Dec. 17, 1957 C. F. BALL 2,816,747

CABLE PULL ASSIST FOR SELF-PROPELLED LONGWALL MINER

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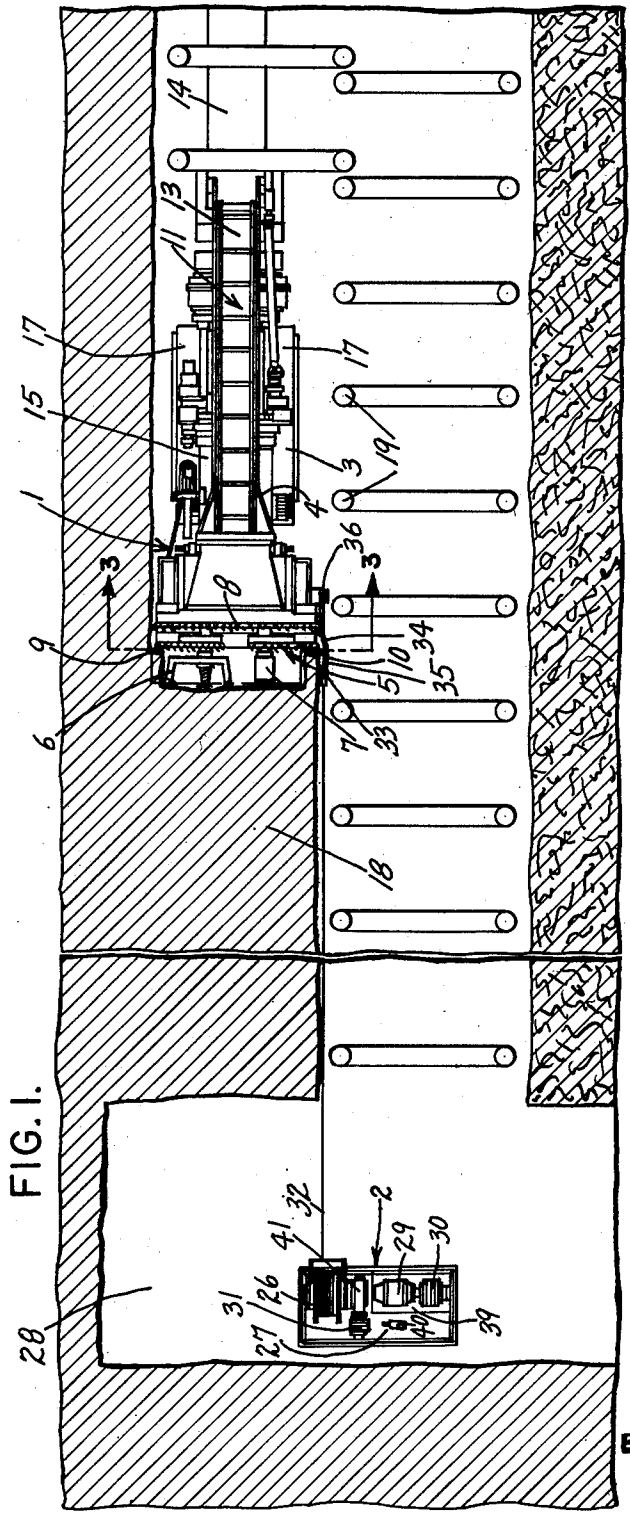


FIG. 1.

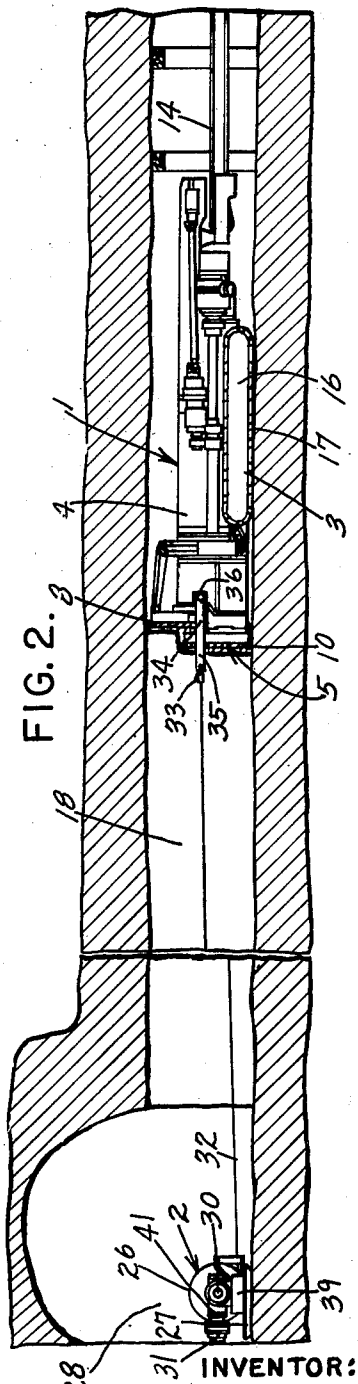


FIG. 2.

