(No Model.)

2 Sheets—Sheet 1.

J. N. McLEOD.

MAGNETO ELECTRIC GENERATOR.

No. 495,139. Patented Apr. 11, 1893.

FIG. 1.

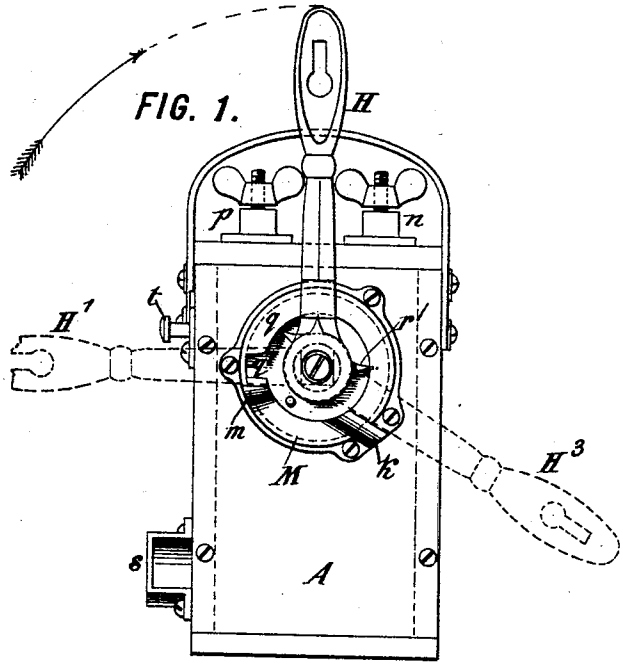


FIG. 2.

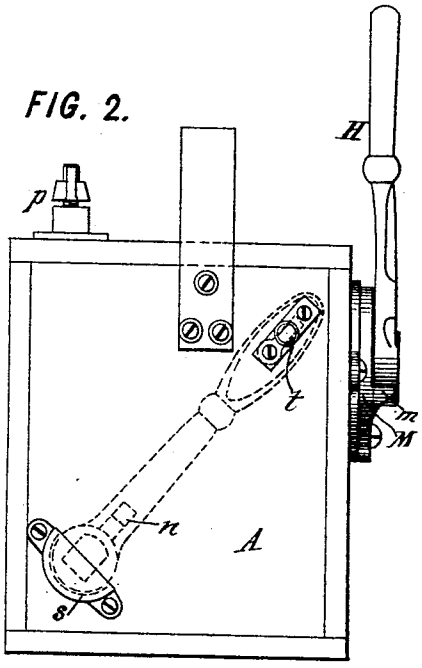


FIG. 3.

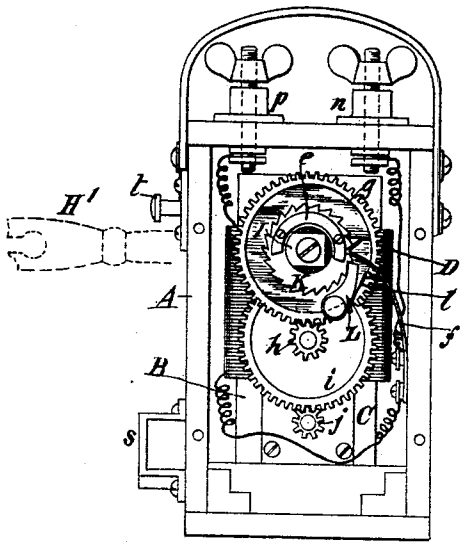
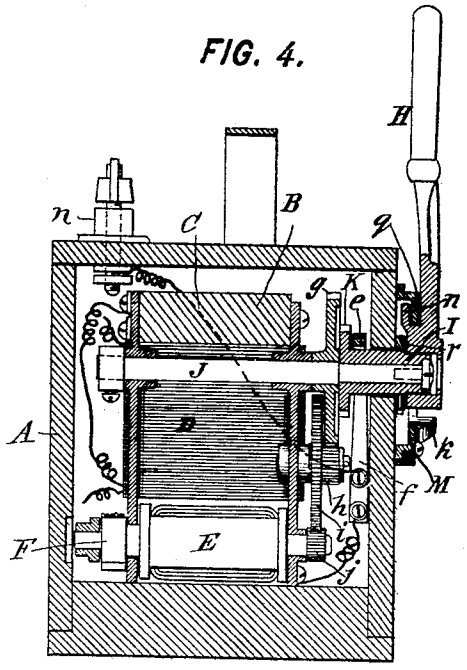


FIG. 4.



