

May 15, 1945.

D. REITER

2,376,187

DENTAL MALLET

Filed Nov. 13, 1944

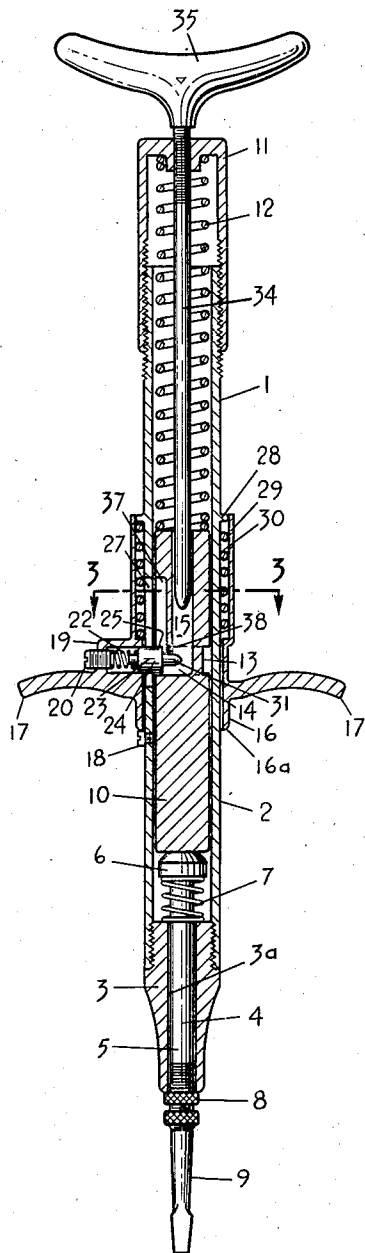


Fig. 1

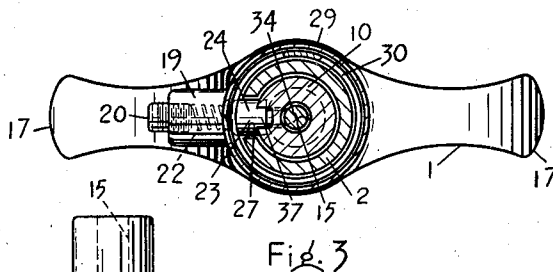


Fig. 3

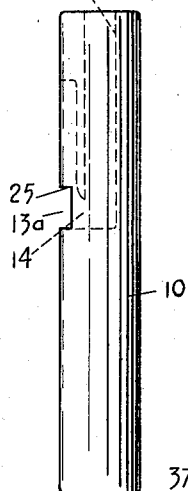


Fig. 4

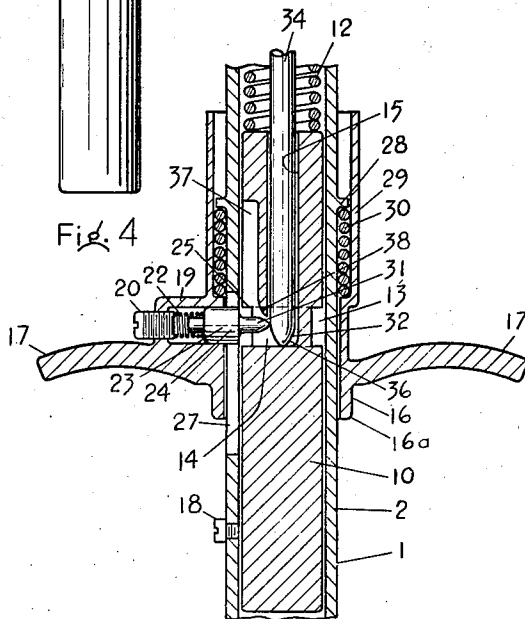


Fig. 2

Inventor
David Reiter

By George F. Vaia.
his Attorney

UNITED STATES PATENT OFFICE

2,376,187

DENTAL MALLET

David Reiter, Woodside, Long Island, N. Y.

Application November 13, 1944, Serial No. 563,235

6 Claims. (Cl. 32—52)

This invention pertains to a dental mallet and particularly to an automatic type thereof.

An object of the invention is the provision, in a dental mallet, of a simple arrangement of relatively few component parts having a minimum number of wearing surfaces and being positive in action.

Another object of the invention is the provision, in a dental mallet, of means capable of adjustment and controlling the release of a hammer so as to gauge the degree of forces in a hammer blow.

A further object of the invention is to provide a dental mallet which may be adjustable so as to control the stroke of a tool as well as the force applied to the tool.

An added object of the invention is to provide a mallet of the automatic type which is of such design as to be easy to operate because it may be manipulated quite effectively by one hand, inexpensive to manufacture because of relatively few parts and easily assembled or disassembled for general repair, inspection or replacement of parts.

