W. H. JORDAN.

MACHINE FOR GRINDING COMMUTATORS OF DYNAMOS AND MOTORS.

APPLICATION FILED MAY 6, 1908.

982,367. Patented Jan. 24, 1911.

2 SHEETS—SHEET 1.

Fig. 1.

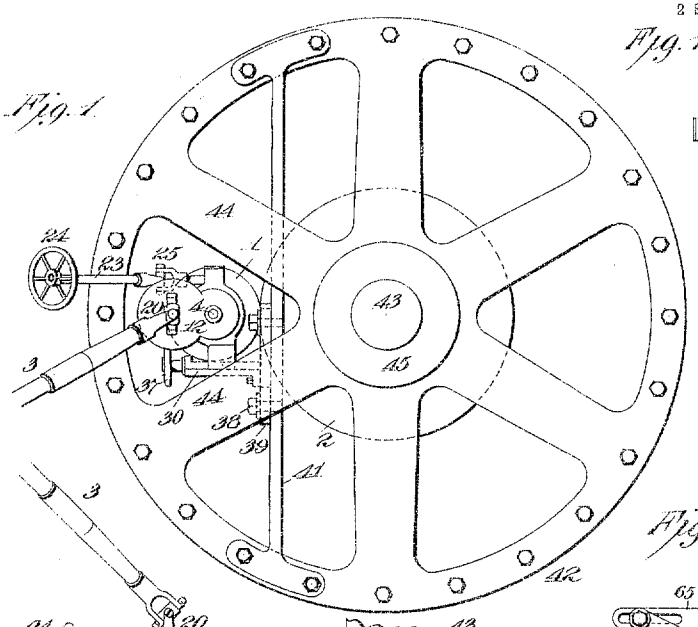


Fig. 1a.

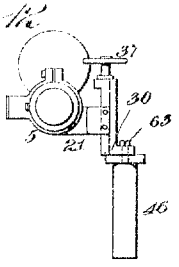


Fig. 2.

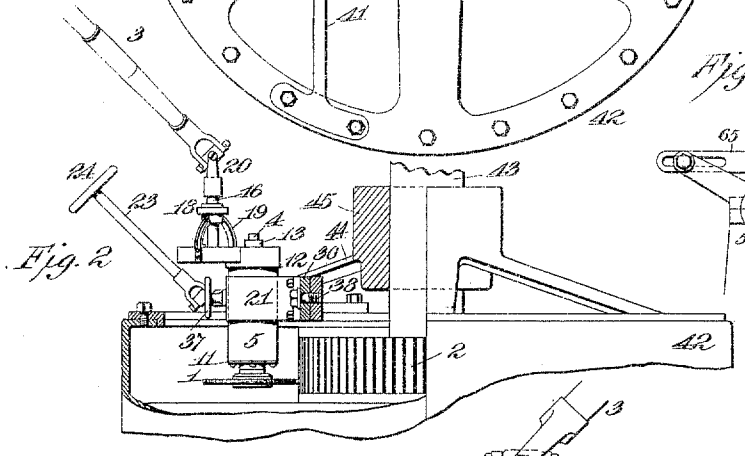


Fig. 1b.

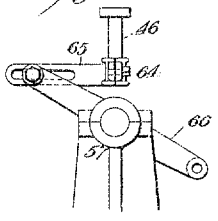


Fig. 3.

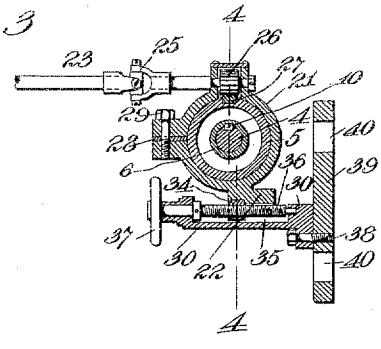
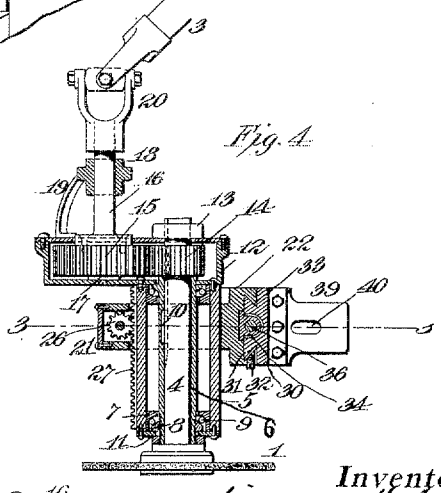


Fig. 4.



