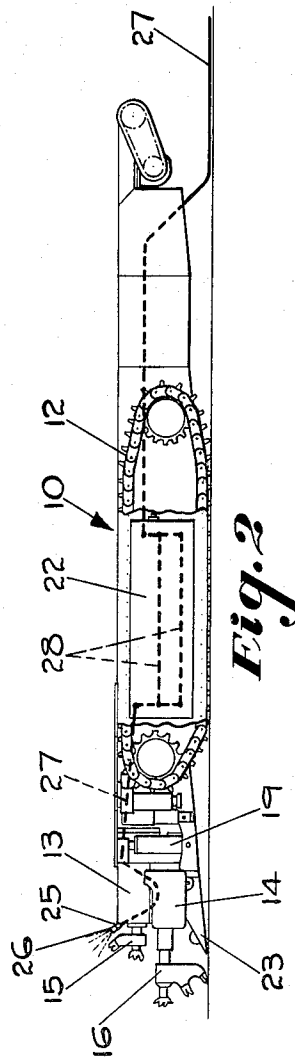
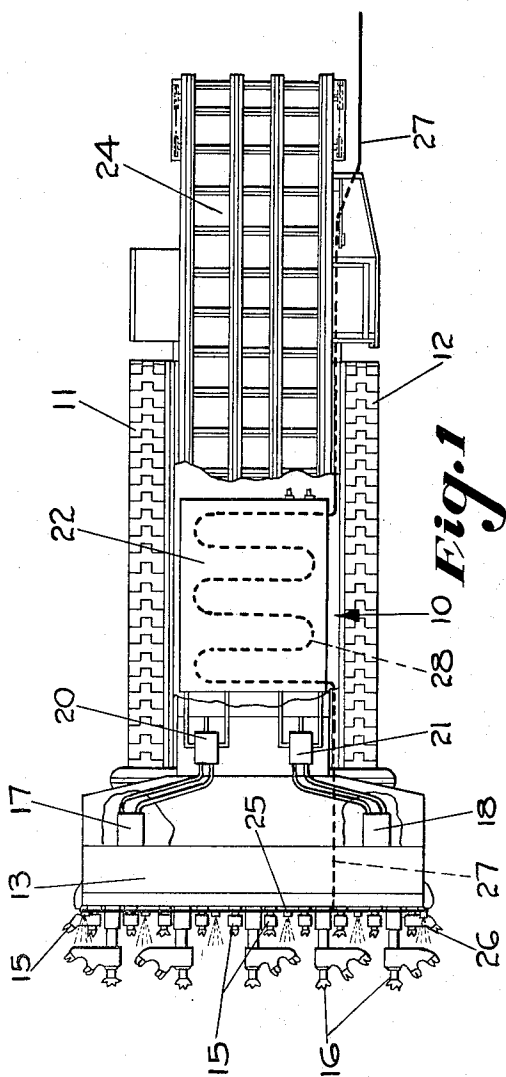


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MINING MACHINE HAVING COMBINATION
SPRAY AND COOLING MECHANISM
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MINING MACHINE HAVING COMBINATION SPRAY AND COOLING MECHANISM

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1 Claim. (Cl. 262—26)

This invention relates to a mining machine, or the like, in which a fluid spray is provided for dampening and settling dust, which fluid is also used to cool the operating motor or motors, or, more specifically, the hydraulic fluid of a hydraulic motor or motors.

Other objects of the invention will appear hereinafter, the novel features and combinations being set forth in the appended claim.

In the accompanying drawings:

Fig. 1 is a plan view, with parts broken away, showing a continuous mining machine incorporating the features of my invention; and

Fig. 2 is a side elevational view, with parts broken away, showing the machine of Fig. 1 incorporating said invention.

The machine of Figs. 1 and 2 of the drawings which embodies my invention is a continuous mining machine, that represented being known in the trade as the "Colmol." This machine is representative of a continuous mining machine which presents certain problems, including particularly the dissipation of heat. As is well known, mining machines are often of limited height due to the coal seam in which they must work, which means that the amount of horsepower required to do any job must be confined to a minimum space. As a result of this and other factors, the primary driving motors are generally electric motors, and in some continuous mining machines, including some of the "Colmols" above mentioned, the power is transmitted from the primary electric motors to the breaker arms or heads by means of a hydraulic coupling including one or more high pressure, high volume hydraulic pumps, coupled with one or more high pressure, high volume hydraulic motors. Due, among other things, to the fact that a continuous mining machine does not have significant rest or non-operating periods between successive operations, as do many other types of mining machines, it has been found that the motors, and particularly the hydraulic motors, tend to become excessively heated after a continuous operation over a matter of a few hours, resulting in excessive temperature in the hydraulic fluid or oil, with consequent unsatisfactory operation.

In a continuous mining machine, of which the "Colmol" is illustrative, it is generally desirable to spray the coal as it is broken away from the mine faces with a fluid, such as water, to dampen and thus reduce the dust, in the interest of mine safety and comfort of the operators.

