No. 723,134. PATENTED MAR. 17, 1903.

A. W. BROWNE.

AUTOMATIC MALLET.

APPLICATION FILED MAY 15, 1902.

NO MODEL.

FIG. 1.

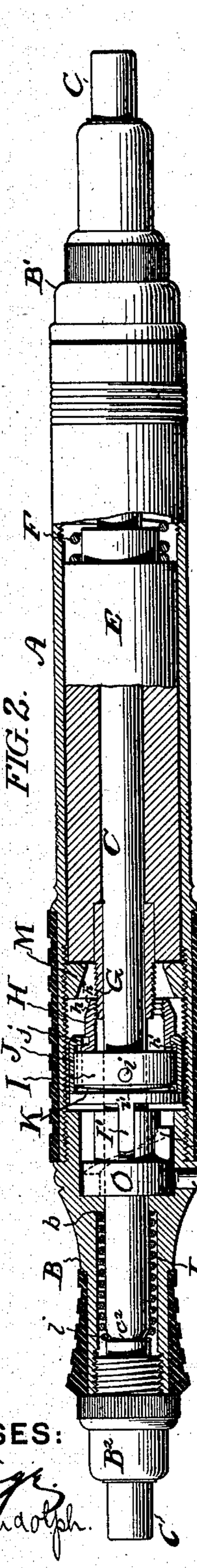

FIG. 2.

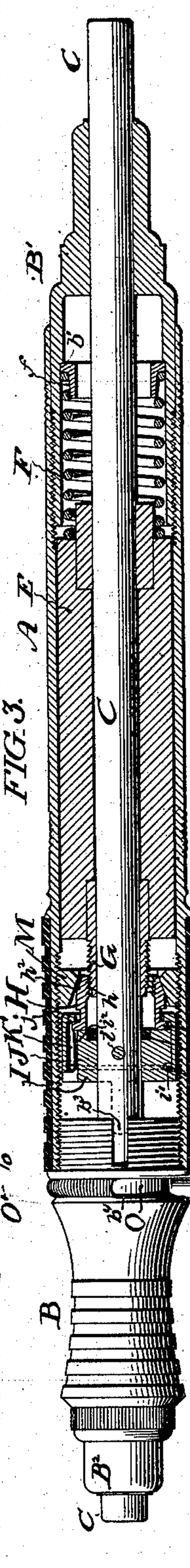

FIG. 3.

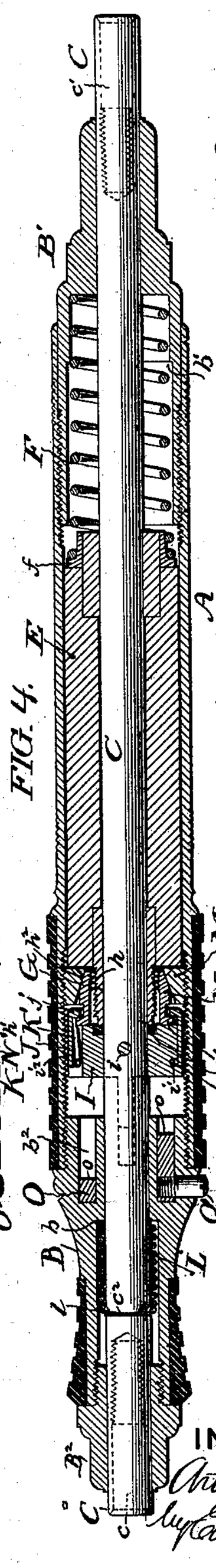

FIG. 4.

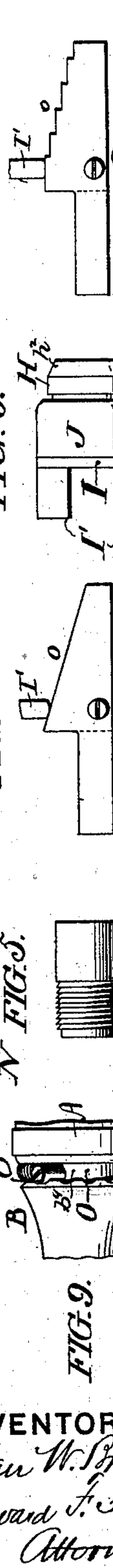

FIG. 8.