INVENTOR:
CHARLES F. BALL
BY Charles F. Ozood.
ATTORNEY

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FIG. 3.

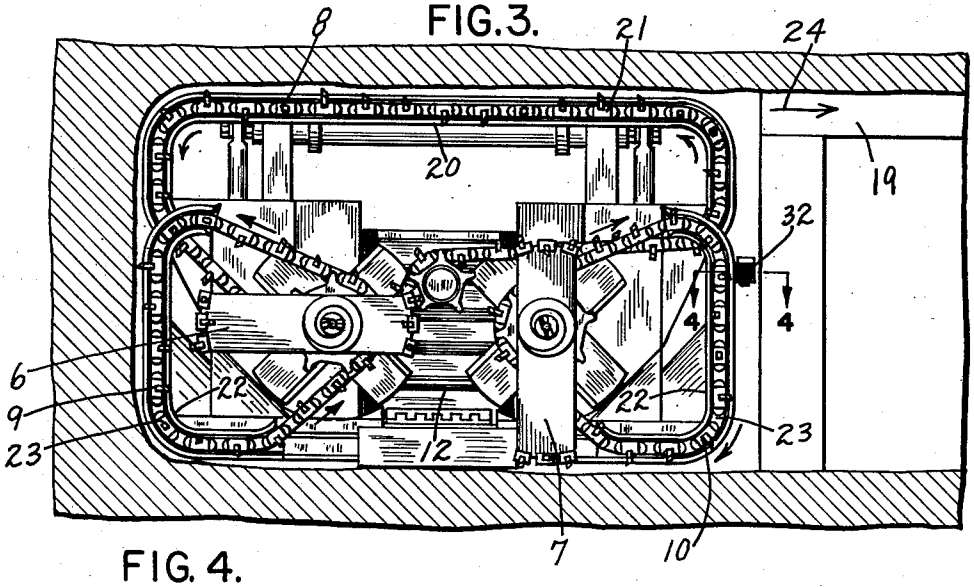


FIG. 4.

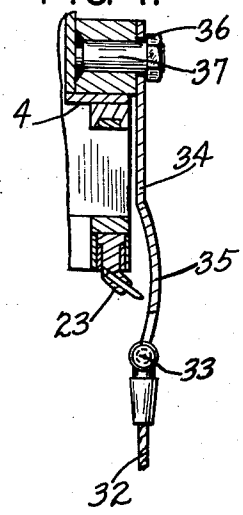


FIG. 5.

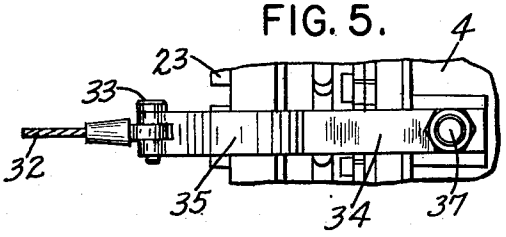
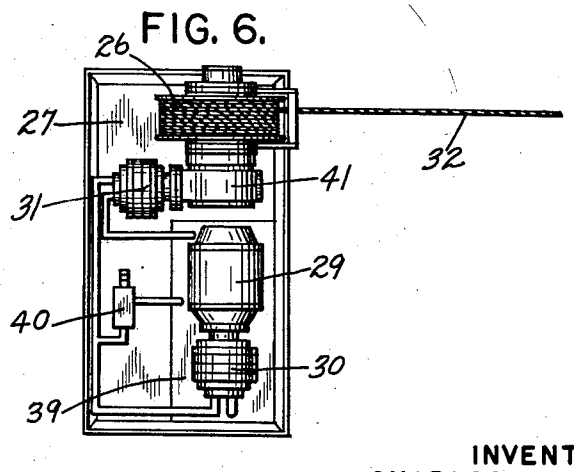


FIG. 6.



INVENTOR:
CHARLES F. BALL

BY Charles F. Osgood,

ATTORNEY

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CABLE PULL ASSIST FOR SELF-PROPELLED LONGWALL MINER

Charles F. Ball, Franklin, Pa., assignor to Joy Manufacturing Company, Pittsburgh, Pa., a corporation of Pennsylvania

Application May 18, 1956, Serial No. 585,850

10 Claims. (Cl. 262—9)

This invention relates to continuous miners and more particularly to a longwall continuous miner having a cable pull assist for supplementing the machine propelling means and for maintaining the disintegrating head of the miner along its proper course during the mining operation.

