Nov. 9, 1937. H. D. GREENBERG 2,098,495

MECHANICAL MALLET

Filed Feb. 10, 1934

Fig. 1.

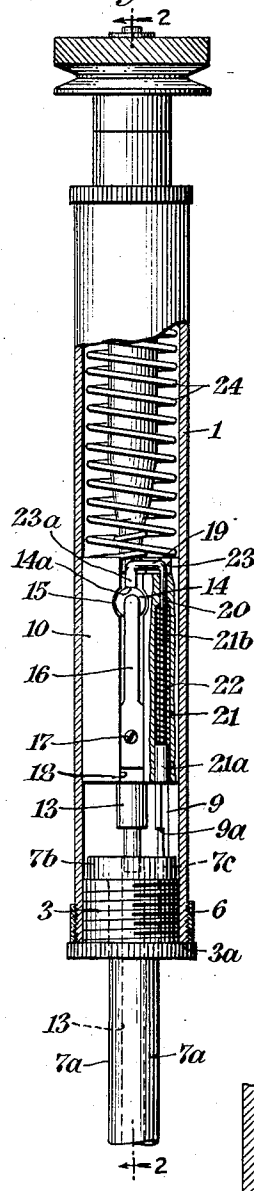


Fig. 2.

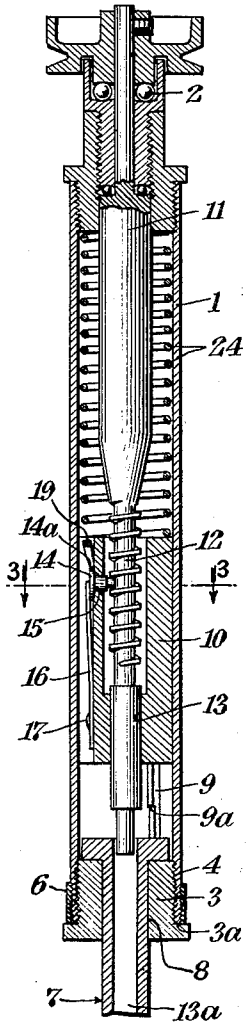


Fig. 3.

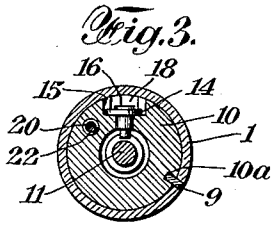


Fig. 4.

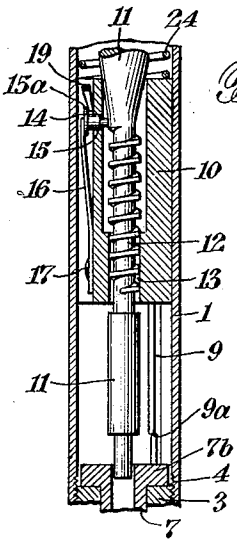


Fig. 5.

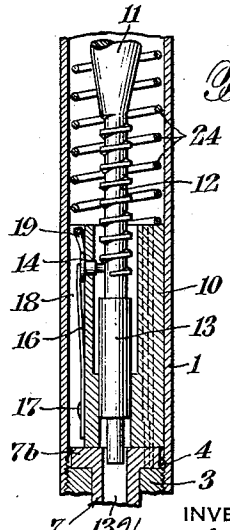
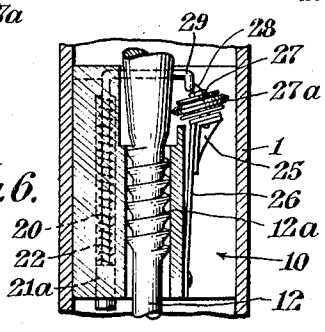


Fig. 6.



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Patented Nov. 9, 1937

2,098,495

UNITED STATES PATENT OFFICE

2,098,495

MECHANICAL MALLET

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Application February 10, 1934, Serial No. 710,753

13 Claims. (Cl. 125—33)

My invention relates to mechanical mallets, and while it is adapted for heavy work such as rock drilling, it relates particularly to those used for dental and bone surgery. My mallet possesses, among other advantages, those of being capable of such adjustment as to cause either a succession of blows, or one blow at a time; of providing for regulating the strength of the blows delivered, without changing the spring by which they are caused; and of simplicity of construction, with accessibility of the parts, and to such ends my invention consists in the improvements in mechanical mallets hereinafter specified.

I have chosen for illustration the best forms of my invention, known to me, but such forms are to be regarded as typical, only, of the many embodiments of which my invention is susceptible.

In the accompanying drawing:

Fig. 1 is a vertical view partly in section showing a dental mallet embodying my invention.

