

F. O. JAKUES, JR.
MACHINE FOR CONTOURING CROWN MATRICES.
APPLICATION FILED JAN. 29, 1909.

939,261.

Patented Nov. 9, 1909.

3 SHEETS—SHEET 1.

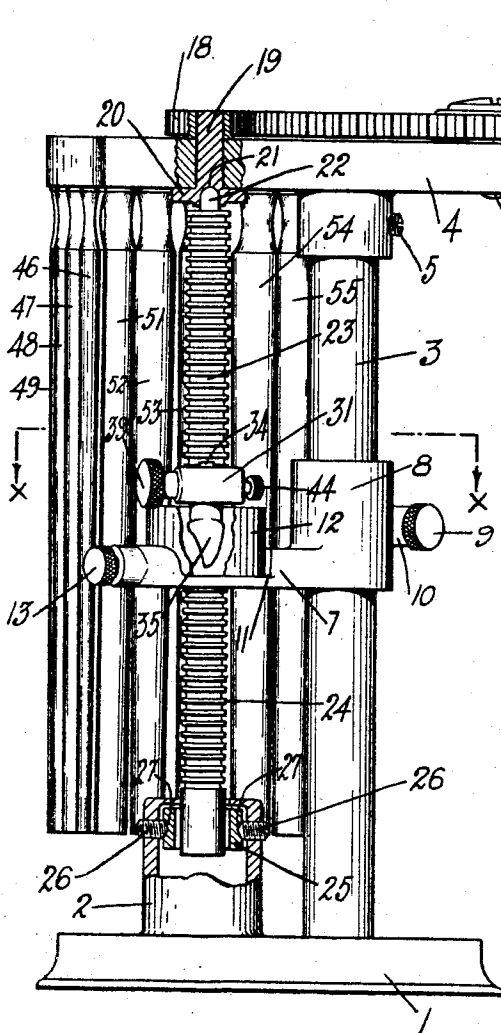


FIG. 1.

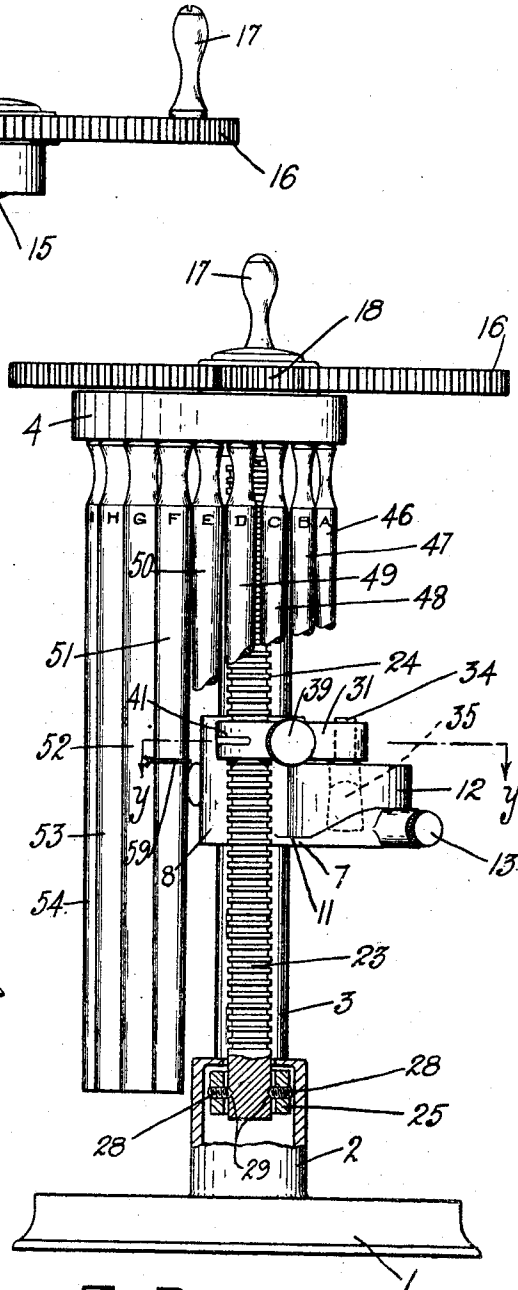


FIG. 2.

