March 5, 1929. C. W. WYMAN 1,704,233

MINING MACHINE

Original Filed July 1, 1925

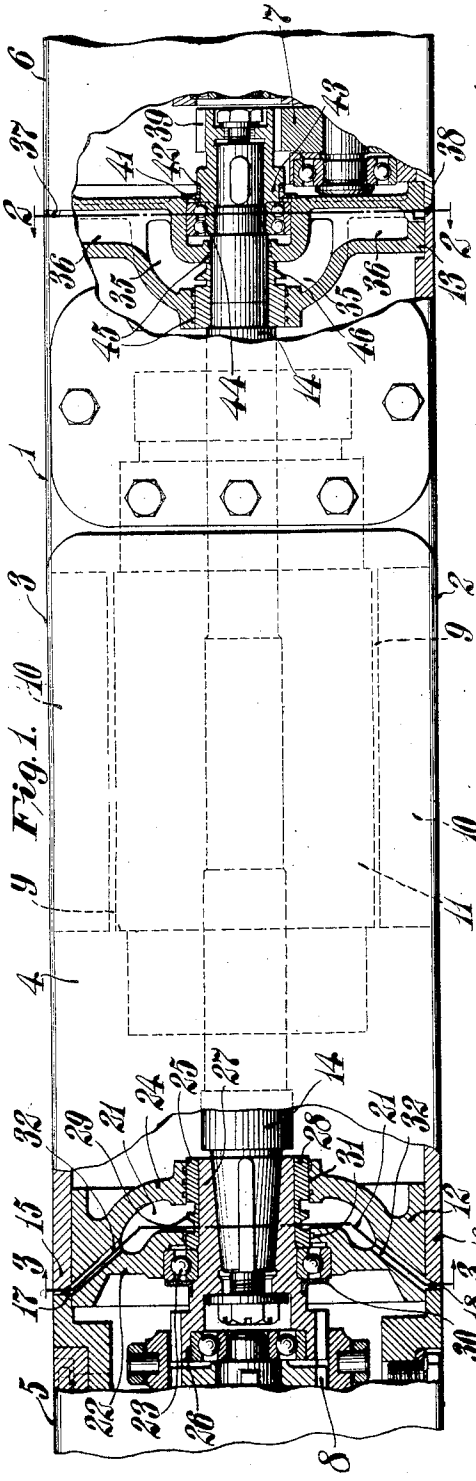


Fig. 1.

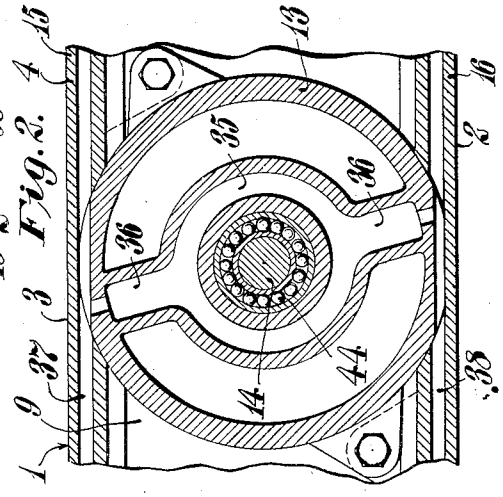


Fig. 2.

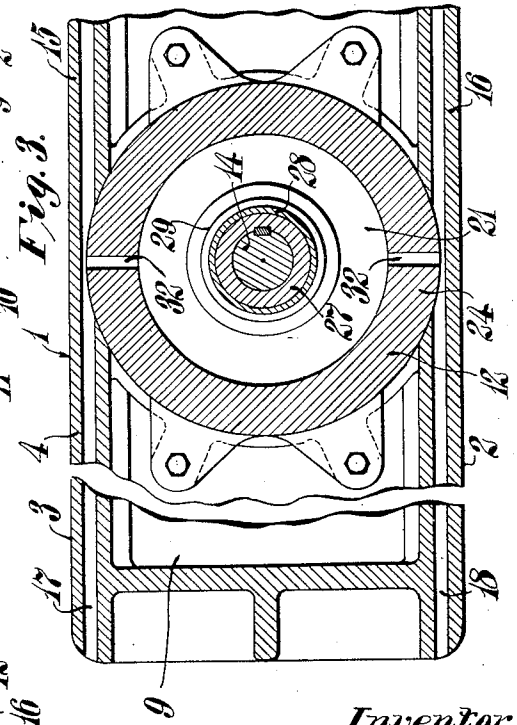


Fig. 3.

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# UNITED STATES PATENT OFFICE.

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## MINING MACHINE.

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This invention relates generally to mining machines of the electric motor propelled type and more particularly to the electric motors of such machines.