WITNESSES:
John Becker
Fred. White

INVENTOR:
Joseph N. McLeod,
By his Attorneys,
Arthur O. Fraser & Co.

(No Model.) 2 Sheets—Sheet 2.

J. N. McLEOD.

MAGNETO ELECTRIC GENERATOR.

No. 495,139. Patented Apr. 11, 1893.

FIG. 5.

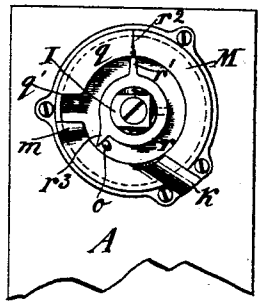


FIG. 6.

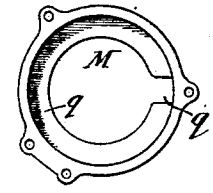


FIG. 7.

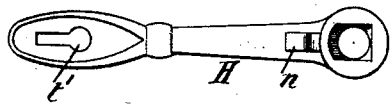


FIG. 8.

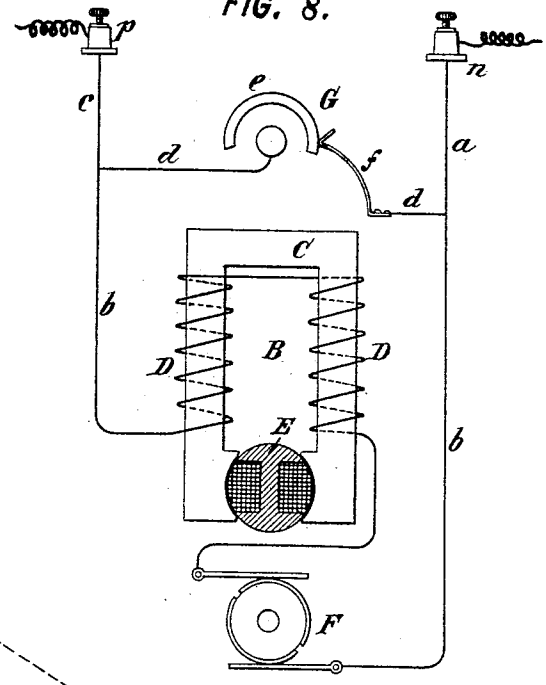
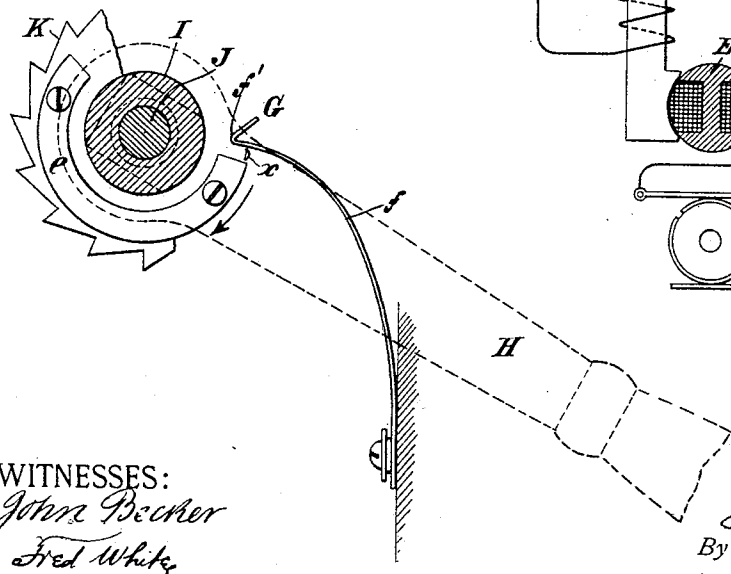


FIG. 9.