WITNESSES.

Albert S. Progentkowski.
George W. McLaughlin.

INVENTOR.

Fernando O. Jaques Jr.
By Horatio E. Bellmore
ATTORNEY.

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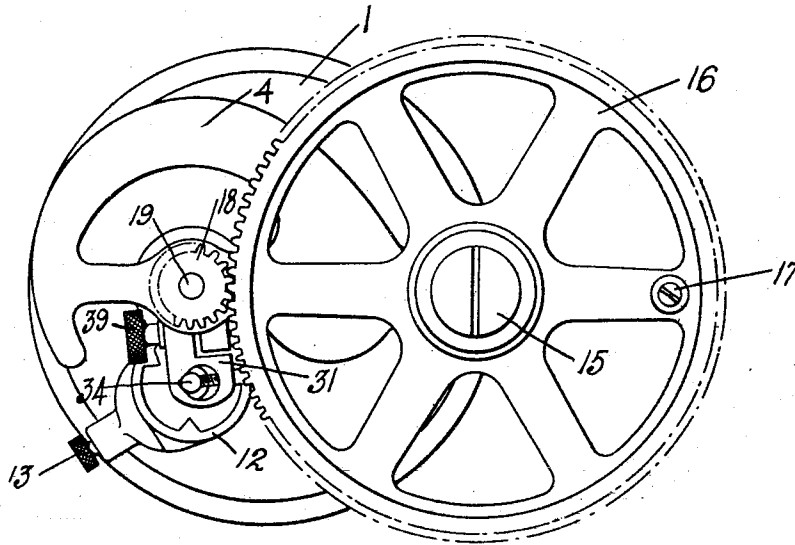


FIG. 3.

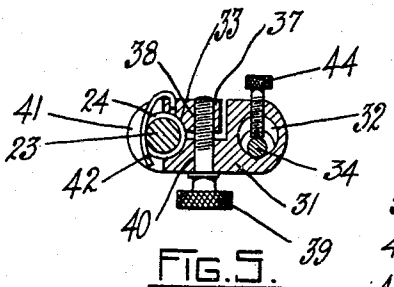


FIG. 5.

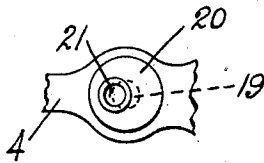


FIG. 6.

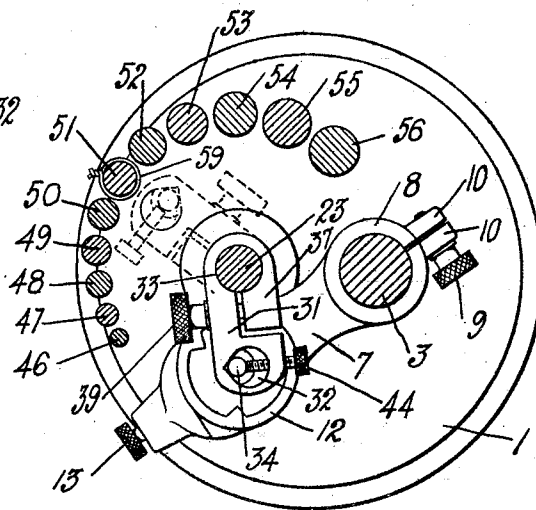


FIG. 4.

WITNESSES.

Albert S. Regentkawi.
George McLaughlin

INVENTOR.

Fernando O. Jaques Jr.
By Konatis E. Bellows
ATTORNEY.

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3 SHEETS—SHEET 3.

