April 5, 1932. H. NIELSEN 1,852,668

MECHANICAL HAMMER

Filed June 17, 1930 3 Sheets-Sheet 1

Fig. 1.

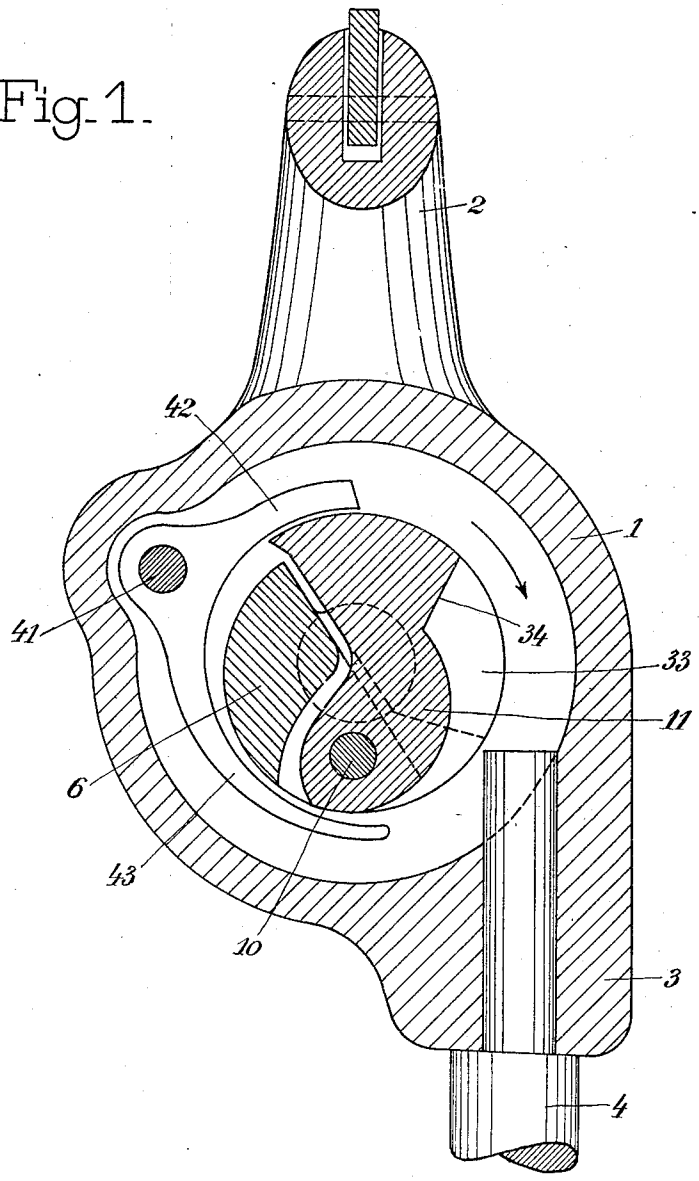

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Fig. 2.

