April 2, 1957 W. T. WARNER 2,787,179

PRECISION HAMMER

Filed Sept. 16, 1955 2 Sheets-Sheet 1

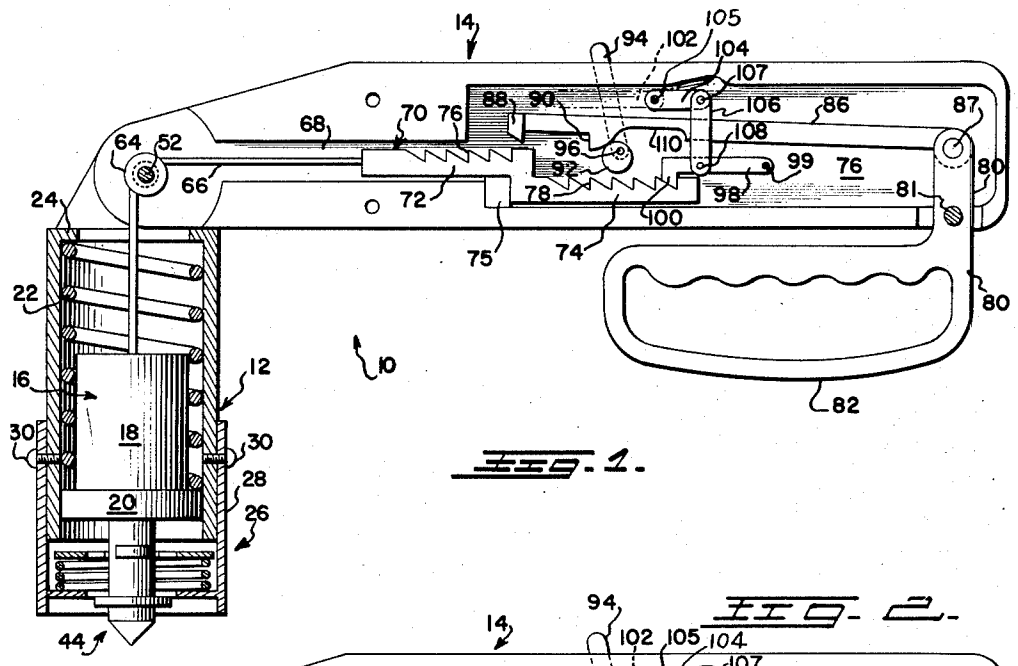


FIG. 1.

