Nov. 15, 1932. R. P. MARTIN 1,887,980

POWER HAMMER

Filed July 30, 1930 3 Sheets-Sheet 1

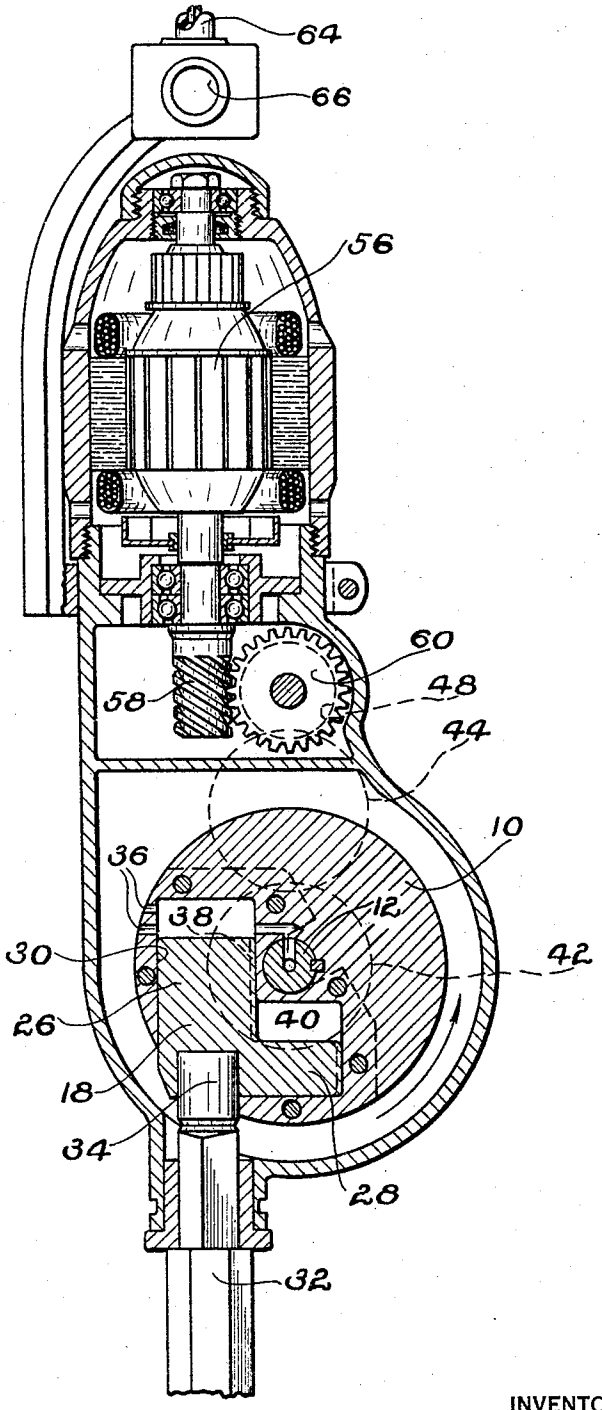


Fig. 1

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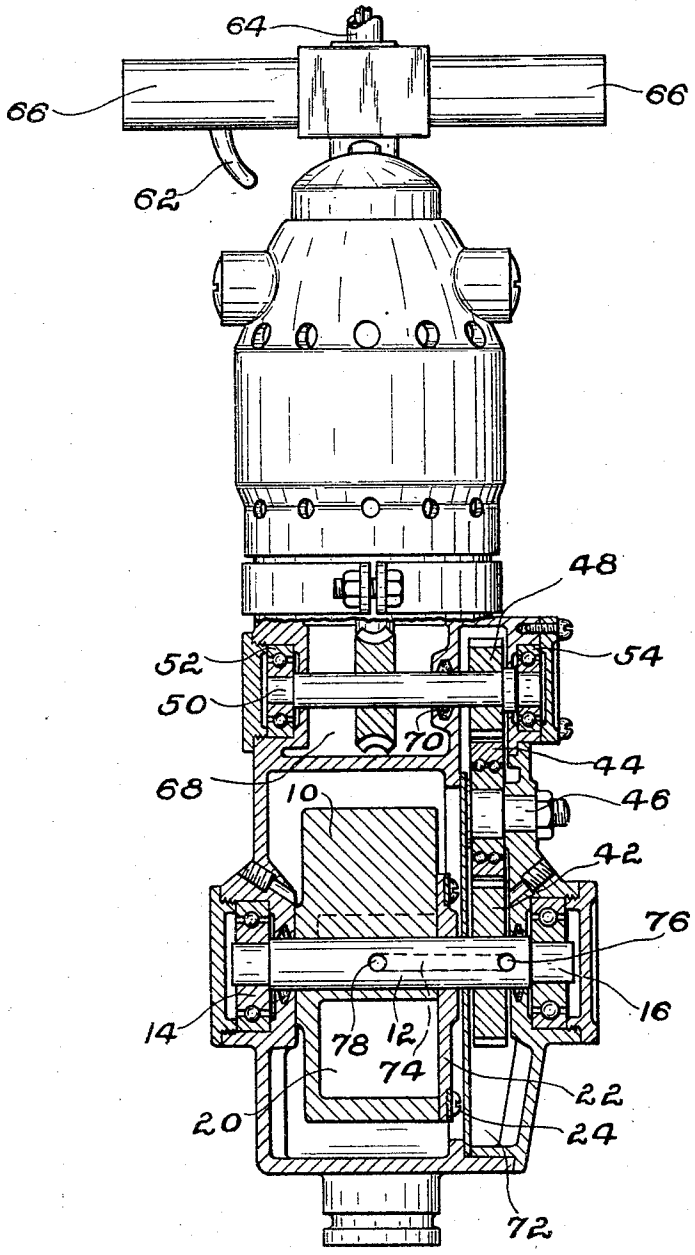