Fig. 2 is a longitudinal section taken substantially on the line 2—2 of Fig. 1.

Fig. 3 is a horizontal sectional view taken on the line 3—3 of Fig. 2.

Fig. 4 is a view similar to Fig. 2, but showing the hammer head in raised position, and with the pin 14 released by the blind thread so that the hammer head is free to be thrown downward by the spring 24 to strike a blow on the tool holder.

Fig. 5 is a view similar to Fig. 4 showing the hammer head resting on the head of the tool holder at the end of the stroke.

Fig. 6 is a view similar to Fig. 4 but showing the use of a disc 27.

In the form of my invention shown in Figs. 1 to 5, there is a casing 1 which is closed at its upper end by a ball bearing 2 and at its lower end is closed by a bushing or head 3 which is adjustably mounted in a screw-thread 4 formed in the inner surface of the casing. For the purpose of locking the said head in any desired position up or down in the casing, the latter is provided with a screw thread on its exterior, and a screw sleeve 6 is mounted thereon. When the head 3 has been adjusted to the desired position, it is locked therein by screwing the sleeve 6 hard against a shoulder 3a on the said head. A tool-holder 7 is mounted in a bore 8 in the cylinder head 3 and consists of a preferably cylindrical shank 7a and a disc-shaped head 7b. The tool holder, in the present instance, is prevented from rotating, by engagement of a notch 7c in the periphery of its head 7b with a guide key 9, which is set in, or otherwise attached to the inner periphery of the casing 1. The portion of said guide key which is engaged by said head has a shoulder 9a formed on said guide key, to limit the upward movement of the tool-holder.

A mallet-head or hammer head 10 is also mounted in the casing and is prevented from rotation by engagement of said guide key with a groove 10a in the mallet-head. A screw shaft 11 is mounted at its upper end in the ball-bearing 2 and at its lower end in a bore 13 formed in the tool-holder 7, the shaft also extending through a bore 13a formed in the mallet head. The shaft is provided with a screw-thread 12, which at its upper end becomes a "blind-thread", i. e., the channel between adjacent turns of the thread at the upper end becomes rapidly shallower until it merges into the slightly enlarged cylindrical surface of the shaft. This is for the purpose of releasing a headed pin 14 which is rotatively mounted horizontally in a hole 15 in the mallet-head 10, said pin being pressed into said groove and toward the shaft by a spring 16 that is secured by a screw 17 in a slot 18 in the mallet-head.

For the purpose of holding pin 14 out of engagement with the screw thread, when it has been retracted therefrom by the said "blind thread", so that the mallet-head may be thrown against the tool holder to drive the tool to its work, I provide a latch 19, which is mounted on a latch carrier, that, in the present instance, is in the form of a wire 20 having a vertical portion 21b, which is located in a vertical bore 21 in the mallet-head, said wire having at its lower end, a head 21a between which and the top of the bore is interposed a spiral spring 22, the spring tending to extrude the said wire-head 21a below the bottom of the mallet-head. The upper end of said wire is bent horizontally and is located in a slot 23 in the mallet-head, and said wire is provided with a finger 23a or other form of latch, for the purpose of its dropping behind the head 14a of the said pin 14, when the blind thread raises said pin out of the groove between the threads. Thus the pin is prevented from re-engaging the screw thread until the mallet-head has caused the head 21a on the lower end of the wire 20 to rise in the mallet-head and release the latch 19.

A relatively heavy spring 24 is located between the underside of the top of the casing and the upper side of the mallet-head, for the purpose of throwing the mallet-head to its blow on the tool holder.

The operation of the whole mechanism may now be stated. Supposing, first, that it is desired to cause the mallet to deliver a succession of blows,—the head **3** is adjusted at a sufficiently high level so that the pin **14** cannot fall below the lower end of the screw thread **12**, and the shaft is set in rotation. The said pin, under the pressure of the spring **16**, drops into the groove between the threads and is carried upward thereby until, at the top, the "blind thread" throws the pin outward until the latch **19** drops behind the head of the pin, when, the mallet-head being free of the screw-thread, the spring **24** throws the mallet-head downward on the tool carrier. Contact of the head **21***a* of the latch carrier with the tool holder, causes the former to rise, relative to the mallet head, and thus to release the latch **19** from the pin head **14***a*, when the pin **14**, under the tension of the spring **15**, re-engages the screw thread, and the operation is repeated and will continue so long as the shaft is revolved.

