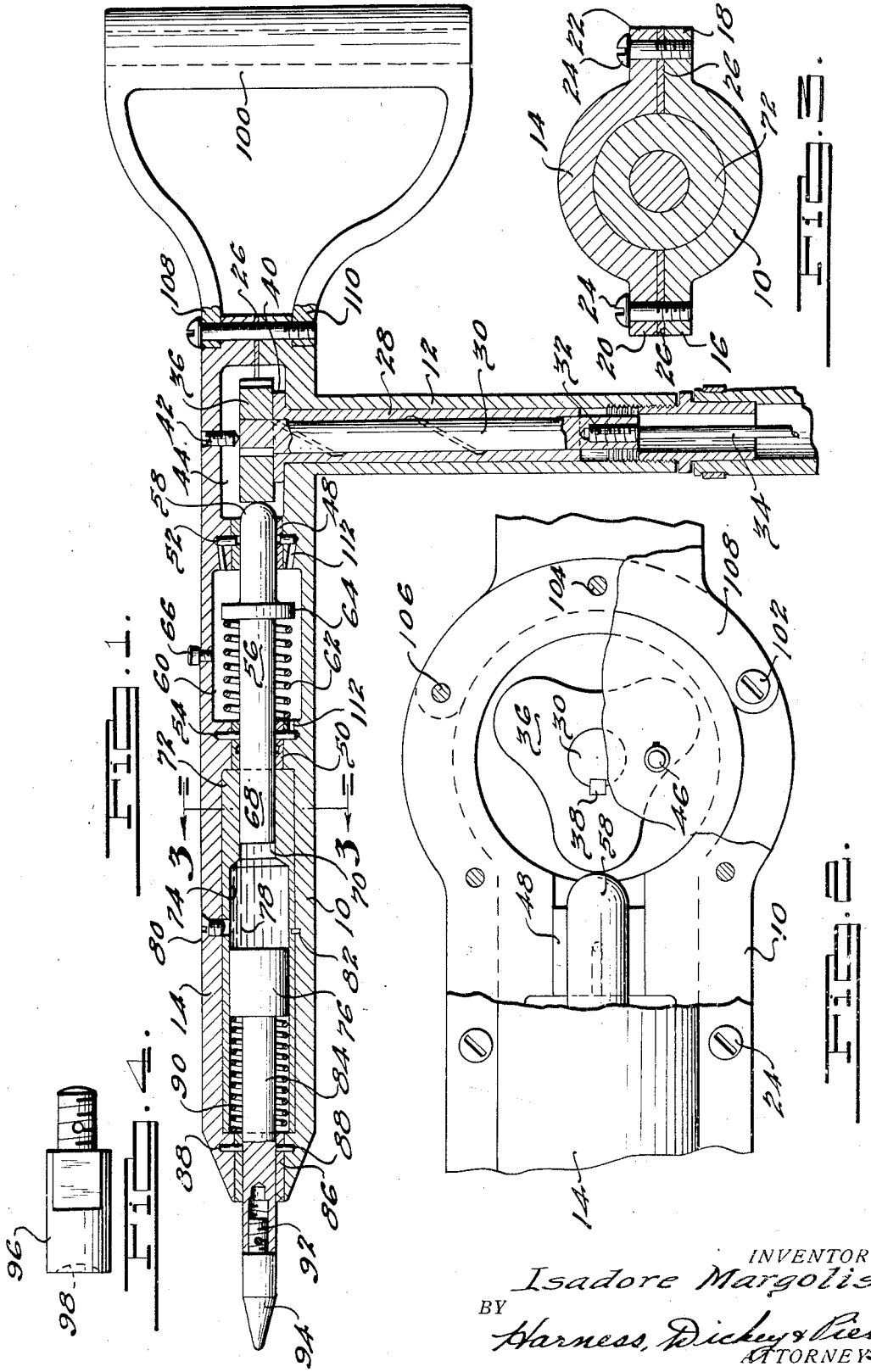
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HAMMER

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HAMMER

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This invention relates to power hammers.

The main objects of this invention are to provide an improved power hammer of high efficiency; to provide a hammer in which the force from the rotating power driven shaft is applied to the power head in a novel and more efficient manner; to provide a hammer having a hydraulic power transmitting unit interposed in its line of drive; to provide a hammer of simple construction which is rugged, sturdy, and capable of long usage without repair or adjustment; to provide a hammer which is adapted to a wide variety of uses, including the bumping out and working of sheet metal, particularly with respect to repair work on automobile fenders and the like; to provide a hammer in which well known principles of hydraulics are utilized to increase the power of the hammer head.

An illustrative embodiment of this invention is shown in the accompanying drawing, in which:

Fig. 1 is a view in longitudinal medial section of the improved hammer.

Fig. 2 is an enlarged fragmentary plan view, with parts broken away, showing the driving cam and plunger actuated thereby.

Fig. 3 is an enlarged sectional view taken on the line 3—3 of Fig. 1, looking in the direction indicated by the arrows.

Fig. 4 is a view in elevation of one of the various forms of hammer heads which are adapted to be removably mounted in the improved hammer.

