Jan. 27, 1953 L. TARWATER 2,626,598

ELECTRIC HAMMER

Filed Aug. 14, 1950 2 SHEETS—SHEET 1

FIG. 2.

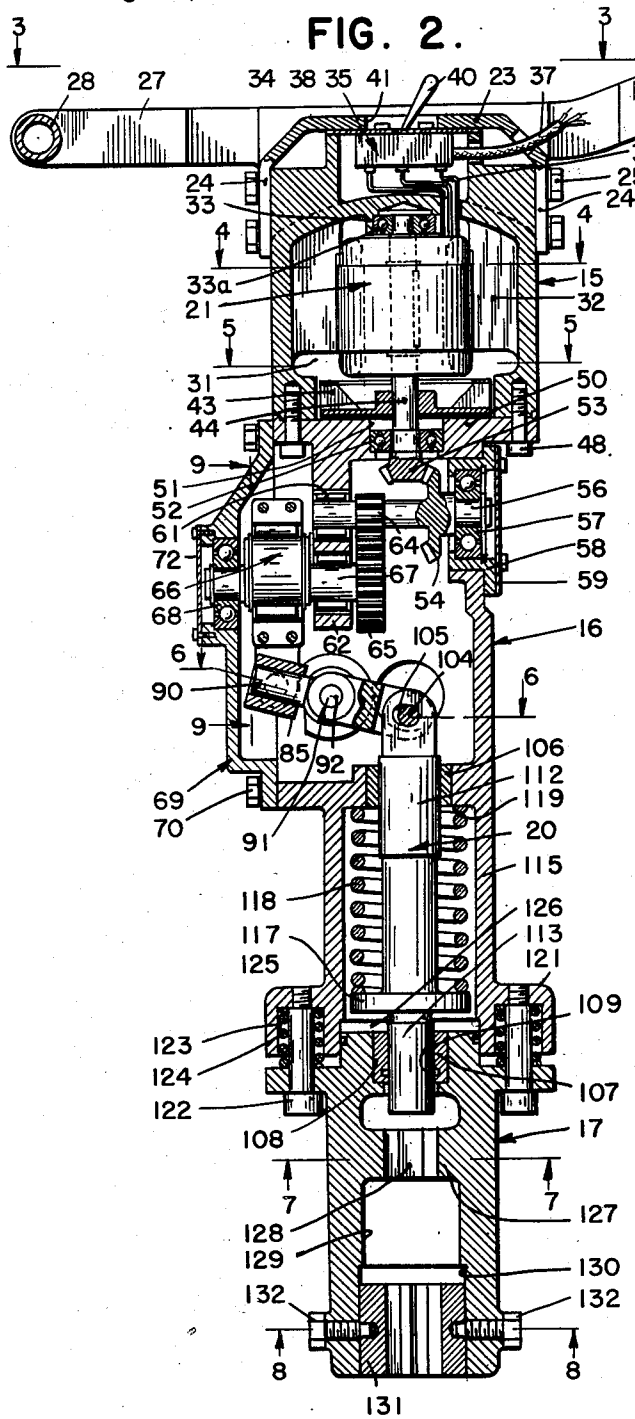

FIG. 1.

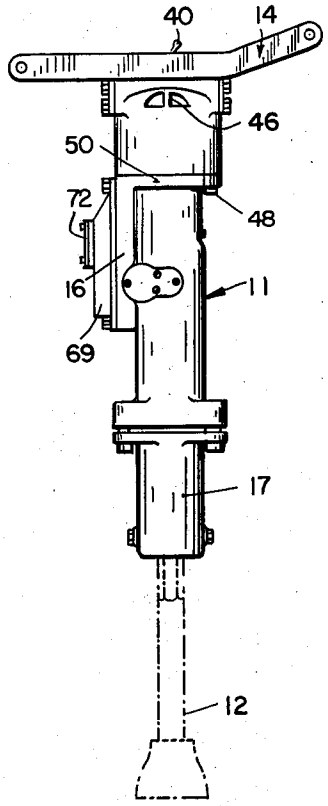

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FIG. 3.

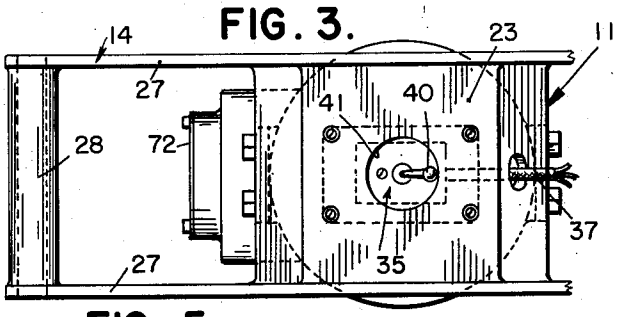


FIG. 4.

