March 21, 1933. M. G. H. OUSBÄCK 1,901,981

MOTOR DRIVEN MECHANICAL HAMMER

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Fig. 1.

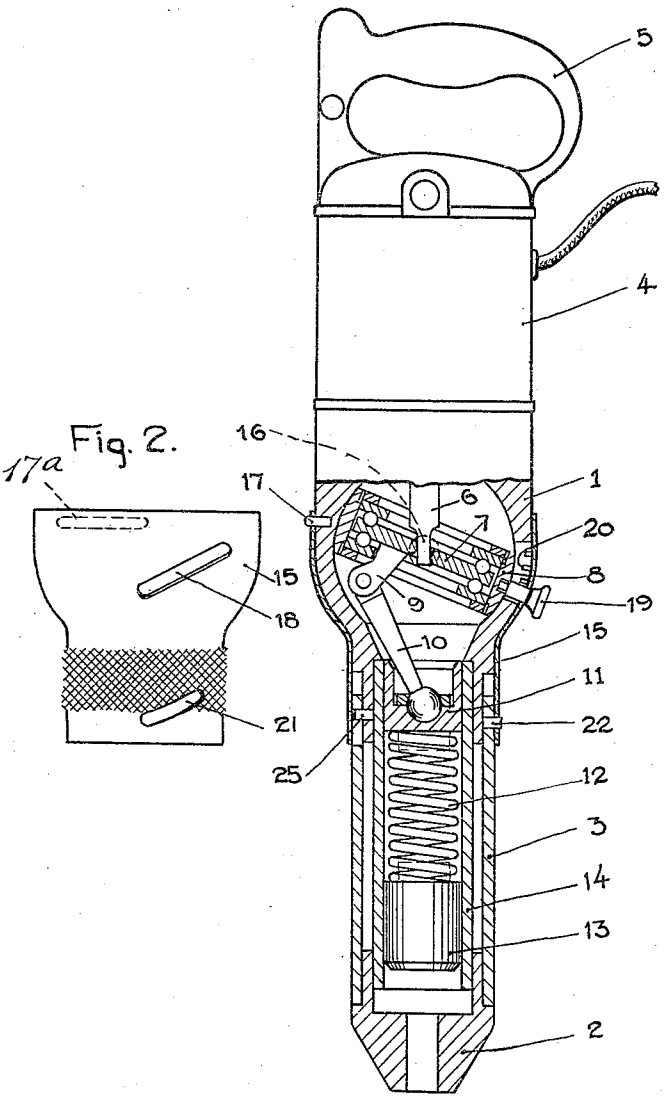
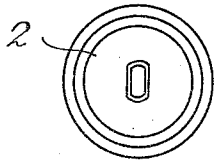


Fig. 2.

Fig. 3.



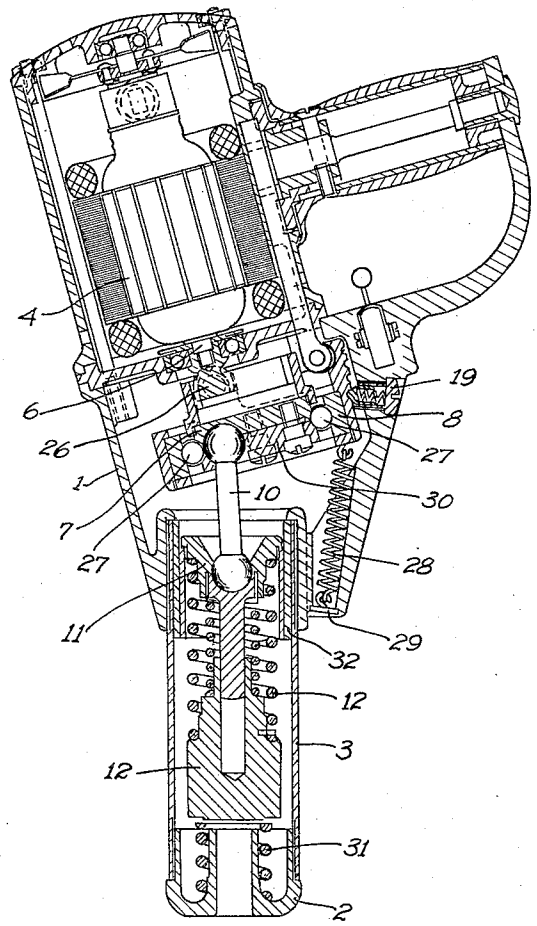
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Fig. 4



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UNITED STATES PATENT OFFICE

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MOTOR-DRIVEN MECHANICAL HAMMER

Application filed January 11, 1932, Serial No. 585,857, and in Sweden January 12, 1931.

