May 10, 1927. **1,628,309**

K. DAVIS

MINING MACHINE CARRIER

Original Filed June 23, 1919 2 Sheets-Sheet 1

Fig. 1.

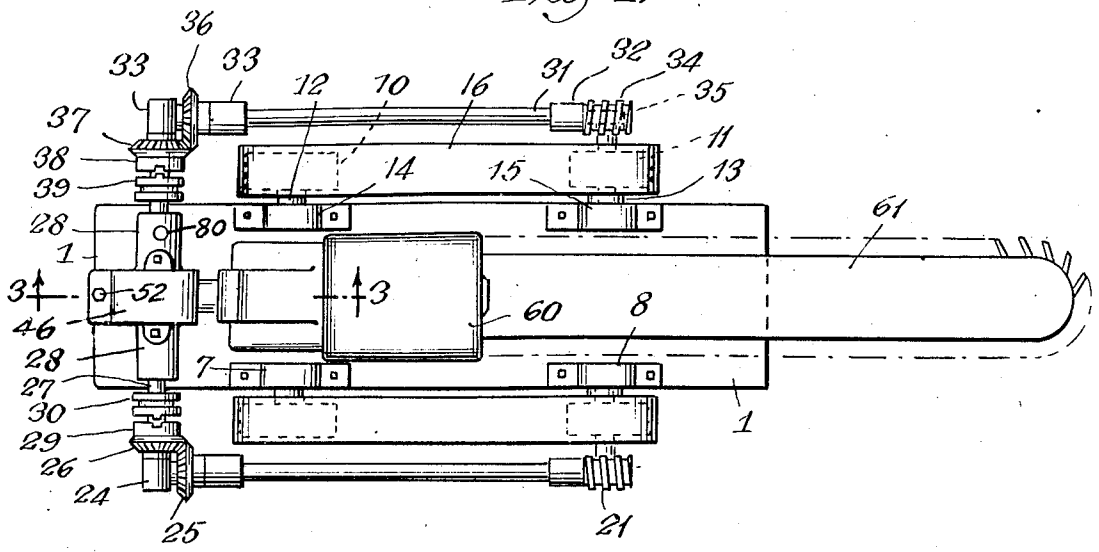


Fig. 2.

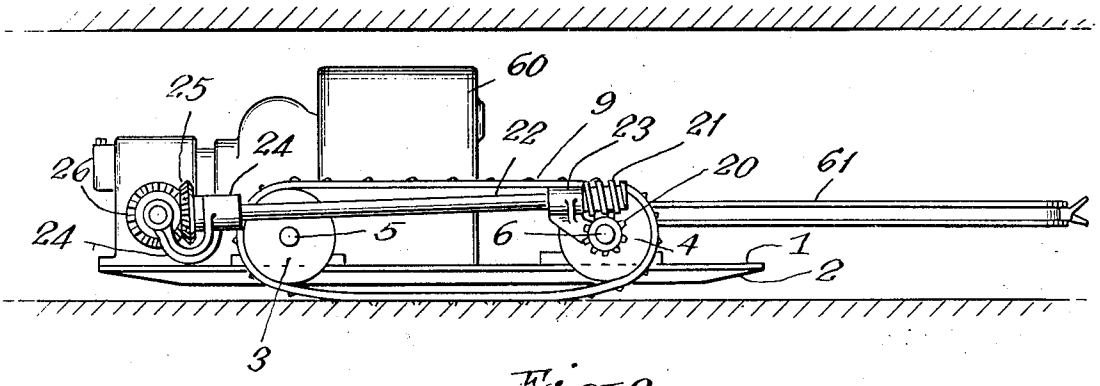
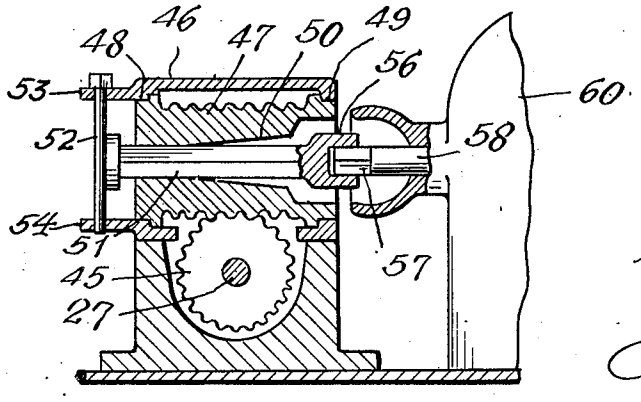