It will be observed that my mechanism when used for continuous hammering, does not require that the tool be pressed against the piece or place being operated upon, such as a tooth or bone, but depends only on the rotation of the shaft, and on the adjustment of the casing head **3** so as to prevent the pin **14** from falling below the lower end of the screw thread so that it cannot engage said thread. My construction therefore, relieves a dental patient, for instance, from the discomfort and pain of such pressure. It also enables the operator to regulate the nearness of the tool to the work that is being hammered, and thus to hammer lightly or heavily as may be best. For instance, tile setters, in cutting a tile with a chisel, hold the chisel slightly away from the tile, as otherwise it would break the tile irregularly. My mechanism makes such operation possible.

When my implement is to be used for delivering intermittent hammer blows, the casing head **3** is lowered sufficiently so that the pin **14** will be below the level of the lower end of the screw thread **12** and therefore cannot engage it. This lowering of the head may be effected by unscrewing the screw sleeve **6** so as to unlock the said casing head, when the latter can be screwed downward from the casing sufficiently to accomplish the said purpose, after which the said screw sleeve may again be used to lock the casing head in the desired position. Intermittent blows may now be effected by grasping the casing and pressing down upon the chisel or other tool, while the latter rests on the tooth of a patient, or other object to be operated upon, until the head **7***b* of the tool holder has raised the hammer sufficiently so that the pin **14** can engage the screw thread. The rotation of the screw shaft will, as before, raise the hammer until the said pin has been thrust outwardly and been caught by the latch **23***a*, when the spring **24** will throw the mallet head downward, striking a blow on the tool holder, where it will come to rest unless and until the casing is again pressed down upon the tool.

The mechanism by which my mallet head is automatically reciprocated is entirely contained within the mallet-head, so that, by unscrewing the casing head **3**, the entire reciprocating mechanism can be taken out of the casing for repair or adjustment.

The design of my machine is simple and rugged.

Where my invention is applied to mechanical mallets, for heavy work, such as rock drilling, I prefer, in place of the pin **14**, to use a disc **27** whose under surface **27***a* is made conical or beveled so as to rest upon and contact with the upper surface **12***a* of the screw thread **12**, as shown in Fig. 6.

The said disc may be supported in any manner which will permit it to move into and out of contact with the screw thread. In the present instance, I have illustrated it as mounted upon a bracket **25** which is fastened to a spring **26** that is attached to the mallet head as shown in Fig. 6. The said disc is here represented as mounted upon a pivot pin **28** that is supported on a bracket and has a ball bearing on each of its faces. The said pin **28** is pointed at its upper end, and a latch **29** corresponding to the latch **23***a* of Fig. 1, together with its supporting wire **20**, head **21***a*, and spring **22**, operates to hold the disc **27** out of engagement with the screw thread while the hammer is delivering its blow. This disc form of thread-engaging means will be more durable and require less power than the pin **14**.

I claim:

1. In a mechanical mallet, the combination of a casing, a rotatable shaft therein having a screw thread thereon ending in a blind thread, a mallet head having a part thereon for engagement with said screw thread, a latch and a latch-operating part mounted on said mallet head and adapted to catch said part when it is thrown out of engagement with said screw thread, a spring adapted to throw said mallet head when said part is held by said latch, a tool holder in said casing which is adapted to receive the blow of said hammer head, and means for so adjusting said tool holder as to permit said hammer head to descend so low that its said thread-engaging part shall be below the range of engagement of said thread and means whereby said hammer head may be raised sufficiently so that said part shall engage said screw thread.

2. In a mechanical mallet, the combination of a casing, a shaft therein having a screw thread ending in a blind thread, a hammer head having a part adapted to engage the said thread, a latch and a latch-operating part carried by said mallet head for holding said part out of engagement with said thread when it has been thrown out of said engagement and means for so adjusting the range of travel of said mallet head relative to said screw thread as to cause said screw-engaging part to be out of range with said thread.

3. In a mechanical mallet, the combination of a casing, a shaft therein having a screw thread ending in a blind thread, a hammer head having a part to engage the said thread, a latch and a latch-operating part carried by said mallet head for holding said part out of engagement with said thread when it has been thrown out of said engagement and means for so adjusting the range of travel of said mallet head relative to said screw thread as to cause said screw-engaging part to be out of range with said thread, and means for so raising said mallet head as to bring said screw-engaging part into engagement with said thread.

4. In a mechanical mallet, the combination of a casing, a shaft therein having a screw thread ending in a blind thread, a hammer head having a part adapted to engage the said thread, a latch and a latch-operating part carried by said mallet head for holding said part out of engagement with said thread when it has been thrown out of said engagement and means for so adjusting the range of travel of said mallet head relative to said screw

thread as to cause said screw-engaging part to be out of range with said thread, and means for so raising said mallet head as to bring said screw-engaging part into engagement with said thread, said means comprising a tool holder.

