J. KUNZ.

MECHANICAL HAMMER.

APPLICATION FILED OCT. 21, 1908.

1,046,809.

Patented Dec. 10, 1912.

2 SHEETS—SHEET 1.

Fig. 1.

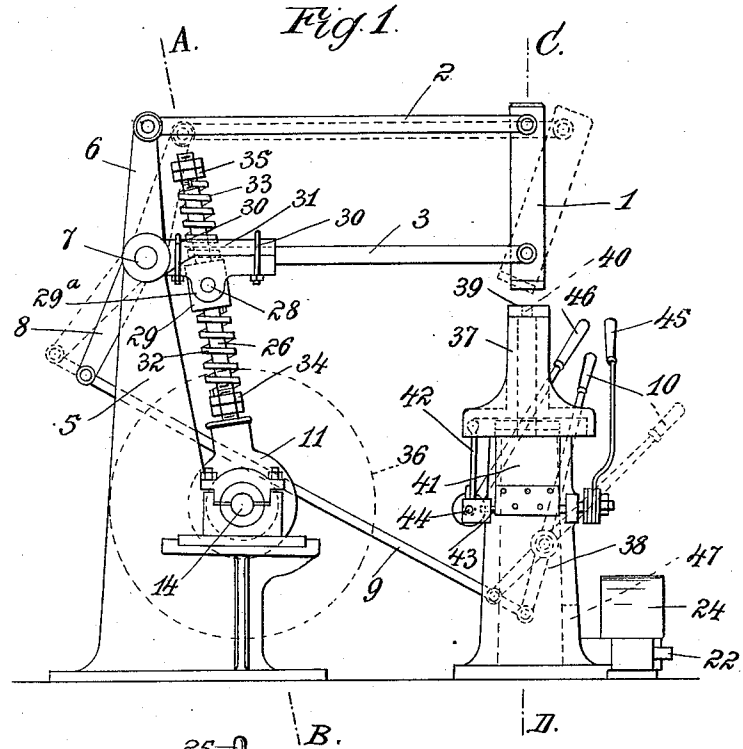
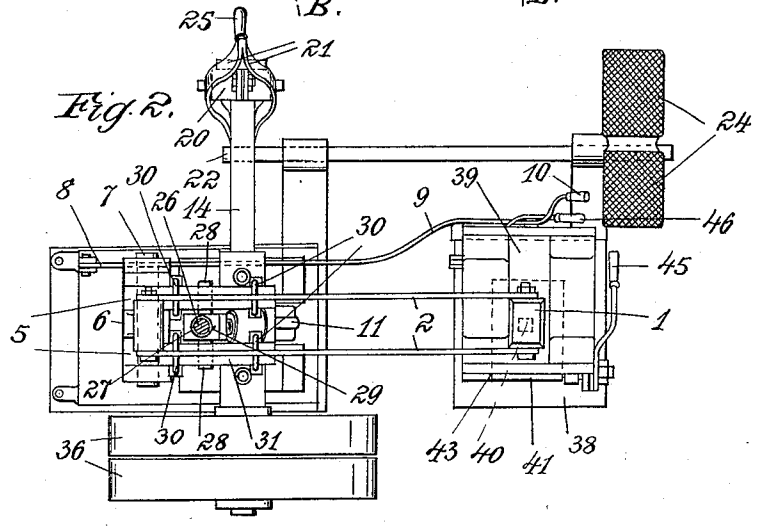


Fig. 2.



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2 SHEETS—SHEET 2.

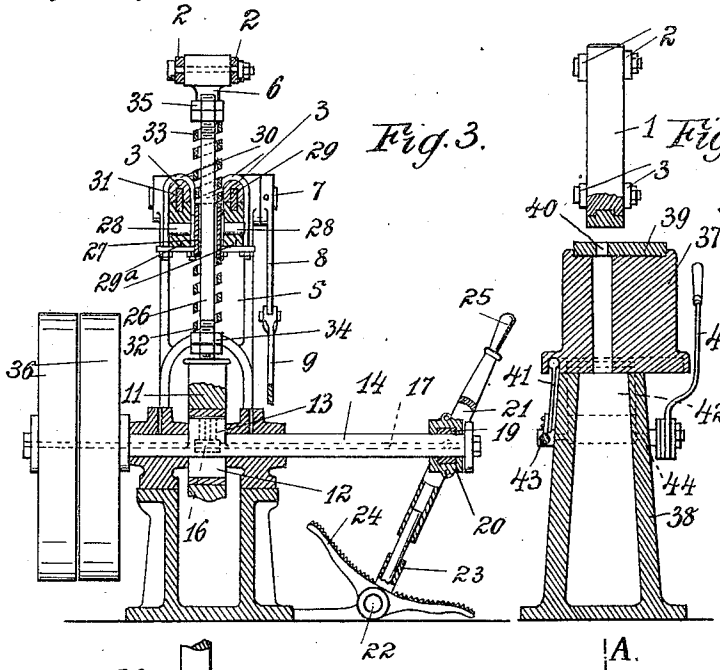

Fig. 3.