WITNESSES:
John Becker
Fred White

INVENTOR:
Joseph N. McLeod,
By his Attorneys,
Arthur C. Fraser & Co.

UNITED STATES PATENT OFFICE.

JOSEPH N. McLEOD, OF BROOKLYN, ASSIGNOR TO THE McLEOD ELECTRIC MANUFACTURING COMPANY, OF NEW YORK, N. Y.

MAGNETO-ELECTRIC GENERATOR.

SPECIFICATION forming part of Letters Patent No. 495,139, dated April 11, 1893.

Application filed April 27, 1892. Serial No. 430,825. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH N. McLEOD, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Magneto-Electric Machines, (Case B,) of which the following is a specification.

This invention relates to magneto electric machines especially designed for blasting purposes, and for other uses where it is required to send a momentary powerful electrical impulse. The machines of that class have self-exciting generators wherein the machine is short-circuited at the beginning of the operation, and remains so until the armature develops sufficient electro-motive force to send an effective current out over the line, whereupon the short-circuit is broken, thereby forcing the current to pass over the line circuit.

My improved blasting machine is operated by a vibrating lever or handle which is detachable when not in use so as to make the machine more compact for transportation, and avoid liability of tampering with it. The construction is such that the operating handle can be applied in only one place, and can be removed and replaced only in one angular position.

Figure 1 of the accompanying drawings is a front elevation of my improved machine. Fig. 2 is a side elevation thereof showing the handle in operative position in full lines and stowed away in dotted lines; Fig. 3 is a front view, the front of the case being removed; Fig. 4 is a vertical transverse section. Fig. 5 is a fragmentary front view showing the handle removed. Fig. 6 is a rear view of the guard ring removed. Fig. 7 is a rear view of the handle removed. Fig. 8 is a diagram showing the circuit connections. Fig. 9 is a fragmentary diagram illustrating the circuit-breaker in sectional front elevation and at the instant of breaking the circuit.

Let A designate the inclosing box or case, which may be of wood or other suitable material. Within this box a magneto electric machine or dynamo electric generator B is mounted. This may be any ordinary construction of magneto machine, the field-magnet C thereof being wound with exciting coils D D in the usual manner. The armature E is or may be an ordinary Siemens shuttle-wound armature. The circuit connections may be as shown in Fig. 8, where the circuit extends from one terminal binding post *n* by wires *a b* to commutator F, and thence through the exciting coils D D by wires *b* and *c* to the opposite binding post *p*. This circuit is short-circuited by wires *d d* and circuit-breaker G, the latter consisting of an oscillating segment *e* and contact spring *f*. As long as the segment and spring are in contact, the short-circuit or local circuit *b d* is formed, but upon the segment *e* oscillating out of contact with *f*, this local circuit is broken and the current is forced to pass over the line wire or circuit in which the blasting fuses or other devices to be operated are connected. The circuit-breaker is connected to the operating device so as to act to break the local circuit toward the end of the operating stroke. Consequently the first part of the operating stroke is devoted to rotating the armature, while the electro-motive force it generates is short-circuited and acts consequently to develop a considerable current through the field exciting coils D D, in order to excite the field-magnet to the maximum and thereby induce the greatest electro-motive force in the armature, before by the breaking of the local circuit the current is sent over the line. This is the usual arrangement of local or condensing circuit commonly used in magneto electric blasting machines.

The armature E is driven by the following mechanism:—An operating handle or lever H, shown detached in Fig. 7, is applied as shown best in Fig. 4, to the polygonal end portion of an oscillatory shaft or boss I, which is preferably made tubular and mounted to oscillate on a rotary shaft J. On the oscillatory shaft I is fixed a ratchet-wheel K, the teeth of which are engaged by a pawl L pivoted to a gear-wheel *g*, which is mounted to rotate, being preferably fixed on the shaft J. This gear *g* meshes with a pinion *h*, to which is fixed a gear *i* which meshes with a pinion *j* fixed on the armature shaft. The gears *g h*

$i\,j$ constitute a multiplying train for driving the armature rapidly in forward direction at each forward oscillation of the ratchet-wheel K.