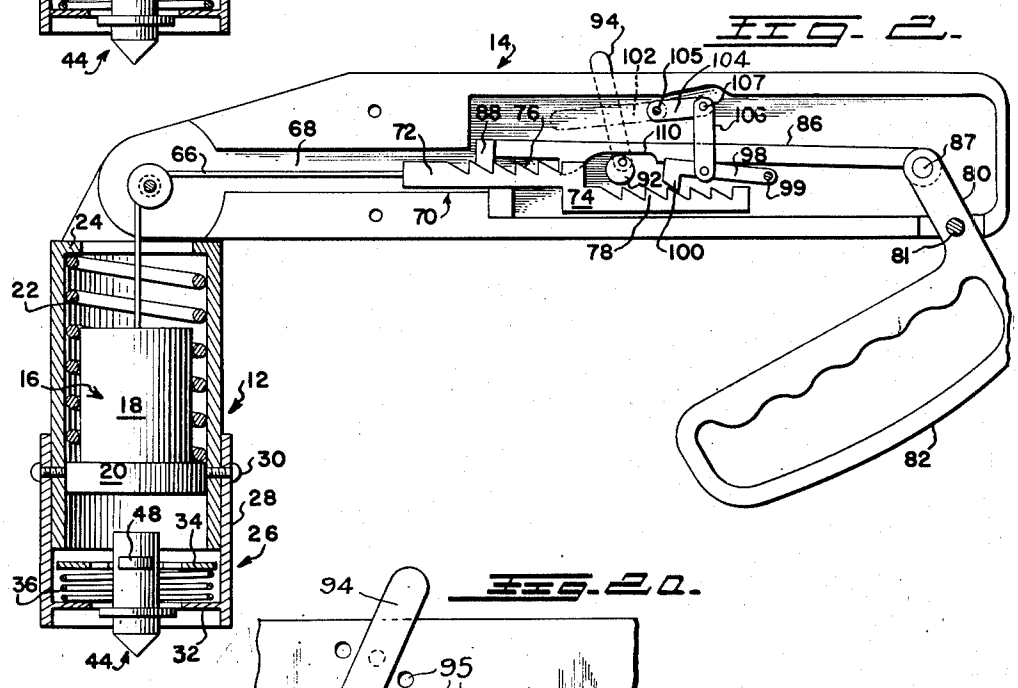


FIG. 2.

FIG. 2a.

INVENTOR
WILLIAM T. WARNER

BY Mead, Browne, Schuyler & Beveridge
ATTORNEYS

April 2, 1957 W. T. WARNER 2,787,179

PRECISION HAMMER

Filed Sept. 16, 1955 2 Sheets-Sheet 2

FIG. 3.

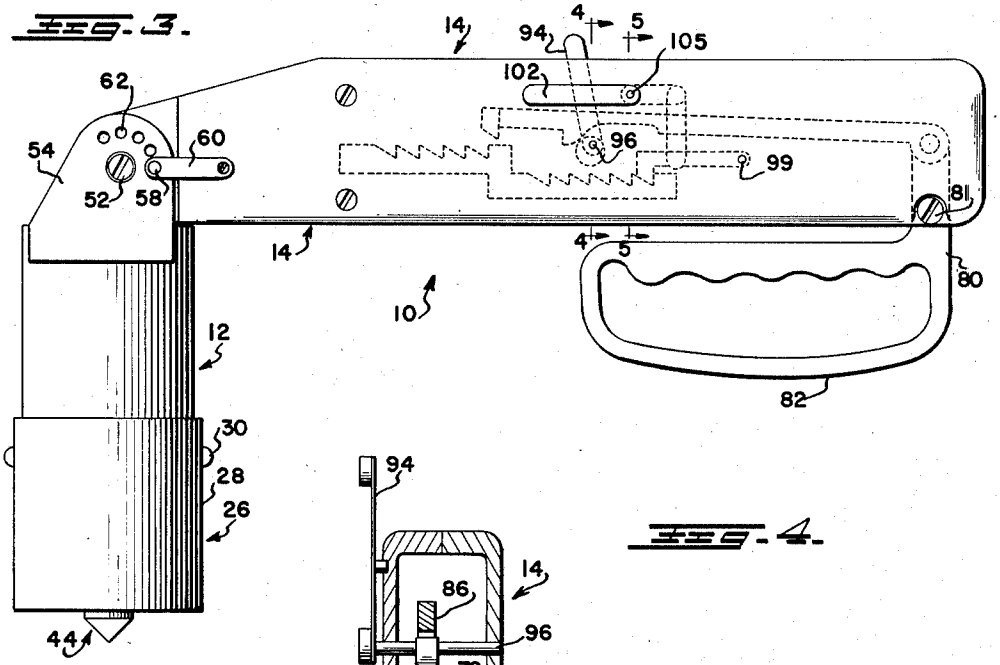


FIG. 4.

FIG. 5.

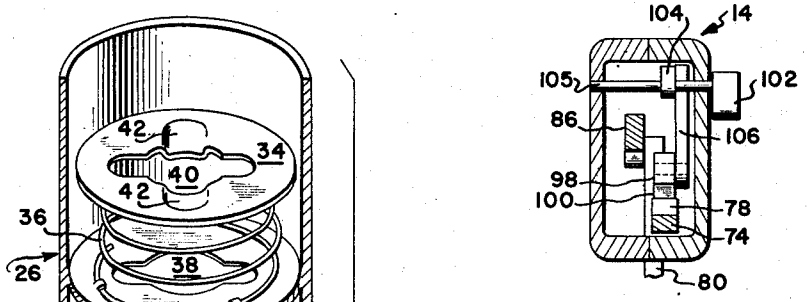


FIG. 6.