The present invention relates to an improvement over the continuous miner disclosed in my copending application Serial No. 496,962, filed March 28, 1955, wherein, under certain conditions, it is found that the propelling means for the machine is inadequate to force the disintegrating head forwardly at the desired speed into the solid mineral of the mine vein, and that due to the structure of the disintegrating head there is an inherent tendency of the machine-head being thrust outwardly from the face during the mining operation. The improvement of the present invention over the machine of the copending application consists of the provision of a supplemental propelling means for aiding in the feeding of the disintegrating head into the mineral and for reducing the tendency of the head being thrust laterally outwardly from the face during the disintegration of the solid mineral. The improved supplemental feeding and thrust counteracting means of the present invention is desirably in the form of a cable pull assist embodying a hoist or winch having its cable operatively attached to the miner and exerting a constant forward pull on the latter at the outer side thereof as the miner advances along the longwall face.

It is therefore an object of the present invention to provide an improved continuous miner having improved propelling and guiding means. Another object is to provide an improved propelling and guiding means which also serves to counteract the thrust of the disintegrating head outwardly from the face during the mining operation. Yet another object is to provide an improved cable pull assist for a longwall miner and including a winch or hoist disposed in advance of the miner and toward which the miner moves as mining progresses. These and other objects and advantages of the invention will however hereinafter more fully appear in the course of the ensuing description.

In the accompanying drawings there is shown for purposes of illustration one form which the invention may assume in practice.

In these drawings:

Fig. 1 is a plan view and Fig. 2 is a side view of a longwall miner in its operating position in a mine, and with which an illustrative form of the invention is associated.

Fig. 3 is an enlarged front end view of the disintegrating head of the miner, taken on line 3—3 of Fig. 1.

Fig. 4 is an enlarged horizontal detail section taken on line 4—4 of Fig. 3, showing the cable connection.

Fig. 5 is a side view of the cable connection shown in Fig. 4.

Fig. 6 is a plan view of the winch or hoist.

In this illustrative construction, as shown in the drawings, the longwall continuous miner is generally designated 1 and the improved cable pull assist is generally designated 2.

The longwall miner is fully disclosed in my copending application Serial No. 496,962 mentioned above, and generally comprises a mobile base 3, desirably a crawler base, adapted to travel over the floor of a mine and having mounted thereon an elongated frame or support 4 which carries at its front portion a mine vein attacking and disintegrating mechanism or so-called disintegrating head mechanism generally designated 5. The attacking and disintegrating mechanism comprises a pair of cooperating rotary boring instruments or so-called boring heads 6 and 7 disposed on parallel longitudinal axes, an upper or top and side trimming cutter 8 extending transversely of the frame rearwardly of the boring instruments, and side and bottom trimming cutters 9 and 10, the latter being arranged in a transverse zone intermediate the transverse top cutter and the boring instruments. Conveying means generally designated 11 is arranged longitudinally within the frame 4 and comprises a front elevating conveyor 12 and a cooperating rear discharge conveyor 13. The rear conveyor 13 may discharge on a conveyor 14 which may be of any suitable type. The crawler base 3 comprises a frame 15 rigidly secured to side frames 16 about which endless crawler treads 17 are guided for orbital circulation. These crawler treads may be independently driven and may be operated concurrently or separately to effect propulsion and steering of the machine in a well-known manner.

In Figs. 1 and 3 the miner is shown advancing along a longwall face 18 inwardly of a line of roof props 19.

The top and side trimming cutter 8 operates at the roof level and comprises a guide frame 20 providing a guideway in which an endless loop type cutter chain 21 is guided for orbital circulation. The side and bottom cutters 9 and 10 are arranged at opposite sides of the frame 4 and comprise guide frames 22 which provide guideways for endless loop type cutter chains 23. During operation of the disintegrating head the side and bottom cutter chains 23 move orbitally in relatively opposite directions and thereby exert substantially balanced transverse forces while the top trim chain 21 has an unbalance force that tends to pull or push the front end of the machine away from the face in the direction of the arrow shown at 24 in Fig. 3. The crawler treads may be operated so that the machine may properly advance and by proper control of the treads the operator may to some extent correct any deviations of forward machine movement as needed to produce a straight cut.

Under certain conditions it is found that the crawler treads are incapable of providing a sufficient forward feeding force to effect advance of the disintegrating head at the proper speed and that the treads do not at all times provide adequate means for counteracting the outward thrust of the disintegrating head from the face due to the unbalance force of the top trim chain 21. In order to overcome these deficiencies the improved cable pull assist is provided.

