No. 844,991. PATENTED FEB. 19, 1907.

G. A. ALLEN.

PORTABLE DYNAMO.

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Fig. 1.

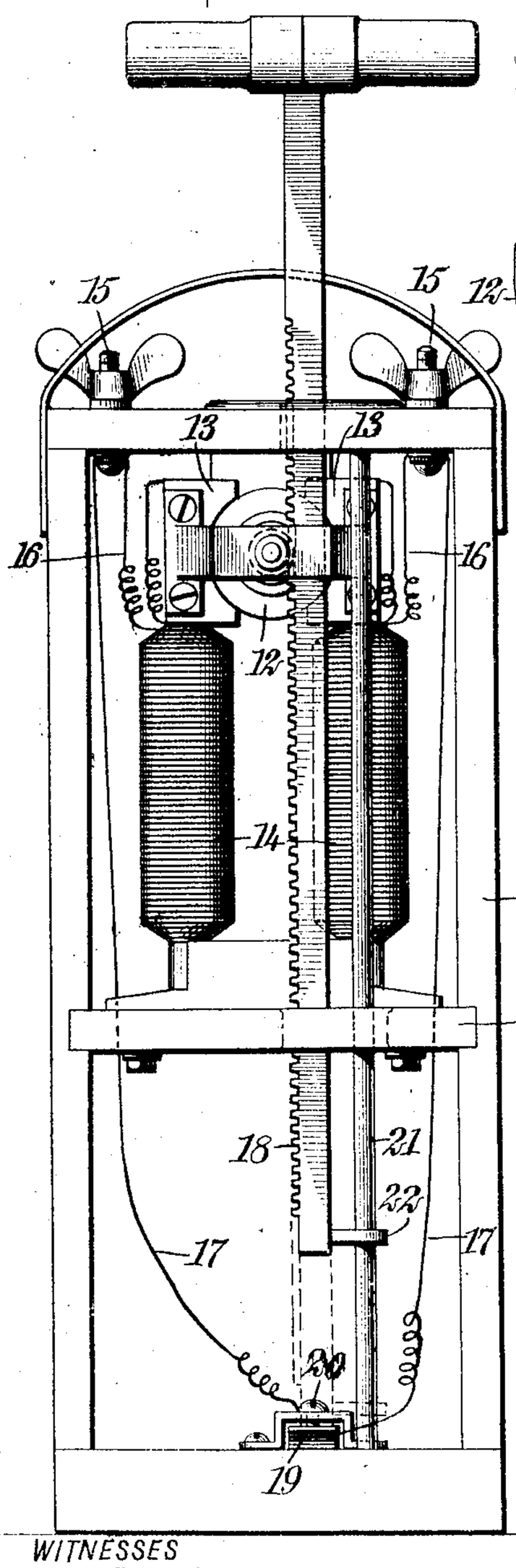


Fig. 2.

