask and the vacuum pump, which in a single operation will produce a suction on one side of the molten metal and a positive pressure on the other side thereof to force the molten metal into the mold cavity.

With these and other objects in view, the invention consists of the features of construction, combination and arrangement of parts hereinafter fully described and claimed, reference being had to the accompanying drawings, in which:—

Figure 1 is a side elevation of a casting apparatus constructed in accordance with my invention, showing the pressure producing device in operative position upon the mold or flask, and with the valve controlling mechanism in valve opening position; Fig. 2 is a vertical transverse section on the line 2—2 in Fig. 1; Fig. 3 is a horizontal transverse section on the line 3—3 in Fig. 1; Fig. 4 is a sectional side elevation showing the pressure producing device thrown back to an inoperative position and the valve closed to cut off communication between the mold or flask and the vacuum pump; and Fig. 5 is a vertical longitudinal section through the parts, arranged as shown in Fig. 1, and illustrating the operation of the device in making a casting.

As is well known, fillings of the character described are made by first forming a pattern from wax, which pattern is formed directly in the cavity to be filled, after which the wax pattern is placed, with other proper forming elements, in a body of investment material and contained within a flask or mold. The flask and body of investment material are then heated, by which a portion of the wax is evaporated and the remainder liquefied and taken up by the pores of the investment material, after which the other pattern forming elements are removed, thereby producing in the body of investment material a mold cavity, a cup or chamber above the same for the reception of the gold or other metal and a conducting sprue or passage leading downward from the chamber to the cavity for the flow of the gold.

After the mold is made in the manner described a mass of metal of suitable size to form the desired casting is placed in the metal chamber and then, by suitable means, the mold is heated to a sufficiently intense degree to melt the metal. Owing to the small size of the sprue or passage, this molten metal cannot flow down into the cavity, and to cause its flow into the cavity it has been heretofore the practice to either draw the molten metal into the cavity by suction under the action of a vacuum apparatus, or to positively force the gold from the chamber through the sprue and into the cavity by suitable pressure from above, such as steam pressure. In many cases it is found that it is impossible to secure the proper degree of suction or forcing pressure in order to make very dense and fine castings; and one object of my invention is to provide a means by which this difficulty may be overcome in a simple and effective manner and by means of which the two principles of inducing the gold to flow into the cavity may be combined in a single apparatus.

The invention is also designed to provide a means whereby, when the steam pressure element is adjusted to an operative position, communication will also be established between the mold and the vacuum appliance.

In carrying my invention into practice I provide a suitable type of vacuum appliance, such as a vacuum pump 1, with which