INVENTOR

WILLIAM T. WARNER

BY Mead, Browne, Schuyler & Beveridge

ATTORNEYS

United States Patent Office 2,787,179 Patented Apr. 2, 1957

2,787,179

PRECISION HAMMER

William T. Warner, Butte, Mont.

Application September 16, 1955, Serial No. 534,845

12 Claims. (Cl. 81—52.35)

This invention relates to hammering devices and more particularly to a hammer device having a blow whose power may be adjusted.

It is an object of this invention to provide a hammer in which the strength of the hammer blow can be regulated from a very gentle tap to a very strong blow as desired.

It is a further object of this invention to provide a hammer device which is adapted to interchangeably receive a variety of tools acted upon by the hammer, such as a chisel, punch, or designing tool.

It is a still further object of this invention to provide a hammer device which is angularly adjustable in such manner as to permit use of the hammer in confined locations having only a limited space.

It is still another object of this invention to provide a hammer device in which the tool acted on by the hammer is securely held in place in the hammer head, thereby minimizing danger of flying steel burrs from the tool and also permitting the operator to have one hand free to hold the workpiece in place.

In achievement of these objectives, there is provided in accordance with an embodiment of this invention a hammer including a hammer head or housing which supports a removable tool such as a chisel or the like. A movable hammer member is longitudinally movable in the hammer housing and is biased into engagement with the tool by a strong spring member disposed within the hammer housing. The hammer member is connected to a cable extending into a handle structure connected to the hammer housing. The handle structure is angularly adjustable with respect to the hammer housing through a 90-degree angle to permit use of the hammer in various locations having a confined or restricted space. A hand grip lever is carried by the handle structure and operates a pull arm having a first pawl which cooperates with a ratcheted drawbar connected to the cable which is connected to the movable hammer member. The ratcheted drawbar may be moved through a step-by-step movement by successive movements of the hand grip lever to correspondingly compress the spring in the hammer housing.

A tension-holding second pawl is provided within the handle structure to hold the ratcheted drawbar at any position to which it may have been advanced by actuation of the hand grip lever. An adjustably movable eccentric means is engageable with the pull arm which engages the ratcheted drawbar in such manner as to cause disengagement of the first pawl with the ratcheted drawbar upon the completion of a predetermined movement of the operating handle. The eccentric member may be adjusted to a position at which the pull arm is disengaged from the drawbar just as the tension-holding pawl engages the drawbar, thereby preventing reverse movement of the drawbar when the pull arm is released from the drawbar. The eccentric may also be moved to other positions in which the first pawl is disengaged from the drawbar before the tension-holding pawl engages the

next succeeding tooth of the drawbar, thereby permitting adjustment of the spring stress and of the resulting hammer blow for increments of less than one ratchet tooth movement.

Further objects and advantages of the invention will become apparent from the following description taken in conjunction with the accompanying drawings in which:

Fig. 1 is a sectional elevation view of a hammer in accordance with the invention, the hammer being shown in inactivated position;

Fig. 2 is a view similar to Fig. 1 but showing the hammer in a cocked position;

Fig. 2*a* is a detailed view of a portion of the hammer;

Fig. 3 is a side elevation view of the hammer corresponding to the view shown in Fig. 1, with the operating mechanism within the handle structure being shown in dotted outline;

Fig. 4 is a view in transverse section along line 4—4 of Fig. 3;

Fig. 5 is a view in transverse section along line 5—5 of Fig. 3; and

Fig. 6 is a perspective view of the tool-holding portion of the hammer device.

Referring now to the drawings, there is shown a hammer device generally indicated at **10** including a hammer housing generally indicated at **12** and a handle structure generally indicated at **14** which is adjustably movable with respect to hammer housing **12** through an angle of 90 degrees to permit use of the hammer device in restricted locations.