Fig. 3



Kenneth Davis INVENTOR

BY John D Morgan

ATTORNEY

May 10, 1927. 1,628,309

K. DAVIS

MINING MACHINE CARRIER

Original Filed June 23, 1919 2 Sheets-Sheet 2

Fig. 4.

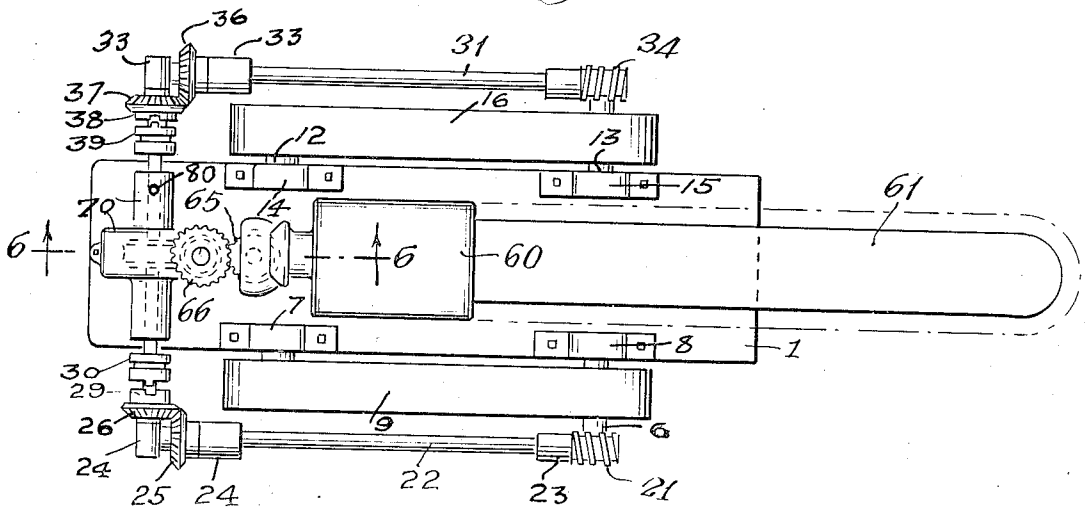


Fig. 5

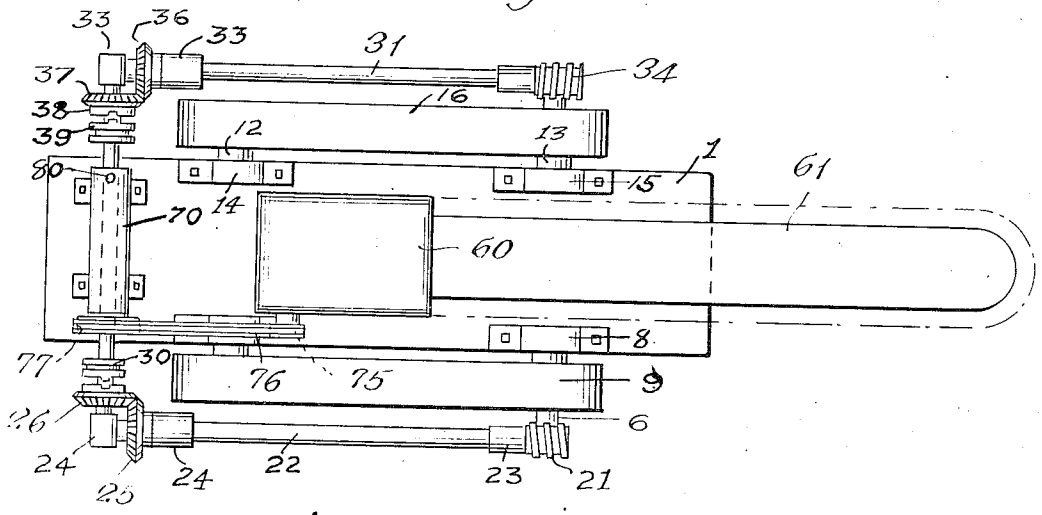
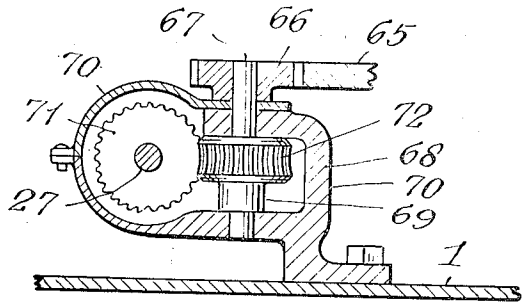


Fig. 6.



Kenneth Davis INVENTOR

BY John D Morgan

ATTORNEY

Patented May 10, 1927. 1,628,309

UNITED STATES PATENT OFFICE.

KENNETH DAVIS, OF ST. BENEDICT, PENNSYLVANIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO REMBRANDT PEALE, OF ST. BENEDICT, PENNSYLVANIA, W. SANDERS DAVIES, OF NEW YORK, N. Y., AND WILLIAM S. WALLACE, OF PHILADELPHIA, PENNSYLVANIA, TRUSTEES.

MINING-MACHINE CARRIER.

Application filed June 23, 1919, Serial No. 306,156. Renewed May 13, 1925.

The invention relates to machines for use in coal mining, and more especially to a machine or carrier for conveying the mining machine from place to place in the mine; and in certain of its aspects, the invention is directed to a machine which is adapted to convey the mining machine from any place in the mine to any other place by the shortest route, and independently of the track ways, if any, in the mine.

Further objects and advantages of the invention will be set forth in part hereinafter, and in part will be obvious herefrom, or may be learned by practice with the invention; the same being attained through the instrumentalities and combinations pointed out in the appended claims.

