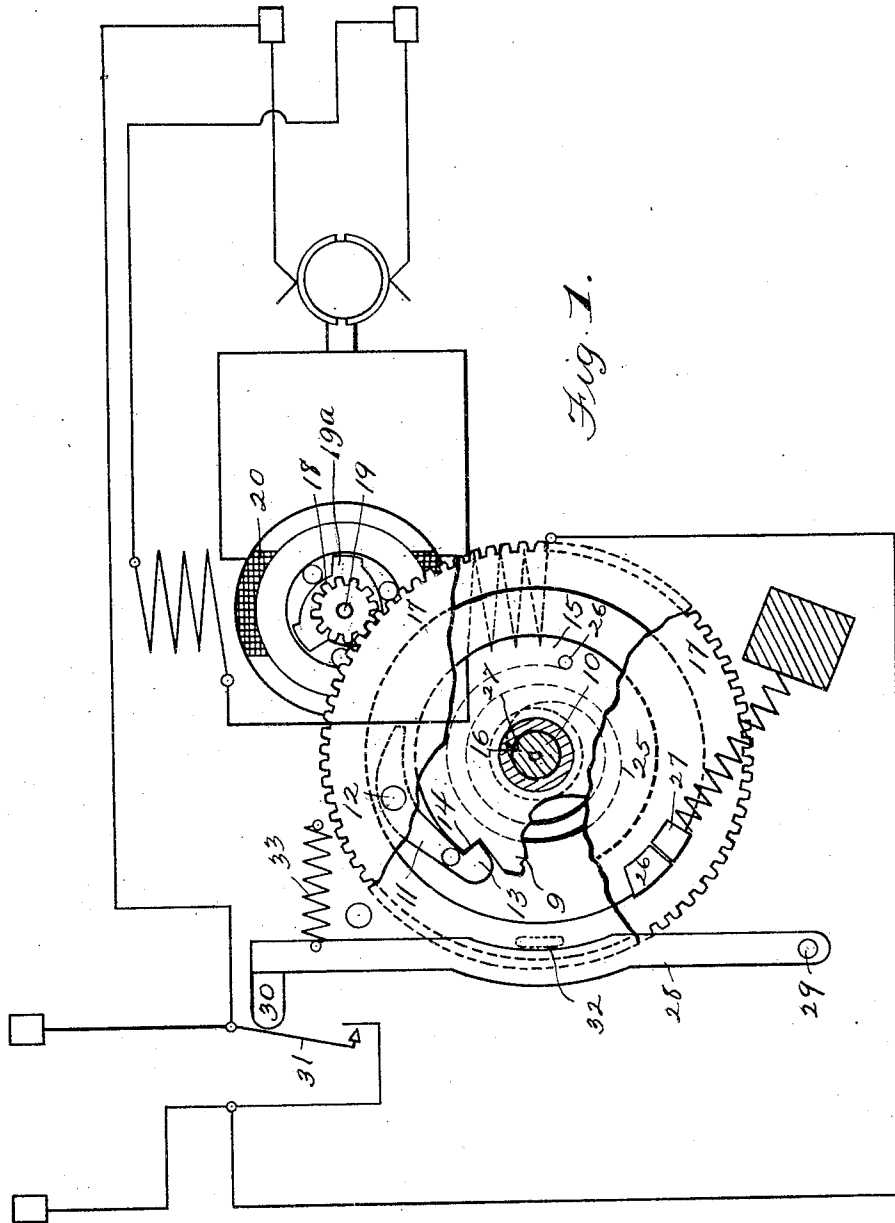


1,363,585.

Patented Dec. 28, 1920.
2 SHEETS—SHEET 1.