Hammer housing **12** is a hollow generally cylindrical casing which serves as a housing for a hammer and a power spring. The hammer member is generally indicated at **16** and includes an axially extending portion **18** having a smaller diameter than the inner diameter of housing **12**. Hammer **16** also includes a base portion **20** integral with or connected to the lower end of portion **18** with respect to the view shown in the drawing and having a diameter just slightly less than the internal diameter of housing **12**. A relatively heavy spiral power spring **22** is disposed within housing **12**, one end of the spring abutting against an annular flange **24** adjacent the upper end of the housing while the lower end or opposite end of the spring abuts against the upper surface of base portion **20** of hammer **16**. A tool holder generally indicated at **26** is detachably connected to the lower or outer end of hammer housing **12** and includes a generally cylindrical casing **28** which is detachably connected to the lower end of housing **12** by means of screws **30** or other suitable fastening means.

As will best be seen in the views of Figs. 1, 2 and 6, tool holder **28** houses a pair of spaced lower and upper plate members **32** and **34**. Lower plate **32** is fixed with respect to casing **28** while upper plate **34** is axially movable within casing **28**, the movement of upper plate **34** being limited by engagement with the lower edge of hammer housing **12**. A spiral spring member **36** is disposed between the surfaces of plates **32** and **34** and normally urges plate **34** away from plate **32** and toward the lower edge of hammer housing **12**.

As best seen in the view of Fig. 6, each of the plates **32** and **34** is provided with a slotted opening **38** and **40**, respectively, having a centrally located circular enlargement. Upper plate **34** has a pair of oppositely disposed concave recesses **42** which are disposed perpendicularly to the longitudinal axis of slot **40**. A tool generally indicated at **44** is adapted to be received and held by the plates **32** and **34**. Tool **44** may be of any suitable type, such as a hammer element, a chisel, a punch, or a designing tool. Tool **44** has a generally cylindrical shank portion **46** which is received in the circular central por-

tion of the slotted apertures 38 and 40, and a pair of oppositely disposed projecting ears 48 at its upper end which are adapted to be received through the similarly shaped elongated slotted portions of the respective apertures 38 and 40. Adjacent its lower end, tool 44 is provided with a circular rim portion 50. The tool is inserted upwardly through the apertures 38 and 40 and then rotated through an angle of 90 degrees until ears 48 drop into the concave recesses 42 of upper plate 34. The upper surface of rim 50 will then engage the underneath surface of lower plate 32. Spring 36 urges the upper plate 34 away from the lower fixed plate 32 thereby retaining tool member 44 positively in position between plates 32 and 34. At the same time, tool 44 is free to move downwardly with the freely movable upper plate 34 when hammer member 16 strikes against the upper end of tool 44 upon release of the hammer, as will be explained more fully hereinafter.

The handle structure 14 is formed of a pair of generally channel-shaped side members placed with their respective open sides in abutting relation. One end of the handle structure is disposed between a pair of bracket-like extensions 54 at the upper end of hammer housing 12. The hammer housing and handle structure are pivotally connected together by means of a pin or bolt member 52 which passes through extensions 54 and through handle 14. Handle structure 14 is freely movable on pin member 52 and may be held in any desired adjusted position by means of a spring-biased pin 58 carried by spring arm 60 on handle 14. Pin 58 engages any one of the holes 62 provided in the upper end of one of the bracket portions 54 to provide different angular adjustments of handle 14 with respect to hammer housing 12.

A pulley 64 (Figs. 1 and 2) is supported for rotation by pin member 52 which pivotally connects the handle 14 to the hammer housing 12. A cable 66 is connected to the upper end of the hammer 16 and passes upwardly over pulley 64 and into an axially extending passage 68 within the handle structure 14. The end of cable 66 is connected to one end of a drawbar generally indicated at 70. Drawbar 70 includes a portion 72 movable within the axial passage 68 and a second portion 74 which is offset from the first portion 72 and which is movable axially within a chamber 76 disposed within the handle structure and communicating with the elongated passage 68. Drawbar portion 72 is provided with ratchet teeth 76 while drawbar portion 74 is provided with ratchet teeth 78. A hand-grip operating lever 80 is pivotally mounted at point 81 to the outer end of the handle structure. Lever 80 has a hand-grip portion 82 disposed on the exterior of the handle structure, the opposite end of lever 80 extending upwardly into the interior of the handle structure.