Witnesses:

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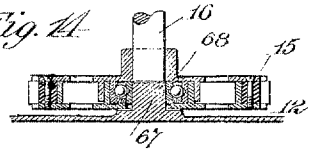
John Stetson.

Fig. 11.



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2 SHEETS—SHEET 2.

Fig. 5

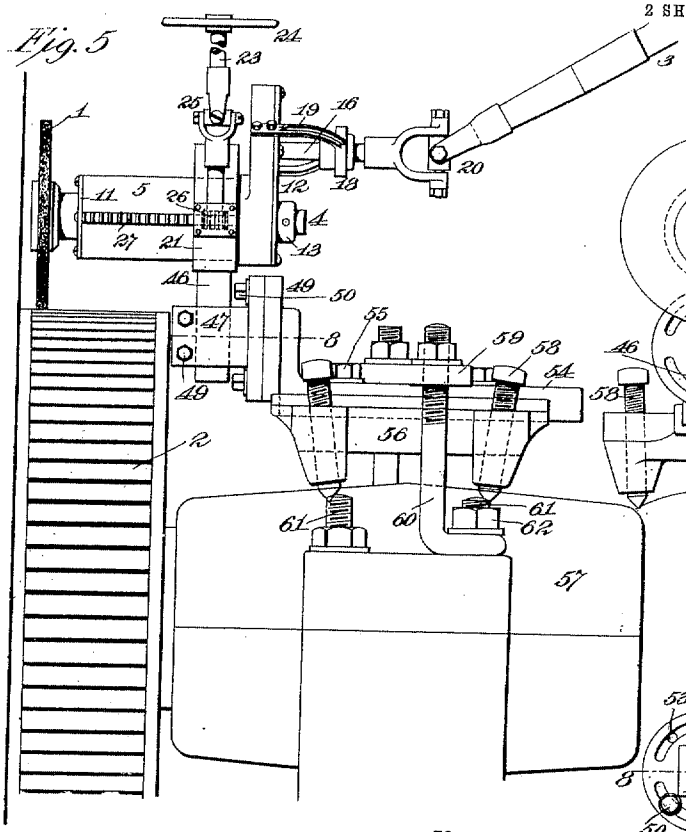


Fig. 7

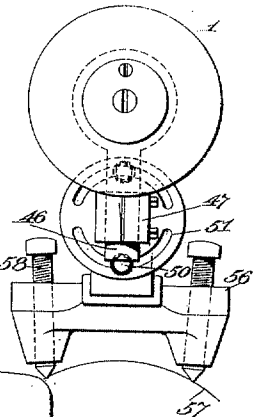


Fig. 9

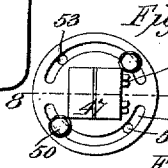


Fig. 8

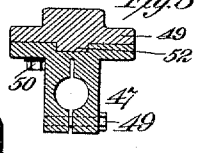


Fig. 11

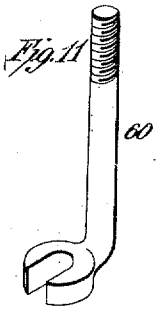


Fig. 6

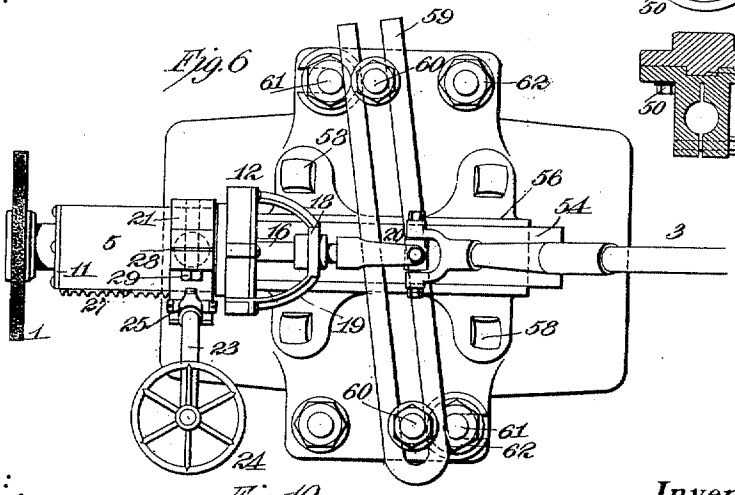
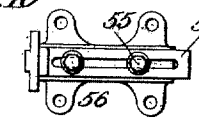


Fig. 10



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UNITED STATES PATENT OFFICE.

WILLIAM H. JORDAN, OF BROOKLYN, NEW YORK, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO JORDAN BROTHERS, A CORPORATION OF NEW YORK.

