Aug. 18, 1931. E. H. W. WEIBULL ET AL 1,819,139

STRIKING TOOL

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Fig. 1.

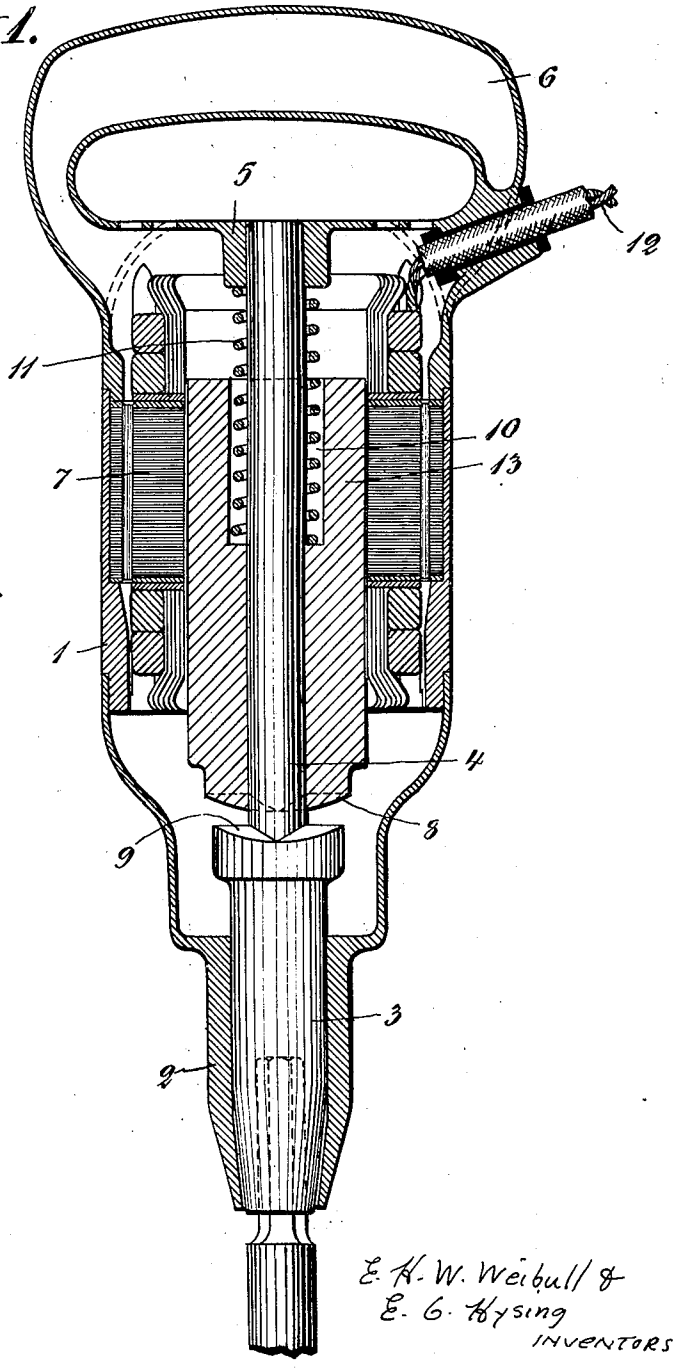

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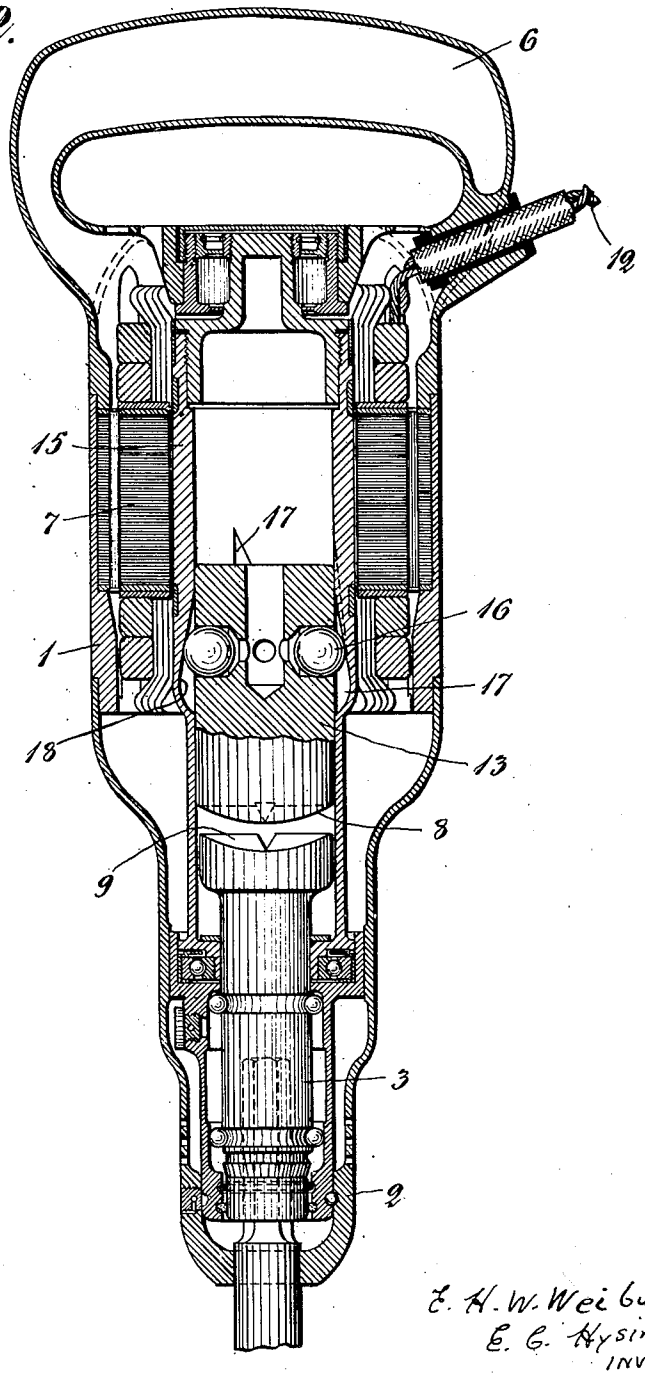
Fig. 2.



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UNITED STATES PATENT OFFICE

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STRIKING TOOL

Application filed January 18, 1929, Serial No. 333,302, and in Sweden January 27, 1928.

The present invention relates to an improvement in striking tools of the type provided with a reciprocating striking-body or bodies, in which tools a member rotated by an electric motor is utilized to produce the movement.

In striking-tools of this kind hitherto known, the electric motor has been carried out as a common direct current or alternating current motor provided with a rotor having coil-windings. This arrangement has proved unsatisfactory on account of the relatively low number of revolutions used.

As the weight of the striking tool cannot be increased beyond a certain limit, if using the tool in question as a hand tool it has not been possible to make these striking-tools, already known, for larger work, on account of the relatively small number of revolutions of the motor. Difficulties have been encountered in efforts to increase the number of revolutions of the motor, the coil-windings of the motor rotor being torn off or detached from the influence of the compound stresses which arise by the increased number of revolutions of the rotor and the striking stresses caused by the working of the striking body. Further, it has been found that the coil-windings of the rotor are subject to a detrimental overheating unless a motor of large dimensions is chosen as proper cooling is a difficult problem.

It has been found that, by employing an alternating current motor, provided with short-circuited rotor, as a driving motor the previous difficulites are overcome. By using such a rotor the number of revolutions of the motor may without any difficulty be greatly increased, which results in an increase in the force of the blow of the striking body without any increasing of the weight of the striking body or the tool. Consequently the striking tool may have a wider range of use and at the same time wearing and supervision of the commutators, and the brushes and the like, present for instance in commutator motors, are avoided.

According to a special embodiment of the invention the short-circuited rotor may be made hollow to receive a part of the striking-device. Further, the short-circuited rotor may also slide axially in relation to the stator winding and be a part of the striking body. In this event it may be suitable that the length of the short-circuited rotor is chosen to be equal to the length of the stator winding, together with the amount of the intended axial displacement of the rotor; likewise, the length of the stator winding may be equal to the length of the rotor, together with the amount of the intended axial displacement of the rotor.

