

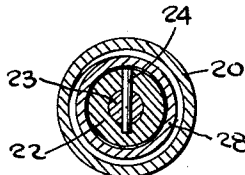
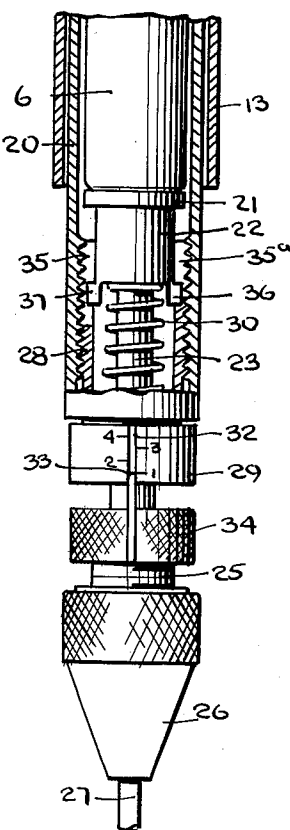
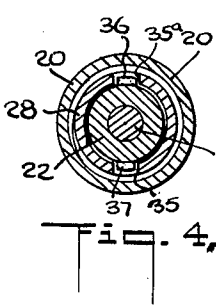
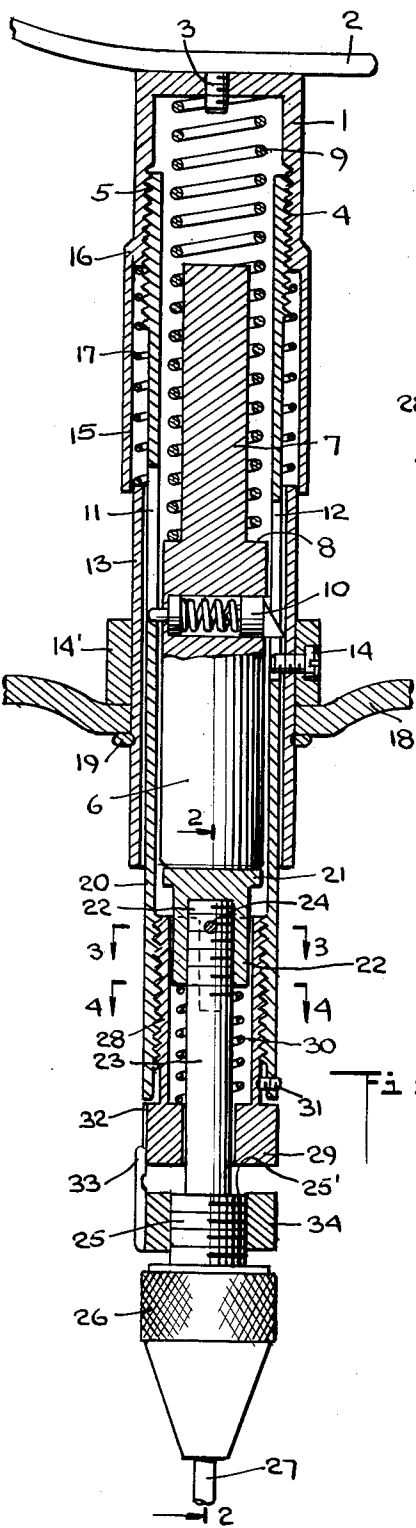
Dec. 6, 1955

D. REITER

2,725,878

SURGICAL MALLET STRUCTURE

Filed Sept. 20, 1954



INVENTOR.
DAVID REITER
BY
McBierman
ATTORNEY

1

2,725,878

SURGICAL MALLET STRUCTURE

David Reiter, Woodside, N. Y., assignor to Union Broach Co., Inc., a corporation of New York

Application September 20, 1954, Serial No. 457,103

8 Claims. (Cl. 128—305)

The present invention is directed to surgical mallets, more particularly to an improved form thereof having advantages over those known in the prior art.

Such instruments are used by surgeons in various operations such as in cutting bone. In particular such surgical mallets are used by dental surgeons for cutting or spreading the bone around a tooth so as to facilitate the extraction of a tooth. Such an instrument is described in my Patent No. 2,421,354, dated May 27, 1947, and entitled "Surgical Instrument With Mallet Action." This patent describes a commercially acceptable surgical mallet which has proven quite satisfactory in use. However, improvements thereon are possible and particularly in the respect that the surgeon was unable to determine accurately the force of the blow imparted by the mallet and he did not have means for quickly and accurately adjusting the force which often was necessary or highly desirable during the operation. Also in the prior mallet there was a substantial recoil which caused irritation to the surgeon when the mallet was used for a substantial length of time during an operation.