communicates a nipple 2 supporting an annularly grooved plate 3 adapted to receive the lower edge of the mold or flask 4. The portion of the plate which lies beneath the flask is provided with perforations 5 for establishing communication between the flask and passage in the nipple. As shown, the said passage in the nipple is controlled by a valve 6, which is preferably of the rotary, tapered plug type, and is adapted, when turned to different positions, to open and close the conducting passage. Supported by the plate 3 is a bracket arm 7 to which is pivotally connected, as at 8, a manually operable member 9. This member is provided with a suitable grip or handle 10, and with a cup 11 to contain a charge of a steam generating material, such as a body of asbestos 12. The bracket arm is recessed to form a stop shoulder 13, and the pivoted end of the pressure generating element is provided with a stop projection 14 adapted to engage the shoulder 13 to limit the outward movement of the part 9 to an inoperative position. The mold or flask 4 contains the body of investment or other porous material 15 in which the mold cavity 16, sprue or passage 17 and chamber 18 to receive the body of metal 19 are formed, and it will be understood that the mold or flask is placed in position upon the plate 3 after it has been heated to reduce the metal to a molten state. While the mold is being heated a vacuum of a suitable degree is formed in the cylinder of the vacuum appliance 1 by operating the piston thereof, and the pressure producing element 9 is prepared for use by saturating the body of asbestos 12 with water. The apparatus having thus been primed for operation and the mold or flask set in position, the element 9 is moved downward so that the cup 11 will be disposed in position to cover the top of the mold, the water-saturated body of asbestos being thereby brought into the zone of the intense heat of the mold, by which the water is generated into steam, producing pressure on the body of metal 19 to force it downward from the chamber through the sprue or passage 17 into the mold cavity 16. At the same time that the steam pressure is generated the valve 6 is moved to establish communication between the mold cavity and vacuum appliance, by which a suction will be induced within the cavity and throughout the body of investment material to draw the gold down into the cavity, the gold being thus subjected to a drawing action on one side and a forcing pressure on its other side, such as steam pressure, air pressure or other pressure, whereby its flow to the mold cavity is facilitated and whereby it is caused to more efficiently and reliably fill the mold cavity, so that an inlay or filling of a high degree of hardness and accuracy of shape will be produced. For the purpose of insuring an accurate opening movement of the valve when the pressure producing element 9 is turned down to an operative position, suitable connections between said pressure producing element and the valve are employed, the connections shown consisting in the present instance of a crank arm 20 connected with the stem of the valve and coupled by a link 21 to a crank member or projection on the member 9, whereby, when the pressure producing device is forced downward, the valve will be opened and when the pressure producing device is moved upward or thrown backward, the valve will be closed. An absolute certainty of co-action between the vacuum producing and steam generating parts of the appliance is thus insured, so that the operation may be carried out with the highest degree of efficiency.

It will be evident from the foregoing description that my invention provides an apparatus of the character described which is adapted in a simple, reliable, convenient and efficient manner to enable a dentist or operator to simultaneously subject the molten metal to what may be termed two feeding and forcing pressures, that resulting from a drawing or suction action on one side, and that resulting from the steam forcing pressure on the other side, and that by this means material advantages over the ordinary processes may be obtained. It will, of course, be understood that the invention may be embodied in an organization employing any suitable construction of vacuum producing appliance and steam pressure generating devices, or that the novel features of the invention may be applied to existing types of inlay or casting machines.

Having thus described my invention, I claim:

1. An apparatus of the character described embodying a vacuum producing appliance, a mold communicating therewith, a controlling valve in the line of communication, a steam pressure producing element adapted to be disposed over the mold so as to be heated therefrom, and a connecting means between said element and the valve for opening and closing the valve in the opposite movements of said pressure producing element.

2. A dental inlay or casting apparatus comprising a vacuum producing apparatus, a mold supported in communication therewith, a controlling valve in the line of communication, a pivotally mounted element having means for forming steam pressure under heat from the mold, said element being movable into and out of engagement with the mold, and connecting means between said element and the valve for opening the valve when said element is disposed

upon the mold and closing the valve when said element is moved away from the mold.

3. A dental inlay or casting apparatus comprising a vacuum pump, a mold support, a mold adapted to be mounted upon said support and placed in communication with the vacuum pump, a controlling valve in the line of communication, a pivotally mounted pressure producing element having a cup for the reception of a material adapted to absorb moisture, said cup being movable down upon the mold so that the said material will be subjected to the heat of the mold for the generation of steam pressure, and valve controlling means operated upon the movement of said element toward and from the mold to open and close the valve.

4. A dental inlay or casting apparatus comprising a vacuum pump, a nipple rising therefrom, a valve controlling the passage in said nipple, a plate mounted on the nipple, a mold adapted to rest upon said plate and to communicate with the vacuum pump through the nipple, a member pivotally mounted and provided with a chamber containing a body of moisture absorbing material, said member being movable down upon the mold to bring the moisture absorbing material into contact with the mold for the generation of steam, crank elements connected with the valve and pivotally mounted member, and a link connecting said crank elements.

In testimony whereof I affix my signature in presence of two witnesses.

HARRY V. HART.

Witnesses:
MARGARET TERFORD,
JOHN F. GARNER.