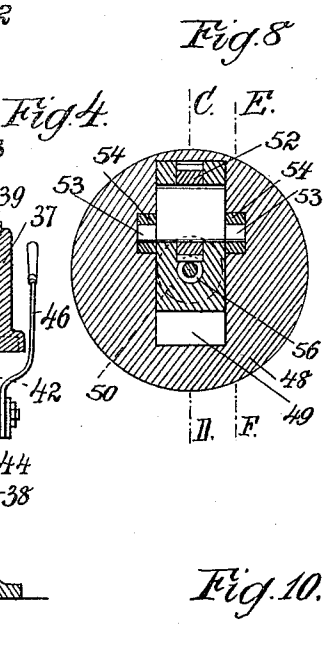

Fig. 4.

Fig. 8.

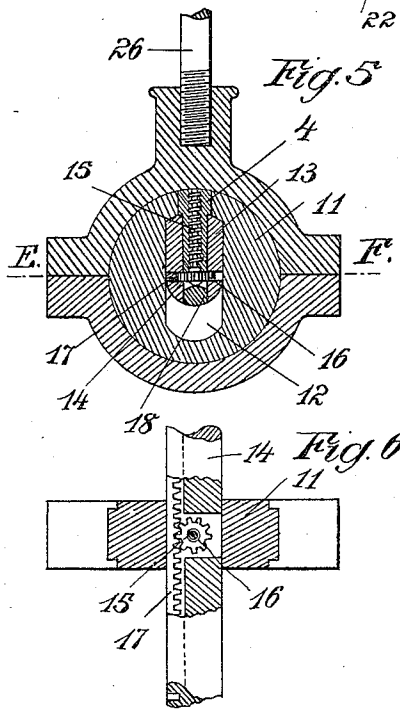

Fig. 5.

Fig. 6.

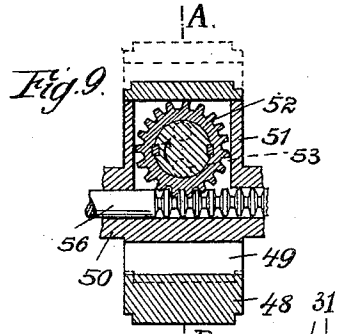

Fig. 9.

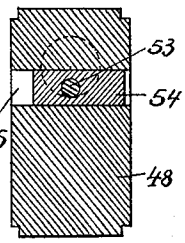

Fig. 10.

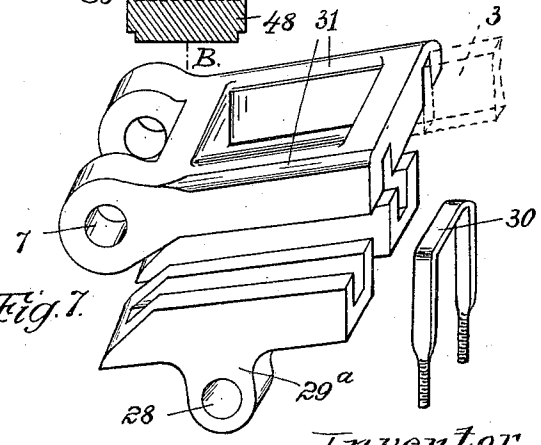

Fig. 7.

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UNITED STATES PATENT OFFICE.

JEAN KUNZ, OF CRONBERG-IN-THE-TAUNUS, GERMANY.

MECHANICAL HAMMER.

1,046,809. Specification of Letters Patent. Patented Dec. 10, 1912.

Application filed October 21, 1908. Serial No. 458,763.

To all whom it may concern:

Be it known that I, JEAN KUNZ, manufacturer, a subject of the German Emperor, and resident of Hartmutstrasse No. 1, Cronberg-in-the-Taunus, Germany, have invented new and useful Improvements in Mechanical Hammers, of which the following is a specification.

This invention relates to a mechanical hammer designed to perform smithy work which has hitherto been done by hand, so that a whole series of forging operations can be carried out which were not possible with existing mechanical hammers. For this purpose the hammer is so constructed that its inclination to the vertical can be altered during the work, that is, between successive strokes, without varying the spot at which it strikes the anvil. Moreover, the anvil can be moved in two directions on its bed during working and between successive strokes so as to bring not only the anvil plate, but also the swage hole or one or other edge of the anvil plate under the hammer, whereby it is possible in the simplest manner to perform operations of welding, swaging and the like.