An elongated pull arm 86 is positioned within chamber 76 and is pivotally connected at point 87 to the end of lever 80. A pawl member 88 is carried at the opposite end of pull arm 86, pawl 88 being adapted to engage the ratchet teeth 76 of drawbar portion 72 to effect movement of the drawbar 70 and of hammer 16. Pull arm 86 has a cam follower portion 90 extending downwardly from its underneath surface in axially spaced relation to pawl 88. Cam follower 90 is adapted to cooperate with an eccentric roller 92 to release pawl 88 from ratchet teeth 76. Eccentric roller 92 is carried at the lower end of a lever member 94 pivotally supported by handle 14 and disposed for operation exteriorly of handle 14. Lever 94 may be shifted about its pivotal axis 96 to change the position of eccentric roller 92 relative to cam follower 90. A series of detent notches 95 (Fig. 2a) may be provided in the outer surface of handle 14 to positively position lever 94 in various angular positions. A bumper 75 of rubber or the like is provided to absorb the impact of drawbar 70 when the drawbar is released.

A lever member 98 is mounted for pivotal movement within chamber 76 and carries a pawl member 100 which is spring-biased into engagement with ratchet teeth 78 of the drawbar portion 74. Lever 98 may be raised upwardly about its pivotal axis 99 to disengage pawl 100 with respect to ratchet teeth 78 by means of an operating handle 102 disposed on the exterior of the handle 14 and rigidly connected to shaft 105 which in turn is rigidly connected to one end of an extension 104 disposed within handle 14. The opposite end of extension 104 is pivotally connected at 107 to a vertical link 106 which in turn is pivotally connected at point 108 to lever 98 intermediate the length of lever 98. Shaft 105 is pivotally supported in the walls of handle 14 as best seen in Fig. 5, hence rotary movement of handle 102 is directly transmitted by shaft 105 to the extension or crank 104. Thus, downward movement of lever 102 causes upward movement of link 106 and of lever 98 to thereby disengage pawl 100 from ratchet teeth 78.

The operation of the hammer device will now be described. With the proper tool 44 in position as shown in the views of Figs. 1, 2 and 3 and with the parts initially occupying the positions shown in Fig. 1, hand-grip portion 82 is pulled downwardly away from the handle structure 14 from the position shown in Figs. 1 and 3 to the position shown in Fig. 2, thereby rotating the inner end of lever 80 in a counterclockwise direction with respect to the views shown in the drawings and causing pull arm 86 to advance to the left to engage the nearest tooth space to the left of the neutral or disengaged position shown in Fig. 1. The underneath surface of pull bar 86 is provided with a cut-away portion 110 which is so proportioned with respect to eccentric roller 92 as to permit pawl 88 to drop downwardly into the first tooth space to the left of the disengaged position of the pawl shown in Fig. 1. The linear movement imparted to pull arm 86 by rotation of hand-grip portion 82 from the position of Fig. 1 in a counterclockwise direction to the position of Fig. 2 is equal to the tooth pitch of the teeth 76. With pawl 88 engaged with a tooth 76, the operating handle 80 is then moved back in a clockwise direction to the position shown in Fig. 1, causing pull arm 86 to pull drawbar 70 forwardly by a predetermined distance, such as the pitch of one of the teeth 76. The distance which drawbar 70 is moved forwardly depends on the position of eccentric roller 92 with respect to cam follower 90. As operating lever 80 reaches the end of its clockwise movement, cam follower 90 on the underneath surface of pull arm 86 engages eccentric roller 92 and raises pull arm 86 upwardly to the position shown in Fig. 1, causing pawl 88 to become disengaged from the tooth 76 with which it was engaged.

With the eccentric roller 92 in the position shown in Figs. 1, 2 and 3, pawl 88 is raised out of engagement with ratchet tooth 76 just as pawl 100 drops into engagement with one of the teeth 78. Hence, release of pawl 88 from a tooth 76 will not cause release of the stress on spring 22 since the drawbar will be held in its new position due to the engagement of pawl 100 with a tooth 78.

