

July 12, 1932.

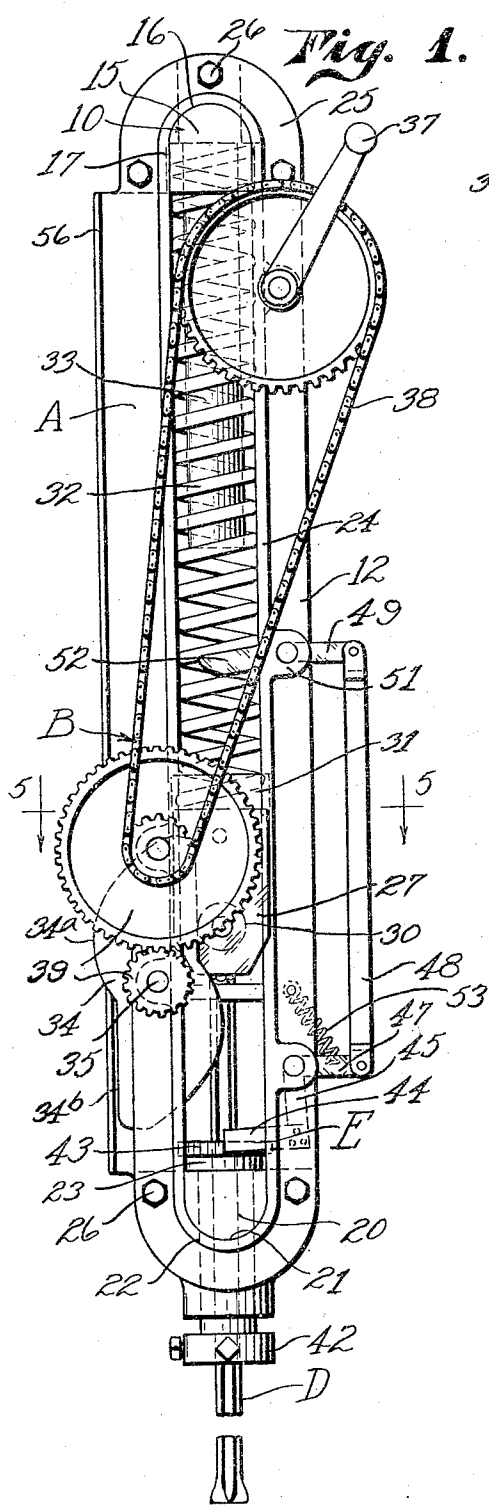
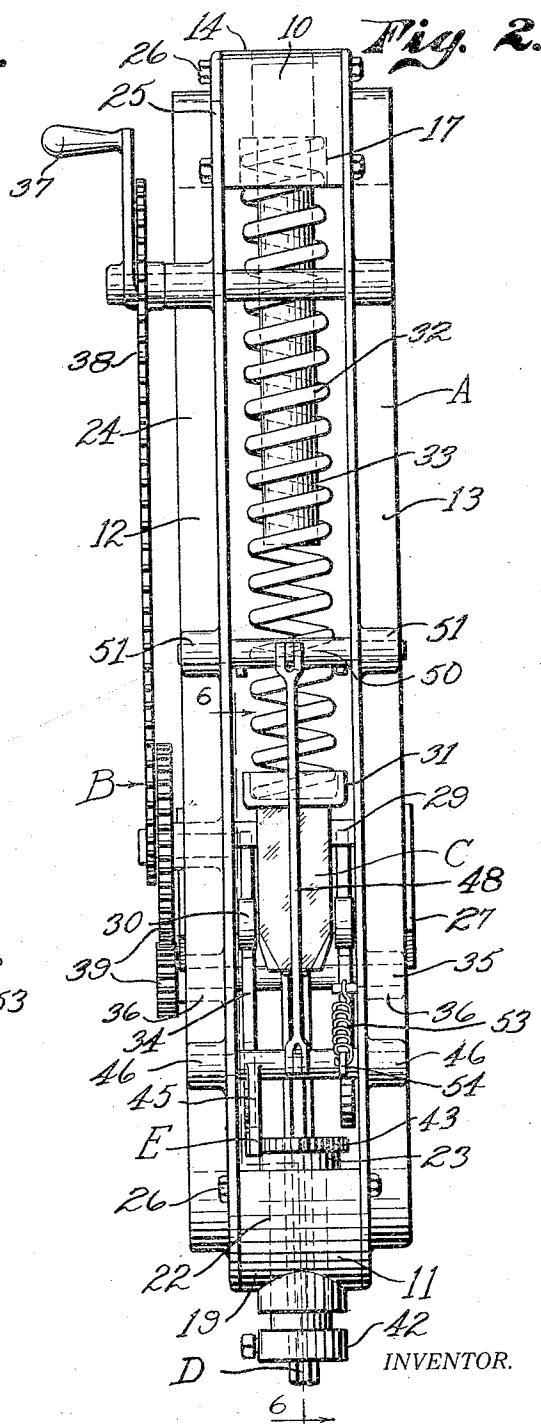
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1,867,201

