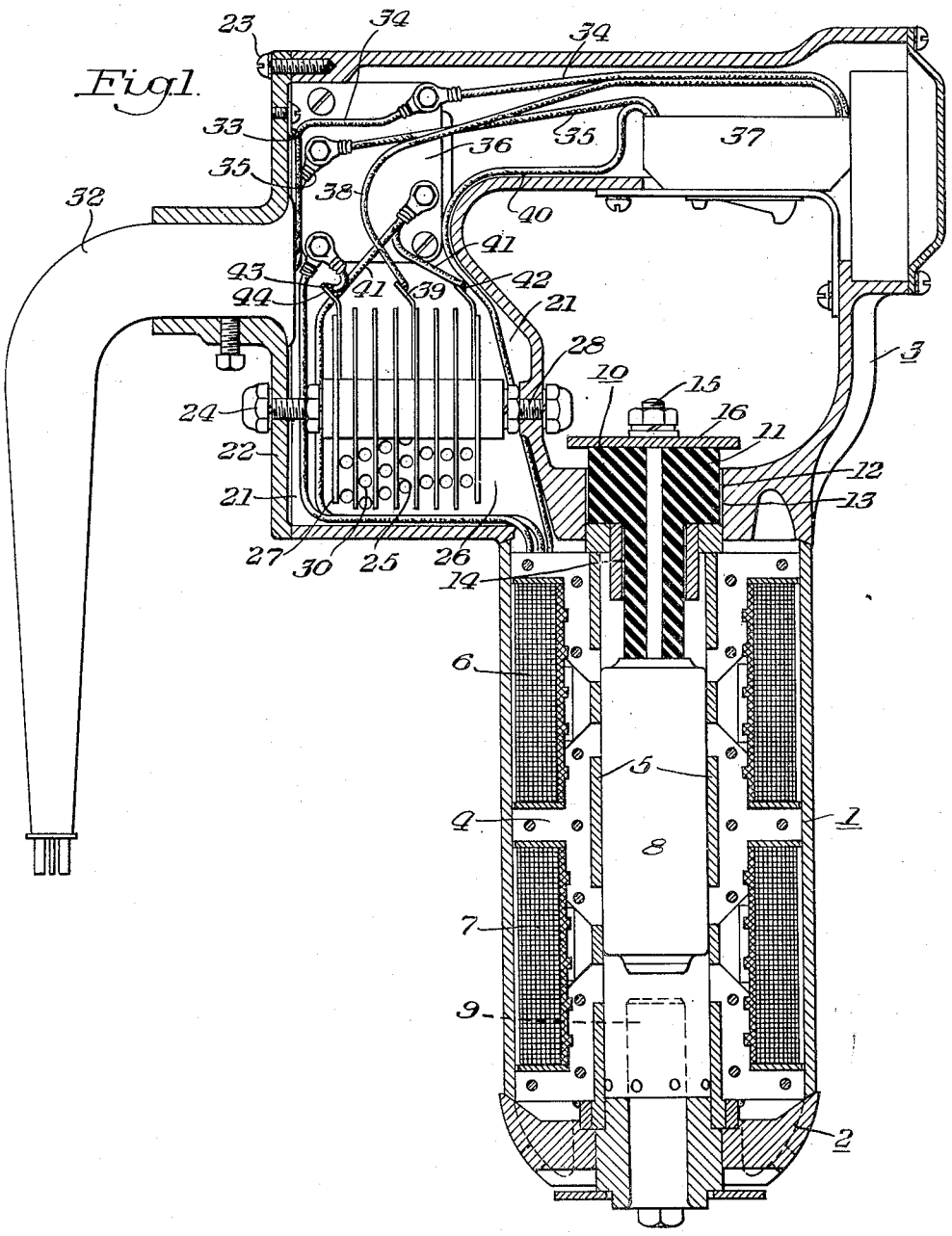
Oct. 7, 1952 C. S. WEYANDT 2,613,241

ELECTRIC HAMMER WITH RECTIFIER IN HANDLE

Filed Sept. 19, 1949 2 SHEETS—SHEET 1

Fig. 1.