This invention refers to improvements in hammers, and relates more particularly to a motor-driven hammer.

An object of this invention is to provide a novel mechanism for reciprocating the striking member of a hammer by a motor-driven rotating element.

Another object is to provide a hammer having means for adjusting the position of said rotating element, for the purpose of changing the length of the stroke of the reciprocating member.

A further object is to provide a hammer connected with a tool-holder, and having means for changing the position of said tool-holder in conformity with the length of the stroke of the reciprocating member.

Still another object is to provide a hammer having a connecting rod or link mechanism combined with a disk-shaped cross-head rotated by a driving shaft, said disk being fitted obliquely in relation to said shaft, and transmitting to the striking member a movement in the approximate direction of the rotating shaft.

The invention will be more clearly understood from the following detailed description, when studied in connection with the accompanying drawings showing a preferred embodiment of the inventive idea.

In the drawings:

Figure 1 shows a motor-driven hammer in side elevation and, partly, in vertical section.

Figure 2 is the side view of a regulating collar.

Figure 3 is a top view of a tool-holder.

Figure 4 shows another modification of the hammer.

The hammer shown in Figs. 1–3 comprises a tool-holder 2 adjustably connected with a casing 1, by means of a sleeve 3. An electric motor 4 is situated within the upper part of the casing 1, which is provided with a handle 5. The driving shaft 6 of the motor 4 is connected, by any suitable means, with a cross-head 7 having the shape of a disk, and rotating on ball-bearings in a guide ring 8 provided with a round side surface. The ring 8 situated within the casing 1 is carried by diametrically opposed studpins 16, one of which is shown by the dotted lines in the drawings. These studpins 16 enable the disk 7 to turn within the casing 1. Due to this arrangement, the studpins 16 will absorb all the shocks occurring during the operation of the hammer, so that these shocks will not be transmitted to the driving shaft 6.

The disk 7 is rigidly connected with a crank web 9, and a connecting rod or link 10 is pivoted to said crank web. The rod 10 is joined to a guide piston 11 by means of a ball joint. A spring 12 is situated between the guide piston 11 and a striking weight 13, and transmits the movement of the piston 11 to the weight 13.

A guide sleeve 14 is situated within the sleeve 3, and is used as a guide for the piston 11, the weight 13 and the tool-holder 2. A regulating collar 15 shown in side elevation in Fig. 2, surrounds the lower part of the casing 1 and the upper portion of the sleeve 3. The collar 15 may be rotated within limits prescribed by a slot 17*a* and a guide stud 17 projecting through said slot, and firmly connected to the casing 1. Another oblique slot 18 is situated on the opposite side of the collar 15, and is used to guide a stop pin 19 passing through a corresponding opening in the casing 1, and fitted in that end of the ring 8, which slants away from the motor shaft 6. It is thus possible to change the angle formed by the ring 8 and the shaft 6 by turning the collar 15, the variation of this angle resulting in a change of the length of stroke of the piston 11, reciprocated by the rod 10 and the crank web 9. The ring 8 may be locked in certain positions by inserting the stop pin 19 into one of the notches 20 provided in the casing 1. A third slot 21 is formed approximately parallel to the slot 18, and is situated below said slot on the collar 15. A pin 22 firmly connected to the sleeve 3 projects through the slot 21, so that the sleeve 3 and the tool-holder 2, connected therewith, can be moved when the collar 15 is rotated, and a certain position of the tool-holder 2 will correspond to a certain length of the stroke.

A guide pin 25 is rigidly connected to the

casing 1 and projects through an opening formed in the sleeve 3. The pin 25 is situated on the other side of the collar, approximately in line with the slot 21.

The hammer operates as follows:

As soon as the electrical motor 4 has been started, the rotation of the motor shaft 6 will be transmitted to the disk 7, the crank web 9 and the rod 10. The rod 10 will reciprocate the piston 11, which will transmit its movement to the striking weight 13 through the intermediary of the spring 12. The rotation of the disk 7 will, therefore, be transformed into a reciprocating movement of the striking weight 13, this transformation taking place without any strain, and with a very small loss of power. The weight 13 will move approximately in line with the rotating shaft.

To adjust the length of the stroke, it is necessary to change the position of the ring 8 with respect to the shaft 6. This is done by releasing the stop pin 19 from its notch and turning the collar 15. The pin 19 will then move with respect to the slot 18. The tool-holder 2 is at the same time correspondingly shifted, while the pin 22 moves in the oblique slot 21. After the adjustment of the stroke has been completed, the stop pin 19 is inserted into one of the notches 20 corresponding to the new adjustment.