In operation, the handle H is applied in the position shown in dotted lines at H′ in Fig. 1, and is swung forcibly toward the right in the direction of the arrow until it reaches the position shown at H^3, where it is stopped by a stop projection k fixed on a guard ring M. By this movement the ratchet wheel K and gear g are oscillated forward for somewhat over half a revolution, their motion being multiplied so as to impart a considerable number of turns to the armature. The short-circuit $b\,d$ remains closed during the greater part of this movement, and until just before the end thereof, at which instant, and while the armature is revolving at its maximum speed, the short-circuit is broken and the current is consequently sent out over the line wires that are attached to the respective binding posts. The handle is then swung back to the first position H′, thereby imparting a backward oscillation to the shaft I and ratchet wheel K, while the pawl L clicks idly over the teeth of the ratchet, toward which it is pressed by a spring l. This backward motion consequently is not transmitted to the armature, the latter being driven only in forward direction.

One of the members of the circuit-breaker G is stationary, while the other oscillates with the shaft I. Preferably the contact spring f is stationary, being attached to the box as shown in Fig. 3, while the segment e is fastened to the ratchet-wheel K. The segment is in electrical connection with the metal gears and frame to which the binding post p is also connected, while the spring f is insulated therefrom and connected by a wire with the wires $a\,b$ in connection with the binding post n. When the handle is in position H′, the segment e is in the position shown in Fig. 3, and by extending over a radius somewhat exceeding one hundred and eighty degrees, it maintains contact with the spring f during nearly the entire vibration of the handle H; but toward the end of the vibration, and before the handle reaches the position H^3, the end of the segment passes beyond the end of the spring in the manner shown in Fig. 9, thereby breaking the circuit. Whatever spark passes upon this rupture of the circuit, passes at x from the end of the segment e to a point on the spring f somewhat back from the nose f' thereof, so that the latter is not oxidized by the spark. The nose f' being the portion of the spring which rubs against the periphery of the segment, consequently is free from oxidation, and retains the brightness given to it by rubbing against the segment. The construction by which this result is obtained is not here claimed, but is made the subject of another application for patent Serial No. 429,264, filed April 15, 1892.

In a machine operated by a lever, it is very desirable that the lever be removable so that it may be unshipped to make the machine more compact for transportation, and also to prevent its being tampered with by unauthorized or mischievous persons. The handle is accordingly made with a squared socket to fit over the squared or angular end of the shaft I. If, however, the handle should be removed and replaced in any position of the shaft, and in any position relatively to the shaft, the operation of the circuit breaker would be impaired, and it would be liable to be damaged. To insure the correct operation of the circuit breaker, it is essential that its moving member shall bear an invariable angular relation to the operating handle or lever, in order that the circuit shall be broken immediately before the end of the stroke thereof. This result I accomplish by constructing the angular end of the shaft I, and the angular socket in the handle H, of such shape that they fit together in only one position. The preferred construction is to square the end of the shaft on three sides, leaving the fourth side rounding, as shown in Fig. 5, and to make the socket in the operating handle of like shape, as shown in Fig. 7. To insure the breaking of the circuit at the proper instant, the working stroke of the handle is made determinate by means of two opposite limiting stops m and k formed on the guard ring M, and located to engage the handle respectively at the beginning and the end of the stroke thereof. The stop k arrests the handle immediately after the breaking of the circuit, and allowing only sufficient intervening movement to insure a current of sufficient duration being sent over the line. The opposite stop m limits the return movement or retractile vibration of the lever, and thereby prevents the segment being swung leftward beyond the position shown in Fig. 3, and consequently prevents the spring f dropping off the opposite end of the segment. If the segment were turned far enough to cause the spring to drop off, and were then turned backwardly, the turned-up end of the spring might not slide back upon the segment and thereby lift the spring back to proper position, but there would be liability that the spring would buckle or be otherwise injured upon the next forward oscillation of the segment.