The invention consists in the novel parts, constructions, arrangements, combinations and improvements herein shown and described.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate one embodiment of the invention, and together with the description, serve to explain the pinciples of the invention.

Of the drawings:—

Fig. 1 is a top plan of a machine constructed in accordance with the invention, and showing a mining machine loaded thereupon;

Fig. 2 is a side elevation corresponding to Fig. 1, and showing the side at the bottom of Fig. 1;

Fig. 3 is an enlarged, fragmentary, vertical section taken substantially on the line 3—3 of Fig. 1;

Fig. 4 is a top plan, generally similar to Fig. 1, but showing a different form of driving connection between the conveyed mining machine and the machine carrier;

Fig. 5 is a top plan similar to Figs. 1 and 4, but showing still a different form of driving connection between the mining machine and its carrier; and

Fig. 6 is an enlarged, fragmentary, vertical section taken substantially on the line 6—6 of Fig. 4.

The usual types of mining machines, that is, machines for cutting a kerf in the coal, and especially for undercutting the coal by making a horizontal bottom kerf, are provided with means for forcing the cutter against the coal in the undercutting, or other kerf, and this is usually accomplished by progressing or traveling the machine along the face of the work at the rate of progress of the cutting, the machine usually winding itself upon an anchored chain or cable. The mining machines are not provided, however, with means for freely moving them about in the mine from one place to another, say from the face of one room to the face of another.