HAMMER

Filed Dec. 12, 1927

2 Sheets-Sheet 1



INVENTOR.
Walter A. Babb.

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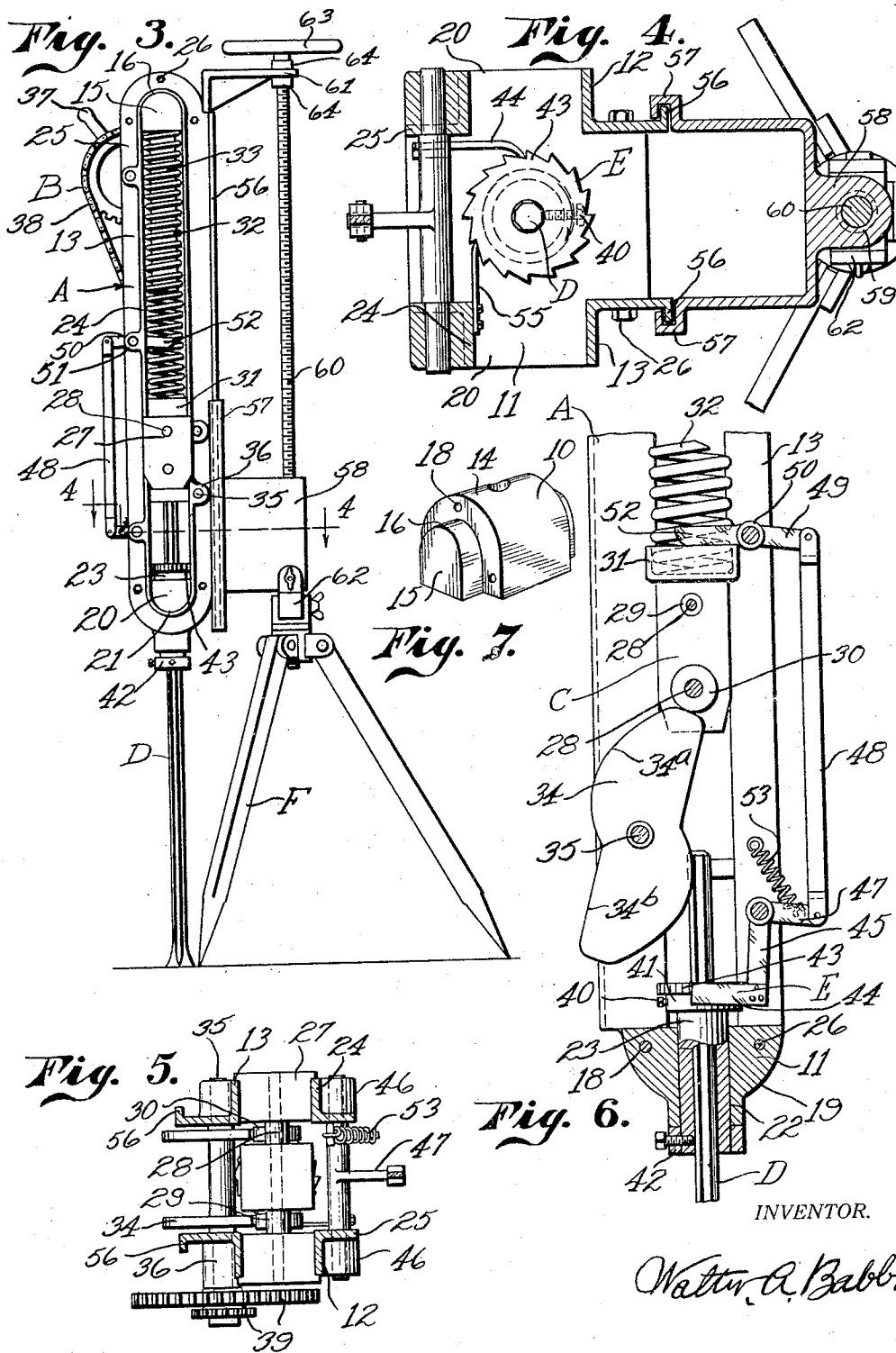
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INVENTOR.