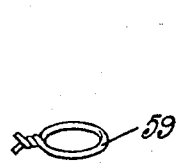


FIG. 7.

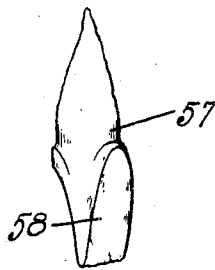


FIG. 8.

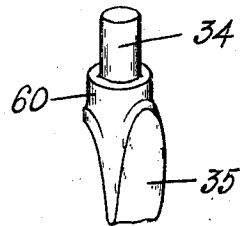


FIG. 9.

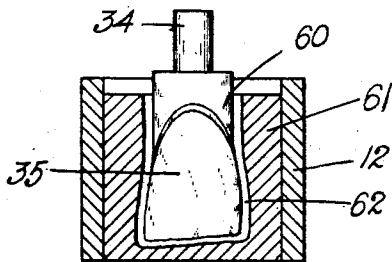


FIG. 10.

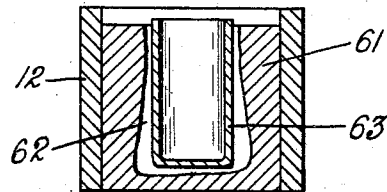


FIG. 11.

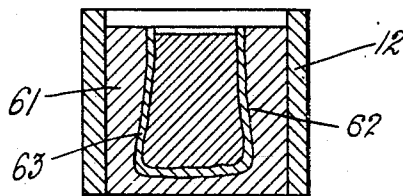


FIG. 12.

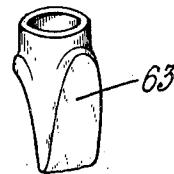


FIG. 13.

WITNESSES.

Albert S. Pienkowsky.
George Mc Laughlin.

INVENTOR.

Fernando O. Jaques Jr.
By Horatio E. Bellows
ATTORNEY.

UNITED STATES PATENT OFFICE.

FERNANDO O. JAKES, JR., OF CRANSTON, RHODE ISLAND, ASSIGNOR TO CENTRAL TOOL COMPANY, A CORPORATION OF RHODE ISLAND.

MACHINE FOR CONTOURING CROWN-MATRICES.

939,261.

Specification of Letters Patent.

Patented Nov. 9, 1909.

Application filed January 29, 1909. Serial No. 475,027.

To all whom it may concern:

Be it known that I, FERNANDO O. JAKES, Jr., a citizen of the United States, residing at Cranston, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Machines for Contouring Crown-Matrices, of which the following is a specification.

My invention relates to a machine for 10 contouring matrices for seamless dental crowns. In my copending patent application filed October 27, 1908, Serial Number 459,698, is set forth a novel method of contouring which involves the construction of 15 a matrix with an orifice conforming to the shape of the natural tooth, but of such larger dimensions as to exactly compensate for the thickness of the wall of the blank to be later introduced and operated upon.

20 The essential purposes of the present invention are to provide a machine for forming such a matrix, particularly a matrix which will permit compensation for the thickness of the bottom as well as for the 25 side wall of the blank; also to provide means for predetermining the dimensions of any required crown and means for automatically imparting to the matrix a shape embodying such dimensions. Further, to provide a 30 mechanism whose use makes the construction of plaster forms from impressions of the natural teeth in the preparation of a crown unnecessary.

To the above and other ends my invention consists in means for automatically performing the proposed functions, and in the novel construction and operation of the parts both severally and combined.