The injurious effect of oil upon the insulated windings of electric motors is well known. In mining machines of ordinary construction the possibilities of damage from this cause are very considerable and in certain very recently developed machines in which portions of the gearing run in oil baths and which are adapted when it is desired to cut at different heights to be inverted, with resultant certainty of spreading of any oil which might secure access to the motor casing, these possibilities are greatly enhanced.

A primary object of the invention is to prevent injury to the windings of a mining machine or other motor by interrupting the flow of and discharging any oil tending to creep into the motor housing proper, improved means being provided for this purpose. A more specific object is to provide means for discharging liquid moving along the power shaft of a motor irrespective of which of two relatively inverted positions the motor runs in. Other objects and advantages of the invention will subsequently appear.

In its general aspect the invention comprises means forming a chamber in one or both ends of a motor housing between the bearings for the power shaft and the inner wall of the housing, means for removing liquid from the surface of the shaft within the chamber, and means for venting the chamber. Preferably the means for removing the liquid takes the form of centrifugal means and the venting means is formed in duplicate at opposite sides of the chamber so that when the motor is operated in either of two relatively inverted positions, the liquid may be discharged. Preferably also the venting means takes the form of a branched passage so that when the motor is employed in a mining machine, venting will take place even though the machine be tilted due to the slant or to casual humps in the mine bottom. In the event that the motor is arranged in juxtaposition to and drives mechanism rotating in an oil bath or otherwise copiously lubricated, auxiliary means may be provided to limit the flow of lubricant to the bearings of said motor and if desired these may be constructed to permit access of a governed quantity of oil to the bearings.

In the accompanying drawings, in which for purposes of illustration I have disclosed one form which the invention may assume in practice,

Fig. 1 is a fragmentary view in side elevation of a mining machine constructed in accordance with the illustrative form of the invention and having parts broken away to show details of construction.

Fig. 2 is a fragmentary section on the line 2—2 of Fig. 1, and

Fig. 3 is a similar section on the line 3—3 of Fig. 1.

Referring to the drawings 1 is a mining machine frame providing surfaces 2 and 3 on which the machine may slide depending upon the desired location of the cut. The machine comprises a central motor section 4, a cutting mechanism section 5 and a feed mechanism section 6. Each of the last two sections contains transmission mechanism and both the feed transmission mechanism 7 and the cutter driving mechanism 8 run in oil baths. The motor section 4 comprises a chamber 9 in which are field coils 10 and a rotatable armature 11. The ends of the chamber are closed by end closure members 12 and 13, which also support the armature bearings. The armature is mounted on a shaft 14, whose opposite ends respectively drive the cutting and the feeding mechanisms.

Referring first to the cutting mechanism driving end of the motor, it will be observed that at the juncture of the casings 4 and 5 the top and bottom plates 15 and 16, which are herein formed as integral parts of the motor section 4, are cut away to provide channels 17, 18 which extend for the full width of the machine and open through the sides thereof. The end closure member 12 has formed therein a chamber 21 which is circular in outline and substantially concentric with the shaft 14. At the outside of the chamber is a wall 22 which carries a ball bearing 23 supporting the armature shaft, and at the inner side of the chamber is a wall 24 which is traversed by an opening 25 concentric with the shaft 14. The end of this shaft is tapered and carries a driving pinion 26. This pinion has an extension in the form of a cylindrical sleeve

27 surrounded by the inner race of the ball bearing 23 and by a sleeve 28 pressed thereon and providing an oil throwing ring 29 between its ends. To the outside of the bearing 23 the sleeve 27 is grooved and carries a felt, leather, or other suitable sealing ring 30, preferably of porous material such as those mentioned, which greatly diminishes the flow of oil into and through the bearing 23. If desired this ring may be perforated by a small hole to permit a governed quantity to pass, but ordinarily a sufficient amount passes due to the porosity of the ring. Sealing grooves 31 in the inner and outer walls of the chamber aid in preventing flow of lubricant into the motor casing. From the chamber diametrically opposite passages 32 lead to the grooves 17 and 18.

Referring now to the other end of the motor, it will be noted that the head 13 is constructed quite similarly to the head 12, containing a chamber 35 vented through passages 36 to transverse discharge passages 37 and 38 respectively at the top and bottom of the machine. The feed drive is accomplished by a pinion 39 on the extremity of the shaft 14, and a flexible packing 41 seated in a groove 42 in the sleeve 43 of pinion 39 seals the bearing 44 in which the shaft 14 is journaled. The sealing grooves 45 and oil throwing ring 46 are substantially the same as the corresponding structures at the other end of the shaft save in that the sealing grooves next the bearing 44 are next the shaft 14 proper.