Fig. 2

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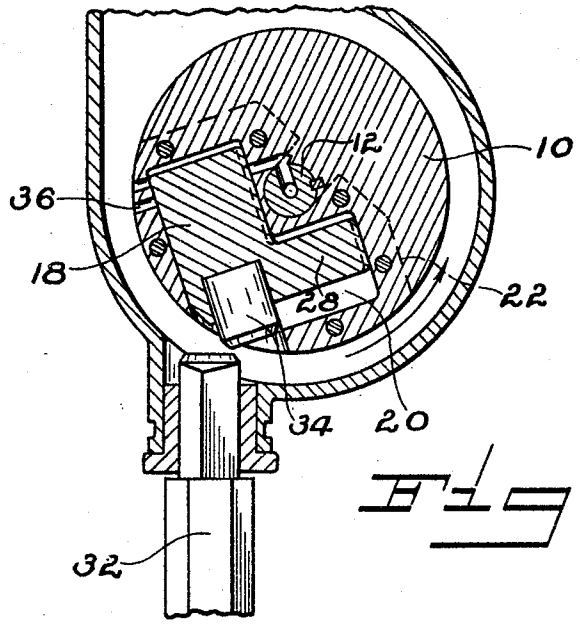


Fig. 3

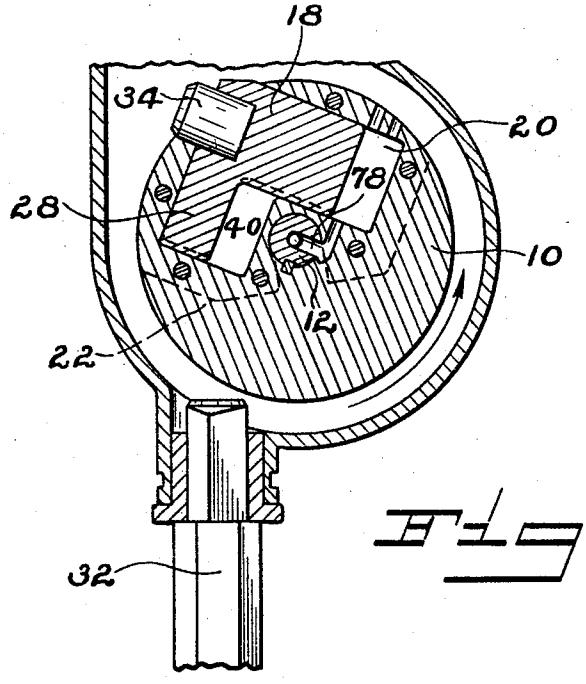


Fig. 4

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UNITED STATES PATENT OFFICE

ROBERT P. MARTIN, OF SEATTLE, WASHINGTON, ASSIGNOR OF ONE-FOURTH TO HORACE BYFORD, OF SEATTLE, WASHINGTON

POWER HAMMER

Application filed July 30, 1930. Serial No. 471,873.

My present invention relates to the art of power hammers and more particularly to that class of power hammers which employ centrifugal force to restore the hammer element to its striking position after each blow has been struck.