In the accompanying drawings which 40 form a part of this specification, Figure 1 is a front elevation of a machine embodying my invention partially in section, Fig. 2, a side elevation partially in section of the same showing some portions of the measuring rods broken away, Fig. 3, a plan of the machine, Fig. 4, a section of the same on line *x x* of Fig. 1, showing in broken lines the supporting arm in calculating position, Fig. 5, a section on *y y* of Fig. 2, Fig. 6, a 50 bottom plan view of the crank disk, Fig. 7, a perspective view of the wire loop, Fig. 8, a perspective of the natural tooth, Fig. 9, a

like view of a model or form, Fig. 10, a side 55 elevation of the same within the matrix and flask shown in transverse section, Fig. 11, a like section of the matrix, flask, and inclosed unbent crown blank, Fig. 12, a like section of the same after the internal swaging operation, and Fig. 13, a perspective 60 view of the completely contoured crown.

Similar characters of reference indicate like parts throughout the views.

The frame of my machine in the present 65 instance comprises a base, 1, provided with an integral cylindrical socket member, 2, a post, 3, upon the base, a plate, 4, fixed to the top of the post by a screw, 5, and projecting over the socket member, 2. An arm, 70 7, has a split bearing or sleeve, 8, upon the post, 3, to which it is frictionally held in any adjusted position, either vertically or radially, by a binding screw, 9, engaging ears, 10, of the split ring, 8. The arm, 7, 75 is provided with a recess, 11, to receive a bottomless flask, 12, which is maintained therein by a set screw, 13, mounted in the end of the arm.

Mounted upon a pivot pin, 15, near one 80 end of the plate, 4, is a gear, 16, having an operating handle, 17, and meshing with a pinion, 18, fixed to the upper end of a pin, 19, rotatably mounted in the plate, 4, concentric with the socket member, 2. Fixed 85 to or integral with the lower end of the pin, 19, is a disk, 20, provided in its bottom face with an eccentric cavity, 21, as shown in Fig. 6, the same constituting, as will be later seen, a crank or crank disk. 90

Projecting loosely into the cavity, 21, is the reduced rounded end, 22, of a rod, 23, provided throughout its length with a series of annular ribs, 24. The lower end of the rod is supported in the socket member, 2, 95 by a universal joint, as follows: Encircling the rod, 23, and interspaced therefrom is a ring, 25, sustained by pivot points, 26, fixed in the socket member, and entering diametrically opposite cavities, 27, in the exterior of the ring. At diametrically opposite portions of the ring, 25, are fixed pivot points, 28, disposed at right angles to the points, 26, and entering cavities, 29, in the lower end of rod, 23. 100

Longitudinally and transversely adjust- 105

able on rod, 23, above the plane of the flask is an arm comprising in detail an oblong body portion, 31, provided in its end portions with openings, 32 and 33, to receive respectively the shank, 34, of a tooth form or model, 35, and the rod, 23. The body, 31, is rectangularly cut from the opening, 33, to one of its side margins to form a flexible integral flange, 37, partially surrounding the rod and provided with a threaded opening, 38, to receive the end of a binding screw, 39, passing through a threaded opening, 40, in the arm body. A horizontal slot, 41, extends into the body and partially around the rod to permit contact with the ribs of the latter of a spring, 42, fixed at one end to the arm body. A set screw, 44, in the arm body extends into the opening, 32, and binds therein the tooth model shank.

It will be observed that, by means of the screw, 39, the described arm may be frictionally engaged with the rod, 23, at any desired radial or longitudinal point or may be loosened to permit free rotation of the arm to any desired position; that while being so rotated, the arm is retained in its original horizontal plane by means of the spring, 42. It will be further noted that, by virtue of the offset portion of the cavity in the disk, 20, the latter, when actuated by the gear, 16, through pinion, 18, imparts to the rod, 23, and to the model, 35, a radially oscillating movement. The model, however, has also a vertically reciprocating movement due to the fact that the upper end of the rod, 23, which is pivoted at its bottom but which is relatively free at its top, describes during a horizontal oscillation an arc in its vertical plane. This novel vertical movement is important for a reason hereinafter set forth.