Such transference or transport of the mining machines is highly efficient and economical, as a single mining machine can undercut or otherwise mine the face of a room in a very brief time, relatively considered, and if means for easy and rapid transportation is provided, the machine can be used successively in a plurality of rooms and could be kept at work in room after room while the previously undercut coal in the various rooms is shot down or otherwise dislodged, and is loaded or otherwise conveyed from the room, to clear the face for a succeeding undercutting by the mining machine. The desirability of frequently conveying a machine from place to place in a mine which operates upon some other than the room system, such as the long-wall system, will be clear without further explanation in view of the foregoing.

By the present invention there is provided a carrier for mining machines which is adapted to carry or transport the mining machine from one place in the mine workings to another, the carrier traveling over the mine bottom and by the shortest route, irrespective of any track-ways or track system, or of the absence thereof, in the mine.

In much modern mining work no tracks are laid in the rooms or other kinds of workings, the shot-down or otherwise dislodged coal being conveyed away by devices or mechanisms which do not use or require track-ways, such as formerly were laid in all rooms extending from the main track in the heading or entry to the room face, and being extended from time to time as the face progressed or receded, and which formerly were also employed in a generally similar way and location in long-wall work.

Also, in workings where track ways are laid from the heading or entry to the face of the room, much time and energy are lost through the necessity of conveying the mining machine along the tracks all the way from the face of one room to the heading or entry at the mouth of the room, then along the heading or entry to another room, and then inwardly along the track in such room to the room face.

By my present invention, a carrier is provided upon which the mining machine may be loaded or mounted at a room face, or other suitable place in the work, and the carrier loaded with the mining machine is progressed over the mine bottom, in any desired direction and by the shortest route, to any other desired place.

As an instance of this, in a room and pillar mine, cross-cuts or break-throughs are made through the pillars between adjacent rooms at relatively short distances of advance in the rooms or room faces, and by the present invention a mining machine may be mounted on the carrier, at the face of a room, and the carrier may then be run and steered over the mine bottom and through the nearest cross-cut or break-through into the next room, and unloaded at the room face. The mining machine is dismounted in each of a succession of rooms, makes an undercutting across the face thereof, is mounted again upon the carrier, and is passed from room face to room face, always traveling by the shortest route through the pillar cross-cuts or break-throughs.

The carrier is provided with steering means cooperating with the traveling means, and controlled by a driver or operator but preferably and in the present embodiment the carrier derives its motive power from the mining machine which it carries. The carrier and its load thus constitute and provide a dirigible, automotive device, traveling whithersoever independently of trackways.

Referring to the accompanying drawings, which illustrate by way of example one embodiment of the invention, the mining machine carrier is provided with a shallow platform or floor 1 onto which the transported mining machine is slid as it boards the carrier, and upon which it rests while it is being conveyed from one place to another in the mine. The platform 1 is set relatively low, so as to provide as much head-room as possible in low seams, and likewise to facilitate and expedite the loading and unloading of the mining machine. At its end or ends, the platform 1 is beveled upon its under side, as shown at 2, the carrier tilting until the end rests upon the mine floor or bottom during the loading and unloading of the mining machine.

Means are provided by the invention as stated for moving and guiding the carrier over the mine bottom without the guidance or assistance of tracks, and in the embodied form thereof there are provided endless belt or traction treads at either side of the carrier, and driving connections therefor whereby they are driven from the transported mining machine. Interposed in said connection are means for independently controlling the drive of each endless belt or traction tread to steer and turn or direct the carrier in any desired direction through the mine workings.

Referring in detail to the embodied form of said means, at one side of the carrier there are provided sprocket wheels 3 and 4 which are mounted, respectively, on short shafts 5 and 6. These shafts 5 and 6 project outwardly, respectively, from posts or pedestals 7 and 8, which are fixed to and extend upwardly from the platform 1 and spaced apart at one side thereof. Over the wheels 3 and 4 is arranged an endless belt or traction tread 9, having on its inner side means cooperating with the wheels 3 and 4 whereby the tread is driven and guided, and having on its external side similar means for engaging with and traveling over the uneven surface of the mine floor.