Considerable work has been done on power hammers of so-called portable size in an endeavor to provide a power hammer which will be strictly portable, but which is more easily handled by one man, which will strike a blow sufficiently powerful as to do really serious work, such as demolition, breaking of concrete, etc., and whose striking mechanism is so designed and arranged that long life with freedom from breakdowns may be expected from it.

A large number of hammers produced in the past have used striking elements which were pivotably secured to a rotatable hammer base and which were arranged to fold up within the hammer base on striking the tool. I have found that hammers so constructed, which provided a positive engagement with the hammer base, would transmit to the hammer base, its driving gearing and its source of power a portion of the shock incidental to striking the blow. This has been found to be very harmful and hammers so constructed have a very short useful life.

In my present design I have provided a hammer which is characterized by having its striking member or hammer proper slidably secured within a revolving hammer base. In this way I have found that the force of impact when the striker engages the tool is confined almost wholly to the striker itself, causing it to slide or reciprocate within the hammer base, and in this way I have the same effect as though the striking member were a freely falling body, and I have found that the gearing and driving means are not in any way affected by the shock of striking.

Having thus described my invention in brief, the objects I obtain with my device are, namely:

First: The production of a power hammer which is characterized by extreme simplicity of construction of the striking member itself, a fact which permits economical construction and long life for the tool.

Second: The production of a power hammer mechanism in which the striking member acts as though it were a freely falling body at the time impact occurs.

Third: The production of a hammer mechanism which is characterized by having a striking member or hammer which is so disposed within its rotatable hammer base that centrifugal force will act upon the striker and restore it to its striking position after each successive blow.

Fourth: The production of a striking mechanism for power hammers which admit of providing a relatively heavy striking member and which may be included within a hammer base of relatively small diameter. This enables the production of a heavy tool that will not be bulky or unwieldy.

Other and more specific objects will be apparent from the following description taken in connection with the accompanying drawings, wherein

Figure 1 is a longitudinal sectional view through the central axis of my machine, showing the same as driven by an electric motor.

Figure 2 is an elevation of my tool, certain parts being broken away to better show the construction and relationship of the various parts.

Figures 3 and 4 are fragmentary sectional views showing my striking mechanism at different phases of its cycle of operation.

Referring to the drawings throughout which like reference characters indicate like parts, numeral 10 designates the hammer carrying member or hammer base. This is fixedly secured to the revolvable shaft 12, which shaft in turn is suitably supported on anti-friction bearings at 14 and 16. Slidably secured within base 10 is the striking member or hammer proper 18. This I have shown as rectangular in cross section, and is disposed within the milled cavity 20. Securing the hammer in place is a cover plate 22, which is secured in turn to the hammer base in any convenient manner as by the lock-washered screws 24. I believe it will be apparent that other forms of construction

might be used at this point. One alternate solution would be to have a similar cover plate as 22 on the opposite side of the hammer base. This would permit broaching or shaping out of cavity 20.

I prefer to form hammer 18 with a main body portion 26 and an L-shaped portion 28. The L-shaped addition 28 serves a dual function. It enables me to substantially increase the weight of hammer 18 so that a heavier blow may be struck without the necessity of employing a hammer base 10 of larger diameter, and in addition it permits a larger mass of metal disposed at a point where it is acted upon by the centrifugal forces to the greatest extent and thus overcomes any tendency for the hammer to become frictionally engaged by the side wall 30 of the hammer base and prevented from being thrown out to its fullest extent, which is required for proper engaging of the tool 32.

I have found some difficulty in the past in so heat-treating an irregular shaped mass of metal so as to enable it to withstand the repeated impact without chipping. To overcome this condition I prefer to insert into striker 18, by pressing securely thereinto, a cylindrical tool engaging block 34, which can be specially heat-treated as an impacting surface. In order to prevent hammer 18 becoming air-bound within cavity 20, I provide air ports 36, and also additional air ducts 38, on the hammer itself that the small cavity 40 may not become air-bound.

I believe it will be apparent that any satisfactory driving means may be employed with my striking mechanism. The arrangement I have shown has proven very satisfactory and consists of the driven gear 42, idler gear 44, which is adapted to revolve upon the stub-shaft 46, and the driving gear 48. Gear 48 is fixedly secured to the revolvable shaft 50 which in turn is suitably journaled on anti-friction bearings at 52 and 53. In the showing I have made I have indicated an electric driving motor 56. In order to provide sufficient electric power for serious work it is necessary to use a relatively high speed motor. This keeps the weight to a minimum but also requires a large reduction between the motor shaft and the hammer base. This condition is easily met by employing a driving worm 58 and a driven worm gear 60, the latter being fixedly secured to shaft 50.