Fixed in the plate or arm, 6, and concentrically disposed with relation to the axis of rod, 23, are a series of downwardly projecting rods, 46, 47, etc. Each rod is parallel with the oscillatory axis of the rod, 23, and gradually tapers from a point near its top to its lower end, the top of one rod being of a diameter equal to the diameter of the lower end of the next adjacent rod of the series.

One approved method of forming tooth crowns in which this machine is employed is the following: The operator twists a piece of wire around the neck, or gum line, 57, of the natural tooth, 58, which is to be crowned, thus forming a wire loop, 59, whose internal diameter is equal to the interior diameter of the crown to be formed. In addition to the wire loop is employed certain stock or model metal teeth. A given tooth in different persons differs but little in contour, but does materially differ in dimensions. There-

fore a plurality of model metal teeth of each kind of human teeth are provided, similar in contour but of varying diameters.

In Fig. 9 is shown a metal model of a central having the usual cusp or body, 35, and neck or gum line, 60, above which is a shank, 34, to facilitate mounting in the machine. The successive diameters of the necks, 60, of the series of models of any particular tooth are the diameters of the lower ends of the respective rods, 46, 47, 48, etc., which rods may be marked or lettered successively to identify the respective models, which are also marked or lettered, whose diameters correspond to their respective lower ends. In this instance, the rods themselves are lettered alphabetically, but the markings may be on the frame adjacent the several rods. The variation in diameter throughout the length of any single measuring rod is the same as the variation between the gum lines of each model tooth, and is equal to the increased diameter of the path described by the oscillation of the upper end of the rod, 23.

The wire loop, 59, after removal from the natural tooth is upwardly pushed upon that rod of the series whereon it will cling at an intermediate point. In Figs. 1 and 4, the loop, 59, is shown upon the rod, 51, marked F. The model tooth bearing the corresponding letter is inserted and fixed in the opening, 32, of the arm, 31, and the latter is then swung rearwardly into the position shown in broken lines in Fig. 4 in radial alinement with the rod, 50, and vertically moved on the rod, 23, to bring the gum line, 60, of the model tooth in horizontal alinement with the loop, 59. The arm, 31, is then swung back in the same horizontal plane to its original position above the flask, 12. The flask, into which casting metal has been introduced in a fused condition, is then elevated to a position surrounding the model and fixed by the clamping screw, 7. The gear, 16, is then manually rotated to impart the desired movement of the model during the cooling of the fused metal. This movement produces, as shown in Fig. 10, a matrix, 61, with an opening, 62, conforming substantially with the contour of the model but of greater lateral and vertical dimensions. The increased lateral dimension is due to the oscillatory movement, and the increased vertical dimension, to the vertical movements of the rod, 23. After the matrix has cooled the model is withdrawn, and the flask removed from the arm, 7. Next a cylindrical seamless crown blank or thimble, 63, is inserted into the matrix opening, 62, as shown in Fig. 11. The blank is then filled with filings or other materials which are tamped down to expand the blank wall

against the sides of the orifice, 62, as shown in Fig. 12. The matrix is then fractured to release the resulting contoured crown shown in Fig. 13. The internal dimensions of the entire crown including the gum line will be found to be those of the exterior of the natural tooth.

Another method of employing my machine discards the use of the loop, 59, and the measuring bars. This occurs when in place of a conventional metal model of the natural tooth the operator first constructs from an impression of the natural tooth a plaster form of the same dimensions as the latter. This form is then mounted in the arm, 7, directly, without preliminary measurements, and the machine set in operation.

As the construction of a plaster form involves the exercise of a high grade of skill and care the first described method is preferable to second.

What I claim is,

1. In a machine for contouring crown matrices, the combination with a flask for fused metal, of means for supporting a tooth model within the flask, and means for imparting radially oscillating and vertically reciprocating movement to the model supporting means.

2. In a machine for contouring crown matrices, the combination with a flask for fused metal, of a frame, means upon the frame for supporting a tooth model within the flask, and means upon the frame for imparting radially oscillating and vertically reciprocating movement to the model supporting means.