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Fig. 3.

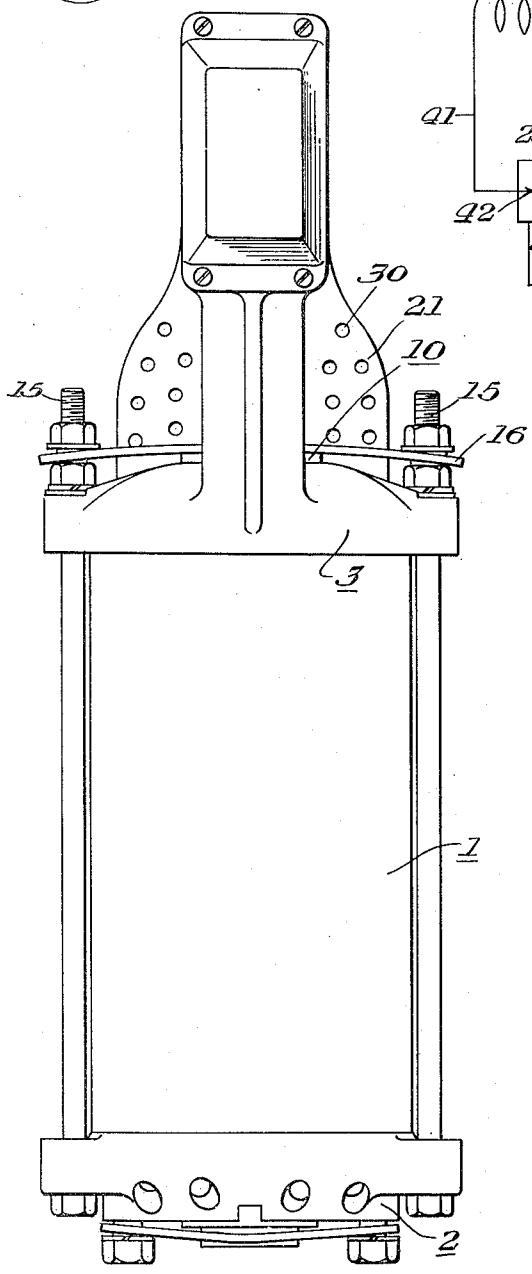
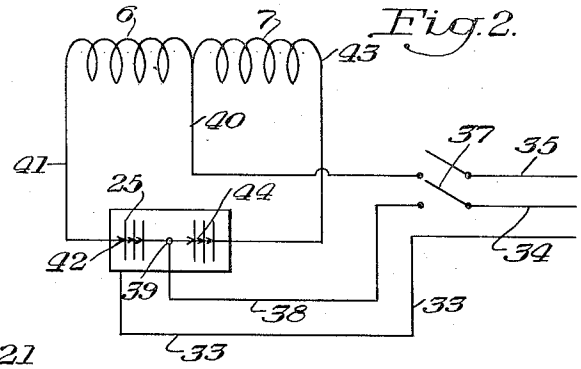


Fig. 2.



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ELECTRIC HAMMER WITH RECTIFIER IN HANDLE

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4 Claims. (Cl. 172—126)

1

This invention relates generally to electromagnetic reciprocating hammers and more particularly to an electric hammer having spaced electromagnetic coils energized by alternate electric impulses usually obtained from a rectified half wave alternating current circuit.

Electric hammers have been constructed to operate from various types of rectifiers such as vacuum tube diodes or dry disc rectifiers. These rectifiers, heretofore, have been mounted in a separate housing spaced some distance from the hammer itself, generally 15 to 20 feet. One disadvantage of such construction is that a separate unit for the rectifier is required, making it awkward to handle in many operations such for instance as drilling in ceilings overhead and drilling high on side walls of buildings. Another disadvantage is that in grounding such devices it is necessary to run a ground wire from the hammer to the case of the rectifier and from the case of the rectifier to the ground connection. This requires the use of four wires from the rectifier to the hammer and four point receptacles and plugs. It also requires three wires from the rectifier to the source of supply and the ground. The requirement of four wires from the rectifier to the hammer is more expensive than the ordinary three-wire or two-wire cable and does not give as good service as the lesser wired cables since there is more danger of breakage internally in the cable, due to twisting and bending in normal use. Another disadvantage is that in order to break all live connections to the hammer coils, it is necessary to have a three-pole switch. This is rather an expensive device and means that the handle to contain the switch must be larger, making the device more clumsy and heavier and more difficult to handle as a portable tool.