Walter A. Babb.

UNITED STATES PATENT OFFICE

WALTER A. BABB, OF GLENDALE, CALIFORNIA

HAMMER

Application filed December 12, 1927. Serial No. 239,445.

This invention relates to hammers, and particularly to a small portable hammer for prospectors' work and for rapidly drilling holes for explosives in places where electric or other power is not available or convenient.

At the present time it is necessary for a prospector, miner or other person who must drill holes for the placing of explosives or for other purposes in unsettled districts to laboriously drill his holes with sledge and rock drill. Such procedure is tedious and tiresome and, when but one man is available, very inconvenient for him to both hold the drill and strike his blows with any degree of force. Furthermore, much better results are secured by the striking of a series of rapid blows than by the striking of heavier intermittent blows. Furthermore rotational feeding of the bit is very difficult under such circumstances, due to the inability of one holding the drill by hand to hold the bit in position for the successive chipping off of small particles around the bottom of the hole. The tendency of a hand-controlled drill being to slip into the bottom of the cavities formed by previous blows. Better results are secured when the blows are struck on the edge of previously formed cavities, thus successively chipping off the unsupported edges as the drill rotates.

It is also very important in devices of this character that impact strains be properly guarded and that, in so far as possible, the framework is, or acts as, a unitary structure, at the same time having sufficient flexibility to cushion heavy blows. It is an object of this invention to provide such a construction.

Another object of this invention is to provide a self-contained hammer and drill holder which may be easily transported from place to place and which can be easily manipulated, either by hand or, if power is available, by such power.

Another object of this invention is to provide such a device in which a series of rapid blows may be given to the drill-bit.

Another object of this invention is to give a successive rotary feeding movement to the drill-bit during operation.

Another object of this invention is to pro-

vide such a device which will be simple to make, repair and operate, and of lasting and durable construction, but which may be easily dis-assembled for packing or transportation.

Another object of the invention is to provide such a device in which the assembling bolts take none of the impact stresses of operation.

Other objects will be apparent from the following description and will be finally pointed out in the claims.

In the drawings which show a form of my invention, Figure 1 is a side elevation of the device; Fig. 2 is a front elevation thereof; Fig. 3 is a side elevation taken from the side opposite Fig. 1, showing the device in use on a tripod; Fig. 4 is a section on line 4—4 of Fig. 3; Fig. 5 is a section on line 5—5 of Fig. 1; Fig. 6 is a section on line 6—6 of Fig. 2; Fig. 7 is a perspective view of the upper head.