The hammer forms one side of a jointed parallelogram of rods driven by an eccentric, the throw of which can be adjusted from zero to a maximum value. The eccentric is shifted on its shaft by a screw spindle turned through a small pinion in gear with a rack operated by a hand lever. The arrangement enables the stroke to be varied directly during the work. The parallelogram of rods has the advantage of always keeping the hammer parallel to itself. By inclining that side of the parallelogram which is parallel to the hammer the latter is itself inclined in such a manner that it always strikes nearly the same spot on the anvil. Even at this inclination the hammer remains always parallel to itself and receives the blow directly.

Hammers which can be inclined have already been suggested, but in these the hammer turned at its upper end about an axis, so that the inclined hammer struck a different spot on the anvil. Moreover, these hammers could not be inclined while in operation, that is to say, the inclining of the hammer occupied so much time that it could not be effected between the strokes. Hammers with sliding anvils have also been suggested but only for the purpose of preliminarily adjusting the anvil to the hammer and not during the operation itself; thus a simple screw spindle was all that was necessary to move the anvil.

In a modified construction according to this invention the stroke of the eccentric is varied by turning a toothed wheel contained in the cam of the eccentric shaft and having eccentric pins engaging in the eccentric disk so that the turning of the wheel determines the shifting of the eccentric on its shaft. The toothed wheel is placed in a slot in the eccentric shaft and the two pins are journaled in bearing blocks adapted to slide on each side of the said slot in two slots in the eccentric disk parallel to the eccentric shaft. The toothed wheel is turned by a rack constructed so that it can remain stationary within the shaft of the eccentric while the wheel rotates around it.

The accompanying drawings illustrate the hammer, Figure 1 being a side elevation, Fig. 2 a plan, Fig. 3 a section on line A—B of Fig. 1 and Fig. 4 a section on line C—D of Fig. 1. Figs. 5 and 6 show sections through the adjustable eccentric, Fig. 6 being a section on line E—F of Fig. 5. Fig. 7 shows in perspective the movable point of application of the eccentric rod on the parallelogram of rods.

The modified construction of the eccentric is shown in Fig. 8 in section on the line A—B of Fig. 9, which shows a section on line C—D of Fig. 8. Fig. 10 is a section on line E—F of Fig. 8.

The hammer 1 is carried by parallel rods 2, 3 pivoted at one end to the hammer and at the other end to a lever 6 journaled in the frame 5. The lever 6 is rigidly connected with an arm 8 by the shaft 7; rod 9 connects this arm 8 with a hand lever 10. By shifting the hand lever 10 lever 6 is inclined more or less either to the right or to the left and the hammer 1 is correspondingly inclined. One of these positions is shown dotted in Fig. 1.

In order to drive the hammer, rod 3 is connected with an eccentric 11 of adjustable throw. The eccentric has a slot 12 (Figs. 5 and 6) through which the eccentric shaft 14 extends engaging therein by means of a projection 13. In a bore in the latter is adapted to slide a nut 4 which is fixed in the eccentric 11. In the nut 4 there is a screw spindle 15, having at its end a pinion 16 with which gears a rack 17. The rack 17 slides in a

groove in the eccentric shaft 14. A plug 18 closing the bore through the projection 13 serves at the same time as a bearing for the screw spindle 15.

As shown in Fig. 3, on the end of the rack 17 is fixed a ring 19, which turns with the eccentric shaft 14 and with which a two part stirrup 20 engages, in its turn engaged by a fork 21. The fork can slide in a longitudinal direction and is connected with a lever 23 centered at 22, on which lever a double pedal 24 is fixed; at its upper end the fork has a handle 25. By turning the lever 23 by means of the pedal 24 or by the hand lever 25 ring 19 and with it rack 17 within the eccentric shaft 14 are displaced; the pinion 16 is thus rotated in one direction or the other and the screw spindle displaces the nut 4 and with it the whole eccentric, thus altering the throw of the latter and also the stroke of the hammer.

The eccentric rod 26 extends through an opening 27 in a cross piece 29 which carries two pins 28 (Figs. 3 and 7) journaled in suitable bearings 29[a] adjustably mounted on the rods 3. The bearings 29[a] are fixed to the rods by the screw hoops 30 which surround the rods 3 or the casting 31 forming the head thereof. Surrounding the eccentric rod 26 are two powerful springs 32 and 33 adjustable by screw nuts 34, 35 respectively. Spring 32 bears on the underside of the cross head 29 and spring 33 bears on the upper side thereof. The motion of the eccentric is therefore transmitted through these two springs to the parallelogram formed by rods 2 and 3 and hammer 1 and lever 6 so that there is obtained a spring action similar to that of a pneumatic hammer. If there is only a small amount of power available to drive the hammer, the point of connection of the eccentric rod can be shifted along the parallelogram rods 3 after releasing screw hoops 30. The eccentric shaft 14 is driven by the fast and loose pulley 36.