In the construction shown in the drawing, the improved hammer comprises an elongated semi-cylindrical body casing 10 having a cylindrical handle portion 12 integrally cast therewith and extending at right angles thereto, and a companion elongated semi-cylindrical body casing cover portion 14 which is complementary to the casing portion 10.

As shown most clearly in Fig. 3 of the drawing, the casing portion 10, at diametrically opposite sides, is provided with integrally formed radially extending flanges 16 and 18, and the casing portion 14 is provided with like flanges 20 and 22. The flanges of the casing portions 10 and 14 are provided with registering apertures therethrough, those in the flanges 16 and 18 being threaded to receive screws 24 by which the two casing halves are rigidly secured together at a plurality of spaced points, as shown in Fig. 2. A gasket 26 is preferably interposed between the flanges, as is customary in assemblies of this character.

The handle portion 12 is provided with a bushing 28 in which is journaled a driving shaft 30, one end of which is axially bored and tapped, as shown at 32, to receive the threaded end of a flexible driving cable 34 of any suitable character. The other end of the driving shaft 30 extends into the body portion of the hammer and has a three lobed cam 36, non-rotatably secured thereon by a key 38. The adjacent end of the bushing 28 is radially flanged, as shown at 40, and the cam 36 is held thereagainst by an adjusting screw 42 which is threaded through the body cover 14, and by the rotation of which a proper working clearance of the cam may be secured against the axial face of the flange 40. The inner end of the screw 42 is conical and contacts the axial center of the shaft 30.

The cam 36 is located within a chambered space 44, cored or otherwise suitably formed within the body portion of the hammer, and a suitable spring covered opening 46 is provided through which lubricant may be introduced to the cam chamber for lubricating the cam and its bearing surfaces.

The body portion of the hammer is provided with axially spaced bearings 48 and 50 which may be in the form of separable halves, and which are prevented from rotating with respect thereto by radially extending diametrically positioned pins 52 and 54, respectively. The bearings 48 and 50 journal an axially extending plunger 56, one end of which is rounded, as shown at 58, and bears against the face of the cam 36. The body of the hammer between the bearings 48 and 50 is also chambered out, as shown at 60, to house a helical compression spring 62, one end of which bears against the end of the chamber 60 adjacent the bearing 50, and the other end of which bears against an annular collar 64 integrally formed on the plunger 56 for normally constantly urging the rounded end 58 of the plunger into contact with the cam 36. The chamber 60 is also provided with a spring cover oil fitting 66 through which lubricant may be introduced into the chamber 60 for the moving parts therein.

The other end 68 of the plunger 56 has a relatively snug working fit in a cylindrical bore 70 of a cylindrical sleeve or liner 72, so as to function as a piston. The cylinder 72 is also provided with a coaxial cylindrical bore 74, communicating with and of larger diameter than the bore 70, and is adapted to slidably receive a snugly fit piston head 76 in spaced relation to the bore 70. The space between the piston head

76 and the smaller diameter bore 70 is adapted to be filled with a liquid 78 which may be introduced thereto through a threaded aperture normally closed by a screw 80.

Corresponding apertures for the screw 80 in the body member 14 and the liner 72 are maintained in registry by a pin 82, one end of which extends into an opening in the liner, and the other end of which extends into a corresponding opening in the body portion 10.

The piston head 76 is integrally formed on one end of an axially extending shank 84 of smaller diameter than the bore 74 and is journaled in a bearing 86 which may be in the form of two halves and which is carried by the body members 10 and 14 at the end thereof. Rotation of the bearing halves is prevented by pins 88 in the usual manner.

Means are provided for normally constantly urging the piston head 76 toward the cam driven plunger rod 56 to maintain the liquid 78 interposed therebetween under compression, and comprises a helical compression spring 90, one end of which bears against the body casing members 10 and 12 closely adjacent the bearing 86, and the other end of which bears against an axial face of the piston head 76.

The outer end of the shank 84 protrudes beyond the bearing 86 and is axially bored and tapped to receive the threaded shank 92 of a hammer head 94. A plurality of hammer heads 94 having a wide variety of shapes for performing various kinds of work may be provided for the hammer, such as round balls of various sizes, chisels, etc. One form of hammer head 96 adapted for riveting is shown in Fig. 4 of the drawing. This hammer head is circular in cross section, and the end face is provided with a concavity 98 for forming a convex head on a rivet.

In order to steady the hammer in use and permit its being held in both hands, a handle 100 is provided in alignment and at the rear end of the body, and which may be detachably secured thereto by relatively long screws 102, 104, and 106 which pass through arcuate shaped segments 108 and 110 extending from each end of the handle portion 100.

The bearings 48, 50 and 86, as well as the sleeve 28 are provided with oil grooves in the faces thereof, as is customary for lubrication, and the body portions 10 and 14 adjacent these bearings are drilled out, as shown at 112 so that lubricant from the chamber 60 may readily pass to these bearings.