3. In a machine for contouring crown matrices, the combination with a flask for fused metal, of a frame, means mounted in the frame for supporting a tooth model within the flask, and means upon the frame engaging the supporting means for imparting radially oscillating and vertically reciprocating movement to the model supporting means.

4. In a machine for contouring crown matrices, the combination with a flask for fused metal, of a frame, means mounted in the frame and radially and vertically movable therein for supporting a tooth model within the flask and means upon the frame for imparting continuous oscillating and reciprocating movement to the supporting means.

5. In a machine for contouring crown matrices, the combination with a frame, of a rod pivotally mounted at its lower end in the frame, means upon an intermediate portion of the rod for holding a tooth model, and means upon the frame engaging the upper end of the rod for oscillating the rod.

6. In a machine for contouring crown matrices, the combination with a frame, of

a rod pivotally mounted at its lower end in the frame, an arm upon an intermediate portion of the rod for holding a tooth model, means upon the frame engaging the upper end of the rod for oscillating the rod, and a flask mounted upon the frame intermediate the arm and the lower end of the rod.

7. In a machine for contouring crown matrices, the combination with a frame, of a rod pivotally mounted at its lower end in the frame, an arm upon an intermediate portion of the rod for holding a tooth model, means upon the frame engaging the upper end of the rod for oscillating the rod, a flask mounted upon the frame intermediate the arm and the lower end of the rod, and means for adjusting the flask relatively to the arm.

8. In a machine for contouring crown matrices, the combination with a frame, of a rod pivotally mounted at its lower end in the frame, an arm upon an intermediate portion of the rod for holding a tooth model, means upon the frame engaging the upper end of the rod for oscillating the rod, a flask mounted upon the frame intermediate the arm and the lower end of the rod, and means for adjusting the arm.

9. In a machine for contouring crown matrices, the combination with a frame, of a rod pivotally mounted at its lower end in the frame, an arm upon an intermediate portion of the rod for holding a tooth model, means upon the frame for oscillating the rod, a flask mounted upon the frame intermediate the arm and the lower end of the rod, and means for vertically adjusting the arm.

10. In a machine for contouring crown matrices, the combination with a frame and flask, of a vertical operating rod pivotally mounted at its lower end in the frame below the flask, an arm for supporting a tooth model mounted upon the rod above the flask, a crank disk rotatably mounted in the frame and engaging the upper end of the rod and means upon the frame for rotating the crank disk.

11. In a machine for contouring crown matrices, the combination with a frame and flask, of a vertical operating rod yieldingly mounted in the frame at its lower end below the flask, an arm for supporting a tooth model mounted upon the rod above the flask, a disk rotatably mounted in the frame and provided with a cavity off center upon its lower face adapted to receive the upper end of the rod, and means for rotating the disk.

12. In a machine for contouring crown matrices, the combination with the frame, of an operating rod pivotally mounted at its lower end in the frame and provided with a series of annular ribs, a radially movable arm upon the operating rod, means upon

the arm engaging the ribs for supporting the arm during the radial movement of the arm, and means upon the frame engaging the upper end of the rod for oscillating the
5 rod.

13. In a machine for contouring crown matrices, the combination with the frame, of an operating rod pivotally mounted in the frame and provided with a series of annular
10 ribs, a radially movable arm upon the operating rod, a spring in the arms engaging the ribs for supporting the arm during the radial movement of the arm, means upon the arm for clamping the arm to the rod, and
15 means upon the frame for oscillating the rod.

14. In a machine for contouring crown matrices, the combination with the frame, operating rod, and means for oscillating the
20 rod, of a measuring rod in the frame, and an arm upon the operating rod movable toward and away from the measuring rod.

15. In a machine for contouring crown matrices, the combination with the frame, operating rod, and means for oscillating the
25 rod, of a measuring rod in the frame parallel to the oscillatory axis of the operating rod, and an arm upon the operating rod movable toward and away from the measuring
30 rod.