To insure that the oscillating parts shall be fully retracted or swung back to the initial position from which to start the stroke before unshipping the handle, I construct the latter so that it can only be taken off when returned to the initial position H′. To this end the handle is made with a finger or hook n projecting from its rear side and engaging beneath an overhanging annular flange or web q on the ring M, in the manner best shown in Fig. 4. This flange q thus prevents the taking off of the handle until the latter is swung to the initial position, where the hook n coincides with a notch q' cut in the flange q. In this position the handle may be freely removed. In case while the handle is

taken off the shaft I should accidentally be turned, the handle could not be replaced without turning the shaft back to the position shown in Fig. 5. To indicate that it should be restored to this position, I affix to the shaft a pointer consisting of a ring r fastened on the shaft by a set-screw, and having a finger r', which in the correct initial position of the shaft points to a mark r^2 formed on the ring M. This ring r is also provided with a stop-arm r^3, which in this position strikes against a stop-pin o, whereby its displacement in retractile direction is prevented. In case of its displacement in the opposite direction, its movement would be limited by the finger r' abutting against the stop-pin o, which occurs at the end of the oscillation which is imparted to the shaft during the working stroke.

I provide means for holding the handle when unshipped consisting of a socket s, which engages the boss or hub of the handle, and a pin or button t which engages the handle end thereof. The latter end is formed with a button-hole-shaped opening t', as shown in Fig. 7, the round hole through which admits the head of the button t, after which the handle in dropping down into the socket s brings the contracted part of this opening t' to embrace the shank of the button, so that the handle is held firmly in place until lifted off.

My invention is not limited to the exact details of construction which I have herein so particularly described, as these features may be materially modified in structural respects without departing from the essential features of my invention. Their various structural modifications will be obvious to those skilled in the mechanic arts, as for example the reversal of the ratchet and pawl so as to communicate the motion from the oscillating shaft I to the pawl L, and through the latter to the ratchet wheel and multiplying train. The circuit-breaker may also be modified in various ways, provided it be still adapted to break the circuit at the proper instant toward the end of the operating stroke. The stops m k need not be constructed integrally with the ring M, but this construction is most convenient.

I claim as my invention the following-defined novel features, substantially as hereinbefore specified, namely:

1. In a magneto electric machine, the combination with the rotary armature thereof of a multiplying train for driving the armature, an oscillatory driving shaft, an interposed ratchet and pawl, a circuit-breaker connected to said shaft, opposite stops for limiting the oscillation of said shaft, and an operating lever detachably connected to said shaft, whereby the lever may be unshipped at will without liability of misplacement of the shaft or derangement of the circuit-breaker.

2. In a magneto electric machine, the combination with the rotary armature thereof of a multiplying train for driving it, an oscillatory driving shaft, an interposed ratchet and pawl, a circuit-breaker connected to said shaft, and an operating lever detachably connected to said shaft so as to be unshipped at will, and said shaft and lever constructed with relatively engaging angular portions adapted to fit together in only one relative position, whereby the lever when applied occupies always the same angular relation to the circuit-breaker.

3. In a magneto electric machine, the combination with the rotary armature thereof of a multiplying train for driving it, an oscillatory driving shaft, an interposed ratchet and pawl, a circuit-breaker operated by said shaft, an operating lever detachably engaging said shaft so that it may be unshipped at will, and a retaining flange in engagement with said lever, the lever and flange relatively constructed to permit the removal and replacement of the lever in only one angular position thereof.

4. In a magneto electric machine, the combination with the rotating armature and driving mechanism comprising an oscillatory shaft I, of an operating lever H detachably engaging said shaft, means for preventing the detachment of said lever except in one angular position thereof, and a pointer carried by said shaft for indicating its proper angular position for engagement with said lever.

5. In a magneto electric machine, the combination of an oscillatory driving shaft I, an operating handle H, detachably engaging said shaft and a fixed ring M formed with stops m and k for limiting the vibratory stroke of said handle.

6. In a magneto electric machine, the combination of an oscillatory shaft I, a detachable handle H having a projection n, and an overhanging flange q engaging said projection, and provided with a notch q' coinciding with said projection when the handle is in the position where it may be applied or removed.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JOSEPH N. McLEOD.

Witnesses:
ARTHUR C. FRASER,
GEORGE H. FRASER.