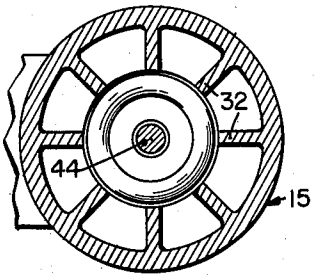


FIG. 5.

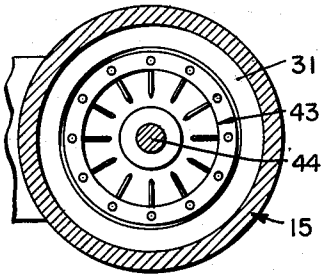


FIG. 6.

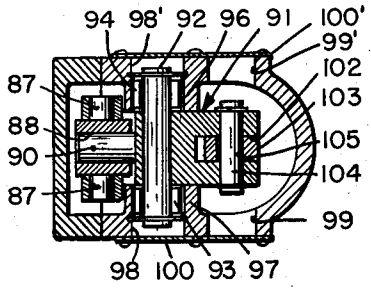


FIG. 7.

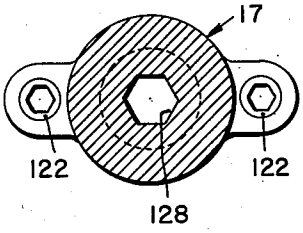


FIG. 8.

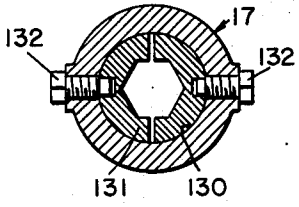
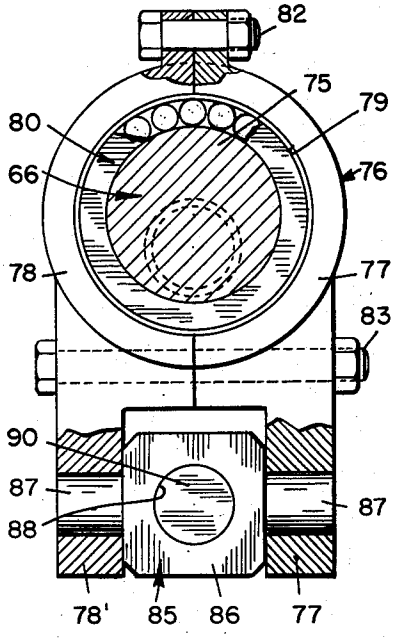


FIG. 9.



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Patented Jan. 27, 1953 2,626,598

UNITED STATES PATENT OFFICE

2,626,598

ELECTRIC HAMMER

Lawson Tarwater, Redlands, Calif.

Application August 14, 1950, Serial No. 179,239

9 Claims. (Cl. 125—33)

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This invention has to do with power-driven hammers or tampers adapted to be held manually.

An object of the invention is to provide a novel, motor-driven tamper or hammer for manual use.

Another object is to provide a motor-driven tamping machine of novel construction which imparts rapid hammer blows to a tamping tool or other tool mounted therein.

A further object is to provide a tamping machine having novel, rugged and efficient means for transmitting rotary motion into reciprocatory, rectilinear motion.

Another object is to provide a device of the type indicated which may be readily fabricated and assembled and one which is comparatively easy to handle when operated.

These and other objects will be apparent from the drawings and the following description thereof. Referring to the drawings:

Fig. 1 is an elevational view of a machine embodying the invention;

Fig. 2 is a central sectional elevational view through the machine of Fig. 1;

Fig. 3 is a partial plan view of the machine on line 3—3 of Fig. 2; and

Figs. 4–9, inclusive, are sectional views in the planes designated respectively 4—4, 5—5, 6—6, 7—7, 8—8 and 9—9 on Fig. 2.

More particularly describing the invention, reference numeral 11 generally indicates the tamping machine which is adapted to mount a suitable tool, such as a tamping tool 12 shown in broken lines in Fig. 1. While the device was designed principally for use in operating tamping tools, it will be apparent that the machine may be used for operating various tools where it is desired to impart rapid hammer blows to the tool.

The machine includes a suitable handle 14, a motor housing 15, a main or gear housing 16, and a tool housing 17. A hammer or hammer bar 20, which is contained partly in the main housing and partly in the tool housing, is reciprocated by a motor 21 through the medium of suitable mechanism in the main housing for transforming the rotary motion of the motor shaft into rectilinear motion.

Proceeding with a more detailed description, the handle 14 includes a central plate or web 23 having two parallel spaced mounting portions 24 by means of which the handle is secured to the motor housing by means of bolts 25. The handle includes a pair of spaced side bars 27 and these are connected at each end by tubular handle members 28 and 29.

