

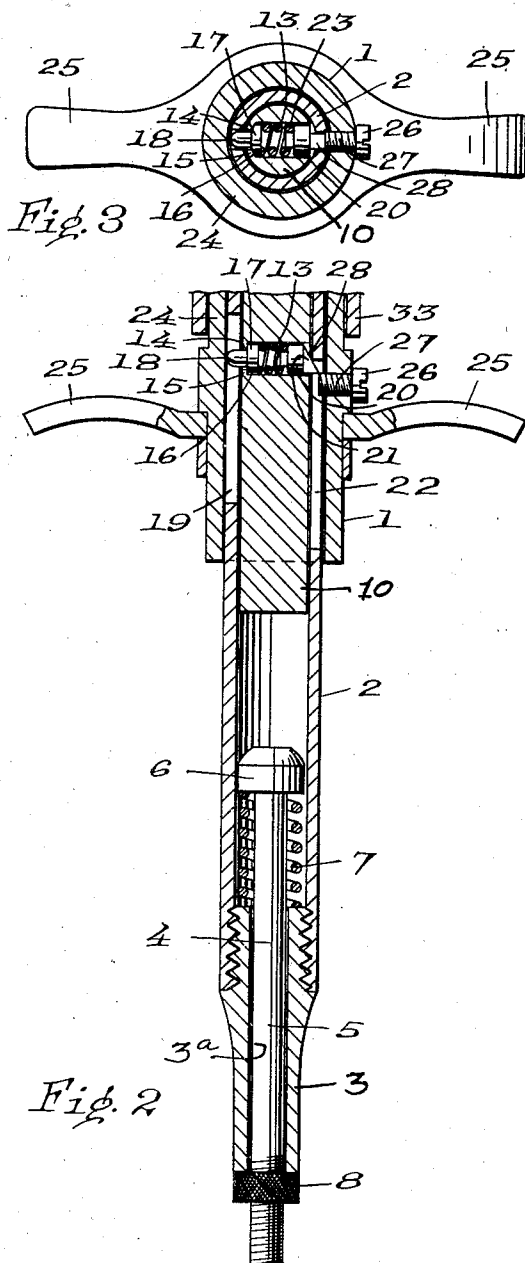
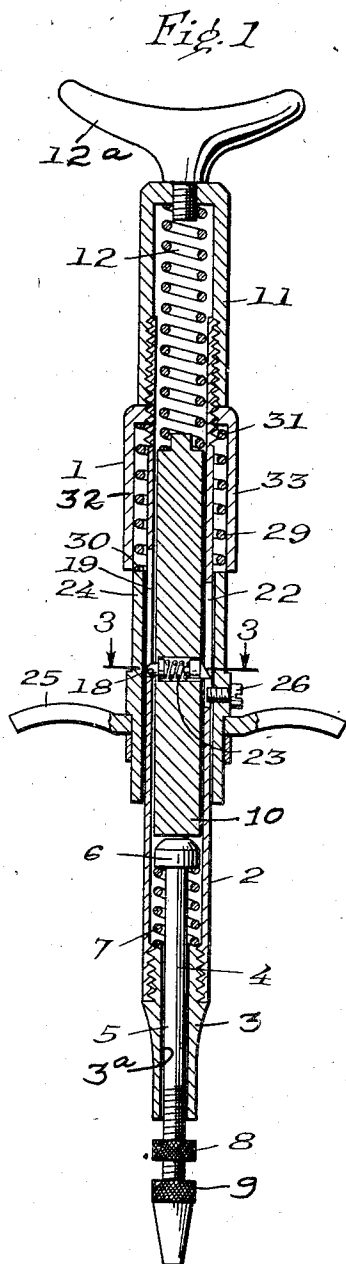
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SURGICAL INSTRUMENT WITH MALLET ACTION

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## SURGICAL INSTRUMENT WITH MALLET ACTION

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5 Claims. (Cl. 128—305)

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This invention relates to a surgical instrument and more particularly to an automatic type thereof.