MACHINE FOR GRINDING COMMUTATORS OF DYNAMOS AND MOTORS.

982,367. Specification of Letters Patent. **Patented Jan. 24, 1911.**

Application filed May 6, 1908. Serial No. 431,101.

To all whom it may concern:

Be it known that I, WILLIAM H. JORDAN, a citizen of the United States, and a resident of the borough of Brooklyn, county of Kings, and State of New York, have invented a new and useful Machine for Grinding Commutators of Dynamos and Motors, of which the following is a specification.

The object I have in view is the production of a device for grinding commutators, or analogous structures, of motors or dynamos, when such become worn and without dismantling the dynamo or motor.

Another object is to produce a device which may be readily applied to dynamos or motors of different sizes and designs, and which may be accurately adjusted in relation to the commutator.

A further object is to produce a device which may be used for dynamos, and also used in connection with steam turbines in which the commutator is not readily accessible.

Further objects will appear from the following specification and accompanying drawings, considered together or separately.

Figure 1 is a plan view of a device embodying my invention applied to a dynamo mounted upon a steam turbine and rotated thereby. Fig. 2 is a view at right angles of Fig. 1 showing parts of the structure broken away. Fig. 3 is an enlarged view in section on the line 3—3 of Fig. 4 of part of the structure illustrated in Figs. 1 and 2. Fig. 4 is a sectional view on the line 4—4 of Fig. 3. Fig. 5 is a side view of a structure embodying my invention shown mounted upon a portion of a dynamo or motor, with a modified embodiment of the attaching means. Fig. 6 is a plan view of the same. Fig. 7 is an end view with parts omitted. Fig. 8 is a section on the line 8—8 of Fig. 5. Fig. 9 is a front view of a modified embodiment of the adjustable head. Fig. 10 is a detail view of parts of a structure illustrated in Fig. 9, but with the clamp bar removed. Fig. 11 is a detail of one of the clamp bolts. Fig. 12 is a detail view of a modification. Fig. 13 is a detail view showing the device attached to the brush supporting yoke of an electrical machine; and Fig. 14 is a detail sectional view of a modified support of one of the rotating gears.

In all of the views like parts are designated by the same reference characters.

In carrying out my invention, I provide a grinding wheel or disk 1 formed of an abrasive material. This disk is adapted to be brought into engagement with the commutator 2 for the purpose of truing or grinding the latter. The disk 1 is adapted to be rotated by a shaft 3 and to be held in engagement with the commutator 2. Means is provided for supporting the bearings or mountings of the grinding wheel 1 and for moving the grinding wheel so as to vary the amount of the commutator that is to be removed and also to move the grinding wheel throughout the length of the commutator so that all of its surface may be equally ground.

The direct support for the grinding wheel 1 is a shaft 4 (Figs. 3 and 4). This shaft is mounted preferably on ball bearings in a cylindrical casing 5. The internal diameter of the casing is sufficiently large to permit the introduction of the shaft 4, a sleeve 6 surrounding it, and the ball races 7—8 and balls 9. The ball races 7 are secured to the inside of the casing 5. The ball races 8 are secured to the outside of the sleeve 6. One set of ball races is shown as being provided for each row of balls. One of the ball races 7 is shown as screwed upon the sleeve to permit adjustment in the usual manner. The shaft 4 fits closely within the sleeve 6, and is secured so as to rotate therewith by any suitable means, such as a key 10. This key is shown as carried by the sleeve, and engages with a key-way formed in the shaft. The key-way extends continuously to the end of the shaft opposite to the grinding wheel. This permits the shaft to be removed from the sleeve and yet compels it to rotate with the sleeve. A plate 11 covers one end of the casing 5 and excludes dust. The other end of the sleeve is covered by a gear casing 12, secured to the cylindrical casing 5. The shaft 4 extends entirely through both walls of the gear casing 12, and its free end is provided with a collar 13, which holds the shaft 4 in position and prevents it sliding out.

The sleeve 6 extends into the casing 12, and carries a pinion 14, by means of which it may be rotated. The gear 15 intermeshes with the pinion 14 and rotates it. This gear 15 is carried upon a shaft 16, and is supported upon a bearing 17. The shaft is also supported upon a bearing 18, which is supported upon the casing 12 by means of arms 19.

On the end of the shaft 16 is a universal joint 20 to which the flexible shaft 3 is secured. Rotation of the shaft 3 will rotate the shaft 4 through the intermediary of the universal joint 20, the shaft 16, the gear 15, the pinion 14, sleeve 6 and key 10. By proportioning the sizes of the gear and pinion, the grinding wheel 1 may be made to rotate at the desired speed in relation to the speed of rotation of the shaft 3. It is desirable that an increase of speed be secured for the reason that it permits a slower rate of rotation of the shaft 3 and universal joint 20.