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The motor housing 15 is formed to provide a motor chamber 31 into which projects a plurality of ribs 32 for supporting the motor. The motor may be a press-fit within the ribs. The motor housing is also formed to provide a recess 33 for the reception of a motor shaft bearing 33a at the upper end of the motor.

I contemplate using an electric motor, however, the construction is such that other types of motors, such as a rotary air motor, for example, might be used. The upper end of the motor housing is provided with a cup-like recess 34 to receive a switch 35, and this is connected to the motor by suitable wires 36 and to a source of electric current by wires in a cable 37. A plate 38 serves to enclose the recess and act as a mounting element for the switch. The switch toggle lever 40 projects upwardly through an opening 41 in the plate 23 of the handle. If an air motor were used, the housing could carry the necessary control valve and could be provided with air intake and exhaust parts.

The lower portion of the motor housing accommodates a fan 43 mounted on the motor shaft 44. The fan serves to cool the motor by circulating air through the spaces between the ribs 32 in the motor housing and for this purpose a pair of openings 46 are provided in the motor housing on each side of the device, the openings communicating with the spaces between the ribs 32.

The motor housing is secured to the main housing 16 with the two in abutting relation by bolts 48. The main housing includes an upper wall 50 provided with a central opening 51 for mounting a shaft bearing 52. The lower end of the motor shaft is fitted with a gear 53 and this meshes with a gear wheel 54 fixedly mounted on or integral with a shaft 56. This shaft is supported at one end in a bearing 57 mounted in a bearing housing 58 having a cover plate 59. The other end of the shaft is mounted in a bearing 61 supported in a depending wall portion 62 of the main housing. A second gear wheel 64 on shaft 56 meshes with a gear 65 on a crankshaft 66, the latter being supported in a bearing 67 mounted in the wall 62 and in a bearing 68 mounted in a bearing plate 69 secured to the main housing by bolts 70. The plate 69 has a cover plate 72 which covers the end of the shaft 66.

The crankshaft 66 includes an eccentric or crank portion 75 and on this is mounted a connecting rod (Fig. 9), generally indicated by 76.

The connecting rod includes a pair of members 77 and 78 which are complementary and together form a circular opening 79. A roller bearing assembly 80 is positioned between the member 76 and the crank portion 75 of the shaft. The two members 77 and 78 are secured together by bolts 82 and 83. At their lower ends the members 77 and 78 are formed to provide a pair of spaced apertured extensions 77' and 78' in which is pivotally mounted a universal block 85 consisting of a central body 86 having a pair of trunnions 87 at opposite sides. This member is provided with an axial bore 88 which is adapted to receive the cylindrical pin-like end 90 of a lever 91.

The lever 91 is pivotally mounted by means of a shaft 92 fixed therein and pivoted in bearings 93 and 94 (Fig. 6) in inwardly extending bearing cups 96, 97, formed in the main housing. The main housing is provided with apertures 98, 98', 99, 99' which are covered by plates 100, 100'.

The lever 91 is bifurcated at 102 to receive the upper end 103 of the hammer 20. The end 103 is pivotally connected to the lever by a pin 104 which passes through a hole 105 in the hammer, the hole being sufficiently large to permit of the arcuate movement of the pin. The hammer 20 is supported radially by a bushing 106 in the main housing and by a second or lower bushing 107 within a bore 108 in the upper end of the tool housing 17. The bushing 107 has a packing gland or seal ring 109.

The hammer 20 is formed with cylindrical smooth surface sections 112 and 113 which are fitted for sliding movement within the aforementioned bushings. Intermediate its ends and within a spring chamber 115 formed in the main housing the hammer is provided with flange 117. A compression spring 118 is interposed between this and a shoulder 119 in the housing. Thus, the hammer is constantly yieldably urged downwardly.

The tool housing 17 is bolted to the lower end portion 121 of the main housing by bolts 122. I preferably provide a resilient connection at this point by providing the lower end of the main housing with a plurality of counterbores 123 of larger cross-sectional area than the bolts 122 and springs 124 are positioned in these counterbores. The upper end portion 125 of the tool housing is cylindrical and fits in a counterbore 126 in the lower end of the main housing.

The tool housing is formed to provide a tool guide wall 127 intermediate its ends and this is provided with a suitable opening 128 for receiving the tool 12, the opening being shown as hexagonal. The lower end of the tool housing has an enlarged bore or space 129 for receiving a flange or the like on the tool and a counterbore 130 below this in which is fitted a split tool bushing 131 held in place by screws 132.