Fig. 4 shows another modification of the motor-driven hammer, comprising a casing 1, a tool-holder 2, a sleeve 3 and electric driving means 4 arranged substantially in the same manner as in the modification shown in Figs. 1–3. The driving shaft 6 is connected by means of a joint 26, with a disk-shaped cross-head 7 adapted to rotate on ball bearings 27 carried by a guide ring 8. Said guide ring 8 is connected with a spring 28 carrying a small plate 29, which presses against an edge of the casing 1. One end of the rod 10 is connected with the cross-head 7 by means of a plate 30 screwed to said cross-head, while the other end is connected with a guide piston 11 by means of a ball joint. The lower end of the piston 11 fits into an opening within the weight 13, which is connected with said piston by means of a spring 12. Another spring 31 is situated within the tool-holder 2 and serves to diminish the repercussions of the hammer. A second sleeve 32 is situated within the upper part of the sleeve 3. The position of the ring 8 may be adjusted by means of a stop pin 19 in a way similar to that described in connection with the modification shown in Figs. 1–3.

It is, of course, possible to give the tool other constructional forms than the one just described while keeping within the scope covered by the invention. The link 10 may thus be united to the piston 11 by a pin joint instead of the suggested ball joint, in which case the piston must rotate in the lining sleeve. A non-rotating washer or the like is then suitably inserted between the piston and the spring 12.

The stop pin 19 may be replaced by an ordinary pin, thus eliminating the necessity of making notches in the shell. If an adjustment collar is used, and placed at a point where the operator usually holds the tool with one hand while drilling, the regulation of the stroke can be undertaken most conveniently and without requiring a fresh hold.

The power may be supplied from some other source than an electric motor in the handle of the tool, for example from a stationary motor or the like, by means of a flexible cable.

The ratio of angularity between the two slanting grooves in the collar 15 may naturally vary according to the desired change of position between the tool-holder and the striking weight in relation to the changed obliquity of the disk.

The adjustment of the disk 7, in order to regulate the stroke, can also be carried out by some other means than the one shown by the drawings, both in case of small and big hammers. For large hammers, such as forging hammers, the regulating mechanism may suitably be made in some manner, which enables it to be operated by a pedal. In hand-hammers the stroke adjustment may be combined with a spring or the like for placing the disk in either end position.

What is claimed is:

1. A motor-driven hammer, comprising a driving shaft, means for rotating said shaft, a cross-head connected with and rotated by said shaft in an oblique plane with respect to said shaft, a reciprocating striking member, means including a link member for connecting said striking member and said cross-head, and means for simultaneously adjusting the position of said cross-head with respect to said shaft, and the position of said tool-holder with respect to said striking member.

2. A motor-driven hammer, comprising a casing, a motor having a driving shaft, and connected with said casing, a cross-head within said casing rotated by said driving shaft, a reciprocating striking member, means including a link member for connecting said striking member and said cross-head, a regulating collar surrounding said casing, a member connected with said collar for adjusting the position of said cross-head with respect to said shaft, a tool-holder, a sleeve surrounding a part of said casing and connected with said tool-holder, and means for connecting said sleeve and said regulating collar.

3. A motor-driven hammer, comprising a driving shaft, means connected with said shaft for rotating the same, a reciprocating striking member, a crosshead connected with and rotated by said shaft in an oblique plane with respect to the central line along which

said striking member reciprocates, said central line meeting said crosshead substantially at the center thereof, means including a link member for connecting said striking member and said crosshead substantially on said line, and means connected with said crosshead for adjusting the position thereof with respect to said line.

4. A motor-driven hammer, comprising a casing, a motor having a driving shaft projecting into said casing, a guide ring within said casing, bearings connected with said guide ring, a crosshead rotated on said bearings by said driving shaft, a striking member reciprocating along its central line which meets said crosshead substantially at the center thereof, means including a link member for connecting said striking member and said crosshead substantially on said central line, a regulating collar surrounding said casing, and a member connected with said collar for adjusting the position of said crosshead with respect to said shaft.

5. A motor-driven hammer, comprising a casing, a motor having a driving shaft and connected with said casing, a guide ring within said casing, bearings connected with said guide ring, a crosshead rotated by said driving shaft, a reciprocating striking member, means including a link member for connecting said striking member and said crosshead, a regulating collar surrounding said casing, a slot formed in said collar, a plurality of openings formed in said casing, and a pin projecting through said slot and one of said openings and adapted to adjust the position of said crosshead with respect to said shaft.

In testimony whereof I have affixed my signature.

MATS GÖSTA HARRY OUSBÄCK.