These objections have been eliminated in the present invention by placing the rectifier within a portion of the hammer itself. This makes possible the use of a two-pole switch to completely disconnect any live conductors from the hammer. It makes possible the use of a standard three-conductor cable from the source of supply directly to the hammer for both supplying power and grounding of the hammer.

One object of this invention is the provision of an electromagnetically operated reciprocating hammer having its rectifier built within the handle to provide a three-conductor cable with two conductors for the supply circuit and one independent conductor for grounding the casing of the hammer.

Another object is the provision of a dry disc rectifier carried by an electromagnetic reciprocating hammer with the plane of the discs parallel with the vibratory action of the hammer to avoid mechanical fixture of the discs.

2

Another object is the provision of an electromagnetic reciprocating hammer having an uninterrupted ground connection to the casing and a double pole switch in the operating circuit of the hammer.

Another object is the provision of a dry disc rectifier built within the handle of an electromagnetic hammer and requiring less discs per volt owing to the proximity and the inductive reactance of the hammer operating coils.

Another object is the provision of a rectifier mounting that supports one end of the cable and forms a portion of the handle.

Other objects and advantages appear in the following description and claims.

The accompanying drawings show, for the purpose of exemplification without limiting the invention or claims thereto, certain practical embodiments of the invention wherein:

Fig. 1 is a sectional view of the electromagnetic reciprocating hammer;

Fig. 2 is a circuit diagram of the hammer shown in Fig. 1; and

Fig. 3 is a view in side elevation showing the electric hammer.

Referring principally to the drawings, the electric hammer comprises the cylindrical housing 1 having a nose casting 2 fitted to the bottom thereof and a handle casting 3 fitted to the top thereof. An electromagnetic core 4 is constructed on the tube 5 made of nonmagnetic material such as brass, bronze or other suitable alloy. The bore of the barrel 5 is cylindrical and its outer surface is octagonal to receive the eight sides of the electromagnetic core 4 which is brazed thereto to form an integral structure with annular winding recesses to receive the coils 6 and 7. A piston 8 of electromagnetic material is substantially the same diameter as the bore of the cylinder 5 and reciprocates therein and is arranged to strike the tool shank 9 adjacent the lower end of the hammer and the resilient stop 10 with the upper end of the handle.

The resilient stop 10 comprises an elastomer member 11 having a cylindrical portion 12 fitting within the bore 13 of the handle casting 3 and a smaller cylindrical portion 14 extending into the upper bore of the tubular barrel 5. The elastomer member 11 has an opening therethrough to exhaust the air from the bore of the barrel 5 ahead of the piston 8 which strikes the elastomer member 10. A pair of tierod bolts 15 pass through the leaf spring 16 adjacent the ends thereof and are secured by means of the nuts and spring washers as shown. The lower end of the tierods 15 are attached to the nose casting 2

to connect it with the handle casting 3 and hold them both in assembled relation on the cylindrical housing 1 of the hammer.

The elastomer member 11, having its small diameter portion 14 and its large diameter portion 12, is arranged to aid the spring 16 in stopping the upward travel of the free piston 8, striking and deforming the elastomer member 11, both of which absorb energy from the blow and return it to the piston as it is energized by the lower coil 7 on its downward stroke. The elastomer member 11 provides a novel mode for receiving the shock and retransmitting it to the free piston.