On the opposite side thereof the carrier is provided with sprocket wheels 10 and 11, which are mounted respectively upon shafts 12 and 13. Shafts 12 and 13 project outwardly, respectively, from posts or pedestals 14 and 15, which are fixed to and extend upwardly from the opposite side of the platform 1 from the similar mechanism already described. Running over the wheels 10 and 11 is an endless belt or traction tread 16, constructed, capacitated and operating in the same general manner as has been already described in connection with the cooperating tread 9.

The embodied form of driving connections, providing an independent drive for each side of the machine as already described, comprises a worm gear 20 fixed to the wheel 4, and intermeshing therewith is a worm 21 mounted upon the saft 22. The shaft 22 is journaled at one end in a bracket 23, which bracket is mounted upon shaft 6 of the wheel 4. At its other end shaft 22 is journaled in a bracket 24, which bracket is mounted upon the end of the driving shaft 27, to be later described.

The shaft 22 has fixed thereto at its other end a bevel gear 25, which meshes with a bevel gear 26, mounted loosely upon a driving shaft 27. The shaft 27 is journaled in bearings 28 mounted upon the end of the platform 1. Fixed to bevel gear 26 is one member 29 of a clutch, the other member 30 thereof rotating with, but being splined to travel along, the driving shaft 27.

Referring now in detail to the driving

connections on the other side of the machine, a shaft 31 is journaled in a bearing bracket 32, which bracket is mounted on the shaft 13 of wheel 11. Shaft 31 is journaled at its other end in a bearing bracket 33, which bracket is supported upon the other end of the driving shaft 27 from the bearing bracket 24 at the other side of the machine. Fixed on shaft 21 is a worm 34, meshing with and driving a worm gear 35 which is fixed to wheel 11.

At its other end, shaft 10 has fixed thereto a bevel gear 36, which gear meshes with a bevel gear 37, which is loosely mounted on the driving shaft 27. Fixed to gear 37 is one member 38 of a clutch, the other member 39 thereof rotating with, but being splined to slide along, shaft 27.

In the embodied form of driving connections whereby the loaded-on mining machine propels its own carrier, devices are provided for connecting with different standard or commercial types or forms of mining machines. In Figs. 1, 2 and 3, and referring for details to Fig. 3, means are provided having a socket connection adapted to connect with a rotating shaft of the mining machine, such for example as the intermediate shaft of a machine of the general structure shown in Figs. 1, 2 and 3, which show the general features of a machine known commercially as the Goodman short-wall machine. It will be understood that this reference to such commercial machine is exemplary and not restrictive in character.

Referring more in detail to said driving connection, the driving shaft 27 has fixed thereon a worm gear 45, within a housing 46. Meshing with the worm gear 45 is a worm 47, having shouldered bearings 48 and 49 journaled in the housing 46. The worm 47 has a central, longitudinal pyramidal or tapered aperture 50, with its enlarged end toward the mining machine. Within the aperture 50 is a squared shaft 51, the shaft 51 having considerable freedom for lateral movement with respect to the worm, but the shaft and worm rotating together. Shaft 51 is longitudinally slidable within the worm 47 for coupling to, and uncoupling from, shaft 58 of the mining machine. Shaft 51 has at its inner end a socket 56 which receives the squared end 57 of shaft 58 of mining machine 60, whereby the carrier is driven from the mining machine mounted thereon. Shaft 51 is moved to the left in Fig. 3 while the mining machine is drawn into position on the carrier, and shaft 51 is then moved to the right to couple to shaft 58. A pin 52 passing through the housing at 53 and 54 serves to hold shaft 51 to coupled position, pin 52 being withdrawn when shaft 51 is slid to the uncoupled position.

The cutter bar 61 of the mining machine is shown projecting rearwardly therefrom. By the connections just described, it will be seen that the mining machine will drive the propelling mechanism of the carrier without the mining machine shaft 58 and the carrier mechanism being nicely or exactly lined up together, and that the mechanism may be operatively connected by merely sliding the mining machine onto the carrier, and may be disconnected by the mere act of sliding the mining machine off the carrier when its destination has been reached.