The electric motor may be controlled in any convenient manner as by the trigger switch 62, which is arranged to interrupt the electric current supplied over the feed wires 64. I have found it very convenient to cover the operator's hand-hold 66 with heavy live rubber. This prevents any danger of electric shock to the operator, and also cushions any vibrations incidental to the operation of the machine. A factor that contributes in a large degree to the satisfactory operation of this machine is an adequate oiling system. In my design I have found it very desirable to use a rather thick oil in the worm cavity 68. Leakage from this chamber is prevented by the oil gland 70. In the gear chamber 72 I prefer to use a lubricating oil of normal consistency which should be varied from light in cold weather to heavy in warm weather. This I have found sufficient to lubricate the gears themselves and by means of the oil chamber 74 and the cross openings 76 and 78 respectively, the oil from chamber 72 is led into the striker chamber 20. The anti-friction bearings at 14 and 16 are normally packed in light grease, and oil retaining glands are provided to retain the grease within the bearing chambers.

Method of operation

In operating my device the first operation necessarily is to turn on the electric current by operation of the switch 62. This starts the motor and causes the hammer base 10 to revolve at relatively high speed. This will normally be from 400 revolutions up, the higher speed being permissible as the hammers are made lighter. Let us assume that a blow has been delivered as shown in Figure 1, wherein the striker, or more properly block 34, has come in full engagement with the tool 32. When two highly tempered steels as these come together there is quite a violent impact and the rebound therefrom drives the entire hammer 18 upwardly within chamber 20. This action is similar to that when a blacksmith strikes his anvil with his hammer. The rebound is unusually quick, and the striker will instantly assume the position as indicated in Figure 3. The hammer base carrying the striking member is then free to revolve past the tool. As soon as the striker has passed the tool centrifugal force begins to act upon the mass of the striking member and quickly restores it to its extended or striking position, as indicated in Figure 4. The mechanism is now ready to deliver the next blow.

The foregoing description and the accompanying drawings clearly disclose a preferred embodiment of my invention but it will be understood that this disclosure is merely illustrative and that such changes in the invention may be made as are fairly within the scope and spirit of the following claims:

What I claim is:

1. In a power hammer, a tool; a revolvable shaft; means for driving said shaft a hammer base fixedly secured to said revolvable shaft; an L-shaped hammer member having a body portion adapted for limited reciprocal movement within and tangent to the circle of rotation of said hammer base; and an L-shaped portion which extends at right angles to the body portion, toward the direction of travel of the hammer for

substantial radial movement in and with respect to the plane of rotation of the hammer under the influence of centrifugal force developed by said base to move said body portion along its path of movement.

2. In a power hammer, a tool; a revolvable shaft; a hammer base fixedly secured to said revolvable shaft; an L-shaped hammer member adapted to a limited reciprocal movement within said hammer base; said L-shaped hammer having a body portion disposed to move on a tangent to the circle of rotation of the hammer base and an L-shaped portion normal to the body portion and extending toward the direction of travel of the hammer and disposed in the plane of rotation of the hammer; the L-portion of said hammer so disposed that the centrifugal force created by revolving said hammer, will be largely directed along the longitudinal axis of the body portion of said hammer; a driving motor; a hand-hold; said tool, motor and hand-hold being co-axially disposed and reduction gear means connecting said motor and said revolvable shaft.

3. In a power hammer, a tool; a revolvable shaft; a hammer base fixedly secured to said revolvable shaft; an L-shaped hammer member adapted to a limited reciprocal movement within said hammer base; said L-shaped hammer having a body portion disposed to move on a tangent to the circle of rotation of the hammer base and an L-shaped portion which extends at right angles away from the body portion toward the direction of travel of the hammer and disposed in the plane of rotation of the hammer; the L-portion of said hammer so disposed that the centrifugal force created by revolving said hammer will be largely directed along the longitudinal axis of the body portion of said hammer; a block inserted into the working face of said hammer member, so disposed as to form a tool engaging surface; a driving motor; a hand-hold; said tool, motor and hand-hold being co-axially disposed and reduction gear means connecting said motor and said revolvable shaft.

In witness whereof, I have hereunto subscribed my name this 25th day of July A. D. 1930.

ROBERT P. MARTIN.