The anvil 37 rests free on a column 38 and has on top a plate 39, which has at one side a swage hole 40. On its under surface at each of two edges the anvil has a groove in which engages an iron plate 41, 42 having a suitably rounded head. These plates turn with shafts 43, 44 to which are fixed the hand levers 45, 46 respectively. By turning lever 45 or 46 the whole of the anvil is displaced on its column 38 in one direction or the other, so that the plate 39 and the swage hole 40 can be brought under the hammer 1, or if the lever 46 is moved, the front or back edges of the anvil can be brought under the hammer. The hole 40 is carried down right through the anvil so that the hammer scale can fall into the hollow interior of the column whence it is removed through a side opening 47.

The hammer operates as follows:—Pulley 36 drives shaft 14 and through this the eccentric 11 and rod 26. The springs 32, 33 between the nuts 34 and 35 on the one hand and the cross head 29 on the other transmit the motion of the eccentric to the lower rods 3 of the parallelogram and so to the hammer 1. By adjusting the hand lever 25 or the pedal 24 the rack 17 is shifted and moves, by means of the screw spindle 15, the eccentric more or less in one direction or the other, thus altering the stroke thereof and the stroke of the hammer 1. By adjusting the hand lever 10 the lever 6 of the parallelogram inclines either forward or backward and the hammer 1 is similarly inclined. When only a small source of power is available the point of application of the eccentric can be shifted by loosening the screw hoops 30 and moving the bearing 29[a] together with the cross head 29 farther toward the right along the rods 3 (Fig. 1).

By means of the levers 45 and 46 the anvil can be moved in two directions, so as to bring either the swage hole or the front or back edge of the table under the hammer, the edge being required for setting off.

In the construction shown in Figs. 8–10 the eccentric disk 48 has a slot 49 through which the shaft 50 extends, the portion of the shaft within the slot being formed like a casing 51 wherein is housed a toothed wheel 52. This wheel has on each side an eccentric pin 53 journaled in a block 54 which can slide in a slot 55 in the eccentric disk parallel to the axis thereof. Through the hollow shaft 50 extends a toothed rod 56 adapted to remain stationary while the toothed wheel rotates around it in the plane of the eccentric. By sliding the toothed rod 56 in an axial direction the wheel 52 is turned on its axis so that owing to the eccentric pins 53, the disk 48 is moved in a plane at right angles to its shaft, the journal blocks 54 sliding in the slots 55. In Fig. 9 the two extreme positions of the eccentric pins are shown in dotted lines which correspond with the zero position and that of the maximum throw of the eccentric respectively. Rack 56 can be slid by a hand lever or otherwise. This adjustable eccentric can be used quite generally as a machine element for other devices than a mechanical hammer in which the throw of an eccentric has to be varied during working.

The adjustment of the throw of the eccentric and of the anvil can be effected in other ways than those described.

Having thus described the nature of my invention and the best means I know of carrying the same into practical effect, I claim:—

1. The combination of a support, a rod, pivotally mounted on said support, a hammer pivotally carried by said rod, an angle lever, a second rod pivotally connected with

one member of said angle lever and with said hammer, and means connected with the other member of said angle lever operative during the operation of the hammer for shifting said lever and said second named rod to change the direction of the hammer's stroke.

2. The combination of a hammer, mechanism for operating said hammer, means for changing the direction of the stroke of said hammer, an adjustable anvil with which said hammer coöperates and means for adjusting said anvil relatively to said hammer during its operation.

3. The combination of a hammer, a support, means movably mounted on said support and directly connected with said hammer for changing the angle of said hammer in its plane of motion and mechanism for operating said hammer connected with said means at a point between the support and the hammer.

4. The combination of a hammer, a driving shaft, an eccentric mounted on said shaft to rotate therewith and movable transversely thereto, said eccentric being connected with the hammer, means movable lengthwise of said shaft for shifting said eccentric transversely of the shaft to regulate the hammer blow and a pivoted lever pivotally connected with said means for positively moving it in opposite directions.

5. The combination of a hammer, a driving shaft provided with a longitudinal recess, an eccentric connected with said hammer and mounted on said shaft to rotate therewith and movable transversely thereto, means movable in said recess for shifting said eccentric transversely of the shaft to regulate the hammer blow and a pivoted lever pivotally connected with said means for positively moving it in opposite directions.

6. The combination of a hammer, a driving shaft, an eccentric connected with said hammer and mounted on said shaft to rotate therewith and movable transversely thereto, a rack and pinion on said shaft and eccentric in engagement with each other, and means for positively operating said rack and pinion in opposite directions to move the eccentric relatively to said shaft to regulate the hammer blows.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two witnesses, this ninth day of October 1908.

JEAN KUNZ.

Witnesses:
JEAN GRUND,
ROBERT BRIHL.