An object of the invention is the provision of an improved surgical instrument having a simple, positive and inexpensive operating mechanism.

Another object of the invention is the provision of an improved surgical instrument capable of being employed as a dental mallet to impart successive blows to a reciprocal tool.

A feature of the invention is to provide in a surgical instrument, a hammer having a radial cross bore carrying a removable nib and a reciprocal latch spring pressed in opposite directions.

An added feature of the invention is to provide, in a surgical instrument, a cylinder having oppositely disposed, longitudinally extending guideways and a hammer carrying a nib arranged in one guideway to limit movement of the hammer in one direction and the hammer also carrying a latch arranged in the other guideway to be urged into the hammer to an inoperable position at the limit of movement of the hammer in an opposite direction.

The above and numerous other objects and features of the invention will become apparent from the succeeding description considered together with the accompanying drawing wherein:

Figure 1 is a vertical sectional view taken through a surgical instrument embodying the present invention.

Figure 2 is an enlarged view somewhat similar to the showing of Figure 1 except that herein the hammer is illustrated in an elevated position and the catch mechanism tripped preparatory to the descent of the hammer.

Figure 3 is an enlarged horizontal sectional view taken along the lines 3—3 of Figure 1, looking in the direction of the arrows.

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 or surgical instrument of an automatic type. While throughout this specification the instrument embodying this invention may be referred to as a mallet, dental mallet or surgical instrument, it will be understood that the instrument is particularly adaptable for any type of surgery wherein an implement of the class herein described may be employed advantageously to operate on bone or boney structure.

The present invention, being an improvement on the invention illustrated, described and

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claimed in my prior Patent No. 2,376,187, granted November 13, 1944, comprises a main barrel or outer sheathing 2 extending longitudinally of the implement for substantially its entire length and being formed preferably as a hollow, round cylinder open at both ends to function as a foundation or casing. 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 3a through which extends a shank 4 of a plunger element 5. The plunger is arranged to move axially or longitudinally of the implement within certain predetermined limits and accordingly has as an inner end thereof a head, anvil or blow or impact receiving enlargement 6 positioned within the barrel. Interposed between the anvil and guide member within the barrel is a resilient element characterized by a helical or coil spring 7 acting longitudinally of the instrument to maintain the plunger in a normal or retracted position as clearly illustrated in Figure 1. In order to limit the inward movement of the plunger there is provided a washer or stop means 8 which is threadedly associated with the plunger intermediate the ends thereof and is arranged to bear against or contact an associated end of the guide member as illustrated most clearly in Figure 2 of the drawing. The stop member may be so manipulated longitudinally of the plunger as to govern the effective travel of the plunger. That is to say, by arranging the washer 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 ultimate limits of travel of the plunger is of course the free and solid heights of the resilient element and the washer may be so manipulated as to effect a plunger stroke equal to any fraction or whole of the range of resilient element action. Threadedly associated with the outer or free extremity of the plunger is a chuck 9 which is instrumental in removably securing to the plunger a tool of any nature such as a chisel, bit, elevator or any such suitable or desirable tool employed in the art of surgery and adapted to receive impacts or blows and no tool is shown in the drawing.

Disposed within the barrel intermediate the ends thereof is a blow imparting component or hammer 10 also and preferably of cylindrical form and arranged to slide, within certain predetermined limits, within the sheathing away from and toward the plunger anvil. Normally the

hammer bears against the anvil from which position it can be drawn along the barrel to be 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 carried by the plunger in a direction outwardly of the instrument. The extremity of the sheathing removed from the guide means is provided with exterior threads with which interior threads of a cap or closing member 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 acting 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 12 to intensify the hammer blows. A thumb rest or piece or saddle 12a is mounted upon the cap by any means and for the purpose of presenting a suitable bearing area against which a thumb of an operator may bear.