Inventor
George Haddow

Witnesses
F. G. Campbell

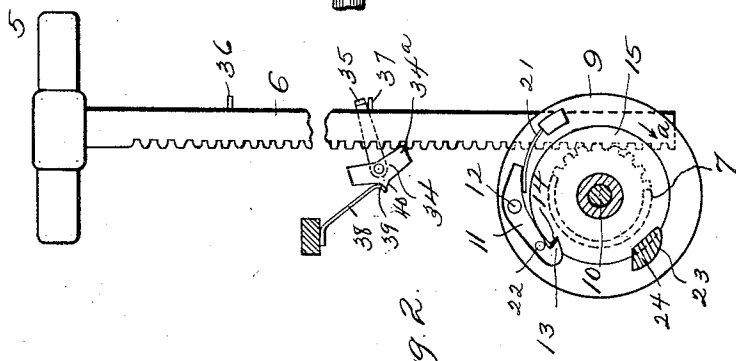
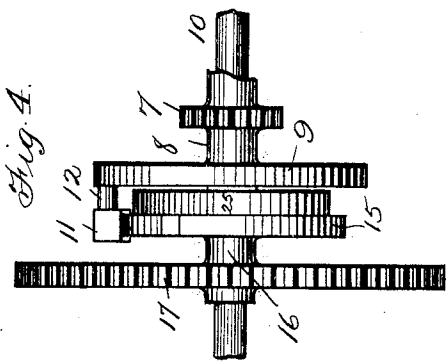
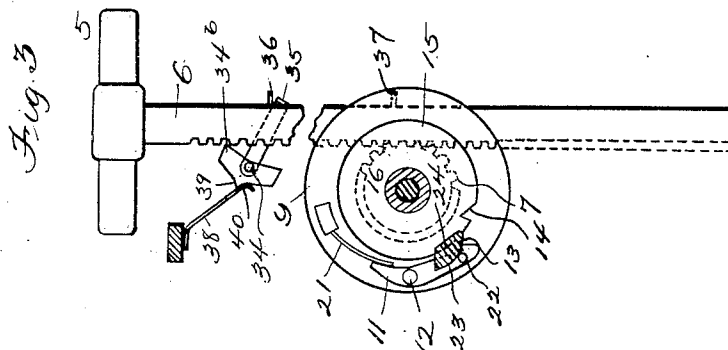
By *Samuel Hume*
Attorney

G. HADDOW.
BLASTING MACHINE.
APPLICATION FILED AUG. 14, 1919.

1,363,585.

Patented Dec. 28, 1920.

2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

GEORGE HADDOW, OF TAMAQUA, PENNSYLVANIA, ASSIGNOR TO ATLAS POWDER COMPANY, OF WILMINGTON, DELAWARE, A CORPORATION OF DELAWARE.

BLASTING-MACHINE.

1,363,585.

Specification of Letters Patent.

Patented Dec. 28, 1920.

Application filed August 14, 1919. Serial No. 317,472.

To all whom it may concern:

Be it known that I, GEORGE HADDOW, a subject of Great Britain, residing at Tamaqua, in the county of Schuylkill and State of Pennsylvania, have invented certain new and useful Improvements in Blasting-Machines, of which the following is a specification.

This invention relates to blasting machines for electrically discharging dynamite or powder charges, the object of the invention being to provide an improved machine of this character constructed in such manner that the current delivered thereby will be up to the maximum capacity of the machine and uniform at all times.

With some of the blasting machines at present in use the current is generated by the operation of a rack bar plunger engaged with a gear on the armature shaft. The aforesaid type of machine is unsatisfactory in its operation because the amount of current generated depends upon the force with which the plunger is operated, consequently the current developed is not uniform and often is not up to the current capacity of the machine. This results in frequent failure to fire the charges with a consequent loss of unexploded powder in the bore holes and a loss of labor.

Since the electrical energy generated by the ordinary dynamo electric blasting machine is produced by the push down or the pull up motion of a push rod engaged directly or through gears with the armature shaft; and since this motion is at the will of the operator, it follows that the strength of the current generated is liable to great variations; to such an extent that when a round of holes close to the capacity of the machine is to be fired, the successful firing of all of them is extremely doubtful. This uncertain behavior of the machine is entirely due to the varying strength of the mechanical force actuating the apparatus. To avoid these objections the present invention contemplates the provision of a machine in which the movement of a rack bar by the operator stores up power in a spring, which spring is automatically released near the end of the stroke of the rack bar and the stored power utilized to impart such a rapid

and uniform movement to the armature of the machine as to produce current of a uniform strength and up to the capacity of the machine, throughout the return movement of the spring.

A further object of the invention is to provide a machine of the character indicated embodying means for preventing the operator from giving only a partial movement to the rack bar, but compelling said rack bar to be moved its full stroke after it starts in one direction or the other.

Further objects and advantages of the invention will be set forth in the detailed description which now follows.

In the accompanying drawing—

Figure 1 is a diagrammatic view of a blasting machine with the parts constituting particularly the present invention, illustrated partly in section and partly in front elevation and some of said parts being broken away;

Fig. 2 is a view partly in front elevation and partly in section of the actuating rack and the pawl and ratchet disk with the parts in the position they occupy prior to the initial movement of the handle;

Fig. 3 is a view similar to Fig. 2 illustrating the parts in the position they occupy after the downward movement of the rack bar has been completed; and

Fig. 4 is a side view of the pawl and ratchet disk and associated parts.

Like numerals designate corresponding parts throughout the several figures of the drawing.

Referring to the drawing 5 designates a handle that is carried by an operating rack bar 6. The teeth of this rack bar mesh with a pinion 7, that is connected by a hub 8, with a pawl carrying disk 9, the pinion 7 and the disk 9 being free to turn upon a fixed shaft 10. A pawl 11 is pivotally connected at 12 to the disk 9, and its hook end 13 is adapted to engage a notch 14, formed in a ratchet disk 15. The ratchet disk 15 is connected by a hub 16 with a gear wheel 17, so that these two parts turn together. The gear wheel 17 meshes with a pinion 18 mounted upon the shaft 19 of a generator 20. This generator is of the ordinary and well known construction used in machines

of this character and its specific construction forms no part of the present invention, the present invention relating particularly to the actuating means for the armature shaft.