In the operation of the device, assuming that a suitable tool has been mounted in the tool housing by removing the tool bushing 131 and subsequently replacing it with the shank of the tool projecting into the tool housing, rotation of the motor shaft 44 serves to operate the lever 91 through the medium of the gears and crankshaft and connecting rod with the result that the hammer 20 is reciprocated to operate the tool. The hammer is aided in its downward movement by the action of the spring 118.

Although the invention has been particularly shown and described, it is contemplated that various changes and modifications can be made without departing from the scope of the invention as defined in the following claims.

I claim:

1. In a motor-driven tamping machine, a housing, a motor in said housing, a hammer bar mounted in said housing for axial movement, a crankshaft driven by said motor, a lever pivotally mounted between its ends in said housing, and a connecting rod on said crankshaft and connected to one end of said lever, the other end of said lever being directly pivotally connected to said hammer bar.

2. In a motor-driven tamping machine, a housing, a motor in said housing, a hammer bar mounted in said housing for axial movement, a crankshaft driven by said motor, a lever pivotally mounted between its ends in said housing, a connecting rod on said crankshaft and connected to one end of said lever, the other end of said lever being directly pivotally connected to said hammer bar, and a spring in said housing yieldably urging said hammer bar outwardly of said housing.

3. In a motor-driven tamping machine, a housing, a motor in said housing, a hammer bar mounted in said housing for axial movement, a crankshaft driven by said motor, a lever pivotally mounted between its ends in said housing, a connecting rod on said crankshaft and connected to one end of said lever, the other end of said lever being directly pivotally connected to said hammer bar, a tool housing section mounted at the end of said housing for limited movement with respect thereto axially of said hammer bar, said tool housing section providing a guide for axial movement of said hammer bar and guide means for axial movement of a tool received therein, and resilient means urging said tool housing section away from said housing.

4. In a machine having a motor, a reciprocatory axially movable hammer bar, and means operatively connecting the motor and bar, housing means comprising a motor and main housing structure for enclosing said motor and said hammer bar, a bearing in said housing structure slidably supporting said bar, a tool housing mounted at the end of said housing structure for limited movement with respect thereto axially of said bar, said tool housing providing a guide for axial movement of said bar and guide means for axial movement of a tool received therein, and resilient means urging said tool housing away from said housing structure.

5. In a motor-driven tamping machine, a housing, a motor in said housing, a hammer bar mounted in said housing for axial movement, a crankshaft driven by said motor and supported in the housing, a connecting rod on the crank portion of said shaft, a pivotally mounted block at the outer end of said connecting rod, a lever pivotally mounted intermediate its ends in said housing, one end of said lever being mounted for axial slidable movement in said block, and means pivotally connecting the other end of said lever to said hammer bar.

6. In means for transforming rotary motion of a shaft into reciprocatory motion in a driven element, a crankshaft driven by said shaft, a connecting rod on the crank portion of said crankshaft, a block pivotally mounted in the outer end of said connecting rod, a lever pivotally mounted intermediate its ends, one end of said lever being slidably received in said block, and a relatively sloppy pivotal connection between the

other end of said lever and the driven element to be reciprocated.

7. A connecting rod structure comprising, when assembled, a pair of complementary members defining a crank-pin-receiving opening and a pair of spaced parallel apertured extensions therebeyond, bolts securing said members together, and a block having trunnions thereon pivotally mounted in said apertured extensions, said block having a bore therethrough for the reception of a lever to be actuated.

8. In a motor-driven tamping machine, a housing structure including a main housing with a motor housing at one end and a tool housing at the other, said tool housing being mounted for limited movement toward and away from said main housing, means yieldably urging said tool housing away from said main housing, a motor in said motor housing, a hammer bar in said main housing projecting into said tool housing, a bushing in said main housing for slidably receiving said hammer bar, a bushing in said tool housing slidably receiving said hammer bar, additional bushing means in said tool housing for slidably receiving a tool therein, and means in said main housing operatively connecting said motor and said hammer bar for reciprocating said hammer bar axially.

9. In a motor-driven tamping machine, a housing structure including a main housing with a motor housing at one end and a tool housing at the other, said tool housing being mounted for limited movement toward and away from said main housing, means yieldably urging said tool housing away from said main housing, a motor in said motor housing, a hammer bar in said main housing projecting into said tool housing, a bushing in said main housing for slidably receiving said hammer bar, a bushing in said tool housing receiving said hammer bar, and means in said main housing operatively connecting said motor and said hammer bar for reciprocating said hammer bar axially, said last-mentioned means comprising a crankshaft driven by said motor, a connecting rod on the crankshaft, and a lever pivotally mounted between its ends in said main housing connecting said connecting rod and said hammer bar.

LAWSON TARWATER.

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