Upon a frame A is mounted the driving mechanism B for reciprocating a hammer block C. A drill-bit D may be mounted in the frame A and is fed by the rotating mechanism E. The frame A comprises an upper head 10, a lower head 11, a right-hand side member 12, and a left-hand side member 13. The upper head 10 is a block having a semi-cylindrical upper end 14. Projections 15 extend from the sides thereof and also have semi-cylindrically shaped upper surfaces 16, concentric with the surface 14, but of smaller radius. The projections 15 are somewhat narrower than the head itself, forming a ledge for the attachment of the side members 12 and 13, the bolt-holes 18 extending through the body outside of the projections 15. The lower head 11 is of similar formation and is provided with a semi-cylindrical end portion 19 and projections 20, having semi-cylindrical portions 21, and is provided with a vertical bore 22, which carries the drill bushing 23. The side members 12 and 13 are in the shape of elongated chain-links, and are of angular section, the outstanding leg 24 of the angle being adjacent, the link opening and facing outwardly. The ends of this opening are shaped for the reception of the projections 15

and 20 on the heads 10 and 11, respectively, and bolt-holes in the vertical legs 25 of the side members 12 and 13 correspond to the bolt-holes 18 in the upper and lower heads, and bolts 26 fitted therein hold the heads 10 and 11 and side members 12 and 13 in assembly.

The hammer block C is mounted for reciprocation between the side members 12 and 13, and has attached thereto lipped guide members 27, which are guided by the opposing faces of the outstanding legs 24 of the said side members. These guide members may be connected by pins 28 and spacers 29, or may be attached in any other way to the hammer block C. On each side of the hammer block and upon one of the pins 28 are mounted rollers 30, for the purpose hereinafter described. On the upper end of the block and forming a part thereof is a cup-shaped receptacle 31 for the reception of the lower end of a spring 32, the upper end of which is received in the recess 17 in the upper head 10. A mandrel 33 affixed to the upper head 10 serves to guide the spring 32 and to keep it from buckling.

A pair of two-lobed cams 34, affixed to a shaft 35, which is journaled in the side members 12 and 13, in bosses 36, and offset from the line of travel of the hammer block C, is adapted to actuate the block through the rollers 30. These cams have working lobes 34—*a* and cutaway portions 34—*b*. Shaft 35 is operated from the hand crank 37 through the chain drive 38 and the gearing 39, preferably to give an increase in rotative speed of the cam-shaft 35 over the rotation of the crank 37, the amount of such increase being dependent upon the power required to operate the hammer in the manner desired. With a light hammer block and light spring, the step-up may be considerable, but with a heavier block and heavier spring, a speed reduction may be desired, any ratio being obtainable by easily changed gearing.

The drill bushing 23 is affixed to the drill D, by a set-screw 40, which passes through a collar 41, formed at the top thereof. A second collar 42 is affixed to the drill bushing below the head 11, the relation being such as to allow a limited movement of the bushing vertically through the bore 22. Affixed to the top of the drill bushing 23 is a ratchet wheel 43. A pawl 44 is yieldingly mounted on one arm of a bell-crank lever 45, journaled in the side members 12 and 13, in bosses 46; a second arm 47 of the bell-crank lever 45, connected by a link 48 to a projecting arm 49 of a forked lever 50, journaled in the side members 12 and 13, in bosses 51. The forked end 52 of the lever 50 straddles the spring 32 and lies in the path of the cup 31, so that as the hammer is raised, it strikes the forked end 52 of the lever near the top of its stroke, raising it sufficiently to actuate the ratchet pawl

44 through the link 48 and bell-crank lever 45. A spring 53, attached to an outstanding projection 54 on the bell-crank lever 45, and to the side member 13, serves to return the ratchet pawl 44. A spring detent 55 prevents the turn of the ratchet 43 on the back-stroke of the pawl 44.