In Fig. 4 of the drawings, substantially the same view is shown as in Fig. 1, except that the driving connections between the mining machine and the carrier are different. In Fig. 4 the connections are shown comprising two spur gears, one on the mining machine, and the other on the carrier, which gears are adapted to intermesh when the mining machine is slid into position on the carrier, and are adapted to pass out of mesh when the mining machine is slid from the carrier.

Such a connection is adaptable for use with one or more types or forms of a machine of the general structure shown in Fig. 4, which shows the general features of a machine known commercially as the Sullivan iron-clad machine, which is now on the market. It will be understood, however, that this reference to a well-known commercial machine is illustrative and not restrictive in character.

Referring in detail to said embodied connection, a spur gear 65 is shown which is part of the mining machine, and which is adapted to pass into mesh with a gear 66 of the carrier in the manner already referred to. Gear wheel 66 is fixed on a vertical shaft 67, which shaft passes into, and has a shouldered bearing 69 within a housing 70, which housing is mounted on the platform 1 of the carrier. Inclosed within the housing 70 is the driving shaft 27, the same as or corresponding to the driving shaft having the same reference number in Fig. 1. Fixed on shaft 27 within housing 70 is a spiral gear wheel 71, meshing with a corresponding gear 72 which is fixed upon the shaft 67.

In Fig. 5 of the drawing is illustrated, by way of example, another detailed embodiment of a sprocket chain and sprocket wheel connection between the mining machine and the carrier. Such a form of drive is adaptable for use with a machine having the general structure shown in Fig. 5, which shows the general features of the commercial form or forms of the Jeffrey mining machine, although it will be understood also that this reference to a well-known commercial machine is explanatory and not restrictive in character. Referring in detail to

said mechanism, a sprocket wheel 75 forms part of the mining machine. Over sprocket wheel 75 runs a sprocket chain 76. Sprocket chain 76 also runs over a sprocket wheel 77, which is fixed on the driving shaft 27 of the carrier, which shaft may be regarded as the same or substantially identical with the driving shaft 27 of Fig. 1.

The details of the controls for the two separately operable clutches on the driving shaft 21 are not shown in extended detail, as they may be of any convenient or standard form of rods and levers, or other connections. By operating the clutches 29, 30 and 38, 39 the operator may control the driving and movement of the two endless belt or traction treads so that the machine will run forwardly or backwardly, and will turn in any direction at will, deriving its motor power from the transported mining machine. Thus the machine is free to travel anywhere through a mine, by the shortest and quickest route and absolutely independently of any track systems in the mine, or of the presence or absence of such a system or systems.

The mining machine will usually wind itself onto the carrier, with its own winding chain or rope. This may be attached to the carrier in any way or by any means desired, so far as concerns most features of the invention. A pin 80 is shown on the carrier adapted to receive a hook on the winding chain of the mining machine whereby the machine may be pulled onto the carrier.

The invention in its broader aspects is not limited to the particular details of construction herein shown and described, but changes may be made therein without departing from the principles of the invention and without sacrificing its chief advantages.

What I claim is:—

1. A carrier for mining machines comprising a relatively long, shallow platform having the under surface of its loading end beveled to facilitate the tipping downward of such end during loading, a pair of wheels journaled relatively above said platform and disposed on opposite sides thereof, a tractor tread on each of said pairs of wheels, said wheels and treads constructed and arranged to support said platform in underslung relation thereto in close proximity to the ground, a transverse shaft on said platform, means to drive said shaft from the power driven member of said mining machine when the latter is slid into loading position on said platform, a pair of clutches on said transverse shaft, and a pair of lateral driving shafts operatively connected respectively with the forward wheel of each of said pairs, each of said shafts adapted to be selectively driven from said transverse shaft through the respective clutch.

