May 17, 1938. A. L. GODDARD 2,117,880

MAGNETIC RECIPROCATING HAMMER

Filed May 17, 1935

Fig. 3.

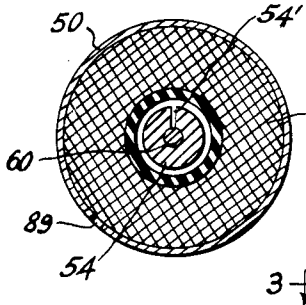


Fig. 1.

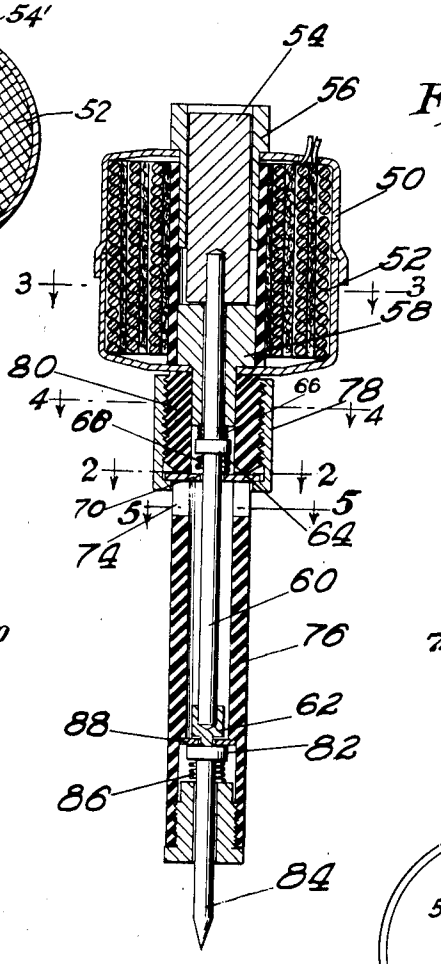


Fig. 4.

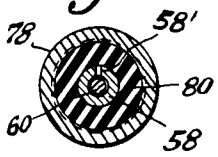


Fig. 5.

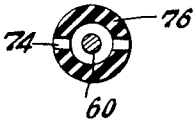


Fig. 6.

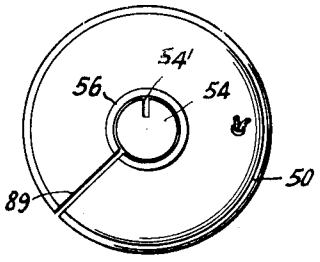
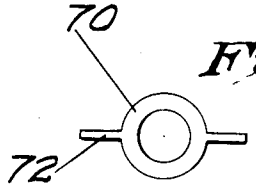


Fig. 2.



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MAGNETIC RECIPROCATING HAMMER

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Application May 17, 1935, Serial No. 22,054

3 Claims. (Cl. 172—126)

This invention relates to a magnetic reciprocating hammer that is simple in construction and is easily adapted to various types of work.

One of the important objects of the invention is to provide a device that can be used in the art of engraving or the like.

Another object of the invention is to provide a device that can be used for embossing.

Another important object of the invention is that the device is adapted to be used as a rock hammer, drill or the like.

Another and still further important object of the invention is that the device can be used as a rammer in foundry mold work.

Other and further important objects of the invention will be apparent from the disclosures in the accompanying drawing and following specification.

The invention, in a preferred form, is shown in the drawing and hereinafter more fully described.

In the drawing:

Figure 1 is a vertical sectional view of the magnetic reciprocating hammer, illustrating the fact that the device is very compact and can be easily handled.

Figure 2 is a sectional view taken on the line 2—2 of Figure 1 looking in the direction indicated by the arrows.

Figure 3 is a horizontal sectional view taken substantially on the line 3—3 of Figure 1.

Figure 4 is another horizontal sectional view taken substantially on line 4—4 of Figure 1.

Figure 5 is a still further horizontal sectional view taken substantially on line 5—5 of Figure 1.

Fig. 6 is a top plan view of the device shown in Fig. 1.

Referring to the drawing more specifically by characters of reference, the numeral 50 designates a casing within which is mounted a coil 52 provided with a movable element 54 slidably mounted in a cylindrical support 56. A stop 58 is provided for the movable element 54. The casing 50 is preferably made of some metal or the like that will act as a magnetic conductor. The electromagnetic coil 52 is designed to be operated on an alternating current or the like whereby the current entering through the wires alternates its direction of flow, thus causing a change of direction in the lines of force thus created.

The electromagnetic coil 52 creates a reduced current that is carried through the casing 50 and the metal element 58 which fits tightly into the casing 50 and is surrounded by some non-magnetic material, preferably bakelite, hard rubber or the like, which forms a support for the coil 52. The magnetic force thus created acts on a cylindrically shaped piece of magnetic material 54 into which is fastened a push rod or the like 60, which rod is made preferably of non-magnetic metal such as brass or the like. The magnetic flux thus created by the electromagnetic coil 52 is carried through a completely magnetic path comprised of parts 54, 50 and 58, which creates a magnetic stress across the air gap between the cores 54 and 58.

The cores 54 and 58 and the casing 50 are provided with small air gaps 54', 58' and 59 respectively, the purpose of the air gaps being to decrease the core loss caused by the electric Foucault currents.

The connecting rod 60, one end of which is fastened into the reciprocating block 54, has provided at its lower end a hammer element 62.

