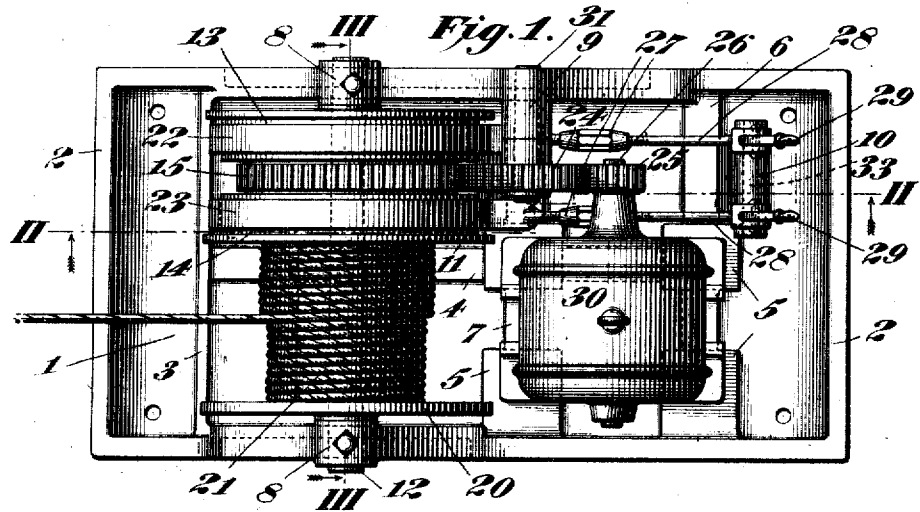
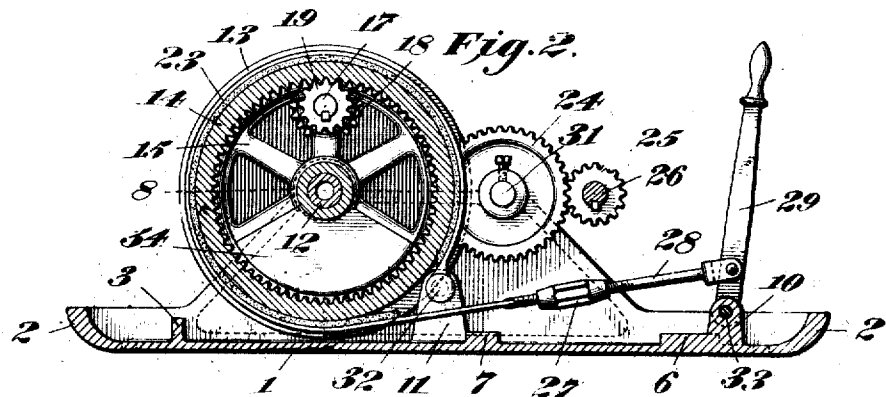
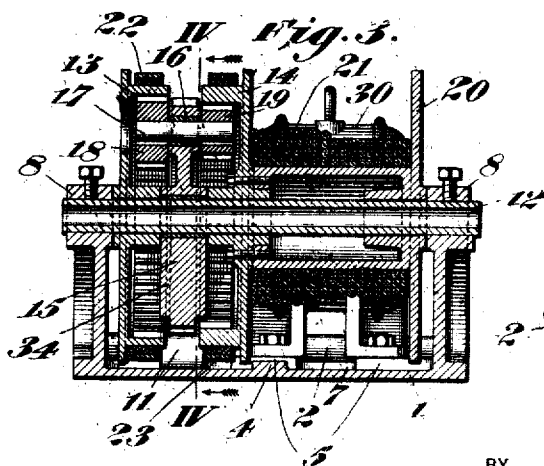
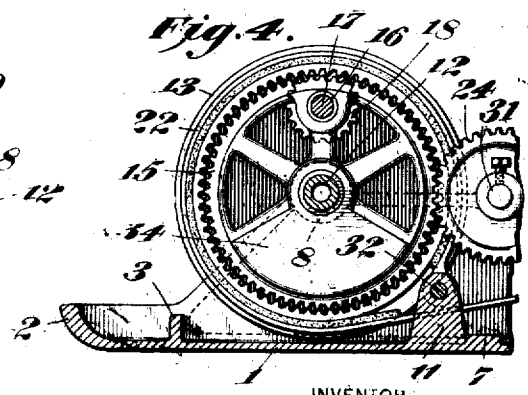


H. V. BROWN.
MINE HAUL.

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1,352,653.

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MINE-HAUL.

1,352,653.