The present invention is intended and adapted to overcome difficulties encountered in the prior art, it being among the objects of the present invention to provide a surgical mallet which is capable of rapid adjustment to alter the length of stroke and force of the blow while the surgeon is operating the same.

It is also among the objects of the present invention to provide a surgical mallet wherein the surgeon is enabled to know exactly what force the mallet applies at each stroke and in which these elements may be adjusted without interruption in the use of the mallet.

It is further among the objects of the present invention to provide a surgical mallet which does not transmit any substantial shock by reason of recoil of the hammer, thus lessening irritation to the hand of the surgeon.

In practicing the present invention there is provided a mallet structure, the upper portion of which is made substantially in accordance with applicant's prior patent. The structure of the lower or operating portion of the mallet is substantially modified in accordance with the objects of the invention. There is provided a hollow guide which is internally threaded so as to mount the same in the lower end of the barrel. The plunger of the mallet extends through the guide and a coil spring within the guide has its ends contacting the bottom of the guide and the underside of an anvil forming the top of the plunger.

A collar is secured to the guide just below the end of the barrel, said guide having a longitudinal groove or scoring on the outer face thereof. A nut operates on the lower threaded end of the plunger and has a spring finger or detent extending over the collar and adapted to seat in the groove. Rotation of the nut changes its position relative to the end of the barrel and thereby varies the stroke, the result of which is to vary the force of the blow imparted by the instrument. In one embodiment of the invention there are markings on the collar showing the positions of the finger or detent when the force of the

2

blow is $\frac{1}{4}$ lb., $\frac{1}{2}$ lb., $\frac{3}{4}$ lb. and 1 lb., respectively. To obtain these forces, full revolutions of the nut are required in said embodiment.

In the accompanying drawing constituting a part hereof and in which like reference characters indicate like parts,

Fig. 1 is a longitudinal cross-sectional view of a surgical mallet made in accordance with the present invention; some parts being shown in elevation and some parts being broken away;

Fig. 2 is a fragmentary longitudinal cross-sectional view of the lower portion of the mallet showing certain details of construction thereof;

Fig. 3 is a transverse cross-sectional view taken along line 3—3 of Fig. 1, and

Fig. 4 is a transverse cross-sectional view taken along line 4—4 of Fig. 1.

The mallet includes an inverted cup-shaped housing 1 having a saddle 2 secured to the top thereof by set screw 3, the saddle being adapted to rest within the palm of the hand. The threaded top of a barrel 4 is mounted on complementary threads 5 in the inside of housing 1. A hammer 6 operating within the housing has a relatively long reduced portion 7 forming a shoulder 8. A compression spring 9 has one end in contact with shoulder 8 and the other end in contact with the inside of housing 1. Just below shoulder 8 in a suitable transverse opening in hammer 6 is a latch arrangement 10 operating in longitudinal slots 11 and 12 in barrel 4, as fully described in my aforesaid patent.

A sleeve 13 surrounds barrel 4 and a set screw 14 passes through ring 14' and fixes said ring onto sleeve 13. A skirt 15 integral with cap 16 has its lower end in contact with the outer face of sleeve 13 and a coil spring 17 therein has one end contacting the top of sleeve 13 and the other end contacting the inside of cap 16. A finger grip 18 contacting the ring 14' is held in place by split ring 19 held in a groove in sleeve 13.

The lower end 20 of the barrel has a head or anvil 21 adapted to be struck by hammer 6. It has a hollow depending portion 22 thereon in which the upper end of a plunger 23 is held by transverse pin 24.

The lower end 25 of plunger 23 is externally threaded and has a shoulder 25'. A chuck 26 is mounted on threaded end 25 of the plunger and is adapted to hold a suitable tool 27 in a well-known manner.

Guide 28 which is externally threaded cooperates with internal threads in the lower end 20 of the barrel. A collar 29 attached to or integral with the lower end of guide 28 is located between the end of barrel 20 and shoulder 25'. A set screw 31 holds guide 28 in fixed position relative to the barrel. A spring 30 surrounding plunger 23, abuts against the lower end of depending portion 22 and the upper face of collar 29.

A longitudinal groove or scoring 32 on the outer face of collar 29 is adapted to receive the free end of a spring finger or detent 33, the lower end of said detent being secured to or integral with nut 34 which is mounted on end 25 of plunger 23.

In the lower end of guide 28 are oppositely placed longitudinal slots 35 and 35a. Extension 22 of anvil 21 has lateral projections 36 and 37 which operate within slots 35 and 35a, respectively. This permits longitudinal movement of the anvil relative to the guide but does not permit relative rotation thereof.