Extremely simplified means has been incorporated in the mallet for moving the hammer away from its normal position or away from the anvil against the action of the resilient element 12. Such simplified means is characterized by the hammer being provided with a cross bore or transverse preferably cylindrical bore or opening 13 positioned at a predetermined location intermediate the ends of the hammer. The cross bore has one end 14 thereof restricted to present a confining circular shoulder 15 and within the bore of the restricted extremity is a stop or limit means 16 having a base 17 thereof positioned within the confines of the bore. Outstanding from the stop means base outwardly of the cross bore beyond the circular shoulder is a pin, nib or neck 18 formed as a part of the base and desirably extending beyond the limits of the hammer. The sheathing is provided with a stop guideway or slot 19 extending longitudinally of the barrel and of a width to accommodate the stop neck which extends into this guideway. As will be noted by referring particularly to Figure 1 of the drawing, the limit means neck is arranged to engage an extremity of the accommodating guideway while the hammer is in a normal position and for this reason the permissible travel of the hammer in a direction toward the anvil is definitely established and also because of the guideway-nib relationship the hammer is prevented from rotating about its axis within or relative to the barrel.

Poised or disposed at the unrestricted or opposite end of the cross bore is a latch means or reciprocal catch means 20 having a cylindrical body portion 21 arranged to fit neatly within the cross bore. The outer or free end of the catch means is wedge shaped as at 21 and this wedge shaped extremity is desirably of lesser width than the diameter of the body portion for purposes of which will also be made apparent hereinafter. Disposed in radial alignment with the stop guideway or slot is a latch guideway or slot 22 formed in the sheathing and of a width to neatly permit

a free movement of the latch wedge shaped end longitudinally thereof. This latch-slot relationship also prevents an axial movement of the hammer relative to the sheathing. The latch guideway is positioned at a different location longitudinally of the sheathing than the location of the stop guideway and in this regard it is deemed necessary only to state at this stage of the description of the invention that when the stop nib is in engagement with an extremity of its accommodating guideway the latch is spaced a predetermined distance from a related end of its accommodating guideway. Urging the stop and latch in opposite directions is a compressible means characterized by a small or light coil-spring 23 which maintains the stop in its illustrated and operable position and functions as a yieldable power means for the latch to permit the latter to be moved rearwardly or inwardly of the cross bore and urge the latch outwardly of the cross bore as the occasion arises during the service movements of the hammer.

A movable or elevating means has been incorporated in the instrument to carry the hammer away from the anvil of the plunger and such a means is characterized by a sleeve 24 which extends around the sheathing or barrel and is arranged to move axially of the instrument. The sleeve is provided with a finger grip or rest 25 which affords ample bearing area for the fingers of an operator so that during the operation of the mallet the sleeve can be pumped back and forth along the sheathing or barrel. Preferably at a location close to the finger rest, the sleeve is provided with an inwardly directed abutment 26 which has a stem portion 27 arranged to move in or along the catch guideway. Normally or as illustrated most clearly in Figure 1 of the drawing the abutment stem is positioned forwardly of the latch, that is to say, between the latch and the plunger extremity of the instrument so that upon movement of the sleeve toward the thumb rest extremity of the instrument the abutment will engage the latch and through this relationship the hammer will be carried away from the plunger anvil. This movement of the hammer may continue in a direction toward the thumb rest until the inclined or diagonal face 28 comes into contact with the sheathing defining an end of the latch guideway. A continued movement of the hammer in this same direction will cause the latch to move into the cross bore off of the supporting ledge afforded by the abutment stem at which time the energy stored up in the spring 12 will dispatch the hammer toward the plunger to result in the anvil receiving a blow and thus cause the tool to be urged outwardly or away from the instrument for the tool's permissible or predetermined stroke. When the sleeve has been returned to its normal position the abutment will strike and move along the latch inclined surface or face 28 until it moves beyond the area of the latch to be once more poised below or to one side of the latch preparatory to once more engaging the latch for elevating the hammer.