The cylindrical casing 5 is supported upon a frame 21, which comprises a body portion having a cylindrical opening and a base 22. The casing 5 lies within the cylindrical opening of the frame, and it is free to move therein in the direction parallel to the longitudinal center of the shaft 4. Movement longitudinally, for the purpose of feeding the wheel 1 across the face of the commutator, is produced by means of a shaft 23, having a suitable hand-wheel 24 upon one extremity. This shaft 23 may contain a universal joint 25, and serves to rotate a pinion 26. The shaft 23 is mounted in bearings carried by the frame 21, as shown in Fig. 3, and the pinion 26 is rotated to engage with a rack 27, such rack being carried upon the cylindrical casing 5. This rack projects from the face of the casing, as shown in Fig. 3, and enters a slot within which the pinion 26 lies.

The engagement of the edges of the rack with the sides of the slide prevents the cylindrical casing 5 from turning or rotating within the opening in the frame 21. By rotating the hand-wheel 24, the cylindrical casing 5, and with it the wheel 1 may be slid in the direction parallel to the axis of the shaft 4, such motion being caused by the engagement of the pinion 26 with the rack 27. For the purpose of taking up wear between such moving surfaces, the frame 21 is slit or split and a shim 28 inserted in such split part. A bolt 29 holds the parts in position. The frame 21 is supported upon a track 30 which engages with a dovetail slot in the base 22 of the frame 21. The frame 21 is adapted to be movable upon a track 33, carried by a frame 30. The track 33 is of sufficient length to permit sufficient movement of the wheel 1 in the direction at right angles to the axis of the shaft 4 to produce the greatest depth of the cut that it is desired to make in the commutator. A shim 31 is carried by the base 22, and is brought into engagement with the side of the track 33. A bolt 32 is used for moving the shim and taking up wear.

For the purpose of sliding the base 22 along the track 33, the former is provided with a nut 34, which enters a longitudinal recess 35 formed in the frame 30. Within this recess lies a threaded shaft 36, such shaft being supported in suitable bearings in engagement with the threads of the nut 34. A hand-wheel 37 is used for the purpose of rotating the threaded shaft and moving the base 22, and with it the arm 21 upon the track 33, thus moving the cutting edge of the grinding wheel toward or away from the commutator. The frame 30 is secured by bolts 38 to a plate 39, such plate having slots 40—40 for attachment of bolts to a support.

In the preferred form of my invention, this plate 39 is secured by bolts to a bar 41, such bar extending across the dynamo frame 42 at right angles to the dynamo shaft 43. In the structure illustrated in Figs. 1 and 2, the bar 41 is secured to the face of the frame 42, and passes under the webs 44 which carry the bearing 45. The parts are so proportioned that the shaft 4 is parallel to the dynamo shaft and the grinding wheel 1 is in engagement with the commutator 2. The cylindrical casing 5 will extend well down into the dynamo frame 42, and the shafts 3 and 23 will extend outward. The shaft 23 is rotated by a suitable motor, while the hand-wheel 24 is accessible to the operator. The hand-wheel 37 may be reached and rotated for the purpose of varying the depth of the cut of the grinding wheel 1. During the grinding operation the hand-wheel 24 is rotated first in one direction and then in the other, causing the cutting face of the wheel 1 to traverse the full depth of the commutator 2.

My invention may be modified in many ways, one modification being particularly applicable to dynamos or motors having horizontal shafts. These modifications are shown in Figs. 5 to 11 inclusive. For the purpose of supporting the frame 21, it is provided with a depending standard 46, preferably of cylindrical cross section, as shown in dotted lines in Fig. 6. This standard passes through an opening in a head 47. This head is split longitudinally, as shown in Fig. 8, and is provided with bolts 48 by means of which the standard may be clamped tightly in position. The adjustable head 47 is connected to a face plate 49 by means of bolts 50. These bolts pass through threaded openings in the face plate 49 and lie within curved slots 51 formed in the adjustable head 47. The face plate 49 is provided with a cylindrical protuberance 52 which enters a correspondingly

shaped opening formed in the abutting face of the adjustable head 47. The engagement of this protuberance with the opening in the head alines the two parts and helps to support the plate. The parts are connected together in addition by the bolts 50. By slackening up the bolts 50, the adjustable head 47 may be rotated around the protuberance 52, and can be held in position by again tightening up the bolts. To avoid the dead points incident to the structure shown in Fig. 7, the structure shown in Fig. 9 may be employed, which utilizes an extra set of holes 53, so that by removing the bolts 50 from one set of holes they may be placed in the other set, permitting the adjustment of the adjustable head 47 to any angle desired.