In order to provide still greater stress on spring 22 with consequent greater hammering force by hammer 16 when the spring force is finally released, the drawbar 70 may be actuated still further to the right with respect to the view shown in the drawings by successive actuations of the operating lever 80. Thus, hand-grip portion 82 of lever 80 may be again moved downwardly to the position shown in Fig. 2 to cause pawl 88 to engage the next tooth 76, and then moved upwardly again to move drawbar 70 to the right until the cam follower 90 is engaged by eccentric 92 to disengage pawl 88 from the second tooth. Pawl 100 will drop into a third ratchet tooth 78 to hold the drawbar 70 in its next actuated position. This process may be repeated a number of times corresponding to the number of ratchet teeth 76.

For example, in the view shown in Fig. 2, the operating lever 80 is shown in the middle of its fourth stroke, the hand-grip portion 82 having been successively actuated four times to finally engage the fourth tooth. As shown in Fig. 2, lever 80 is ready to begin its clockwise movement to move the pull arm 86 to the right and, by the time that the cam follower 90 reaches eccentric 92, pawl 100 will drop behind the next ratchet tooth 78 to hold the hammer 16 in its cocked position.

When operating lever 80 has been actuated a number of times corresponding to the desired degree of stress on spring 22, lever 102 is manually pushed downwardly about its pivot point 105 to raise vertical link 106 upwardly and to thereby raise pawl 100 out of the path of movement of ratchet teeth 78. This releasing movement of lever 102 is preferably done during the last pulling movement on drawbar 70 while pawl 88 is engaged with one of the ratchet teeth 76. This permits eccentric roller 92 to release pawl 88 from ratchet 76 on the final forward pull on drawbar 70, thereby releasing the drawbar and permitting the stored energy in spring 22 to drive hammer 16 downwardly into engagement with tool 44, the degree of force of the blow of hammer 16 on tool 44 depending upon the degree of stress placed in spring 22.

A further feature of the construction is the fact that lever 94 can be rotated about its pivotal axis 96 to advance the crest of eccentric 92 with respect to cam follower 90 to cause a disengagement of pawl 88 from ratchet tooth 76 before pawl 100 has an opportunity to drop into the next succeeding tooth space. This feature may be used to adjust the strength of the blow of hammer 16 for increments of stress on spring 22 corresponding to movements of less than one tooth space of drawbar 70. Thus, for example, assume that pawl 88 and pull arm 86 are in the position shown in Fig. 1 in which spring 22 is completely discharged. If eccentric 92 is permitted to stay in the position shown in Fig. 1, a single actuation of the operating lever 80 will cause spring 22 to be stressed an amount equal to a one-tooth movement of drawbar 70, since pawl 100 will drop into a ratchet tooth 78 upon the completion of one cycle of movement of operating lever 80. However, under certain circumstances, it may be desirable to have spring 22 stressed for an amount even less than one tooth space. In this case, operating handle 94 is rotated in a clockwise direction with respect to the view shown in the drawings to advance eccentric 92 in such manner that pawl 88 is raised out of engagement with ratchet tooth 76 before pawl 100 can move into engagement with the second ratchet tooth 78. By rotation of lever 94 to several successive positions, the spring 22 may be discharged at several different predetermined stresses less than the stress corresponding to a one-tooth movement of drawbar 70. This permits several different adjustments of the impact of hammer 16 within the low range of spring stress to permit variation of the impact of hammer 16 in this range.

The adjustment feature of eccentric 92 just described may also be used to obtain spring stresses corresponding to movements of drawbar 70 for one or more tooth spaces plus a fraction of another tooth space, to thereby provide a precise adjustment of the hammer blow. For example, drawbar 70 may be advanced for three teeth of ratchet 72 by step-by-step operation previously described, with lever 94 in the position shown in Figs. 1–3. With lever 94 in this position, as previously described, pawl 100 always drops into a tooth space of ratchet 78 just as pawl 88 is disengaged from ratchet 76. After completing three step-by-step movements in the manner just described, lever 94 may then be rotated to a position in which cam follower 90 engages eccentric 92 sooner than in the previous operations; say, for example, after a movement of one-half tooth space. Lever 80 is actuated in the usual manner to cause pawl 88 to engage a tooth 76. With pawl 88 in engagement with a tooth 76, lever 102 is then actuated