FIG. 6.

FIG. 7.

FIG. 5.

FIG. 9.

WITNESSES:

Arthur E. Paige.

Howard M. Rudolph.

INVENTOR:

Arthur W. Browne

by Edward F. Simpson, Jr.

Attorney.

UNITED STATES PATENT OFFICE.

ARTHUR W. BROWNE, OF PRINCEBAY, NEW YORK, ASSIGNOR TO THE S. S. WHITE DENTAL MANUFACTURING COMPANY, OF PHILADELPHIA, PENNSYLVANIA.

AUTOMATIC MALLET.

SPECIFICATION forming part of Letters Patent No. 723,134, dated March 17, 1903.

Application filed May 15, 1902. Serial No. 107,423. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR W. BROWNE, a citizen of the United States, residing at Princebay, in the county of Richmond and State of New York, have invented certain new and useful Improvements in Automatic Mallets; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to dental mallets of the class commonly known as "automatic" mallets, which are adapted to impart blows to plugger-points for condensing or packing gold and other fillings in cavities of human teeth. Mallets of this character are operated by placing the end of the plugger-point upon the filling and pushing the casing or handle forward. This movement retracts the plugger-point-carrying spindle and also the hammer until the latter is tripped by suitable means and its impelling-spring forces it forward to deliver a blow upon the aforesaid spindle, the blow being imparted to the plugger-point.

My improvements are herein shown as embodied in a double-action mallet or one capable of holding a plugger-point at either end, one for delivering a straight or direct blow and the other a pull blow.

Obviously my improvements may with but slight modification be applied to a single-action mallet.

In the accompanying drawings, Figure 1 is an exterior view of the mallet. Fig. 2 is an enlarged view, partly in longitudinal central section, showing the normal position of the parts. Fig. 3 is a somewhat similar view showing the position of the parts after the plugger-point has been placed against the filling and the casing partly pushed forward. Fig. 4 shows the position of the parts after the casing has made its full stroke and the hammer has been tripped and delivered its blow. In this view the hammer-impelling spring is shown reversed, as compared with Fig. 3. Fig. 5 is a detached view of the tubular ratchet of the hammer. Fig. 6 is a detached view of the tubular pawl and its carrying-block. Fig. 7 is a diagrammatic view of the cam for regulating the length of stroke of the hammer. Fig. 8 is a similar view of a modified cam. Fig. 9 is an exterior view of a short section of one of the end pieces of the mallet, showing a modified means for holding the cam shown in Fig. 7 in its adjusted position.

The mallet, like others of the same type, consists of a tubular casing comprising a handle-section A and end pieces B and B′, having threaded connection with the opposite ends of said handle-section. A spindle C passes centrally and entirely through the casing and projects from the extremities of the end pieces thereof. The ends of the spindle are provided with threaded sockets *c* and *c′* for the reception of plugger-points D and D′, Fig. 1, which are readily detachable and interchangeable.

A tubular hammer E surrounds the spindle C and is adapted to reciprocate thereon within certain limits. A coiled spring F is confined between one end of the hammer and the end piece B′ for impelling the hammer forward to deliver its blow upon the plugger-point. By screwing the end piece in or out the tension of the spring F may be varied and the force of the blow regulated as desired. In order to increase the range of tension of the hammer-impelling spring in a simple manner, a ring or collar *f* is secured to one end of said spring. In Fig. 4 the ring is shown as resting upon the end of the hammer, the opposite end of the spring resting against the end of the end piece B′. Thus the spring is permitted the maximum amount of expansion when the end piece is screwed outward and may be contracted and its tension increased by screwing said end piece inwardly. When the spring is reversed, the ring *f* abuts against an annular shoulder *b′* on the interior of the end piece and is thereby prevented from extending to the end of the end piece, (see Fig. 3,) whereby there is produced, in effect, a spring having greater strength as compared with the same spring in its reversed position. In this way a single spring may be made to serve as two springs having different strengths, and the spring may be readily reversed when desired by simply detaching the end piece. The same object may be attained

without the ring *f* by simply tapering the spring or making one end of a greater diameter than the other, so that the larger end will abut against the shoulder *b'*, but the smaller end will pass said shoulder.