In the operation of the mallet the surgeon grasps grip 18 with the forefinger and middle finger and places the saddle in the palm between the thumb and forefinger. Then he operates it as usual, causing tool 27 to impinge upon the bone. Having set detent 33 in the position desired for the force to be imparted to the tool, and he wishes to change the force, he merely straightens his index

finger to touch nut 34 and readily rotates the nut, say, one complete turn one way or the other. This immediately changes the force of the blow and the travel of the plunger by a predetermined amount more or less, depending on the direction of rotation of the nut. This has been accomplished without any delay in the operation or removal of the instrument from the bone being treated. The surgeon then replaces his index finger on grip 18 and continues the operation.

It will be seen that there are several advantages in the use of the present instrument since the force of the blow may be adjusted quickly without interruption and without removing the instrument by a mere touch of the finger. The surgeon knows exactly what force is being applied at all times so that his work is eased and the time necessary for the operation is reduced. Because of the long compression spring 9, the recoil of the blow is taken up by the spring so that the shock to the palm of the hand has been greatly lessened.

Although the invention has been described setting forth a single specific embodiment thereof, various changes in the details of construction may be made within the spirit of the invention.

For instance, the collar while being shown integral with the guide, may be made separate therefrom and in place thereof an element having the same function may be substituted. The groove 32 is shown as a single groove but more than one such element may be used, depending upon the fineness of adjustment of stroke which may be desired. Instead of scoring, other means for anchoring nut 34 in adjusted position may be provided.

In place of the detent and scoring, a different combination of elements may be used to give the desired measurement of the force and the desired locking in place, such as cooperating spring pressed pin or ball and socket. Furthermore the detent may be placed on the guide and the scoring may be on the nut or its equivalent element. Numerals or other indicia may be placed on the collar to guide the user of the mallet.

These and other changes may be made in the details of construction within the spirit of the invention, which is not to be limited except by the character of the claims appended hereto.

I claim:

1. In a surgical mallet structure having an elongated housing, a hammer mounted therein for reciprocation, a compression spring for urging said hammer forwardly, means for retracting said hammer against the pressure of said compression spring and releasing said hammer, a barrel at the lower end of said housing in which the end of said hammer is adapted to operate, said barrel being internally threaded at its lower end, and an anvil in said barrel, the improvement which comprises a hollow guide having a stop member thereon, said guide being externally threaded and mounted on said internal threads in said barrel, a plunger secured to said anvil and extending through said guide, the lower end of said plunger being threaded, a coil spring in said guide and surrounding said plunger, the ends of said coil spring contacting the underside of said anvil and said stop member, a collar on said guide, a nut on the lower threaded end of said plunger, a detent on said nut and extending over said collar.

2. In a surgical mallet structure having an elongated housing, a hammer mounted therein for reciprocation, a compression spring for urging said hammer forwardly, means for retracting said hammer against the pressure of said compression spring and releasing said hammer, a barrel at the lower end of said housing in which the end of said hammer is adapted to operate, said barrel being internally threaded at its lower end, and an anvil in said barrel, the improvement which comprises a hollow guide having a stop member thereon, said guide being externally threaded and mounted on said internal threads

in said barrel, a plunger secured to said anvil and extending through said guide, the lower end of said plunger being threaded, a coil spring in said guide and surrounding said plunger, the ends of said coil spring contacting the underside of said anvil and said stop member, a collar on said guide, a nut on the lower threaded end of said plunger, a detent on said nut and extending over said collar, scorings on said collar, said detent adapted to enter said scorings by rotation of said nut to vary the travel of said plunger.

3. In a surgical mallet structure having an elongated housing, a hammer mounted therein for reciprocation, a compression spring for urging said hammer forwardly, means for retracting said hammer against the pressure of said compression spring and releasing said hammer, a barrel at the lower end of said housing in which the end of said hammer is adapted to operate, said barrel being internally threaded at its lower end, and an anvil in said barrel, the improvement which comprises a hollow guide having a stop member thereon, said guide being externally threaded and mounted on said internal threads in said barrel, a plunger secured to said anvil and extending through said guide, the lower end of said plunger being threaded, a coil spring in said guide and surrounding said plunger, the ends of said coil spring contacting the underside of said anvil and said stop member, a collar on said guide, a nut on the lower threaded end of said plunger, a detent on said nut and extending over said collar, the upper end of said guide having at least one longitudinal slot and a projection on said plunger entering said slot to prevent rotation of said plunger relative to said slot.