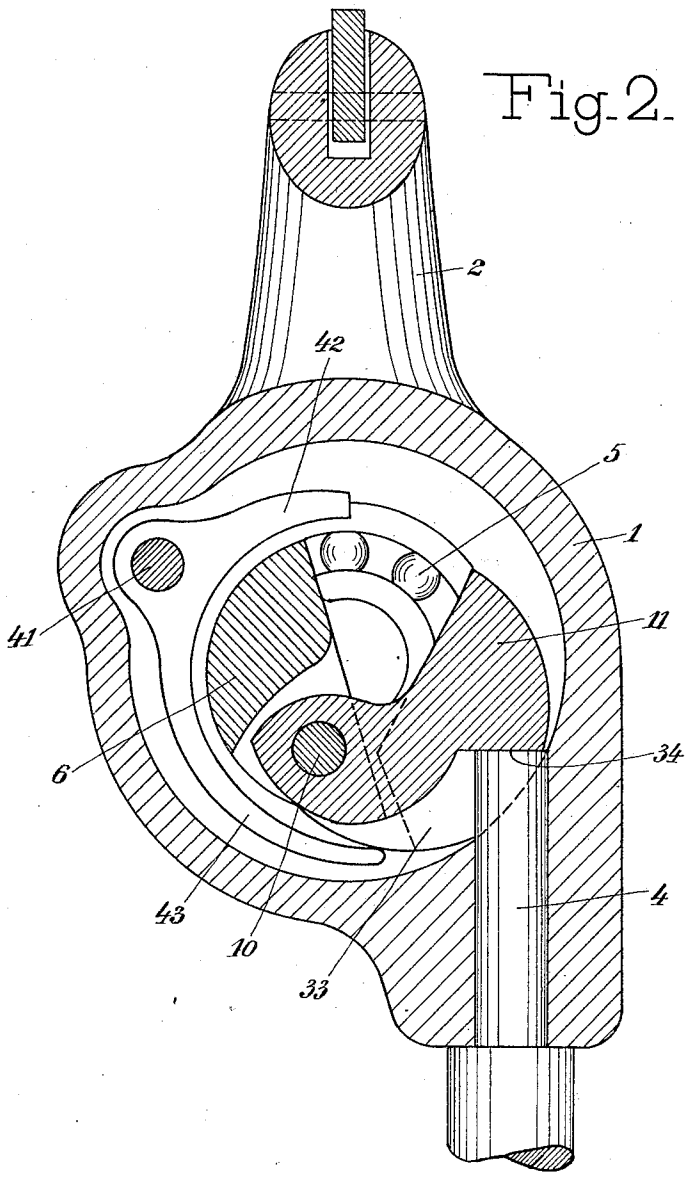

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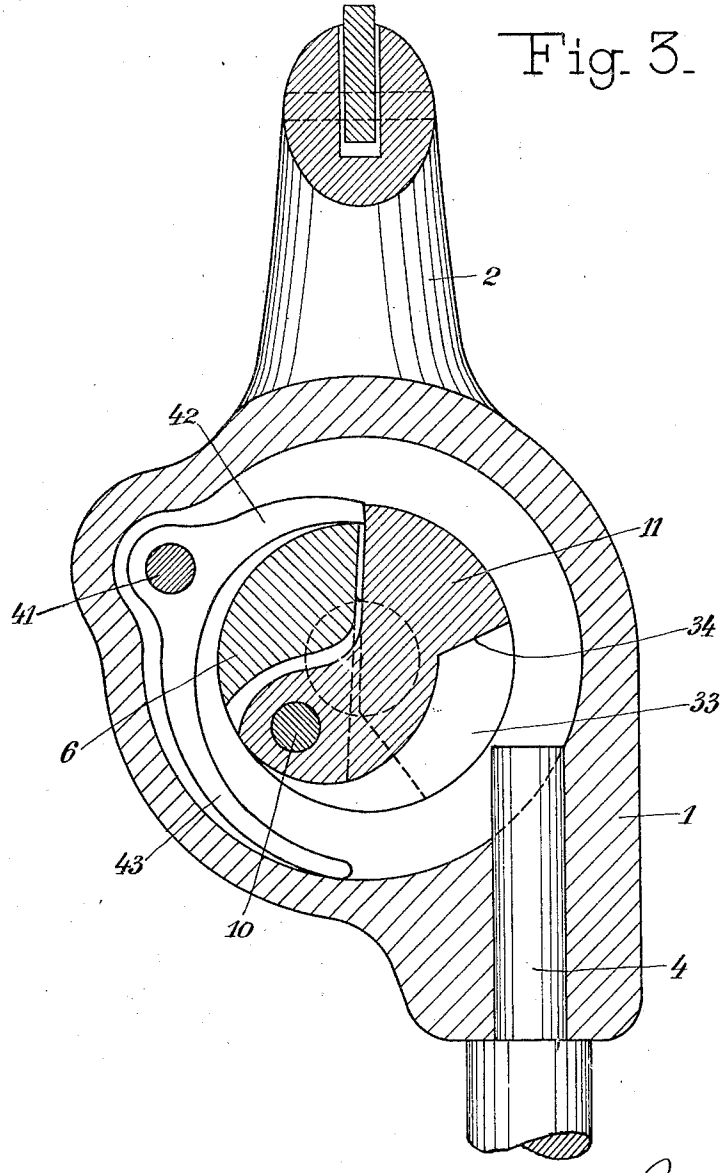
Fig. 3.