5. In a mechanical mallet, the combination of a casing, a rotatable shaft mounted therein and having a screw thread ending in a blind thread, a mallet-head, a screw thread-engaging part mounted on said head, and means of release mounted on, carried by and movably secured to said mallet-head, whereby said thread-engaging part may be made repeatedly to engage said screw thread automatically to raise said hammer when said hammer strikes the tool-holding member.

6. In a mechanical mallet, the combination of a casing, a rotatable shaft mounted therein and having a screw thread ending in a blind thread, a mallet-head, a screw-thread-engaging part mounted on said head, means of release mounted on, carried by and movably secured to said mallet head, whereby said screw-engaging part may be made repeatedly to engage said screw thread automatically to raise said hammer when said hammer strikes the tool-holding member, and means for so raising said hammer as to bring said screw-engaging part into engagement with said screw thread.

7. In a mechanical mallet, the combination of a casing, a rotatable shaft having a screw thread thereon ending in a blind thread, a mallet head mounted in said casing, a rotative thread-engaging part mounted on said mallet head, a latch and latch-operating part carried by said mallet head for holding said part out of engagement with said thread when it has been thrown out of said engagement, and means carried on said mallet head for releasing said thread-engaging part when said mallet head strikes the tool-holder.

8. In a mechanical mallet, the combination of a casing, a rotatable shaft having a screw thread thereon ending in a blind thread, a mallet head mounted in said casing, a rotative thread-engaging part mounted on said mallet head, said part consisting of a disc mounted rotatably upon said mallet head, a latch and latch-operating part carried by said mallet head for holding said part out of engagement with said thread when it has been thrown out of said engagement, and means carried by said mallet head for releasing said thread-engaging part when said mallet head strikes the tool-holder.

9. In a mechanical mallet, the combination of a casing, a rotatable shaft therein having a screw thread thereon ending in a blind thread, a mallet head having a part thereon for engagement with said screw thread, a latch and a latch-operating part mounted on said mallet head and adapted to catch said part when it is thrown out of engagement with said screw thread, and adapted to release said part when said mallet head strikes said tool holder, a spring adapted to throw said mallet head when said part is held by said latch, a tool holder in said casing which is adapted to receive the blow of said hammer head, and means for so adjusting said tool holder as to permit said hammer head to descend so low that its said thread-engaging part shall be below the range of engagement of said thread, and means whereby said hammer head may be raised sufficiently so that said part shall engage said screw thread.

10. In a mechanical mallet, the combination of a casing, a shaft therein having a screw thread ending in a blind thread, a hammer head having a part adapted to engage the said thread, a latch and a latch-operating part carried by said mallet head for holding said part out of engagement with said thread when it has been thrown out of said engagement, a means thereon for releasing the said part when said mallet head strikes the tool holder, and means for so adjusting the range of travel of said mallet head relative to said screw thread as to cause said screw-engaging part to be out of range with said thread.

11. In a mechanical mallet, the combination of a casing, a shaft therein having a screw thread ending in a blind thread, a hammer head having a part to engage the said thread, a latch and a latch-operating part carried by said mallet head for holding said part out of engagement with said thread when it has been thrown out of said engagement, a means thereon for releasing the said part when said mallet head strikes the tool holder, and means for so adjusting the range of travel of said mallet head relative to said screw thread as to cause said screw engaging part to be out of range with said thread, and means for so raising said mallet head as to bring said screw-engaging part into engagement with said thread.

12. In a mechanical mallet, the combination of a casing, a shaft therein having a screw thread ending in a blind thread, a hammer head having a part adapted to engage the said thread, a latch and a latch-operating part carried by said mallet head for holding said part out of engagement with said thread when it has been thrown out of said engagement, a means thereon for releasing the said part when said mallet head strikes the tool holder, and means for so adjusting the range of travel of said mallet head relative to said screw thread as to cause said screw-engaging part to be out of range with said thread, and means for so raising said mallet head as to bring said screw-engaging part into engagement with said thread, said means comprising the tool-holder.

13. In a mechanical mallet, the combination of a casing, a rotatable shaft therein having a screw thread thereon ending in a blind thread, a mallet head having a part thereon for engagement with said screw thread, a latch and a latch-operating part mounted on said mallet head and adapted to catch said part when it is thrown out of engagement with said screw thread, a spring adapted to throw said mallet head when said part is held by said latch, a tool holder in said casing which is adapted to receive the blow of said hammer head, and means for so adjusting said tool holder as to permit said hammer head to descend so low that its said thread-engaging part shall be below the range of engagement of said thread, and means whereby said hammer head may be raised sufficiently so that said part shall engage said screw thread, said last-mentioned means comprising a head at the tool end of said casing.

HARRY DANIEL GREENBERG.