A shoulder 64 is mounted adjacent the upper end of the connecting rod 60, and this shoulder has positioned on the upper and lower sides thereof helical springs 66 and 68 respectively.

The upper spring is longer and somewhat weaker than the lower spring and is fitted between the shoulder 64 and the lower face of the fixed element 58. The lower spring 68 is shorter and stiffer than the upper spring and has one end abutting against the shoulder 64 while the other end contacts a washer or the like 70 which is shaped as shown in Figure 2, having projecting arms 72 which fit into corresponding slots 74 in the casing 76 which surrounds the rod 60.

A cap screw 78 is fitted on the correspondingly screw-threaded outer face of an extension 80 which projects downwardly from the casing 50, and the lower in-turned flanges of this cap screw contact the extension 72 of the washer 70. It will be obvious that a tightening up of the cap screw 78 will also push the washer 70 upwardly, thereby tensioning the springs 66 and 68.

The lower end 62 of the reciprocating structure acts against a button or the like 82 positioned on the upper end of the engraving tool or other element 84, and underneath this button or extension 82 is a very light spring 86. The engraving tool 82—84 is limited in its upward movement by means of a washer 88 which is mounted in the sleeve 76.

The adjustability of the tension on the springs 66 and 68 results in a changed movement of the element 54 and its associated parts as by increasing the load on the lower spring 68, the amount of current required to move the reciprocating

structure 54—84 is increased and the force of the blows is also correspondingly increased. Lessening of the tension on the spring 68 will also lessen the amount of current required to move the element and correspondingly decrease the strength or force of the blows. In this particular structure, the reciprocating part is poised between two springs, one of which is adjustable, and there is an associated reciprocating part which is at all times forced to the upper limit of its possible movement by means of a spring, thereby continually presenting the same for a downward blow caused by the reciprocating action of the hammer element. In this manner, the efficiency of the entire structure is considerably increased.

An additional tool can be fixed onto the end of the element 84 for special work such as dental operations, etching, and the like. These extra tools can be made as desired, and can be attached to the element 84 in any convenient manner.

The older methods of making engraving plates were to use a hammer and chisel, punch or like instrument, and sometimes even a knife when the plate is a block of wood or other soft malleable material.

The magnetic reciprocating hammer displaces these older methods with a much more efficient method and tends to a more perfect and uniform piece of workmanship. The instrument, working with great rapidity and with a uniform motion, will permit its operator to perform the work with greater consistency.

Stipple is another method used in engraving and is merely a system of dots which can be readily made by this invention in its preferred form.

Embossing can also be done by this instrument in that the dies that are used in the art of embossing can be much more easily made by means of this instrument. A suitable tool 84, when used properly, will force the embossing metal into various shapes and thus form suitable dies.

It is entirely feasible that said instrument, if made larger, can be used as a rock hammer and also used much as a sculptor now uses a hammer and chisel, and may even be used to break up rock or stone.

In the art of mold making for foundry work, it is necessary that the sand be rammed tightly into place around the pattern to insure a clean casting. This magnetic reciprocating hammer may be used in such an operation and will greatly facilitate the making of such molds. The instrument may also be used as a vibrator to facilitate the "drawing" of the pattern from the sand.

It will be seen that herein is provided a magnetic reciprocating hammer which is specifically advantageous in that it is readily adaptable to the various uses in the arts of engraving, embossing and the like and which, at the same time, will adequately and properly perform the necessary operations required; namely, cutting away portions of the engraving plate, block, dies and the like.

I am aware that many changes may be made and numerous details of construction varied throughout a wide range without departing from the principles of this invention, and I, therefore, do not purpose limiting the patent granted hereon otherwise than as necessitated by the prior art.

I claim as my invention:

1. A magnetic reciprocating hammer, comprising a housing, and an electro-magnetic coil, operating on alternating current, in the housing, a core movable within the coil, a rod fastened in the core and projecting from the housing, a shoulder on the rod, a sleeve mounted on the housing and surrounding the projecting portion of the rod, a shouldered hammer rod mounted in the outer end of the sleeve and aligned with the core rod for operative contact of the core rod therewith, and means for regulating the movement of the core within the coil, said means comprising three helical springs, two of said springs positioned about the rod and against opposite faces of the shoulder thereon, and a third spring positioned about the hammer rod and against its shoulder.

2. A magnetic reciprocating hammer, comprising a housing, and an electro-magnetic coil, operating on alternating current, in the housing, a core movable within the coil, a rod fastened in the core and projecting from the housing, a shoulder on the rod, a sleeve mounted on the housing and surrounding the projecting portion of the rod, a shouldered hammer rod mounted in the outer end of the sleeve and aligned with the core rod for operative contact of the core rod therewith, and means for regulating the movement of the core with the coil, said means comprising three helical springs, two of said springs positioned about the rod and against opposite faces of the shoulder thereon, and a third spring positioned about the hammer rod against its shoulder, and means for maintaining said springs in position about the respective rods under adjustable tension.

3. A magnetic hammer, comprising a housing, a sleeve extending therefrom, a core reciprocable within the housing, a plunger rod for the core slidably mounted in the sleeve, guide means for the core and plunger rod, the housing, core and guide means being provided with air gaps extending radially and longitudinally thereof, spring means in the extension for poising the core and plunger rod, a cap screw on the extension for adjusting the tension of said spring means, a hammer slidably mounted in the end of the extension, and normally contacting the end of the plunger rod, an adjustable spring surrounding the hammer and urging the same toward the upper limit of its movement, and stop means in the sleeve for limiting the movement of the hammer.

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