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To all whom it may concern:

Be it known that I, HERBERT V. BROWN, a citizen of the United States, residing in the borough of Cherry Tree, in the county of Indiana and State of Pennsylvania, (whose post-office address is Cherry Tree, Pennsylvania,) have invented certain new and useful Improvements in Mine-Hauls; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improved apparatus which is particularly adapted for hauling cars, mining machines and similar apparatus in mines, with particular reference to use in coal mines, although it may also be used for operating mining buckets in vertical or inclined shafts, or, in fact, for any purposes for which a hauling or hoisting apparatus may be used.

In order to simplify the phraseology and description herein, I will refer to my apparatus as a mine haul.

My mine haul consists essentially of a bed plate which is substantially smooth on the bottom and with up-turned ends to facilitate the sliding transfer of the same on a mine floor, or elsewhere, from place to place, and the entire length, width and height of the apparatus is made as small and compact as possible in order that it may go into restricted places such as are customarily to be found in coal mines, especially those with thinner seams of coal. My apparatus can, of course, be placed upon a truck or car and be transported to any place where the headings or other clearances will permit.

The bed plate of my mine haul is provided with upwardly extending brackets adapted to receive an electric motor, and other brackets to receive the bearings of the different shafts and other portions of the apparatus.

My mine haul includes a drum or spool adapted to receive a coil of rope, which may be of any material, but preferably of wire rope of small diameter and great strength so that a length of as much as 1,000 feet can be coiled on said spool if desired, although, of course, a lesser amount may be used where great lengths are not needed. Said spool is revolubly mounted on a shaft and is provided with an internal spur gear near one end, and adjacent to, but spaced

apart from said internal spur gear is another internal spur gear mounted on the same shaft and normally free to either revolve on the shaft or remain fixed, as hereinafter described. In the space between these two internal spur gears and on the same shaft, is mounted a spur gear with external teeth, and mounted in and near the periphery of said external gear is a stub shaft parallel to the main shaft and on each end of this short stub shaft is secured a pinion, one meshing with the internal gear of the hoisting drum or spool and the other meshing with the other internal gear adjacent thereto. The external spur gear is driven by an electric motor either directly from a spur pinion or from a spur pinion through an intermediate idler gear. As illustrated, I have shown the drive from the spur pinion through the idler gear in order to keep the apparatus as small as possible, as a direct drive from the pinion of an electric motor of usual proportions might make the external spur gear much larger in diameter and the apparatus would then not be so easily handled in restricted locations. Each of the large internal spur gears is provided with an external metal brake band having a suitable lining such as asbestos, wire, and other fabric, and adapted to be contracted upon the smooth cylindrical exteriors of said gears by pulling one end of same by means of a suitable hand-lever and the elastic spring of the metal brake band when released will expand it and allow the gear on which it is mounted to rotate, while when clamped tightly the gear is stationary and when closed lightly or released momentarily the gear can rotate slowly or step by step as desired.

Having thus given a general description of my invention, I will now, in order to make the matter more clear, refer to the annexed sheet of drawings forming part of this specification and in which like characters refer to like parts:

Figure 1 is a top plan view of my improved mine haul; Fig. 2 is a vertical longitudinal sectional elevation taken on the line II—II of Fig. 1; Fig. 3 is a vertical transverse sectional elevation taken on the line III—III of Fig. 1; and Fig. 4 is a vertical longitudinal sectional elevation of a portion of the apparatus taken on the line IV—IV of Fig. 3.