In the use of this hammer the driving shaft 30 is attached to a power driven flexible cable having any suitable source of power, such as an electric motor, or an air motor, or the like. Rotation of the shaft 30 will drive the cam 36 so as to give three impulses to the plunger 56 against the action of compression spring 62 for each rotation of the shaft 30. The spring 62 is of sufficient strength to maintain the rounded end 58 of the plunger 56 in contact with the face of the three lobed cam 36, and thus reciprocate the plunger 56 axially within the body portion formed by the casing members 10 and 14.

Reciprocation of the plunger 56 to the left, as viewed in Fig. 1 of the drawing, due to the close fit of the plunger end 68 within the bore 70, drives the fluid therein out of the bore 70 into the enlarged bore 74. The difference between the diameter of these bores may be in the ratio of 1 to 1½, or may be of any other suitable or desired ratio so as to secure the desired result. As is well understood, the difference in diameter governs the ratio of power step-up between the plunger 56 and the piston head 76, this increase being in direct proportion to the relative cross sectional areas of the bores 70 and 74. Reciprocating motion of the plunger 56 will reciprocate the fluid 78 in the bores 70 and 74, and thus reciprocate the piston head 76 and shank 84 integral therewith, to thus reciprocate the hammer head 94.

Any slight seepage of the liquid 78 around the piston head 76, or the close fitting end 68 of the plunger 56, may be replenished by removal of the screw 80 and the introduction of more fluid while holding the piston head 76 to the left, as viewed in Fig. 1 of the drawing with the spring 90 compressed. As soon as refilling operation is finished and the screw 80 replaced, the shank 84 may be released, thus permitting the spring 90 to again maintain the liquid 78 under compression.

Although but one specific embodiment of this invention has been herein shown and described, it will be understood that numerous details of the construction shown may be altered or omitted without departing from the spirit of this invention, as defined by the following claims.

What is claimed is:

1. A hammer comprising a body portion, a cam rotatable in said body portion, an axially reciprocable plunger having one end in contact with said cam, a spring acting on said plunger for maintaining said plunger in constant contact with said cam, a cylinder having a bore therein for receiving the other end of said plunger, said cylinder having another communicating bore of larger diameter than said first mentioned bore, a piston slidable in said larger cylinder bore, a hammer head secured to said piston, and a liquid in said bore interposed between said piston and plunger and for imparting motion from said plunger to said piston.

2. A structure as defined in claim 1 in which a helical compression spring acts on said piston for maintaining said liquid under pressure at all times.

3. A hammer comprising a semi-cylindrical body casing, a cylindrical handle portion integrally formed therewith and extending transversely with respect thereto, a semi-cylindrical body member complementary to said first mentioned body member, each of said body members being provided with oppositely extending substantially diametrically aligned flanges, means for securing said flanges together to form a substantially cylindrical hammer body, a drive shaft journaled in said handle portion, a cam rigidly mounted on said drive shaft within said body portion, a plunger axially reciprocable within said body with one end thereof in position to be actuated by said cam, yielding means for maintaining said plunger end in substantially constant contact with said cam, a cylinder having a bore therein for receiving the other end of said plunger, said cylinder having a second bore therein of greater diameter than said first mentioned bore and communicating therewith, a piston slidably mounted within said larger cylinder bore, yielding means normally urging said piston toward the adjacent end of said plunger, liquid within said cylinder bores interposed between said piston and plunger end, and a hammer head secured to said piston.

4. In a power hammer, a body portion, a plunger axially reciprocable within said body por-

tion, a power driven cam for actuating said plunger, a second plunger normally in spaced relation with respect thereto, and a liquid sealed between said plungers for transmitting motion from one of said plungers to the other of said plungers.

5. A power hammer as characterized in claim 4 in which each of said plungers is provided with a helical compression spring for normally urging said plungers in one direction.

6. A hammer comprising a body portion, a cam rotatable in said body portion, an axially reciprocable plunger having one end in contact with said cam, a spring acting on said plunger for maintaining said plunger in constant contact with said cam, a cylinder having a bore therein for receiving the other end of said plunger, a second cylinder having a bore therein communicating with said first cylinder bore, a piston slidable in said second cylinder bore, a hammer head secured to said piston, and a liquid in said bores interposed between said piston and plunger for imparting motion from said plunger to said piston.

7. A structure as defined in claim 6 in which a helical compression spring acts on said piston for maintaining said liquid under pressure at all times.

8. A hammer comprising a semi-cylindrical body casing, a cylindrical handle portion integrally formed therewith and extending transversely with respect thereto, a semi-cylindrical body member complementary to said first mentioned body member, each of said body members being provided with oppositely extending substantially diametrically aligned flanges, means for securing said flanges together to form a substantially cylindrical hammer body, a drive shaft journaled in said handle portion, a cam rigidly mounted on said drive shaft within said body portion, a plunger axially reciprocable within said body with one end thereof in position to be actuated by said cam, yielding means for maintaining said plunger end in substantially constant contact with said cam, a cylinder having a bore therein for receiving the other end of said plunger, the second cylinder having a bore therein communicating with said first cylinder bore, a piston slidably mounted in said second cylinder bore, yielding means normally urging said piston toward the adjacent end of said plunger, liquid within said cylinder bores interposed between said piston and plunger end for imparting motion from said plunger to said piston, and a hammer head secured to said piston.

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