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1,852,668

UNITED STATES PATENT OFFICE

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MECHANICAL HAMMER

Application filed June 17, 1930, Serial No. 461,815, and in Germany February 24, 1930.

Mechanical hammers of the kind by which one or more striker blocks are suspended from a rapidly rotating member, and are flung outward by centrifugal force and thereby strike a tool, are subject to objections in that the striker block, after hitting the tool is repelled therefrom, and the recoil action from the impact is thereby taken up by the rotary member supporting the striker block. The motion of this member, which in the following will be referred to as the rotor, is retarded by the striker block rebounding from the tool, as the rotor has to absorb the kinetic energy of the rebounding striker block, and then has to accelerate the striker block again, so that the latter acquires the same speed forward as the rotor itself. At the moment when the rotor is hit by the rebounding striker block its rotary speed is reduced considerably, and the rotor may even be stopped for a moment or forced to rotate backward for some short distance, until the return motion of the striker block has been stopped, whereafter the rotor once more rotates forward. Especially if the rotor is connected to the driving motor by a flexible shaft the effect of the recoil of the striker block will be considerable. The regular recoil impacts of the striker block against the rotor cause the latter to move so irregularly that the flexible shaft will be strained far more than otherwise it would without these impacts, and that amount of heat will be generated in the moving parts, whereby the time during which the hammer can work continuously will be limited. The recoil impacts from the striker block exposes the hammer to a very considerable wear causing the hammer to be worn out much sooner than otherwise would be the case, if these recoil blows did not occur.

It has been attempted to avoid or reduce the effect of the recoil blows of the striker block by inserting, between the rotor and the striker block, a shock absorber, for instance in shape of a chamber in which the atmospheric air is compressed by action of the striker block, but devices of this kind increase the generation of heat and have therefore not come into common use in practice.

In hammers of the kind described in U. S. A. Patent 1,770,656 granted to me July 15, 1930, where a locking mechanism is inserted between the rotor and the striker block, which mechanism after each stroke locks the striker block to the rotor, the violent recoil impacts of the striker block on the rotor causes the locking mechanism to be exposed to heavy strains, which may mean a danger of breaking the lock.

The present invention consists in the provision, in connection with the casing enclosing the rotor and providing bearings for the same, of an arm which for each blow of striker block against the tool is automatically brought into such a position that it will be hit by the striker block when the latter rebounds from the tool, so that the kinetic energy of the striker block produced by the recoil will be transmitted by way of the said arm to the stationary casing enclosing the hammer, while the rotor remains unaffected. After the striker block, during its return motion, has struck the said arm the recoil action from this last impact will impart to the striker block a motion forward in the direction of rotation of the rotor, and as the rotor reaches forward to the striker block at the very moment when the latter strikes the said arms, the locking of the striker block to the rotor will be effected easily and without any hindrance. The rotor and the flexible shaft will therefore not have to take up the recoil blow from the striker block and, consequently, the hammer will be worn less and heated less, and its blowing effect measured relatively to the consumption of power will be greater, because the motion of the rotor will

be more uniform and will not be counteracted by the recoil of the striker block.

One construction of the invention is illustrated on the drawings, where

Fig. 1 shows a section of a mechanical hammer, of the kind specified in said Letters Patent, at right angles to the axis of rotation of the rotor, and with the rotor in the position in which the locking mechanism between the rotor and the striker block is automatically released,

Fig. 2 a corresponding view of the hammer in the position where the striker block, after having been swung out from the rotor, strikes the tool, and

Fig. 3 a view of the hammer at the moment when the striker block, after having struck the tool and after rebounding from the latter, hits the arm disposed in connection with the hammer casing and, thus, instead of the rotor receives the injurious blow from the striker block.