The above and numerous other objects of the invention will become apparent from the succeeding description, considered together with the accompanying drawing which discloses in several views, an exemplification of the invention and wherein:

Figure 1 is a longitudinal sectional view of a dental mallet embodying a form of the present invention.

Figure 2 is a partial longitudinal sectional view corresponding to Figure 1 and illustrating some of the elements of the mallet in an abnormal relationship.

Figure 3 is a transverse sectional view taken along the lines 3—3 of Figure 1, looking in the direction of the arrows.

Figure 4 is an elevational view showing a modification of one of the components of the mallet.

Referring now in detail to the drawing, wherein like reference characters refer to like parts, the numeral 1 is employed to indicate, in a somewhat general manner, a mallet of an automatic type and which, more often herein throughout, may be referred to as a dental mallet, but it will be understood that the mallet may be used generally for any type of surgery wherein an instrument of the class described may be employed advantageously to operate on bone or bony structure.

The mallet comprises a main barrel or outer sheathing 2 extending longitudinally of the instrument for substantially its entire length and being formed preferably as a hollow, round cylin-

der open at both ends to function as a casing or a foundation. Removably secured to one end of the barrel is a guide member 3 threadedly associated with the barrel to form a definite interlock therebetween. The guide member has, extending axially thereof, an opening 3^a through which extends a shank 4 of a plunger element 5. The plunger is arranged to move axially or longitudinally of the mallet within certain predetermined limits and accordingly, has as an inner end thereof a head, anvil or blow or impact receiving enlargement 6 disposed within the barrel. Interposed between the anvil and guide member is a resilient element characterized by a coil or helical spring 7 acting longitudinally of the mallet to maintain the plunger in a normal or retracted position as illustrated. So as to limit the inward movement of the plunger the outer or free end thereof is provided with a chuck element 8 which normally bears against an associated end of the guide member. The chuck element may be so adjusted longitudinally of the plunger as to govern the effective travel of the plunger, that is to say, by manipulating the chuck so that it is disposed closer or farther away from the anvil the compressive action of the resilient element can be effected to thereby shorten or lengthen the effective stroke of the plunger. The limits of travel of the plunger is of course the free and solid heights of the resilient element and the chuck may be so manipulated as to effect a plunger stroke equal to any fraction or whole of the range of resilient element action. Extending from the outer or free end of the plunger is a tool 9 which is depicted as a chisel but, however, may equally be a bit, elevator or any such suitable implement employed in the art of surgery and adapted to receive impacts or blows. The tool or implement 9 is removably retained associated with the plunger by means of the chuck and, accordingly, any forces imparted to the plunger will be reflected immediately in the tool.

Disposed within the sheathing intermediate the ends thereof is a hammer 10 also of cylindrical form and arranged to slide within the barrel away from and toward the plunger anvil. Normally, the hammer bears against the anvil from which position it can be drawn along the barrel poised in spaced relation to the plunger so that upon release thereof, an impact or blow can be imparted to the plunger anvil to drive the tool in a direction outwardly of the mallet. The extremity of the sheathing removed from the guide means is provided with exterior threads with which interior threads of a cap or closing mem-

ber 11 are interlocked. Interposed between the cap and hammer and in intimate contact therewith is a resilient element or coil or helical spring 12 forming a power means resting against the hammer for urging the latter away from the cap or toward the plunger. The threads presenting an interlock between the barrel and cap also present an adjusting means whereby the resistive value of the spring 12 can be definitely established. That is to say, as the cap is run out on the sheathing away from the normal position of the hammer the compressive value of the resilient element for a given stroke will be lessened to result in a lighter blow being imparted to the anvil and conversely the closer the cap is to the anvil the greater the degree of forces will be built up in the resilient element to intensify the hammer blows.

Means has been incorporated in the mallet for moving the hammer away from its normal position and as exemplary of such a means the hammer is provided with a circumambient, outwardly facing raceway 13 which is in the nature of a channeled relief and need only extend around the hammer for a relatively short distance if so desired and for all purposes and intent may be formed by taking a straight cut or kerf across the face of the hammer intermediate the length thereof. The raceway is, however, preferred because it is easier and more economical to form in the hammer. In Figure 4 of the drawing there is disclosed an elevational view of a hammer having a straight cut or kerf indicated as 13^a and this design or construction may be employed in lieu of the continuous circumambient raceway. Leading axially or inwardly of the hammer from the raceway or kerf is a cross bore 14 extending to the axis of the hammer where it communicates with an axial bore 15, the latter of which extends from the cross bore to the spring element adjacent end of the hammer.