Outstanding tongues 56 on the rear of the frame of the side members 12 and 13, serve to guide the drilling unit when mounted upon the tripod F. These tongues 56 slide in grooved extensions 57 of a supporting member 58. This supporting member 58 is tapped as at 59 for the reception of a feed screw 60, journaled in and restrained against longitudinal movement by a bracket 61 affixed to the upper head 10 against which the set collars 64 bear. The support 58 is mounted for angular adjustment upon the tripod F by the universal joint 62. As the hand wheel 63 of the feed screw 60 is rotated, the drilling unit may be fed into or away from the formation being drilled.

In operation, the device is either used in the tripod as illustrated in Fig. 3, or is supported by hand over the formation to be drilled, and the crank 37 turned as rapidly as possible. Through the chain drive and gearing, the cams 34 are rotated and the hammer block raised against the resistance of the spring 32, by the action of these cams against the rollers 30. Since the cam is offset with regard to the line of travel of the hammer block, the cut-away portion 34—*b* of the cam allows the hammer block to descend under the action of the spring with great rapidity, striking the head of the drill supported in the drill bushing 23. The weight of the entire apparatus is, prior to the blow, resting on the collar 42, and hence upon the drill bit. As the hammer block descends and strikes the bit, the bit is driven somewhat into the formation, the bushing assuming the approximate position shown in Figs. 1 and 2. The greater inertia of the frame not allowing it to immediately follow the drill bit and bushing, a second blow is given to the bit as the frame descends upon the collar 42. Almost the full force of the hammer blow is effective against the comparatively small inertia of the drill bit, the frame floating, as it were, at the moment of impact. The reaction of the spring against the frame is absorbed (on account of its relative weight) in raising the frame through a very slight distance.

The construction of the side frame in link form, together with the special construction of the heads, whereby all the strain caused by the impacts, is transmitted through the heads directly to the links, relieves the assembly bolts of any operating strains; in fact, the bolts merely hold the device together transversely. The link side members are in tension and, being long and of comparatively

light section, absorb and cushion enough of the blow to prevent fatigue and consequent fracture of the frame. The angular section puts this relatively small portion of the weight in such a form as to resist accidental side stresses, as well as the side and cross bearing stresses of the hammer block.

The links are also supported crosswise by the projections on the heads so that there is no tendency for them to collapse as in an ordinary chain link with a concentrated central load.

Obviously other types of link members may be used to interlock the two heads so as to directly take the impact stresses of operation upon the links.

The operation of the ratchet mechanism is self-evident from the drawings and foregoing description. The ratchet pawls are made wide enough for the vertical movement of the drill bushing.

It will be apparent that rotation of the bit takes place through this ratchet mechanism just prior to the release of the hammer block and the striking of the blow.

Having thus described one form of my invention, it is obvious that many and various changes may be made in the mechanism without departing from the true spirit of the invention.

I claim:

1. A device of the character disclosed, including a supporting frame, a hammer block mounted for reciprocation within such frame, means for reciprocating such hammer block, means for holding a bit in position in the path of such hammer block, means for rotating such holding means, such rotating means including a ratchet on such holding means, a lever pivoted to the frame, a portion of such lever lying in the path of the hammer block and adapted to be operated during the upstroke thereof, a bell-crank lever pivoted to the frame, a pawl carried by such bell-crank lever and adapted to actuate the ratchet, and a connection between the first named lever and the bell-crank lever, whereby reciprocation of the hammer block serves to rotate such holding means.

2. A hammer including a supporting frame comprising opposed heads, link-shaped side members detachably affixed to said heads and having openings in the ends thereof, the said heads having a portion thereof adapted to fit within the openings of the side members and to support such side members against lateral deformation, a hammer block mounted for reciprocation along the frame, and means for reciprocating said hammer block.

In witness whereof, I have signed my name to this specification.

WALTER A. BABB.