April 28, 1936. J. GUTHRIE 2,038,732

MONORAIL SYSTEM

Filed March 10, 1932 2 Sheets-Sheet 1

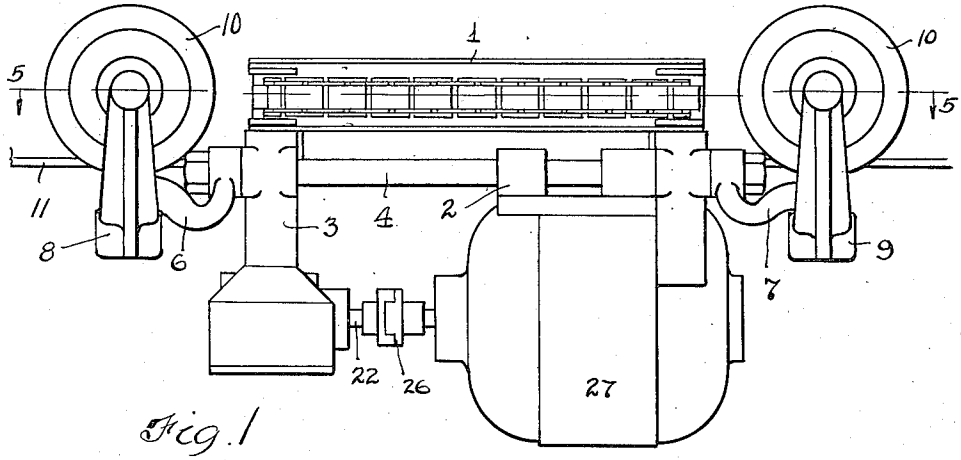


Fig. 1

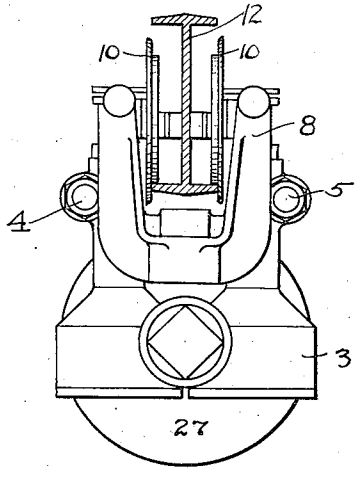


Fig. 2

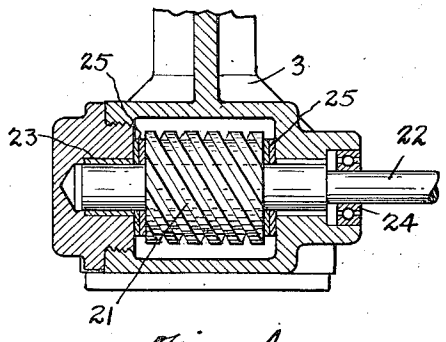


Fig. 4

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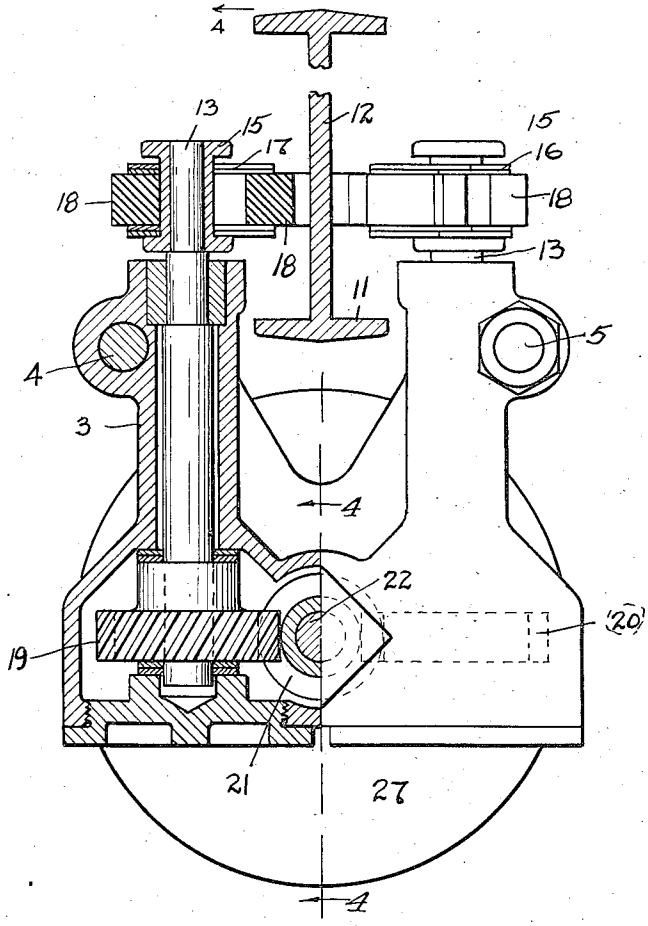