Referring now to the numbers of reference

on the drawings: 1 indicates the base frame generally, 2 are the curved ends thereof to facilitate skidding or sliding over a mine floor or other surface, 3 is a transverse rib on the base frame which is adapted to abut against the end of a prop which is preferably located diagonally from the recess between the end of the frame and the rib 3, the other and upper end of the prop being firmly located against the roof of the mine, for the purpose of anchoring or securing the mine haul in position. A similar prop may be placed at the other end of the base-frame in the similar recess adjacent to the other end of the base, said prop extending upwardly toward the roof in more nearly a vertical direction, to keep the apparatus from tipping when subjected to a pull on the rope. The base is further provided with a central rib 4, as illustrated, to stiffen it and is also provided with pads or brackets 5 on which an electric motor 30 is mounted and secured. Other transverse ribs 6 and 7 are also provided to strengthen and stiffen the construction and aid in the support of the motor. Journal seats 8 are provided for the shaft 12, which shaft is supported in said seats and may be secured firmly therein by means of set-screws as illustrated, or it may merely rest in the same so that it can rotate if desired. This shaft is hollow for the purpose of supplying oil to the interior thereof, which passes through suitable holes to the different moving parts. A bearing 10 is also provided in which is mounted the pivot pin 33 on which the brake levers 29 are adapted to swing, each of these brake levers being formed with a convenient handle for manual operation as illustrated. A seat or journal 9 is provided for the shaft 31, which carries the idler gear 24, which serves to transmit the motion from the electric motor pinion 25 to the external spur gear 15 rotatably mounted on the shaft 12, while 14 is an internal spur gear which is attached to or forms part of the drum or spool, and 13 is another internal spur gear rotatably mounted on the shaft 12, and each of these gears is provided with an external cylindrical surface adapted to serve as a braking surface for the contracting and expanding brake bands 22 and 23 respectively. The external spur gear 15 is provided with a bearing or seat 16 in which is mounted a short stub shaft 17 and on each end of this shaft are keyed small spur pinions 18 and 19, the spur pinion 18 being slightly larger than spur pinion 19, and the spur pinion 18 meshes with the internal spur gear 13 while the spur pinion 19 meshes with the internal spur gear 14. The winding drum is 20, which is flanged on its ends as illustrated, and adapted to contain a large amount of cable or wire 21 reeled thereon, the inner end of which may be secured to the drum and the outer end of

which may be led outwardly and provided with an eye, hook or other appliance to attach to a car, bucket or other object as customary. 22 is a contracting brake band mounted over the outer cylindrical portion of the internal spur gear 13, and 23 is a similar brake strap mounted over the outer cylindrical surface of the internal drum gear 14. The shaft of the electric motor 30 is 26 and the adjusting turn-buckles of the brake rods are 27. The brake straps are each provided with a clevis bolt 28 which is pivoted to the brake lever 29, as illustrated. 32 is a pin for securing the fixed end of the brake strap to the lug 11, having a bearing therein to receive said pin, and 34 is the counterbalance or weighted side of the external spur gear which is so designed and proportioned as to counterbalance the weight of the spur pinions 18 and 19, their shaft 17 and boss or bearing 16.

Having thus described my apparatus, I will now briefly state its mode of operation:

When the parts are in the position as illustrated and the rope paid out and attached to a car, train of cars or other objects to be hauled, the brake straps 22 and 23 may be released by means of the hand-levers 29 and the motor started by throwing in a suitable switch. This causes the external gear 15 to revolve and, of course, carries with it the two spur pinions 18 and 19, the spur pinion 19 meshing with the internal gear 14 of the drum or spool and the spur pinion 18 meshing with the other internal spur gear 13. The brake band 22 may then be tightened more or less and if fully tightened the internal spur gear 13 will be held firmly and not rotate and the pinion 19 will then rotate the drum 20. If it is desired to stop the drum 20 to a greater or less extent, the brake band 23 may be contracted upon it and by dextrous manual movements of the levers 29 to contract the brakes 22 and 23, on the drums which they control, more or less, the spool may be made to move very slowly or step by step or up to the limit of its speed and capacity, and it may be stopped very promptly whenever desired. The gear mechanism which operates this apparatus might be termed an internal epicyclic train.

For the class of work to which this mine haul is adapted it is desirable to be able to vary the speed of hauling or hoisting considerably and further to have instant and positive control of the working drum, and at the same time it is necessary to have the drum readily detachable from the drive so that the rope can be overhauled or hauled off, and all of this is accomplished to a degree by my apparatus.

The action of the drum is absolutely controlled by the friction clutch or by the bands which are capable of being slipped as much

as desired, and can be manipulated more or less as required, and thus any speed from practically nothing to full load can be obtained by the simple manipulation of the levers. The motor can be started with no load and without causing the drum to rotate and the operation of hauling can be performed at every given load and the motor stopped again at no load. This eliminates the necessity of the use of a controller and rheostat and makes possible the use of a simple inclosed starting switch, besides which the necessity of a controller is obviated by the speed-varying ability of the brake band type of clutches in combination with the external gear, the internal gears, and the smaller pinions of different numbers of teeth carried by the external gear.

In order that the gear arrangements, differentials, and ultimate ratio and operation of same may be understood, it can be stated that one arrangement of mine haul which I have constructed has a gear arrangement as follows:

The motor pinion 25 has 25 teeth, the idler gear 24 has 50 teeth, the external spur or intermediate gear 15 has 84 teeth, the internal spur gear 14 of the drum has 54 teeth, the other and slightly larger internal loose spur gear mounted on the same shaft as the drum gear has 57 teeth, the pinion 18 has 16 teeth and the pinion 19 has 13 teeth.