to raise pawl 100 out of engagement with ratchet 78. Operating lever 80 is actuated to advance drawbar 76 until cam follower 90 engages eccentric 92. On this operation, cam follower 90 will engage eccentric 92 earlier than in the previous operations, in the example given, at an additional increment of stress corresponding to a movement of one-half tooth pitch. Upon engagement of cam follower 90 with eccentric 92, pawl 88 will be disengaged from ratchet 76 and the stored energy of spring 22 will drive hammer 16 downwardly into engagement with tool 44. In the example just given, the stress on spring 22 and the corresponding force on hammer 16 will be that corresponding to a movement of three and one-half teeth of ratchet 76.

It can be seen from the foregoing that there is provided in accordance with this invention a precision hammer which has great utility since it permits the adjustment of a hammer blow through a wide range from a very light tap to a very strong blow by its regulating mechanism. Also, the pivoted construction of the handle with respect to the hammer housing permits the hammer to be adjusted to many different angular positions to facilitate working under varying conditions and in confined spaces. Furthermore, the tool holder arrangement permits easy replacement of tools which are acted upon by the hammer and permits interchangeable use of tools required for specific jobs, such as a hammer, chisel, punch, or designing tool. Furthermore, the tool is securely held in place with respect to the hammer by the tool holder in such manner that the operator has one hand free to hold the workpiece.

While there has been shown and described a particular embodiment of the invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention and, therefore, it is aimed to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What I claim as my invention is:

1. A hammer device comprising a hammer member, spring means urging said hammer member toward hammering position, first ratchet means for moving said hammer member in graduated steps against said spring to store energy in said spring, second ratchet means for holding said hammer member against said spring at each predetermined step of increased spring stress, and means for releasing said second ratchet means to permit the stored energy in said spring to move said hammer member with a hammering action.

2. A hammer device comprising a hammer member, spring means for urging said hammer member into hammering position, means for moving said hammer member against said spring in graduated steps to store graduated amounts of energy in said spring, means for applying stress to said spring in increments of less than one of said predetermined steps, and means for releasing said hammer member to permit the stored energy in said spring to provide a hammering action.

3. A hammer device comprising a housing, a hammer member movable in said housing, a spring in said housing engaging said hammer member to urge said hammer member to hammering position, first ratchet means for moving said hammer member against said spring in graduated steps to store energy in said spring in accordance with said graduated steps, second ratchet means for holding said hammer member against said spring at each step of spring stress a tool member supported by said housing in the path of movement of said hammer member, and means for releasing said second ratchet means to permit the stored energy in said spring to force said hammer member into engagement with said tool member.

4. A hammering device comprising a hammer member, a spring member engageable with said hammer member to move said hammer member into hammering position, a ratchet arm connected to said hammer member,

means for moving said ratchet arm in predetermined increments to correspondingly stress said spring in predetermined steps, means for holding said ratchet arm in the successive positions to which it is moved, and means for releasing said ratchet arm and said hammer.

5. A hammer device comprising a hammer member, a spring engaging said hammer member and urging said hammer member into hammering position, a drawbar connected to said hammer member, first ratchet means for moving said drawbar and said hammer member in graduated steps to stress said spring in predetermined increments, second ratchet means for holding said drawbar in a given step to which it is moved, and means for releasing said drawbar to permit said spring to move said hammer into hammering position.

6. A hammer device comprising a hammer member, a spring engaging said hammer member and urging said hammer member into hammering position, a drawbar connected to said hammer member, said drawbar being movable to move said hammer member against said spring to store energy in said spring, said drawbar including a ratchet means, a first pawl member engageable with said ratchet means, means for moving said first pawl member out of engagement with said ratchet means at the end of a predetermined movement of said drawbar, a second pawl member engageable with said ratchet means, said second pawl member being engageable with said ratchet means to hold said drawbar in a pretermined position after the release of said first pawl member, and means for releasing said second pawl member from said ratchet means to permit said spring to move said hammer member into hammering position.