My improved hammer retracting and tripping mechanism may be described as follows: Projecting from the forward end of the hammer E is a tubular ratchet G, surrounding the spindle C and slidable thereon with the hammer. This ratchet is adapted to be engaged by a tubular pawl H, loosely carried by a block I, rigidly connected to the spindle by means of a through-pin *i*, said pawl being preferably provided with a series of annular teeth *h*, four of which are herein shown. The annular flange *j* of a sleeve J, surrounding the block I, engages an annular shoulder *h'* on the pawl and permits said pawl to be freely turned and moved laterally, but not endwise. A looped wire spring K is confined in an annular groove *i'* in the block I, and the bent end K' of said spring, which lies in a groove i^2 in said block, bears against the pawl with a tendency to press it to one side of the longitudinal center of the mallet into engagement with the ratchet G. This spring may be very light, its only function being to normally press the loosely-seated pawl H laterally, so that some portion of its annular teeth *h* will be compelled to engage the teeth of the tubular ratchet G when the spindle C is retracted, as will be more fully explained. The spindle C is normally projected from the forward end of the mallet as far as it is permitted to go by reason of a coiled spring L, surrounding said spindle and connected thereto at one end and abutting at its opposite end against an internal shoulder *b* near the inner end of the end piece B. When the spindle is retracted, which is accomplished by holding the casing in the hand, pressing the plugger-point against the filling in the tooth, and pushing the casing forward, the hammer is moved rearwardly with the spindle, because the pawl H, which is carried by and moves with the spindle, is in a position to engage the ratchet G, as before explained. This movement continues until the coned end h^2 of the pawl comes in contact with a fixed stop M, secured inside the casing, the function of which is to center the pawl and release the ratchet, whereby the hammer is impelled forward by its spring. The end of the tubular ratchet G, striking against a hard rubber or other cushion N, seated in the block I, transmits the blow of the hammer to the spindle and to the plugger-points carried thereby. The stop M is shown as consisting of a ring or collar internally coned to correspond with the coned surface of the pawl and externally threaded to engage the internally-threaded casing. The stop M also serves to limit the movement of the hammer when the spindle is projected. The coiled spring L is connected to the spindle by having one end *l* constricted into a shouldered annular groove c^2, cut into the spindle. This construction is simple and permits of the parts being readily assembled. A tubular nose-piece B^2, having screw-threaded connection with the end piece B, provides a bearing for the spindle and permits of the removal of the same.

The length of stroke of the spindle, and consequently that of the hammer, may be varied by engaging the pawl at different points of the ratchet. If the pawl engages the ratchet at or near its extremity, as in Figs. 2 and 3, the hammer will be carried back to its farthest limit before the pawl is tripped, and the maximum length of the stroke will be delivered. If the pawl engages the ratchet near the end of the hammer, the hammer will be retracted but a slight distance and the minimum length of stroke delivered. By engaging the ratchet at points between these two extremes intermediate lengths of strokes may be secured. The point at which the pawl is caused to engage the ratchet for securing any desired length of stroke is determined by the extent to which the spindle is permitted to be projected after each blow.

For the purpose of regulating the mallet so that a stroke of any given length may be definitely secured I have provided means as follows: Seated in a circular recess b^2 in the inner end of the end piece B, (see Fig. 4, particularly,) concentric with the spindle C, is a tubular cam O. Lugs I' I', projecting from the block I, enter slots b^3 in the end piece B, and one of said lugs bears against the working face *o* of the tubular cam O. By turning the cam by means of a lug (in this instance a screw O') projecting therefrom through a slot b^4 in the side of the end piece the position of the hammer and its ratchet relatively to the pawl may be varied. When the screw O' is at one end of the slot b^4, the cam is so positioned that the spindle is projected to the greatest extent, and all lengths of strokes may be secured, as before described. By moving the screw O' to the opposite end of the slot the pawl is moved to its extreme limit toward the end of the hammer and the shortest stroke of the hammer is effected. Obviously placing the screw in intermediate points effects various lengths of strokes.

In the mallet herein shown the hammer is capable of five different lengths of stroke; but it is apparent that the construction may be readily modified to provide for more or less variations, as may be desired.