It is apparent that downward pressure upon the handle 5 will press the rack bar 6 downwardly and will impart a turning movement to the pinion 7 and to the pawl carrying disk 9. The pawl 11 engaging with the notch 14 under the influence of a spring 21 will pull the ratchet disk 15 around in the direction of the arrow "a" in Fig. 2 and this movement will continue until a pin 22 upon the pawl 11 rides over the curved face 23 of a fixed cam 24 whereby the pawl will be lifted out of engagement with the notch 14 and the disk 15 will be freed from the pawl.

During the downward movement of the rack bar 6 a spring 25 is placed under tension, one end of this spring being connected at 26 to the ratchet disk 15 and the other end of said spring being connected at 27 to the fixed shaft. Consequently when the ratchet disk 15 is freed of the restraint of the pawl at the end of the stroke of the rack bar, the spring 25 immediately acts to impart a quick return movement to the disk 15 and to the gear 17 that is connected thereto and moves therewith. This results in imparting a quick turning movement to the armature shaft 19 through the medium of the pinion 18 as will be readily understood. An abutment 26 upon the gear wheel 17 contacts with a spring pressed plunger 27 at the end of its return movement to thereby cushion the action of the parts. A circuit controlling lever 28, is pivoted at 29, and its free end carries a contact block 30 that is adapted to engage a switch 31 and hold the same open. As the driving disk is nearing the end of its revolution and at the moment when the armature is rotating at highest speed, a stop 32 carried by the gear 17 acts to force lever 28 against the spring 31, thus opening the field circuit of the dynamo and throwing the accumulated energy into the external circuit. It is to be understood that the quick return throw of the gear 17 is the effective working movement, since a one-way clutch 19^a serves to prevent the movement of the gear 17 under the direct action of the handle from actuating the generator 20.

To render it impossible to partly push the rack bar 6 down and then pull the same back without completing the stroke, I provide a dog 34. A tail 35 extends from this dog and lies in the path of movement of pins 36 and 37 that are carried by the rack bar 6. A spring 38 is adapted to bear upon either of the inclined faces 39 and 40 and to hold the dog in either of its past center

positions. As the rack bar starts downwardly its teeth snap past the lower element 34^a of the dog which acts as a ratchet and this movement continues until the rack bar has substantially completed its downward stroke, at which time pin 36 strikes the tail 35 and moves it to the position illustrated in Fig. 3; thereupon the upper member 34^b of the dog snaps into engagement with the teeth of the rack bar under the influence of the spring 38 and remains in this position until the pin 37 upon its up-stroke restores the parts to the position illustrated in Fig. 1.

While the elements shown and described are well adapted to serve the purposes for which they are intended it is to be understood that the invention is not limited to the precise construction set forth but that it includes within its purview whatever changes fairly come within either the terms or the spirit of the appended claims.

Having described my invention what I claim is:

1. In a blasting machine the combination with an electrical generator, of an actuating member therefor, a spring connected to said actuating member, a handle, means for putting the spring under tension by movement of the handle in one direction, means for automatically releasing said spring to permit it to act at the termination of the movement of the handle in one direction and means in engagement with said handle throughout its entire travel, acting at all points in the travel to prevent reverse movement of the handle until it has completed its movement.

2. A blasting machine comprising an electrical generator, an actuating rack-bar, spring actuated means for imparting working movement to the generator, connections between said spring actuated means and the rack-bar for winding the spring by movement of the rack-bar, a dog, which in one position permits movement of the rack-bar in one direction only and when in the other position, permits movement in the other direction only and means for automatically moving the dog at the extremity of such movement.

3. In a blasting machine the combination with a generator comprising an armature, a pinion thereon, a gear wheel meshing with said pinion, a fixed shaft, a ratchet disk, a sleeve connecting the ratchet disk and the gear wheel, said sleeve being free to turn on the fixed shaft, a pawl carrying disk, a pawl carried thereby engaging the ratchet disk, a spring one end of which engages the fixed shaft and the other end of which engages the ratchet disk, a pinion fixed to the pawl carrying disk, a rack-bar meshing with said pinion, means for releasing the pawl from

the ratchet disk after a predetermined movement of the latter, an electric circuit, a switch closing the same and means for actuating said switch at the termination of the
5 movement of the gear wheel.

4. A structure as recited in claim 3 in combination with a dog engaging the teeth of the rack-bar and permitting movement

of the same in one direction only until said rack-bar has completed its throw.

In testimony whereof I affix my signature
in the presence of two witnesses.

GEORGE HADDOW.

Witnesses:

S. R. BEARD,

G. A. BILLMAN.

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