Movably associated with the barrel is a sleeve 16 of cylindrical formation surrounding the sheathing and having one portion 16^a thereof in sliding engagement with the barrel to guide the sleeve in a definite fixed path throughout its range of movement axially of the mallet. Outstanding in opposite directions of the sleeve intermediate the length thereof is a pair of wings 17 which function as finger grips or pieces to assist in operating the mallet. Any means such as the illustrated stop 18 may be removably associated with the barrel to limit the travel of the sleeve in one direction or toward the plunger associated extremity of the barrel. Formed on one of the finger grips is a housing 19 having an opening normal or perpendicular to the axis of the hammer or in alignment with a normally positioned cross bore and as such has one or the outer end thereof closed by means of an adjustable or rotatable element or set screw 20. Disposed within the housing and having one end bearing against a contiguous extremity of a set screw is a coil spring or deformable element 22 which tends to urge a retractible means or pin 23 outwardly of the housing or inwardly of the mallet toward the longitudinal axis thereof. The pin has a cylindrical butt portion 24 normally disposed within the raceway or kerf of the hammer and because of the formation or presence of the overlying shoulder or shoulders 25 at the upper limits of the raceway or kerf a definite or positive interlock is formed between the sleeve and hammer. It is deemed well to here state that the barrel is provided with a slot or elongated opening 27 of sufficient width to accommo-

date the butt end of the pin or retractible means and by reason of this accommodating guideway 27 the sleeve is prevented from rotating relative to the barrel and is maintained in a definite, fixed path. Also the set screw is made adjustable so that a definite value can be established in the deformable element 22 thereby controlling the degree of force necessary to retract or urge the pin back into the housing. It will be obvious to one skilled in the art that the greater degree of forces required to disengage the pin from the hammer will result in a greater degree of forces being built up in the resilient element or hammer power means. Spaced a predetermined distance above the finger grips is an abutment or ledge 28 circular in formation and outstanding from the barrel as an integral part thereof. The sleeve is continued away from the finger grips as a slightly enlarged portion 29 in radial spaced relation to the barrel and normally overlapping the barrel ledge. Disposed within this enlarged sleeve portion is a coil spring 30 which reacts axially of the mallet against the ledge and sleeve so that after a tripping action of the pin-hammer interlock the sleeve may be returned through the action of the coil spring 30 to its normal position as illustrated most clearly in Figure 1 of the drawing.

As previously indicated, the pin-hammer interlock is tripped to release an elevated hammer and impart a blow or impact to the plunger, and toward the fulfillment of the above the pin is provided with a nib, nipple or extension 31 which extends through the cross bore into the axial bore. The extension or nipple is of lesser cross sectional area than the pin butt and has a free end tapered or rounded as at 32 which normally occupies a position within the axial bore. Adjustably associated with and carried by the cap is a rod or pin tripping device 34 of such cross sectional area to be neatly accommodated by the hammer axial bore so as to function additionally as a guiding means for the hammer throughout its range of movement axially of the mallet. An outer end of the bar has secured firmly thereto a thumb rest, piece or saddle 35 arranged to bear against the base of a thumb of an operator. The saddle is also employed as a means for rotating the bar relative to the cap to change or alter the effective length of the bar within the barrel. The opposite end of the bar terminates short of the pin nib so as to be normally spaced therefrom and is formed as a tapered or rounded extremity 36. The hammer, in addition, is provided with an outwardly facing longitudinal groove or recess 37 elongated along the length of the hammer from the area of the cross bore and circumambient raceway or kerf toward the spring adjacent end of the hammer. The recess 37 is in radial alignment with the slot but is narrower than the slot and is, therefore, of a width slightly greater than the diameter of the pin extension so that during certain operating conditions hereinafter explained the pin extension will be guidingly received by the recess 37. This relationship between the pin extension and longitudinal groove prevents a rotative action of the hammer throughout its entire range of axial movement and, accordingly, at all times maintains the cross bore and raceway or kerf in position to receive the pin extension and pin butt respectively when the components of the mallet are permitted to return to normal position as illustrated in Figure 1 of the drawing. Where the longitudinal groove

merges or opens into the cross bore an arcuate or convexly curved surface 38 is provided, thereby presenting a skidway leading from the cross bore to the longitudinal groove. Accordingly, as the sleeve is urged toward the thumb piece or rest, the pin butt, being interlocked with the hammer shoulder 25, causes the hammer to raise away from the plunger and this action continues until the bar extremity 36 engages the pin extension free end 32 to thereby urge the pin to be moved into the housing a distance sufficient to trip the pin-hammer interlock, as most clearly illustrated in Figure 2 of the drawing. As the pin butt is urged from beneath the hammer shoulder and the pin extension at the same time enters the longitudinal recess over the skidway 38 the hammer, through the medium of the forces built up in the coil spring 12, is dispatched on its way to impart a blow or impact on the plunger. By relieving the pressure on the finger grips the coil spring 30 will return the sleeve back to abutting relation with the stop 18 at which time the spring 22 will urge the pin once more into underlying supporting relation with the hammer shoulder 25.