In one aspect of my invention, therefore, I interpose a heat exchanging unit in the line through which the fluid spray flows, and locate this heat exchanger in the hydraulic fluid tank wherein the hydraulic fluid is carried which feeds the pumps and in turn the hydraulic motors for driving the breaker arms or heads. This spraying fluid is quite generally water from the available source in a mine and thus has a temperature much lower than that developed in the hydraulic fluid or any other driving motor. Thus it increases appreciably the overall efficiency of the mining machine and makes possible continuous

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operation which would otherwise be impossible due to undesirable temperature increases in the unit.

In the illustrated embodiment of my invention I have shown a continuous mining machine including a main frame 10 which is supported for transportation upon a pair of endless crawlers 11 and 12 which may be driven through appropriate individual motors, not shown. At its forward end the main frame carries upper and lower head sections 13 and 14 which comprise gear casings. Upper rotary breaker arms or heads 15 project longitudinally forwardly from the upper head section 13. Lower rotary breaker arms or heads 16 project longitudinally forwardly from the lower head section 14. The gears in the upper head section 13 interconnect the upper breaker arms or heads 15 and are driven by a hydraulic motor 17. The gears in the lower head section 14 interconnect the lower breaker arms or heads 16 and are driven by a hydraulic motor 18. Upper and lower head sections 13 and 14 may be relatively adjusted by a pair of hydraulic cylinders or jacks, one on each side thereof, and one of which is seen at 19 in Fig. 2 of the drawings.

Hydraulic motor 17 is hydraulically connected to and driven by a hydraulic pump 20, and hydraulic motor 18 is hydraulically connected to and driven by a hydraulic pump 21. Pumps 20 and 21 derive fluid from a hydraulic tank 22, and any excess or by-passed fluid is delivered to said tank 22.

For a more detailed disclosure and description of the hydraulic motors, pumps, head sections and breaker arms and associated mechanism, reference is made to my application, Serial No. 348,983, filed April 15, 1953, entitled Hydraulic System, which discloses more in detail these parts as they may be employed in the illustrated embodiment of my invention.

In the operation of the mining machine as so far described it is, of course, obvious that the breaker arms or heads 15 and 16 rotate about generally longitudinal horizontal axes and break down the coal on a generally upright coal face. This coal is then swept to the center of the unit, particularly by the lower breaker arms 16, and passes over a bottom blade 23 where it is picked up by a conveyer 24 and discharged over the rear of the unit into any desired receptacle, such as the intermediate transportation system known as the "Molveyor," or, if desired, into a shuttle car, or the like.

Across the top of the head 17 and extending transversely of the longitudinal axis of the main unit there is a spray pipe 25 provided with a plurality of spray nozzles 26 which spray fluid, such as plain water, onto the coal face as it is broken down, thus dampening the coal and reducing significantly the dust hazard, which also contributes to the comfort of the machine operators.

The spray pipe 25 may be provided with the spraying fluid or water by means of a hose or pipe 27 which extends to any desired or available source of water supply. Interposed in the hose or pipe 27 is a heat exchanger 28 which may take the form of one or more bent pipes preferably made of a conductive metal, such as copper aluminum, or the like. The heat exchanger 28, as illustrated, is placed in the large hydraulic fluid or oil tank 22 and has been found very effective to dissipate considerable of the heat which is generated in the first instance by the motors 17 and 18 and which manifests itself by heating the hydraulic fluid. The dissipation of this heat has been found to be a controlling factor in many instances, and the continuity with which a so-called continuous mining machine may be operated. By employing this readily available inherently relatively low temperature spraying fluid for the double purpose of both spraying the coal at the mine face and cooling the hydraulic motors by cooling the hydraulic fluid the overall efficiency of the mining machine has been appreciably enhanced.

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It is to be understood that while in the illustrated embodiment the heat exchanger cools the hydraulic motors 17 and 18, at the same time cooling the hydraulic motors 20 and 21 by cooling the hydraulic fluid, in a broader aspect of my invention the heat exchanger may be associated directly with the primary driving electric motors for cooling them.

Obviously those skilled in the art may make various changes in the details and arrangement of parts without departing from the spirit and scope of the invention as defined by the claims hereto appended, and applicant therefore wishes not to be restricted to the precise construction herein disclosed.

Having thus described and shown an embodiment of the invention, what it is desired to secure by Letters Patent of the United States is:

A continuous mining machine including rotary breaker arms operative to break material from a coal face, hydraulically operated motor means for rotating said arms, a source of hydraulic fluid for said motor means including a reservoir from which hydraulic fluid is delivered to the hydraulic motor means and to which hydraulic fluid is returned from the hydraulic motor means, means for

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spraying a fluid on the material as it is broken down by said rotary arms to reduce the dust, and a heat exchanger associated with said source of hydraulic fluid and disposed in the hydraulic fluid reservoir said spraying fluid being directed through the heat exchanger whereby said spraying fluid will act to cool said hydraulic fluid and thereby cool the hydraulic motor means.

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