If the brake band 22 is clamped fast on the outer surface of the gear 13 so that said gear cannot revolve and the other brake band 23 is loose so that the drum may revolve freely, the drum will revolve at the full speed allowed by the gears and the reduction ratio between the motor and the drum will be expressed by the following formula and ratio:

$$\frac{25}{84} \times \frac{54 - \frac{57}{16} \times 13}{54} = .0423 +$$

or ratio of 23.60 to 1.

If, however, another arrangement of gears should be made, namely, if the motor pinion 25 has 25 teeth as before, the idler gear 24 has 50 teeth, the external or intermediate large gear 15 has 84 teeth, while the internal gear 14 of the drum has 57 teeth, the other internal gear 13 has 54 teeth, the pinion 18 has 13 teeth, and the pinion 19 has 16 teeth, the gear ratio would be expressed by the following formula and ratio, but the drum now will drive in a direction opposite to that of the previous arrangement:

$$\frac{25}{84} \times \frac{57 - \frac{54}{13} \times 16}{57} = .0494 +$$

or ratio of 20.24 to 1.

The resultant driving of the drum shaft at a high gear reduction is due to the difference in the number of teeth between the motor pinion and the external gear 15, and also to the further differential reduction accomplished by the fact that the pinions 18 and 19 and the gears with which they mesh have a different number of teeth.

To explain this further, it might be stated that if gears 18 and 19 should have the same number of teeth and be of the same pitch diameters and the internal gears of course, with which they mesh should then be of the same diameters and number of teeth, there would be no rotary movement of the drum.

Although I have described and illustrated my invention in considerable detail, I do not wish to be limited to the exact and specific details thereof as shown and described, but may use such modifications in, substitutions for, or equivalents thereof, as are embraced within the scope of my invention, or as pointed out in the claims.

Although I have shown the drum gear and the companion gear as internal gears with pinions of different sizes meshing therein, said pinions being carried by an external gear, I wish it understood that I may use external gears instead of internal gears or vice-versa, as the result will be the same, but in that case the cylinders for the brake bands would be located at the sides of the external gears instead of over them, as illustrated.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:—

1. A mine haul comprising a winding drum, an internal gear secured thereto, a loose internal gear of different diameter secured to and mounted on the same shaft, an external gear provided with two pinions of different diameters mounted thereon, each adapted to mesh with one of the internal gears aforesaid, brake bands adapted to control each of said internal gears, and means for driving said external gear, whereby the drum can be rotated at normal speed or at any lesser speed as may be desired.

2. A mine haul comprising a winding drum provided with a gear secured thereto, another similar gear of different diameter mounted adjacent thereto and with their axes co-incident, another gear mounted adjacent to the gears aforesaid, with two pinions mounted between the axis and periphery thereof with their axis substantially parallel to the aforesaid gear shaft and adapted to mesh with the two gears aforesaid, a brake band adapted to control each of the first mentioned gears, and means for driving said train, whereby the drum can be rotated at normal speed or at any lesser speed as may be desired.

3. A mine haul comprising a spool or drum adapted to receive and wind a coil of rope, a gear secured to and having its axis substantially co-incident with the drum axis, a loose gear mounted adjacent thereto and on the same axis, another independent gear mounted on the same axis and provided with two pinions secured between its axis and periphery, the axis of said pinions being substantially parallel to the axes of the gears aforesaid and meshing with the first two gears, a motor mounted on said apparatus and adapted to drive said gears, the first two gears each being provided with and separately controlled by a contracting and expanding brake band, whereby the drum can be either held fixed or rotated at any speed desired up to the normal speed due to the gear ratios.
4. A mine haul comprising a base plate curved upwardly at its ends and provided with prop pockets, a spool or drum mounted thereon, a differential epicyclic train of

gears adapted to rotate said drum, two brake bands adapted to control the movement thereof, one for the gear attached to the drum and the other for the adjacent loose gear, and means for driving the gears, whereby the said drum can be either held fixed or rotated at any speed desired up to the normal speed due to the gear ratios.

5. A mine haul comprising a base plate, a spool or drum revolubly mounted thereon, a differential epicyclic train of gears adapted to rotate said drum, including a gear fixed to the drum and a loose gear adjacent thereto, said drum gear and loose gear each being provided with a braking surface and a brake band adapted to control the same; and means for driving said gears, whereby the drum can be either held fixed or rotated at any speed desired up to the normal speed due to the gear ratios.

In testimony whereof I hereunto affix my signature.

HERBERT V. BROWN.