4. In a surgical mallet structure having an elongated housing, a hammer mounted therein for reciprocation, a compression spring for urging said hammer forwardly, means for retracting said hammer against the pressure of said compression spring and releasing said hammer, a barrel at the lower end of said housing in which the end of said hammer is adapted to operate, said barrel being internally threaded at its lower end, and an anvil in said barrel, the improvement which comprises a hollow guide having a stop member thereon, said guide being externally threaded and mounted on said internal threads in said barrel, a plunger secured to said anvil and extending through said guide, the lower end of said plunger being threaded a coil spring in said guide and surrounding said plunger, the ends of said coil spring contacting the underside of said anvil and said stop member, a collar on said guide, a nut on the lower threaded end of said plunger, a detent on said nut and extending over said collar, a saddle on the upper end of said housing, a finger grip on a sleeve below said housing, said compression spring extending into said sleeve.

5. In a surgical mallet structure having an elongated housing, a hammer mounted therein for reciprocation, a compression spring for urging said hammer forwardly, means for retracting said hammer against the pressure of said compression spring and releasing said hammer, a barrel at the lower end of said housing in which the end of said hammer is adapted to operate, said barrel being internally threaded at its lower end, and an anvil in said barrel, the improvement which comprises a hollow guide having a stop member thereon, said guide being externally threaded and mounted on said internal threads in said barrel, a plunger secured to said anvil and extending through said guide, the lower end of said plunger being threaded, a coil spring in said guide and surrounding said plunger, the ends of said coil spring contacting the underside of said anvil and said stop member, a collar on said guide, a nut on the lower threaded end of said plunger, a detent on said nut and extending over said collar, a saddle on the upper end of said housing, a finger grip on a sleeve below said housing, said compression spring extending into said sleeve and the lower part of said compression spring extending around the upper part of said hammer.

5

6. In a surgical mallet structure having an elongated housing, a hammer mounted therein for reciprocation, a compression spring for urging said hammer forwardly, means for retracting said hammer against the pressure of said compression spring and releasing said hammer, a barrel at the lower end of said housing in which the end of said hammer is adapted to operate, said barrel being internally threaded at its lower end, and an anvil in said barrel, the improvement which comprises a hollow guide having a stop member thereon, said guide being externally threaded and mounted on said internal threads in said barrel, a plunger secured to said anvil and extending through said guide, the lower end of said plunger being threaded, a coil spring in said guide and surrounding said plunger, the ends of said coil spring contacting the underside of said anvil and said stop member, a collar on said guide, a nut on the lower threaded end of said plunger, a detent on said nut and extending over said collar, scorings on said collar, said detent being springy and biased so that it is adapted to enter said scorings by rotation of said nut to vary the travel of said plunger.

7. In a surgical mallet structure having an elongated housing, a hammer mounted therein for reciprocation, a compression spring for urging said hammer forwardly, means for retracting said hammer against the pressure of said compression spring and releasing said hammer, a barrel at the lower end of said housing in which the end of said hammer is adapted to operate, said barrel being internally threaded at its lower end, and an anvil in said barrel, the improvement which comprises a hollow guide having a stop member thereon, said guide being externally threaded and mounted on said internal threads in said barrel, a plunger secured to said anvil and extending through said guide, the lower end of said plunger being threaded, a coil spring in said guide and surrounding said

6

plunger, the ends of said coil spring contacting the underside of said anvil and said stop member, a collar on said guide, a nut on the lower threaded end of said plunger and cooperating elements on said collar and nut adapted to lock said nut in a plurality of adjusted positions to adjustably limit the travel of said plunger.

8. In a surgical mallet structure having an elongated housing, a hammer mounted therein for reciprocation, a compression spring for urging said hammer forwardly, means for retracting said hammer against the pressure of said compression spring and releasing said hammer, a barrel at the lower end of said housing in which the end of said hammer is adapted to operate, said barrel being internally threaded at its lower end, and an anvil in said barrel, the improvement which comprises a hollow guide having a stop member thereon, said guide being externally threaded and mounted on said internal threads in said barrel, a plunger secured to said anvil and extending through said guide, the lower end of said plunger being threaded, a coil spring in said guide and surrounding said plunger, the ends of said coil spring contacting the underside of said anvil and said stop member, a collar on said guide, a nut on the lower threaded end of said plunger, a detent on said nut and extending over said collar, the pressure of said compression spring being greater than that of said coil spring, whereby said compression spring holds said plunger down against the action of said coil spring to space said nut from said collar when the mallet is in rest position.

References Cited in the file of this patent

UNITED STATES PATENTS

1,914,736	Coutu	June 20, 1933
2,437,014	Arnesen et al.	Mar. 2, 1948