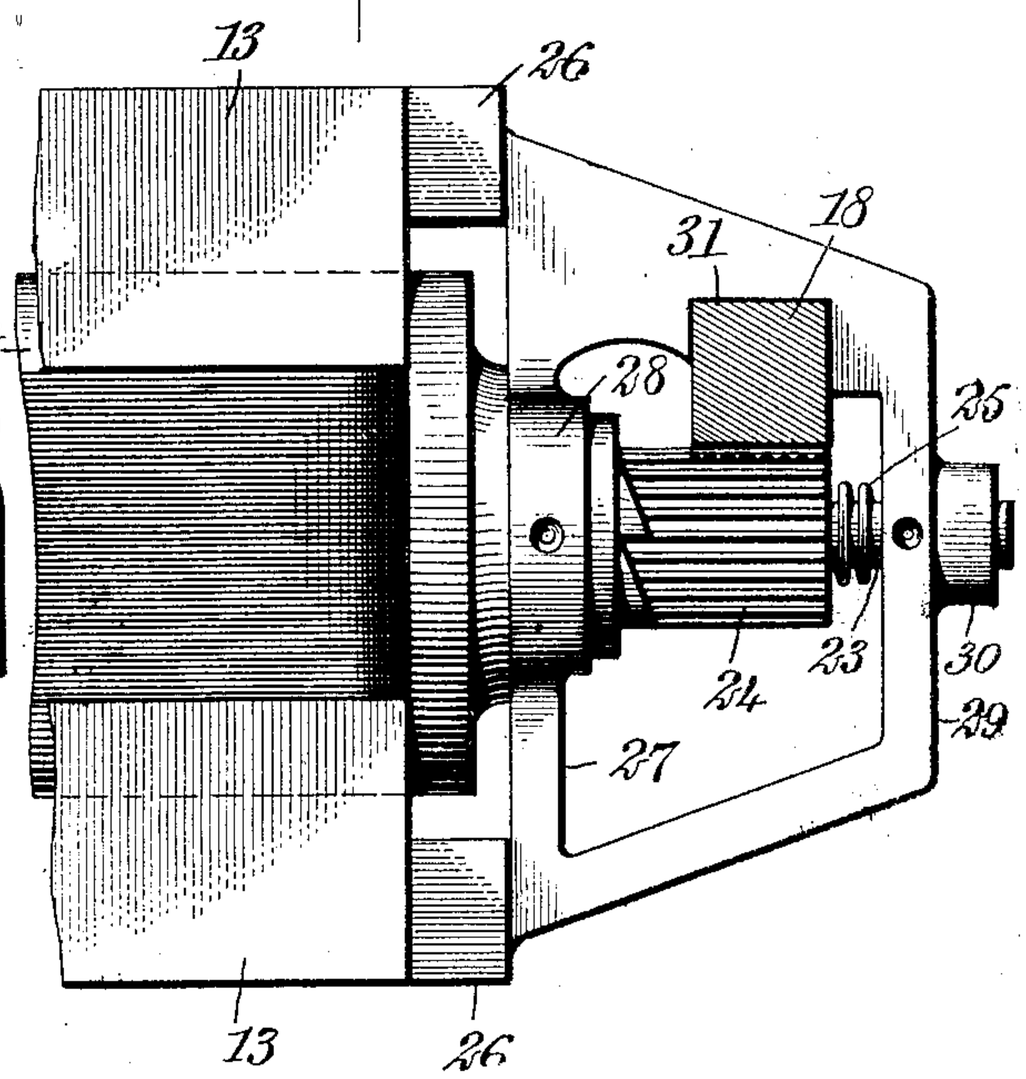
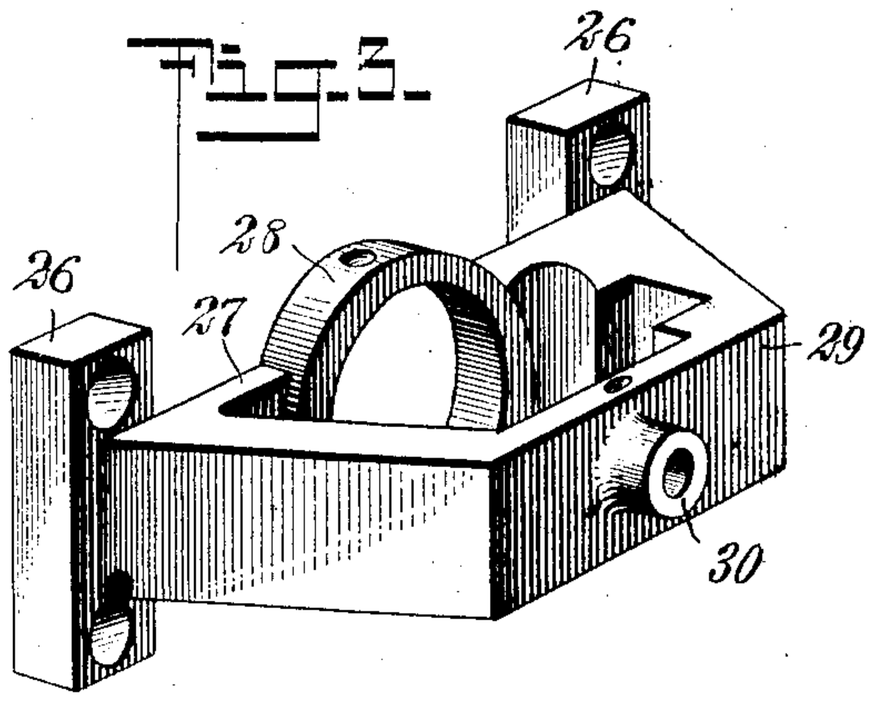


Fig. 3.



WITNESSES

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PORTABLE DYNAMO.

No. 844,991. Specification of Letters Patent. Patented Feb. 19, 1907.

Application filed December 3, 1906. Serial No. 346,139.

To all whom it may concern:

Be it known that I, GEORGE ADIN ALLEN, a citizen of the United States, and a resident of Western Springs, in the county of Cook and State of Illinois, have invented a new and Improved Portable Dynamo, of which the following is a full, clear, and exact description.

This invention relates to certain improvements in portable dynamos, and more particularly to that type of dynamo used in blasting operations for exploding the blasting charges.

The object of the invention is to provide a new and improved construction whereby a dynamo of substantially twice the capacity of those formerly used may be produced of a size convenient to be easily transported from place to place and whereby many of the objectionable features of such dynamos are entirely or substantially obviated.