7. A hammer device comprising a hammer member, a spring engaging said hammer member and urging said hammer member into hammering position, a drawbar connected to said hammer member, said drawbar being movable to move said hammer member against said spring to store energy in said spring, said drawbar including a first and a second ratchet portion, a pull arm having a first pawl member engageable with said first ratchet portion, an operating handle connected to said pull arm, means engageable with said pull arm at the end of a predetermined operating stroke to move said first pawl member out of engagement with said first ratchet portion, a second pawl member engageable with said second ratchet portion, means for causing said second pawl member to engage said second ratchet portion to hold said drawbar in a predetermined position after the release of said first pawl member from said first ratchet portion, and means for releasing said second pawl member from said second ratchet portion to permit said spring to move said hammer member into hammering position.

8. A hammer device comprising a hammer member, a spring engaging said hammer member and urging said hammer member into hammering position, a ratchet means connected to said hammer member, said ratchet means being movable to move said hammer member against said spring to store energy in said spring, pawl means engageable with said ratchet means to effect movement of said hammer member, means for moving said pawl means out of engagement with said ratchet means at the end of a predetermined movement of said ratchet means, and means for adjusting the pretermined movement of said ratchet means required for disengagement of said pawl means.

9. A hammer device comprising a hammer member, a spring engaging said hammer member and urging said hammer member into hammering position, drawbar connected to said hammer member, said drawbar being movable to move said hammer member against said spring to store energy in said spring, said drawbar including a ratchet means, a pawl member engageable with said ratchet means to effect movement of said drawbar, means for moving said pawl member out of engagement with said ratchet means at the end of a predetermined movement of said drawbar, and means for adjusting the predetermined movement of said drawbar required for disengagement of said pawl member from said ratchet means.

10. A hammer device comprising a hammer member, a spring engaging said hammer member and urging said hammer member into hammering position, a drawbar connected to said hammer member, said drawbar being movable in stepped increments to move said hammer member against said spring to store energy in said spring, said drawbar including a ratchet means, an operating lever pivotally mounted on said hammer device, a pull arm connected to said operating lever, a pawl member carried by said pull arm and engageable with said ratchet means to move said drawbar, cam means engageable with said pull arm for moving said pawl member out of engagement with said ratchet means at the end of a predetermined movement of said drawbar, and means for adjusting the predetermined movement of said drawbar required for disengagement of said pawl member from said ratchet means.

11. A hammer device comprising a hammer member, a spring engaging said hammer member and urging said hammer member into hammering position, a drawbar connected to said hammer member, said drawbar being movable in stepped increments to move said hammer member against said spring to store energy in said spring, said drawbar including a ratchet means, an operating lever pivotally mounted on said hammer device, a pull arm connected to said operating lever, a pawl carried by said pull arm and engageable with said ratchet means, said operating lever being actuable through a forward and reverse movement about its pivot point to engage said pawl with a tooth of said ratchet means and to move said drawbar through a predetermined movement against said spring, cam means engageable with said pull arm for moving said pawl member out of engagement with said ratchet means at the end of a predetermined movement of said drawbar, and means for adjusting the predetermined movement of said drawbar required for disengagement of said pawl member from said ratchet means.

12. A hammer device comprising a housing, a hammer member carried by and movable in said housing, a spring carried by said housing and urging said hammer member into hammering position, a handle member connected to said housing and angularly adjustable with respect thereto, a ratchet means carried by said handle member, a cable means connecting said ratchet means to said hammer member, means for imparting a stepped movement to said ratchet means to apply increments of stress to said spring member whereby the blow of said hammer member may be adjusted to a desired value, and means for releasing said ratchet means to thereby release said hammer member.

References Cited in the file of this patent

UNITED STATES PATENTS

690,945	Gray	Jan. 14, 1902
2,455,577	Hager	Dec. 7, 1948

FOREIGN PATENTS

453,203	Italy	Nov. 23, 1949