From the foregoing description the mode of operation of the structure described will be readily understood. Leakage of lubricant through the bearings will be greatly reduced by the flexible packings. What lubricant does pass by will be thrown off by the throwing rings into the chambers 21 and 35 and will flow downward either into the grooves or channels 18 or 38, or 17 and 37, depending on whether the machine is sliding on the surface 2 or surface 3. Owing to the outlets at opposite sides of the frame the lubricant will be effectively discharged even when working on steep pitches or passing over rough and curving bottoms. The felt or other flexible rings materially reduce loss of oil as well as cut down danger of access of the lubricant to the motor windings. These rings are of particular assistance when the motor is not running, since the centrifugal protection is then not available.

While I have in this application specifically described one form which my invention may assume in practice, it will be understood that this form of the same is shown for purposes of illustration and that the invention may be modified in various other forms without departing from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. In a motor, a motor housing providing a rotor compartment, a horizontal rotor therein, said housing comprising a head portion, said head portion having a chamber therein, and said rotor having a horizontal supporting shaft extending through said chamber and journaled in the vertical wall of said head portion lying to the outside of said chamber and having its journal means wholly outside the side of said outer wall which is nearer said chamber, means in said chamber for effecting removal of liquid moving longitudinally through said chamber towards said rotor along said shaft, and means for venting said chamber of such liquid to preclude access of the latter to said compartment including a liquid discharge passage extending from said chamber to the exterior of said motor housing.

2. In a motor, a motor housing, a horizontal rotor therein, said housing comprising a head portion, said head portion having a chamber therein, and said rotor having a horizontal supporting shaft extending through said chamber and journaled in the vertical wall of said head portion lying to the outside of said chamber and having its journal means wholly outside the side of said outer wall which is nearer said chamber, means in said chamber for effecting removal of liquid moving longitudinally through said chamber towards said rotor along said shaft, and means for venting said chamber providing branching vent passages each leading to the exterior of the motor housing.

3. In a motor, a motor housing providing a rotor compartment, a horizontal rotor therein, said housing comprising a head portion, said head portion having a chamber therein, and said rotor having a horizontal supporting shaft extending through said chamber and journaled in the vertical wall of said head portion lying to the outside of said chamber and having its journal means wholly outside the side of said outer wall which is nearer said chamber, centrifugal means in said chamber for effecting removal of liquid moving longitudinally through said chamber towards said rotor along said shaft, and means for venting said chamber of such liquid to preclude access of the latter to said compartment including a liquid discharge passage extending from said chamber to the exterior of said motor housing.

4. In a motor, a motor housing, a horizontal rotor therein, said housing comprising a head portion, said head portion having a chamber therein, and said rotor having a horizontal supporting shaft extending through said chamber and journaled in the vertical wall of said head portion lying to the outside of said chamber and having its

journal means wholly outside the side of said outer wall which is nearer said chamber, centrifugal means in said chamber for effecting removal of liquid moving longitudinally through said chamber towards said rotor along said shaft, and means for venting said chamber providing branching vent passages each leading to the exterior of the motor housing.

5. In a motor, a motor housing providing a rotor compartment, a horizontal rotor therein, said housing comprising a head portion, said head portion having a chamber therein, and said rotor having a horizontal supporting shaft extending through said chamber and journaled in the vertical wall of said head portion lying to the outside of said chamber and having its journal means wholly outside the side of said outer wall which is nearer said chamber, means at the outside of said wall for limiting liquid flow into said chamber, means in said chamber for effecting removal of liquid moving longitudinally through said chamber towards said rotor along said shaft, and means for venting said chamber of such liquid to preclude access of the latter to said compartment including a liquid discharge passage extending from said chamber to the exterior of said motor housing.

6. In a motor normally adapted to be run with its base horizontal, a motor housing, a horizontal rotor therein, said housing comprising a head portion, said head portion having a chamber therein, and said rotor having a horizontal supporting shaft extending through said chamber and journaled in the vertical wall of said head portion lying to the outside of said chamber and having its journal means wholly outside the side of said outer wall which is nearer said chamber, porous flexible packing means for limiting liquid flow into said chamber, means in said chamber for effecting removal of liquid moving longitudinally through said chamber towards said rotor along said shaft, and means for venting said chamber.

7. In a mining apparatus, a motor having a casing providing a rotor chamber, a rotor in said chamber, bearings for said rotor outside said chamber, and liquid venting means outside said chamber and nearer the latter than said bearings including means for discharging liquid at either side of said casing.

8. In a mining apparatus, a motor casing section, a casing section secured to said motor casing section and containing a lubricant bath, a motor in said motor casing section having a horizontal shaft extending into said second casing section, means for precluding passage of lubricant from said second casing section into the first including a flexible packing surrounding said shaft, means for throwing lubricant passing said packing from said shaft, and means for discharging such lubricant from the casing.