The handle casting 3 is provided with a housing which is enlarged, as shown at 21 in Figs. 1 and 2, and the rear end thereof is enclosed by the lid 22 which is held in place by the spaced bolts 23 and the assembly bolt 24 of the rectifier member 25. The chamber 26 within the handle portion 21 is substantially circular in the vicinity of the bolt 24 so as to house the multiple discs 27 of the rectifier stack 25 which is likewise supported at its other end where the bolt 24 passes through the housing as indicated at 28. Since the bolt 24, which supports the rectifier 25, lies in the horizontal plane when the hammer is held in a vertical position, the rectifier discs are disposed parallel to the axes of the piston and any shock or vibration due to the axial movement of the free piston 8 is not transmitted to the rectifier discs in the direction that would tend to flex them, but is parallel to the discs. This aids in obtaining a long life for the rectifier.

The housing 21 is provided with a series of openings 30 through which air may pass to cool the discs of the rectifier.

As shown in Fig. 1, the three wire conductor 31 extends through the reinforcing member 32 to the interior of the handle, from whence the three wires 33, 34 and 35 extend. The wire 33 will be noted to be fastened by a bolt to the interior of the lid 22 that is in turn secured to the housing of the hammer to ground the frame.

The wires 34 and 35 are connected to the terminal block 36 and extend to the switch 37 which is a double pole switch, thereby opening both sides of the circuit to the hammer. The wire 34, which represents one side of the A. C. line, extends through the switch 37 and is connected by conductor 38 to the center of the rectifier stack as indicated at 39. The wire 35 passing through the switch 37 is connected by the conductor 40 to one end of both coils 6 and 7, as shown in Fig. 2. The other end of coil 6 is connected by the wire 41 to one end of the rectifier stack, as indicated at 42. The other end of the coil 7 is connected by the wire 43 to the other end of the rectifier stack, as indicated at 44. Thus, the two-pole switch 37 breaks both the lines to the operating mechanism of the hammer and the ground wire 33 is maintained at all times to the casing of the tool. Such a simple circuit could not be obtained unless the rectifier is formed as a unitary part of the electric hammer as shown.

The impedance of the hammer operating coils 6 and 7 is high due to the constantly varying reluctance upon the reciprocation of the core 8. Ordinarily it would require twelve rectifier discs for 110 v. 60 cycle current. However, the high varying reluctance of the coils reduces the discs to four per coil, thus permitting such a small quantity to be assembled as a unit forming an integral part of the hammer.

I claim:

1. An electric hammer comprising a housing, a free piston of magnetic material reciprocable in said housing, spaced coils carried by said housing to electromagnetically actuate the free piston and having their adjacent ends connected together, a unidirectionally assembled rectifier stack and switch means for opening the line current mounted on said housing, a tri-conductor current supply cable having one conductor for ground connected to said housing and the other two conductors to supply alternating current to said switch means, conductors from the two poles on the other side of said switch to the center of the rectifier stack and the common coil connection respectively, and conductors between the other ends of said coils and the ends of the rectifier stack, respectively thereby eliminating external control and reducing the external connections to the primary power supply.

2. An integral handle casting for an electromagnetic reciprocating hammer consisting of a transverse handgrip having spaced therefrom an annular reciprocating motor housing, an integral wall on one end of the handgrip extending to said housing and annularly shaped to form a chamber open on one end thereof, a disc rectifier having mounting means engageable with the wall of the chamber to support the rectifier in the chamber with the discs lying parallel with the axis of the reciprocating motor housing, and a closure member for said chamber.

3. An integral handle casting for an electromagnetic reciprocating hammer consisting of a transverse handgrip having spaced therefrom an annular reciprocating motor housing, an integral wall on one end of the handgrip extending to said housing and annularly shaped to form a chamber open on one end thereof, a disc rectifier having mounting means engageable with the walls of the chamber to support the rectifier in the chamber with the discs lying parallel with the axis of the reciprocating motor housing, a closure member for said chamber, and a flexible electric cable supported by said closure member for supplying electric current to said hammer.

4. An integral handle casting for an electromagnetic reciprocating hammer consisting of a transverse handgrip having spaced therefrom a circular housing for receiving a reciprocating motor, an integral wall on one end of the handgrip extending to said housing and annularly shaped to form a chamber open at one end thereof, a closure member for said chamber, a disc rectifier having a mounting bolt engageable with said closure member of the chamber to support the rectifier in said chamber with its discs axially of the cylindrical housing and parallel with the reciprocating movement of the hammer.

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