The casing 1 enclosing the hammer is fitted with a handle 2 and has a bore 3, in which there may be inserted a tool 4, for instance a chisel, a button-set or the like. The two side walls of the casing are fitted with ball-bearings 5, Fig. 2, for a shaft supporting the rotor 6. The latter is fitted with a pin 10 parallel to the shaft of the rotor and supporting the striker block 11, which is fitted with a milled recess 33 one wall 34 of which forms a hammer face by means of which the striker block hits the tool 4 once for every revolution of the rotor 6.

Between the rotor 6 and the striker block 11 there is inserted a locking mechanism, which is not shown on the drawings and the construction of which is otherwise irrelevant to the present invention.

The casing 1 is fitted with bearings for a pin 41 parallel to the shaft of the rotor and serving as pivot for an arm 42. The arm 42 is integral with another arm 43, and the two arms together have the shape of a semicircle engaging the rotor 6 with the striker block 11.

When the above mentioned members are in the position shown in Fig. 1, and the striker block 11 is locked to the rotor 6, then the latter and the striker block can freely rotate without the interconnected arms 42 and 43 being moved relatively to the pin 41. If, however, in the position shown in Fig. 1 the lock binding the striker block 11 to the rotor 6 is released, then the striker block while actuated by centrifugal force will be flung out into striking position and immediately thereafter hit the tool 4, as shown in Fig. 2. About simultaneously the striker block, as shown in Fig. 2, strikes the end of the arm 43 and, thereby, turns the arm 42 inward towards the axis of rotation of the rotor. In consequence hereof the striker block, when rebounding from impact on the tool 4, as shown in Fig. 3, will hit the end of the arm 42 which absorbs and annihilates the impact from the striker block, without the latter hitting the rotor 6. Simultaneously the striker block is again locked automatically to the rotor 6, and it participates then in the rotation of the latter, without being flung out by centrifugal force, until the lock between rotor and striking block is released again, which occurs when the rotor has once more reached the position shown in Fig. 1.

In order to mitigate the violent impact between the striker block 11 and the arm 43 the pin 41 may be resilient, or it may be rigid and be journaled in resiliently disposed bearings in the hammer casing 1. Thereby the further advantage is attained that the striker block, whenever it hits the end of the arm 42, will receive a push forward in the direction of motion of the rotor, so that the latter will not be charged with the work of accelerating the striker block.

If the arm 42 is loaded by means of a spring pressing it inward in the direction of the rotor shaft, then the arm 43 may be dispensed with, but a spring will act less reliably and be more exposed to fracture.

The arms 42 and 43 will further cause the striker block 11, when the rotor is running and the tool 4 has been removed, to be turned automatically towards the rotor into the position shown in Fig. 1, where the lock binds it to the rotor, when the automatic releasing mechanism of the lock has been set out of operation. Hereby the drawback is avoided that the rotor might revolve with projecting striker block when the tool 4 has been removed.

The invention may be used in other constructions than the one shown on the drawings, and it may be mentioned especially that the arm 42, the stop or the like which the striker block hits after having rebounded from the tool may be of any shape suited to the purpose, when only it is arranged in such a manner that the impact from the striker block will be transmitted therethrough to the stationary casing of the hammer and not to the rotor.

I claim:

1. A mechanical hammer comprising a casing, a revoluble body, a striker block pivotally connected to said body and arranged under the influence of centrifugal force to be flung against a tool at every revolution of said body, an arm pivotally disposed about a pin with bearings in the casing eccentric to the axis of rotation of the revoluble body and adapted to absorb the impact from the striker block, when the latter rebounds from impact on the tool, so that this impact is transmitted to the casing by way of the said arm.

2. A mechanism hammer comprising a casing, a revoluble body, a striker block pivotally connected to said body and arranged under the influence of centrifugal

force to be flung against a tool at every revolution of said body, a fork-shaped arm pivotally mounted in the casing and eccentric to the axis of rotation of the revoluble body, one branch of the said arm, while actuated by the striker block, being moved in such a manner that the other branch of the arm will be moved ino the path of the striker block rebounding from impact on the tool and, thereby, will absorb the impact from the block.

In witness whereof I affix my signature.

HERMAN NIELSEN.