9. In a mining apparatus, a motor casing section, a gearing enclosing casing section secured to said motor casing section and containing a lubricant bath, a motor in said motor casing section having a shaft extending into said second casing section, means for precluding passage of lubricant from said second casing section into the first including a porous flexible packing surrounding said shaft, means for throwing lubricant passing said packing from said shaft, and means for discharging such lubricant from the casing comprising vent means at the top and bottom of the casing.

10. In a mining apparatus, a motor casing section, a gearing enclosing casing section secured to said motor casing section and containing a lubricant bath, a motor in said motor casing section having a shaft extending into said second casing section, means for precluding passage of lubricant from said second casing section into the first including a porous flexible packing surrounding said shaft, means for throwing lubricant passing said packing from said shaft, and means for discharging such lubricant from the casing comprising vent means at either side of the casing.

11. In a mining apparatus, a motor casing section, a gearing enclosing casing section secured to said motor casing section and containing a lubricant bath, a motor in said motor casing section having a shaft extending into said second casing section, means for precluding passage of lubricant from said second casing section into the first including a flexible packing surrounding said shaft, means for throwing lubricant passing said packing from said shaft, and means or discharging such lubricant from the casing comprising vent means at each side of the top and bottom of the casing.

12. In a mining machine, an electric motor having windings and a power shaft arranged longitudinally of the machine, means for preventing access of lubricant to the windings comprising means providing lubricant discharge chambers at the ends of said motor, and means forming discharge passages opening through either side of the machine adjacent its bottom.

13. In a mining machine having a casing adapted to be supported on opposed bounding surfaces thereof, an electric motor in said casing and having windings and a power shaft arranged longitudinally of the machine, means for preventing access of lubricant to the windings comprising means providing lubricant discharge chambers at the ends of said motor, and means providing discharge passages opening through either side of the casing adjacent the bottom in either position of the casing.

14. In a mining machine, a machine casing having a plurality of supporting surfaces on which the machine is adapted to be selectively supported during its operation, an electric motor in said casing having windings and a power shaft, a bearing in which said shaft rotates, means for lubricating said bearing, and means for collecting excess lubricant from said bearing to prevent access of the lubricant to the motor windings, said casing having a plurality of lubricant discharge passages formed therein, one of said passages adapted to discharge excess lubricant from said bearing when the machine is supported on one surface and another of said passages adapted to discharge excess lubricant from said bearing while the machine is supported on the second of its supporting surfaces.

15. In a mining machine, a machine casing having a plurality of supporting surfaces on which the machine is adapted to be selectively supported during its operation, an electric motor in said casing having windings and a power shaft, a bearing in which said shaft rotates, means for lubricating said bearing, and means including a chamber formed in said casing for receiving excess lubricant discharged from said bearing to prevent access of the lubricant to the motor windings, said casing being provided with a plurality of passages communicating with said chamber, one of said passages adapted to discharge excess lubricant from said chamber when said machine is supported on one of its surfaces and another of said passages adapted to discharge excess lubricant from said chamber while the machine is supported on a second of its supporting surfaces.

16. In a mining machine, a machine casing having a plurality of bounding surfaces on which the machine is adapted to be selectively supported during its operation, an electric motor in said casing having windings and a power shaft, lubricating means for said shaft, and means for preventing access of lubricant to the motor windings including lubricant discharge passages opening through the casing adjacent the surfaces on which the machine is adapted to be supported, one of said passages adapted to discharge excess lubricant from said shaft when the machine is supported on one surface and another of said passages adapted to discharge excess lubricant from said shaft while the machine is supported on the second of its supporting surfaces.

17. In a mining machine, an invertible machine casing having opposed bounding surfaces on which the machine is adapted to be selectively supported during its operation, an electric motor in said casing having windings and a power shaft, lubricating means for said shaft, and means for preventing access of lubricant to the motor windings including means for collecting the excess lubricant from said shaft, and discharge passages communicating with said collecting means and opening through the casing adjacent the bottom of the machine in either position of said casing, one of said passages adapted to discharge excess lubricant from said shaft when the machine is supported on one surface and another of said passages adapted to discharge excess lubricant from said shaft while the machine is supported on the other of said supporting surfaces.

18. In a mining machine, a casing, an electric motor therein having windings and a horizontal power shaft, lubricating means for said shaft, and means for preventing access of lubricant to the motor windings including a lubricant discharge passage opening through a vertical side wall of the machine and through which the excess lubricant discharged from said shaft is adapted to gravitate.

19. In a mining machine, a casing, having a flat horizontal bottom and vertical sides, an electric motor having windings and a horizontal power shaft, lubricating means for said shaft, means for preventing access of lubricant to the windings comprising means providing lubricant discharge chambers at the ends of said motor for collecting excess lubricant from said shaft, and means forming lubricant discharge passages communicating with said chambers and opening through a vertical side of the machine adjacent its bottom.

In testimony whereof I affix my signature.

CHARLES W. WYMAN.