A spring 29 extends about the sheathing and has one end 30 thereof in engagement with the sleeve and another end 31 in bearing relation with a shroud 32, the latter of which is threadedly interlocked with the sheathing. The shroud 32 has a skirt 33 which extends about the spring 29 in spaced relation thereto and forms what might be considered a protective wall for the encased spring 29. After the hammer has been raised

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away from the anvil and the latch mechanism has been tripped to cause the descent of the hammer, a release of the pressure on the finger grip will permit the spring 29 to urge the sleeve back to normal position preparatory to the execution of another cycle in the operation of the instrument.

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

I claim:

1. In a surgical instrument of the type having a spring urged hammer arranged to reciprocate in a cylinder and be moved against an action of the spring by movement of a sleeve, the combination of, a plurality of guideways in said cylinder, a single cross bore in said hammer, a removable nib extending out of one end of said cross bore and into one of said guideways, a latch extending out of another end of said cross bore and into another of said guideways, spring means within said cross bore between said nib and latch urging said nib and latch apart, and means carried by said sleeve adapted to underlie and engage said latch for moving said hammer against the action of said spring.

2. In a surgical instrument of the type having a spring urged hammer arranged to reciprocate in a cylinder and be moved against an action of the spring by movement of a sleeve, the combination of, a plurality of oppositely disposed guideways of different extent in said cylinder, a single cross bore in said hammer, a limit stop extending out of one end of said cross bore and into one of said guideways, a latch extending out of another end of said cross bore and into another of said guideways, resilient means in said cross bore between said latch and stop urging said limit stop and latch apart, and means carried by said sleeve and extending into one of said guideways, said means being adapted to underlie said latch for urging said hammer against the action of said spring.

3. In a surgical instrument of the type having a spring urged hammer arranged to reciprocate in a cylinder and be moved against an action of the spring by movement of a sleeve, the combination of, a pair of diametrically disposed guideways of different extent in said cylinder, a single cross bore in said hammer, stop means extending out of one end of said cross bore and into one of said guideways, said stop means being arranged to move in one of said guideways and engage an end thereof for limiting movement of said hammer in one direction, a reciprocal latch extending out of another end of said cross bore

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and into another of said guideways, resilient means in said cross bore between said latch and stop means urging said stop means and latch in opposite directions into said guideways, and removable means carried by said sleeve and adapted to underlie said latch for urging said hammer against the action of said spring.

4. In a surgical instrument of the type having a spring urged hammer arranged to reciprocate in a cylinder and be moved against an action of the spring by movement of a sleeve, the combination of, a plurality of guideways in said cylinder, a single cross bore in said hammer having one end thereof restricted, a removable nib extending out of said restricted end of said cross bore into one of said guideways, a latch extending out of another end of said cross bore and into the other of said guideways, resilient means within said cross bore urging said nib and latch in opposite directions, and removable means carried by said sleeve adapted to underlie said latch for moving said hammer against the action of said spring.

5. In a surgical instrument of the type having a spring urged hammer arranged to reciprocate in a cylinder and be moved against an action of the spring by movement of a sleeve, the combination of, a plurality of guideways in said cylinder substantially oppositely disposed and arranged at different positions longitudinally of said cylinder, a single cross bore extending radially of and entirely through said hammer, one opening into said cross bore being smaller than the opposite opening therein, a nib extending out of said smaller opening and arranged to move in one of said guideways, said nib being arranged to contact an end of its related guideway for limiting movement of said hammer in one direction, a latch extending out of the larger of said openings and arranged to travel in another of said guideways, said latch being arranged to contact an end of its related guideway and be urged thereby into said cross bore, resilient means within said cross bore urging said latch and nib in opposite directions, and means carried by said sleeve and arranged to contact said latch for moving said hammer against the action of said spring.

DAVID REITER.

#### REFERENCES CITED

The following references are of record in the file of this patent:

#### UNITED STATES PATENTS

| Number    | Name   | Date          |
|-----------|--------|---------------|
| 863,909   | Evans  | Aug. 20, 1907 |
| 1,837,067 | Reiter | Dec. 15, 1931 |