The dynamo now in common use in generating the requisite current for igniting blasting charges is a bipolar dynamo driven by hand by means of a rack-bar and pinion. It is provided with suitable switches for temporarily short-circuiting the current and afterward delivering the current to the blasting-line to ignite the electric fuses which are used in exploding the dynamite or other explosive. The type of the device in which the rack-bar is pushed down to rotate the armature has been found far more advantageous in use than any other type and has survived all others for a large number of years. The large increase in blasting operations, especially in stone-quarries and in railroad construction, has resulted in the demand for larger blasting-machines in order that a greater number of charges might be fired simultaneously. This demand was at first met by the production of a machine capable of firing from forty to fifty fuses at a time, and this machine has been for a number of years considered to have the maximum capacity of any machine capable of being operated by one man and at the same time of a size and weight which would make it easily portable, and therefore commercially valuable.

Numerous devices for using gearing to gain the required number of revolutions of the armature while keeping the length of the rack-bar within reasonable limits were tried and found unsatisfactory, because they were too complicated for the ordinary workmen to keep in repair. The current from the electric-lighting dynamo or similar machine could not be used generally, because it required the services of an electrician to lay the blasting-wires, inasmuch as the electric-lighting dynamo requires a much more complicated system of wiring. The only choice the manufacturers had, therefore, in the attempt to produce a commercially valuable machine was to adhere to the old type of machine, driven by a rack-bar and pinion; but great difficulties were encountered in attempting to build a machine of twice the capacity of those formerly employed yet of small enough size to be portable and capable of being operated by one man.

In order to increase the capacity of the machine, it became necessary to also increase the diameter of the armature-shaft and of the driving-pinion to properly support the armature against the side thrust of the rack-bar and to give the necessary stiffness to said shaft. With the increased size of the armature-shaft and pinion it became necessary to increase the length of the rack-bar to such an extent that one man could not operate it. In this larger type of machine, which it was attempted to manufacture, as well as in most of the smaller machines previously used, the side thrust of the rack-bar against the pinion and shaft of the armature caused a slight bending of the armature-shaft, and the armature was caused to unevenly rotate and brought nearer to one pole than to the other. This resulted in very uneven running of the machine and caused profuse sparking at the brushes, resulting from the varying of the width of the air-gap between the armature and the poles. Thus it was found practically impossible to build a larger machine than those heretofore used while employing the same general design. If the shaft were permitted to remain the same, the armature was not properly supported and ran very unevenly. If the shaft were increased in size, a larger pinion and longer rack-bar had to be used, and this rendered it no longer possible for one man to operate the machine.

By means of my improved construction I am able to build a device of twice the ca-

pacity of any heretofore constructed without increasing the size of the armature-shaft or increasing the length of the rack-bar, and I also reduce to a minimum, if not entirely obviate, all sparking at the brushes and secure a great improvement in the smoothness of running. My improved device is capable of firing more than twice as many fuses than any machine of this type heretofore constructed, but may still be easily transferred from place to place and operated by one man.

The invention consists in certain features of construction and combination of parts, all of which will be fully set forth hereinafter, and particularly pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures, in which—

Figure 1 is a side elevation of my improved blasting-machine, one side of the casing being removed to disclose the operating parts. Fig. 2 is a plan view showing the end of the armature and my improved armature-shaft-supporting means, and Fig. 3 is a perspective view of the armature-shaft support.

Devices of the type to which my invention belongs customarily comprise a rectangular casing 10, of wood or other suitable material, and having a partition 11 intermediate its ends and serving to support the dynamo. This dynamo comprises an armature 12, rotating between poles 13 in the upper portion of the casing, said poles being supported by the field-coils 14, resting on the partition 11. The top of the casing is provided with binding-posts 15, to which the wires leading to the fuses are connected, and each binding-post leads to the field-coils by means of wires 16 and to a switch in the bottom of the casing by means of wires 17. A rack-bar 18 is provided for rotating the armature-shaft, and this rack-bar extends through openings in the top of the casing and in the partition 11 and engages with the switch in the bottom of the casing. The switch is of any suitable type, and preferably comprises a spring 19 and a binding-post 20, normally in contact, whereby as the rack-bar is pushed down into the casing and the armature is rotated the current generated is short-circuited and may pass freely from one wire 17 to the other wire. As the rack-bar reaches the bottom of the casing it presses down upon the spring 19 and breaks the contact and causes the current to flow from one binding-post 15 through the blasting-line to the other binding-post 15. For properly supporting and guiding the rack-bar there is provided a guide-bar 21 parallel to the rack-bar and in engagement with a perforated bracket 22, carried by the latter. As the circuit through the switch at the bottom of the casing is normally closed and remains closed until the rack-bar 18 almost reaches the end of its downstroke, the blasting line is thus short-circuited and practically cut out until the downstroke is about finished. The rotary armature acquires a high speed, and when the short-circuit is broken a powerful current is abruptly thrown into the blasting-line. Approximately at the moment the rack-bar reaches the bottom of the casing the armature 12 is rotating at its greatest speed, and hence the blasting-line containing the fuses instantly receives the maximum current obtainable from the machine, and the charges are exploded.