From the above it will be noted that various changes and alterations may be made to the illustrated and described construction without departing from within the spirit of the invention and scope of the appended claims.

I claim:

1. In an automatic mallet, the combination of, a sheathing, a reciprocating plunger slidably associated with one end of said sheathing, a hammer in said sheathing normally bearing against said plunger, a sleeve surrounding said sheathing and arranged to move relative thereto within certain predetermined limits, spring means acting between said sheathing and sleeve for normally holding the latter in one position, resiliently actuated transversely movable means carried by said sleeve and extending through said sheathing, said transversely movable means arranged to interlock with said hammer, cap means closing the other end of said sheathing, a spring bearing against said cap and hammer, and means carried by said cap means and extending into said hammer, said last named means being in alignment with but normally spaced from an end of said transversely movable means so as to negative said interlock between said transversely movable means and hammer after a predetermined movement of said sleeve.

2. In an automatic mallet, the combination of, a barrel, a reciprocating plunger slidably associated with one end of said barrel, a hammer in said barrel arranged to impart a blow to said plunger, a shoulder formed on said hammer, a sleeve surrounding said barrel and arranged to move axially thereof, a slot in said barrel, transversely movable means carried by said sleeve and extending through said slot, said transversely movable means extending into said hammer and normally underlying said shoulder to form an interlock therebetween for moving said hammer away from said plunger, a cap associated with the other end of said barrel, spring means acting between said cap and hammer, and stem means associated with said cap and extending into said hammer, said stem means being adapted to disengage said transversely movable means from said hammer after a predetermined travel of said hammer away from said plunger.

3. In an automatic mallet, the combination of, a barrel, a hammer in said barrel arranged to impart a blow to a plunger, a sleeve surrounding said barrel and arranged to move axially thereof, a slot in said barrel, housing means carried by said sleeve, spring means within said housing, transversely movable means bearing against said spring means and extending out of said housing through said slot, said transversely movable means extending into said hammer to form an interlock therebetween for moving said hammer in one direction axially of said barrel, a cap associated with one end of said barrel, a coil spring acting between said cap and hammer, and stem means carried by said cap and extending axially of and into said hammer, said stem means being arranged to disengage said transversely movable means from said hammer after a predetermined movement of said hammer toward said cap.

4. In an automatic mallet, the combination of, a barrel, a hammer in said barrel arranged to impart a blow to a plunger, a sleeve surrounding said barrel and arranged to move axially thereof, housing means carried by said sleeve, spring means within said housing, transversely movable means having respective ends bearing against said spring means and interlocked with said hammer, a cap associated with one end of said barrel, a coil spring acting between said cap and hammer, and stem means carried by said cap and extending axially of and into said hammer; said stem means being adjustable axially of said barrel and arranged to disengage said transversely movable means from said hammer after a predetermined movement of said hammer toward said cap.

5. In an automatic mallet, the combination of, a barrel, a hammer in said barrel adapted to impart a blow to a plunger, an axial bore in said hammer, a cross bore in said hammer communicating with said axial bore, a sleeve arranged to move axially of said barrel, a housing carried by said sleeve, a resiliently urged pin extending out of said housing into said cross bore, spring means urging said hammer axially of said barrel, and means adjustably associated with said barrel and extending into said axial bore to have an end thereof normally spaced from said cross bore, said means end being arranged to urge said pin out of said cross bore after a predetermined compressive movement of said spring means.

6. In an automatic mallet, the combination of, a barrel, a hammer in said barrel adapted to impart a blow to said plunger, an axial bore in said hammer, an outwardly facing groove in said hammer parallel with said axial bore, a cross bore adjacent one end of said groove and communicating with said axial bore, a sleeve arranged to move axially of said barrel, a housing carried by said sleeve, a resiliently urged pin extending out of said housing into said cross bore to thereby form an interlock between said sleeve and hammer for moving the latter in one direction axially of said barrel, spring means urging said hammer axially of said barrel, and means adjustably associated with said barrel and extending into said axial bore to have an end thereof normally spaced from said cross bore; the end of said last named means being arranged to urge said pin out of said cross bore into said groove after a predetermined compressive movement of said spring means.

DAVID REITER.