2. A carrier for mining machines comprising a platform adapted to receive a mining machine, tractor treads mounted on each side thereof and constructed and arranged to support said platform in close proximity to the ground, a transverse shaft journaled relatively to said platform, means including clutches to selectively drive said treads from said transverse shaft, means for driving said transverse shaft from the mining machine when in loaded position, and means in said drive for compensating for lateral displacements between said platform and said mining machine.

3. A carrier for mining machines comprising a relatively long shallow platform, tractor treads mounted on each side thereof and constructed and arranged to support said platform in underslung relation thereto in close proximity to the ground, a transverse shaft journaled relatively to said platform, means including clutches to selectively drive said treads from said shaft, a first worm gear on said shaft, a second worm gear having a conical bore hole therein and journaled for rotation in operative relation with said first worm gear, a stub shaft in said bore hole and associated with said second worm gear to drive the same, said stub shaft having a permissive movement in said bore hole to aline it with the driving connection of a mining machine when in loading position upon said platform.

4. A dirigible and automotive carrier for mining machines including in combination a platform onto which a mining machine may be slid and upon which it is supported, an endless traction tread extending along either side of the platform, a transverse driven shaft, a driving connection therefor adapted to be connected to the motor of a mining machine loaded on to the platform, separate driving connections from said transverse driving shaft to the traction treads, and means for independently connecting and disconnecting said driving connections whereby the mining machine carrier may be both traveled and steered freely over the mine floor independently of any track.

5. A dirigible and automotive carrier for mining machines including in combination a platform onto which a mining machine may be slid and upon which it is supported, an endless traction tread extending along either side of the platform, a transverse driven shaft, a driving connection therefor having a member adapted to be connected to the motor of mining machines of different sizes which may be placed upon said platform, separate driving connections from said transverse driving shaft to the traction treads, and means for independently connecting and disconnecting said driving connections whereby the mining machine

carrier may be both traveled and steered freely over the mine floor independently of any track.

6. A dirigible and automotive carrier for mining machines adapted to transport a mining machine freely in very thin seams, and including in combination a traction tread at either side of the machine, a platform located between the endless traction treads very close to the mine floor and below the center line of the traction treads, and adapted to support a mining machine, driving mechanism including a shaft adapted to be driven by a mining machine supported on the platform, separate connections from said driving means to each of the traction treads and means for independently connecting and disconnecting each of the traction treads whereby the mining machine carrier may be both traveled and steered freely over the mine floor independently of any track.

7. A dirigible and automotive carrier for mining machines including in combination a platform onto which a mining machine may be slid and upon which it is supported, an endless traction tread extending along either side of the platform, driving mechanism including a device varibaly positionable to connect with the motors of mining machines of different sizes or makes, separate connections from said driving means to each of the traction treads and means for independently connecting and disconnecting each of the traction treads whereby the mining machine carrier may be both traveled and steered freely over the mine floor independently of any track.

8. A dirigible and automotive carrier for mining machines adapted to transport a mining machine freely in very thin seams, and including in combination a platform located just above and clear of the mine floor for holding a mining machine, a traction member at either side of the platform, driving means adapted to be connected to and driven by a mining machine supported on the platform, and separate connections from said driving means to each of said traction members, and means for independently connecting and disconnecting the driving means and either traction member whereby the mining machine carrier may be both traveled and steered freely over the mine floor indepenedently of any track.

9. A dirigible and automotive carrier for mining machines adapted to transport a mining machine freely in very thin seams, and including in combination a traction mechanism at either side of the machine adapted to engage with the mine floor to propel the machine and including wheels, a platform supported by and located between the traction mechanisms just above and clear of the mine floor and below the centers of said wheels and adapted to support a mining machine, driving means adapted to be connected to and driven by a mining machine supported on the platform and means for controlling the traction means to steer the carrier freely over the mine botton independently of any tracks.

In testimony whereof, I have signed my name to this specification.

KENNETH DAVIS.