The armature 12 is mounted on a shaft 23 and carries a pinion 24, loosely mounted thereon. The one end of the pinion is provided with teeth which engage with oppositely-disposed teeth on the end of the armature, and at the opposite end of the pinion there is provided a spring 25, normally holding the teeth of the pinion in engagement with those of the armature. By pushing down on the rack-bar 18 the armature is caused to rotate; but upon pulling up on the rack-bar the pinion moves longitudinally on the shaft and the teeth slip past each other without causing any reverse rotation of the armature.

In order to support the armature, armature-shaft, and rack-bar, I provide the improved member illustrated in Fig. 3. This member comprises a yoke-casting having longitudinal members 26 upon opposite sides thereof and adapted to be secured to the opposite poles 13. Connecting the two members 26 are two separate and distinct cross-bars or yokes, intermediate of which is provided the guideway for the rack-bar. One of these cross-bars or yokes 27 carries a bearing 28 of considerably-larger size than the armature-shaft 23 and receives the armature intermediate the teeth and the coil thereof. By making this bearing as large as convenient a greatly-increased bearing-surface is provided, and the center portion of the armature may be increased to any size desired. The second cross-bar or yoke 29 is provided with a bearing 30, adapted to receive the end of the armature-shaft, and this bearing is constructed very much smaller than the bearing 28, the size of said bearing depending upon the size of the shaft employed. As the main weight of the armature is supported in the bearing 28 a very small shaft may be employed and also a pinion of much less diameter than would be possible if the entire weight of the armature were supported on the shaft 23 and this shaft made of a size sufficient to properly support said armature. Within the side of the casting intermediate the bearings 28 and 30 is provided a guideway 31 for the rack-bar, whereby the latter

may be supported in a different relationship to the pinion 24 and prevented from moving other than in a longitudinal direction.

As the rack-bar is pushed down to rotate the armature there is created a very great side thrust against the armature-shaft, and there is a strong tendency for this shaft to bend to one side and bring the armature nearer one pole than the other; but by my improved construction wherein the armature is supported by a larger bearing intermediate the opening and the armature and also supported by a second bearing at the end of the shaft no side movement or bending of the armature-shaft is possible, and the side thrust caused by the movement of the rack-bar cannot result in other than a perfectly smooth running of the armature. By preventing all vibration of the armature-shaft the sparking at the brushes is almost entirely eliminated, and, as previously stated, I have constructed a device capable of firing twice the number of charges of any device of this type heretofore constructed, but have still kept the device within the limits defined by the required portability and easy of operation.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In combination, a rotary armature, poles supported adjacent thereto, a shaft for said armature, a support for said armature and shaft, comprising a skeleton frame having a bearing adapted to receive the shaft intermediate the armature and the end of the shaft, and a second but smaller bearing adapted to receive the shaft adjacent its end, a pinion mounted on said shaft intermediate said bearings, and a rack-bar in engagement with said pinion and movable in a plane at right angles to the axis of the shaft.

2. In combination, a rotary armature, poles supported adjacent thereto, a shaft for said armature, a support for said armature and shaft, said support comprising a bearing adapted to receive the shaft intermediate the armature and the end of the shaft, a second bearing spaced from the first-mentioned bearing and adapted to receive the shaft adjacent its end, a pinion loosely mounted on said shaft intermediate said bearings, means whereby the rotation of the pinion causes the rotation of the armature, and a rack-bar in engagement with said pinion and movable in a plane at right angles to the axis of the shaft.

3. In combination, a rotary armature, poles supported adjacent thereto, a shaft for said armature, a pinion loosely mounted on said shaft, coacting means on said pinion and shaft, whereby the rotation of the pinion in one direction causes the simultaneous rotation of the armature and shaft, a rack-bar in engagement with said shaft and movable in a plane at right angles to the axis of the shaft, and a support for said armature and shaft, comprising a member having portions thereof secured to and supported by the said poles, a bearing for the shaft intermediate the pinion and the armature, a second bearing intermediate the pinion and the outer end of the shaft, and a guideway for said rack-bar.

4. In combination, a rotary armature, a shaft for said armature, a longitudinally-movable pinion on said shaft, said pinion and armature having coacting teeth to cause the simultaneous movement of the pinion and armature, a rack-bar in engagement with said pinion and movable in a plane at right angles to the axis of the shaft, a bearing for the shaft intermediate the pinion and the armature, a bearing for the outer end of the shaft, and a guideway for the rack-bar integral with both of said bearings.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE ADIN ALLEN.

Witnesses:
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H. A. Packard.