The face plate 49 is supported upon a horizontal longitudinally slotted plate 54. This plate 54 is connected by means of bolts 55 to a foundation plate 56. By slackening up on the bolts 55, the head 47 may be adjusted within wide limits in relation to the foundation plate 56, the slot in the plate 54 permitting this to be done. The foundation plate is adapted to rest upon the bearing box 57 of the dynamo or motor. The upper face of this bearing box is shown as being curved. The foundation plate 56 is provided with four bolts 58. These bolts are shown as having pointed ends, which engage with the upper surface of the bearing box 57. The bolts preferably incline, as shown, in a converging direction, so as to conform more nearly to the curvature of the box than if they were uninclined. The foundation plate is secured upon and to the bearing box 57 by means of a slotted plate 59, which lies across the plate 54, and has its ends connected by bolts 60 to certain of the bearing box bolts 61. The bolts 60, as shown in Fig. 11, have offset heads with slots, through which the bolts 61 pass. To adjust a bolt 60, the nut 62 of the bolt 61 is first removed and is then returned in position after the head of the bolt 62 has been threaded on the bolt 61. The bolts 60 pass through the slot in the plate 59 and are set up with washers and nuts, as shown. A convenient way of making the bar or plate 59, is in the shape shown, which is something like that of an extenuated horseshoe magnet.

Fig. 12 illustrates a modification of the device in which the standard 46, instead of being integrally formed with the frame, as illustrated in Fig. 5, is secured by bolts 63 to the track 30, which is illustrated in Fig. 3. By this arrangement, the device illustrated in Figs. 1 to 4 inclusive may be used in the situation illustrated in Figs. 5 to 10 inclusive.

Fig. 13 illustrates means for carrying the device upon the brush supporting yoke of an electrical machine. An adjustable head 64, similar to the adjustable head 47, already described, is provided with a slotted arm 65. A bolt passing through the slot connects the arm to the brush yoke 66. By adjusting the bolt within the proper portion of the slot and arranging the arm 65 at the proper angle, the grinding wheel 1 can be brought to bear upon the commutator.

Fig. 14 shows a modification of the means for supporting the gear 15. Instead of the shaft 16 being provided with a flange, as shown in Fig. 4, it enters a socket formed in the top of the gear, as shown in Fig. 14. The pin 67, which is shown as formed integrally with the casing 12, enters the center of the gear 15 and supports one member 68 of a ball bearing, the other member being carried by the gear 15. Any form of ball bearing may be employed, that illustrated being the well known form of which employs two solid rings which form the ball races, with a spacing collar between the rings for properly separating the balls.

In accordance with the provisions of the patent statutes, I have described the principle of my invention, together with the apparatus which I now consider to represent the best embodiment thereof, but I desire to have it understood that the apparatus shown is merely illustrative and that the invention can be carried out in other ways.

Having now described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A commutator grinder having a grinding wheel, a shaft upon which said wheel is mounted, bearings for said shaft, a casing for supporting said bearings, a frame supporting said casing so as to permit longitudinal movement of the latter, means for moving the casing with reference to the frame, a second frame adapted to be removably secured to the frame of the dynamo electric machine and supporting the first named frame so as to permit movement of the latter with reference to the second named frame in a direction substantially at right angles to the grinding wheel shaft, means for moving the second named frame with reference to the first named frame, and a flexible driving connection leading to the grinding wheel shaft.

2. In combination with the casing of an electric machine, having a bearing for a shaft and with inclined webs for supporting the bearing, of a grinding wheel, a flexible shaft for rotating the wheel, means for feeding the wheel across the face of the commutator, the said means including a flexible shaft and a support for the grinder, the said support passing below the webs of the bearing of the electric machine.

3. A commutator grinder, having a grind-

ing wheel, a supporting shaft therefor, a pinion on the shaft, bearings for the shaft, a support for the bearings, means for longitudinally moving the support, a second shaft connected to the bearings and a flexible joint in said second shaft.

4. A commutator grinder having a grinding wheel, a shaft therefor, means for supporting the shaft, means for adjusting the supporting means laterally with respect to the object acted upon, a rack carried by said supporting means, a pinion engaging with the rack and a shaft for rotating the pinion, the said shaft having a flexible portion.

This specification signed and witnessed this first day of May, 1908.

WILLIAM H. JORDAN.

Witnesses:
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JOHN L. LOTSCH.