The cam O, a diagrammatic view of which is shown in Fig. 7, may have a smooth face, as indicated in Figs. 2, 4, and 7, or it may be stepped, as indicated in Fig. 8. The purpose of stepping the cam is to more securely prevent it from accidentally turning. The same object may be accomplished by notching the slot b^4. (See Fig. 9.)

A mallet constructed in accordance with my invention possesses numerous advantages over mallets of a similar class now known to me. It has a wider range of ad-

justment, both as to the strength of blow and length of stroke. These adjustments are quickly and easily effected, and the mallet is susceptible of long and continued use without appreciable wear or derangement of parts.

The hammer and its tubular ratchet, as well as the tubular pawl, being loosely held freely turn during the use of the mallet, and different surfaces of the ratchet and pawl are thus being constantly presented to each other. In this way wear of the parts is reduced to a minimum.

I have already pointed out certain changes of which my invention is susceptible. I desire to further say that my improvements may be altered in other respects and the herein described and illustrated embodiment be modified in various ways without departing from the spirit and scope of my invention.

I claim as my invention—

1. The combination, in an automatic mallet, of the casing, the spindle, the hammer, the hammer-impelling spring, the tubular ratchet of the hammer, the pawl carried by the spindle, means for causing said pawl to engage said ratchet, and means for tripping said pawl, substantially as described.

2. The combination, in an automatic mallet, of the casing, the spindle, the hammer, the hammer-impelling spring, the tubular ratchet of the hammer, the tubular pawl carried by the spindle, means for causing said pawl to engage said ratchet, and means for tripping said pawl, substantially as described.

3. The combination, in an automatic mallet, of the casing, the spindle, the hammer, the hammer-impelling spring, the tubular ratchet of the hammer, the tubular pawl carried by the spindle and having a series of teeth, means for causing said teeth to engage the ratchet, and means for tripping said pawl, substantially as described.

4. The combination, in an automatic mallet, of the casing, the spindle, the hammer, the hammer-impelling spring, the tubular ratchet of the hammer, the tubular pawl carried by the spindle and freely movable laterally in a position to engage the ratchet, and a fixed stop in the casing for centering said pawl, whereby the same is tripped and the ratchet released, substantially as described.

5. The combination, in an automatic mallet, of the casing, the spindle, the hammer, the hammer-impelling spring, the block fixed to said spindle, the tubular pawl loosely carried by said block and having a coned end, a spring for moving said pawl laterally in a position to engage said ratchet, an internally-coned ring inside said casing and fixed thereto, whereby when said pawl comes in contact with said fixed ring said pawl is centered and the hammer-ratchet released, substantially as described.

6. The combination, in an automatic mallet, of the casing, the spindle, a spring for projecting said spindle, the hammer, the hammer-impelling spring, the ratchet on the hammer, the pawl carried by said spindle, a tubular cam surrounding and rotatable about said spindle inside the casing, a lug carried by said spindle and bearing on the face of said cam, means for rotating said cam from the outside of the casing, whereby the length of stroke of the hammer may be varied, substantially as described.

7. The combination, in an automatic mallet, of the casing, the spindle, a spring for projecting said spindle, the hammer, the hammer-impelling spring, the hammer-ratchet, a tubular cam surrounding and rotatable about said spindle, the block secured to said spindle, the pawl carried by said block, a lug on said block bearing on the face of said cam, and a lug on said cam projecting through a slot in said casing, whereby said cam may be rotated and the length of stroke of the hammer regulated, substantially as described.

8. In an automatic mallet a reversible hammer-impelling spring which when in one position produces a spring of a given strength and when reversed produces a spring of a different strength, substantially as described.

9. The combination, in an automatic mallet, of the casing, the end piece thereof provided with an internal shoulder, the hammer, and a coiled reversible hammer-impelling spring confined between said hammer and said end piece, one end of said spring being of a diameter capable of passing the shoulder of said end piece and the opposite end of said spring being of a diameter that will abut against said shoulder, substantially as and for the purpose described.

10. The combination, in an automatic mallet, of the casing, the end piece adjustably connected therewith and provided with an internal shoulder, the hammer, a coiled reversible hammer-impelling spring confined between said hammer and said end piece, and a ring secured to one end of said spring of a diameter which will not permit it to pass said shoulder, substantially as and for the purpose described.

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

ARTHUR W. BROWNE.

Witnesses:
SEYMOUR CASE,
R. W. WOOD.