This cable pull assist comprises a conventional winch or hoist having a hoisting drum 26 journaled on a base 27 which may be suitably anchored in position at the far end gate or entry 28 at the left-hand end of the longwall face 18, as viewed in Fig. 1. A motor 29 on the base drives through a suitable transmission mechanism a pump device 30 which may supply fluid under pressure to a fluid motor 31 suitably operatively connected to the cable drum 26. Wound on the cable drum is a cable 32 which, at its free end, is pivotally connected at 33 to a connector bar 34, the latter desirably being curved at 35 to clear the cutters of the adjacent cutter chain 23. This connector bar 34 is pivotally connected at 36 on a horizontal pivot

pin 37, with the horizontal pivot disposed at right angles to the pivotal connection 33 of the cable with the connector bar. Evidently the cable may be attached to the outer side of the miner head in any suitable manner.

The pull of the cable 32 at the outer side of the head frame produces a couple around the crawler tread support tending to counteract the opposing couple produced by the top trim chain, thereby tending to hold the disintegrating head inwardly in its proper operating position.

The pump device 30 has its suction side connected in a conventional manner to a suitable reservoir or tank 39 and there is a usual relief valve 40 adjustable to produce proper cable pull. This relief valve may also serve to prevent the building up of excessive pressures within the fluid system. The transmission 41 between the fluid motor 31 and the cable drum 26 is desirably of the conventional multi-speed type whereby the cable may be wound in at relatively different speeds.

As the miner is advanced along the longwall face under the propulsion of the crawler base the cable 32 of the cable pull assist exerts a constant pull on the frame of the miner to supplement the crawler treads thereby to increase the crowd or forward driving force of the machine, and when the machine treads are stopped the hoist would simply stall, but would continue to exert a forward pulling force. The pull on the cable on the outer side of the head frame of the miner tends to swing the head inwardly toward the face thereby substantially to counteract the unbalance force of the upper trim chain which tends to move the head outwardly from the face. The operator may control the crawler treads so that the machine will properly advance and by the use of the treads the operator may be properly control and correct any deviations in the direction of advance as needed to cause the head to produce a straight cut.

As a result of this invention an improved longwall continuous miner which is relatively light in weight is provided whereby a powerful and straight cut can be effected in the solid mineral of a mine vein. By the provision of the cable pull assist the miner propelling means may not only be supplemented but also the tendency of the disintegrating head being thrust outwardly from the face is substantially counteracted. The drum mechanism with its pulling cable provides an extremely simple and compact means for supplementing the advancing force provided by the crawler treads and also for counteracting the tendency of the disintegrating head moving outwardly from the face. These and other advantages of the invention will be clearly apparent to those skilled in the art.

While there is in this application specifically described one form which the 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 and embodied 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 combination, a mining machine having propelling means and mineral dislodging and disintegrating mechanism moved forwardly along the face of a mine vein in a direction parallel with the face, said dislodging and disintegrating mechanism tending to force the front end of the machine outwardly from the face during the dislodging and disintegrating operation, and auxiliary propelling means extending along the face of the mine vein and connected to the mining machine outwardly of the face for counteracting the forces tending to move said mechanism outwardly from the face and for supplementing said propelling means in the propulsion of the machine.

2. A combination as set forth in claim 1 wherein said auxiliary propelling means comprises a power winch located in advance of the machine and having a cable wound thereon and connected to the machine outwardly of the face.

3. A combination as set forth in claim 2 wherein said power winch has a driving motor, and controlling means for said winch to maintain a substantially constant pull on said cable regardless of the speed of advance of the mining machine.

4. A combination as set forth in claim 1 wherein said propelling means for the machine includes independently controllable crawler treads whereby the dislodging and disintegrating mechanism may be steered properly to advance the machine and correct any deviation from its course, to produce a straight cut.

5. A combination as set forth in claim 1 wherein said dislodging and disintegrating mechanism includes continuously transversely moving disintegrating elements traveling inwardly of the face.

6. A combination as set forth in claim 5 wherein said disintegrating elements are carried by a transversely moving portion of an endless disintegrating chain traveling inwardly of the face.

7. In combination, a mining machine having propelling means and mineral dislodging and disintegrating mechanism moved forwardly along the face of a mine vein in a direction parallel with the face, said dislodging and disintegrating mechanism tending to force the front end of the machine outwardly from the face during the dislodging and disintegrating operation, and a cable pull assist having a pull cable extending along the face of a mine vein between the face and the line of the roof props and connected to the frame of said dislodging and disintegrating mechanism outwardly of the face for counteracting the forces tending to move said mechanism outwardly from the face and for supplementing said propelling means in the propulsion of the machine.

8. A combination as set forth in claim 7 wherein said cable pull assist exerts a constant pulling force and is adapted to stall when said propelling means is stopped and while said assist continues to exert such pulling force.

9. A combination as set forth in claim 7 wherein said dislodging and disintegrating mechanism includes continuously transversely moving disintegrating elements disposed in horizontal planes and traveling inwardly of the face.

10. A combination as set forth in claim 9 wherein said disintegrating elements are carried by a transversely moving portion of an endless disintegrating chain traveling inwardly of the face.

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