16. In a machine for contouring crown matrices, the combination with the frame, operating rod, and means for oscillating the
rod, of a tapering measuring rod in the
35 frame parallel with the oscillatory axis of the operating rod, and means upon the operating rod for holding a tooth model.

17. In a machine for contouring crown matrices, the combination with the frame, operating rod, and means for oscillating the
40 rod, of a tapering measuring rod in the frame parallel with the oscillatory axis of the operating rod, and longitudinally movable means upon the operating rod for holding
45 a tooth model.

18. In a machine for contouring crown matrices, the combination with the frame, operating rod, and means for oscillating the
rod, of a tapering measuring rod in the
50 frame parallel with the oscillatory axis of the operating rod, and radially and longitudinally movable means upon the operating rod for holding a tooth model.

19. In a machine for contouring crown matrices, the combination with the frame, operating rod, and means for oscillating the
55 rod, of a series of tapering measuring rods in the frame concentrically disposed with relation to the oscillatory axis of the operating rod and parallel therewith, and radially and
60 longitudinally movable means upon the operating rod for holding a tooth model.

20. In a machine for contouring crown matrices, the combination with the frame, operating rod, and means for oscillating the
rod, of a series of tapering measuring rods of individually varying diameters mounted in the frame parallel with the oscillatory
70 axis of the operating rod, and longitudinally movable means upon the operating rod for holding a tooth model.

21. In a machine for contouring crown matrices, the combination with the frame, operating rod, and means for oscillating the
75 rod, of a series of tapering measuring rods of individually varying diameters mounted in the frame parallel with the oscillatory axis of the operating rod, and longitudinally
80 and radially adjustable means upon the operating rod for holding a tooth model.

22. In a machine for contouring crown matrices, the combination with the frame, operating rod, and means for oscillating the
85 rod, of a measuring rod fixed in the frame parallel with the oscillatory axis of the operating rod and provided with a taper corresponding with the degree of inclination of the operating rod, and a longitudinally movable
90 arm upon the operating rod adapted to hold a tooth model.

23. In a machine for contouring crown matrices, the combination with the frame, operating rod, and means for oscillating the
95 rod, of a measuring rod fixed in the frame parallel with the oscillatory axis of the rod and provided with a taper corresponding with the degree of inclination of the operating rod, and a longitudinally and radially
100 movable arm upon the operating rod adapted to hold a tooth model.

24. In a machine for contouring crown matrices, the combination with the frame, operating rod, and means for oscillating the
105 rod, of a measuring rod fixed in the frame parallel with the oscillatory axis of the operating rod and provided with a taper toward its end corresponding with the degree of inclination of the operating rod, a movable
110 arm upon the operating rod, a tooth model removably mounted in the arm whose neck circumference equals the circumference of the end of the measuring rod.

25. In a machine for contouring crown matrices, the combination with the frame, operating rod, and means for oscillating the
115 rod, of a measuring rod fixed in the frame parallel with the oscillatory axis of the operating rod and provided with a taper toward its end corresponding with the degree of inclination of the operating rod, a movable
120 arm upon the operating rod, a tooth model removably mounted in the arm and whose neck circumference equals the circumference of the measuring rod, and a loop
125

adapted to surround and frictionally engage an intermediate portion of the measuring rod.

26. In a machine for contouring crown
5 matrices, the combination with a flask for fused metal, of means for supporting a tooth model within the flask, and means for imparting a compound movement to the model supporting means.

10 27. In a machine for contouring crown matrices, the combination with a flask for

fused metal, of a tooth model within the flask, and means for imparting a compound movement to the model to create an opening in the fused metal having an increased area 15 equal to the thickness of a crown.

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

FERNANDO O. JAQUES, JR.

Witnesses:

HORATIO E. BELLOWS,

WILLIAM E. TEFFT.