Other characteristic features of the invention will be more closely set forth in the following in connection with the description of the embodiments illustrated in the annexed drawings, in which:—

Fig. 1 is a longitudinal section of a striking tool constructed in accordance with the invention.

Fig. 2 is a similar view of a modification of the invention.

Referring to Fig. 1, 1 is a frame. Mounted to slide axially and possibly also to turn in the front part 2 of said frame is an anvil 3. This anvil, which is capable of only a relatively small axial movement is, besides, supported by means of the shaft 4 journaled in the rear part 5 of the frame; this part 5 is provided with a handle 6. Besides, the frame 1 contains a stator winding 7 and a short-circuited rotor 13 cooperating therewith, said rotor, possibly, consisting of a solid iron-core.

In the embodiment shown in the drawings the short-circuited rotor is provided with an axial central channel receiving the shaft 4; and, besides, the rotor is mounted to slide axially on this shaft and shaped as a striking-body, cooperating with the anvil 3; for this purpose the anvil as well as the rotor are, at the adjacent ends, provided with oblique striking faces 8 and 9 respectively.

As obvious from the drawings, the length of the rotor is considerably greater than the length of the stator winding, in order to permit displacement of the rotor axially in relation to the stator winding without interrupting the field of the alternating current. The rear end of the rotor has a counter boring or the like 10 to receive one end of a spring 11,

acting as an energy storer; the other end of said spring rests against the frame part 5. The conductors 12 supply the electric energy to the stator winding 7.

The arrangement works in the following manner.

When the stator winding 7 is supplied with electric current, the short-circuited rotor 13 is rotated and is caused incident to rotation, to perform a rapid reciprocating movement. The forward movement is effected under the influence of the spring 11 and the backward movement by the camming action of the oblique faces 8 and 9 in conjunction with the rapid rotation of the rotor.

At this backward movement the spring 11 is compressed and stores energy, which will then be delivered by the rotor being thrown forward in the direction towards the anvil 3, and after this the same operation recurs.

On account of the great length of the rotor, the alternating current field of the stator winding will not be interrupted by the axial reciprocating movement of the rotor, but during its axial movement, the rotor will maintain a continuous rotating movement as long as the stator winding is supplied with electric energy, although, at the same time, a certain reduction in velocity occurs. This rotation is, at this time, counteracted by the alternating current field in about the same manner as if the rotor were influenced by an energy storing torsion spring.

In the embodiment according to Fig. 2 the short-circuited rotor includes a guiding-sleeve 15, mounted to turn, but not to slide in the frame 1, and receiving the striking body 13; the energy storer consists, in this case, of balls 16 which roll in grooves 17 in the sleeve 15 and, thus, force the striking body to rotate with the sleeve. By this rotation the balls 16 are influenced by the centrifugal force and a suitable inclination of the bottoms 18 of the grooves 17 develops a camming action causing the balls to move inwardly while the striking body moves in a direction away from the anvil 3, the balls 16 being thus forced to move against the influence of the centrifugal force.

This specific arrangement of balls, however, forms no part of the present invention and is, in this connection, described only to set forth the working manner of the arrangement according to Fig. 2.

Having now particularly described the nature of our invention and the manner of its operation, what we claim is:

1. A striking tool, including a frame, an electric motor drive device located in said frame and including a hollow stator, an anvil, and a striking body associated with the anvil and axially and rotatably movable through the hollow stator, and means acting in response to centrifugal force during rotation of the striking body to urge the latter in the direction of the anvil.

2. A striking tool, including a frame, an electric motor drive device located in said frame and including a hollow stator, an anvil, and a striking body associated with the anvil and axially and rotatably movable through the hollow stator, and means acting in response to centrifugal force during rotation of the striking body to urge the latter in the direction of the anvil, said means including centrifugal bodies moving with the striking body.

3. In a striking tool, a frame, an electric motor drive device mounted in said frame, including a stator, a hollow sleeve-like member rotatably mounted therein, a movable anvil mounted in said frame, and a striking body associated with the anvil and mounted for axial movement through the sleeve-like member and stator, and means actuated in response to centrifugal force during rotation of the striking body to urge the latter toward the anvil.

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