Fig. 3

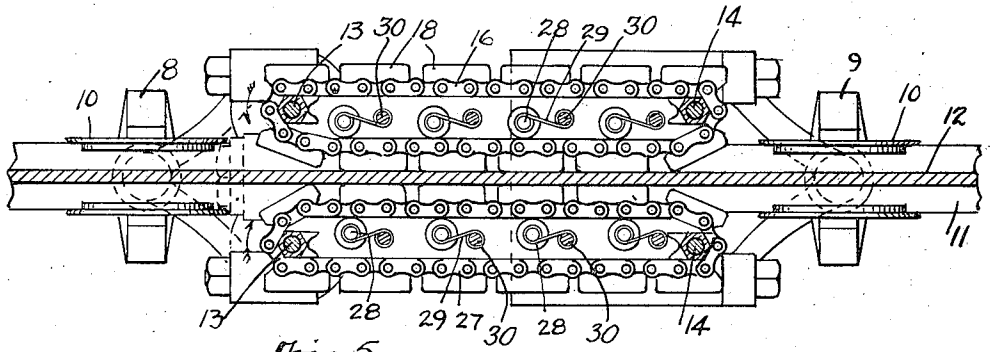


Fig. 5

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MONORAIL SYSTEM

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Application March 10, 1932, Serial No. 598,008

3 Claims. (Cl. 105—30)

The present invention relating, as indicated, to a monorail system, has more precise reference to the provision of a driving tractor adapted to be used in conjunction with overhead conveyor rails for factory installations, and the like. The general object and nature of my invention is to provide an electrically driven tractor unit which is adapted to engage with the flange of a monorail and having a pair of endless tracks which are intended to laterally engage with the web of such rail. The frictional engagement of such tracks with the surface of the monorail has been found to be so powerful and positive that a device constructed according to the principle of my invention may equally well be used upon a vertically disposed rail; that is, the tractor may be used as an elevator. It is a further object to provide a power driving connecting means which shall impart an automatic braking action to the tractor. Briefly stated, this last mentioned automatic braking means consists of a worm and gear drive in which the worm gear is of relatively low pitch so that it will be possible to transmit torque through such drive connection in one direction only.

To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims, the annexed drawings and the following description setting forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings:

Fig. 1 is a side elevation of the tractor constructed according to the principle of my invention; Fig. 2 is an end elevational view of Fig. 1; Fig. 3 is an enlarged elevational view, partly in section, of the endless drive and gear connection; Fig. 4 is a fragmentary, partially in section, view taken substantially on line 4—4 of Fig. 3; and Fig. 5 is a top plan view, being partly in section and taken substantially upon the line 5—5 of Fig. 1.

Although for the purposes of description, I have specified the device constructed according to the principle of my invention as applied to an overhead horizontal rail, it is to be understood that such device, with slight mechanical changes may be equally well adapted to operate upon a vertical or angularly inclined trackway or rail.

Referring more particularly to the drawings, I have shown a frame member indicating generally by the numeral 1, which consists of the electric motor base plate 2 and the worm gear housing 3. A pair of longitudinally extending tie rods 4 and 5 compose the remainder of the frame unit and serve to rigidly secure the elements 2 and 3 in spaced relationship. On each end of the frame 1 and connected thereto by means of suitable bolts on the ends of the tie rods 4 and 5 are found the angle brackets 6 and 7. The brackets 6 and 7 in turn carry the U-shaped supporting arms 8 and 9, respectively. Each branch of the U-shaped supporting arms 8 and 9 is adapted to carry a flanged wheel 10 which rides upon the flange 11 of the I-beam or monorail 12.

Extending upwardly from the frame member 1 are the double pair of shafts 13 and 14. The shafts 13 are power driven, whereas the shafts 14 are merely idlers. The upper end of the shafts 13 and 14 each carry the sprockets 15 which, in turn, support the endless chains 16 and 17. The chains 16 and 17 carry a plurality of rubber pads or feet 18 which are adapted to make frictional contact with the sides of the web of the I-beam 12.

The lower ends of the driven shafts 13 carry a pair of gears 19 and 20 which are in engagement with the centrally disposed worm gear 21. The worm gear 21 is mounted upon the horizontal shaft 22. The shaft 22 is suitably journaled in the bearings 23 and 24 in the gear housing 3. A plurality of thrust washers 25 are provided in order to accommodate the horizontal end thrust of the worm gear 21. The shaft 22 is connected by means of a suitable coupling 26 to the electric drive motor 27.

It will thus be seen that rotation of the worm gear 21 will inturn serve to drive the shaft 13, causing the endless chains 16 and 17 to travel in opposite directions of rotation, as indicated by the arrows in Fig. 5, whereby the above described carriage will propel itself along the I-beam 12.

In order to provide resilient engagement of the intermediate run of the endless chains 16 and 17, a plurality of vertical shafts 28 are mounted by means of the spring elements 29 connected to the stationary shafts 30 carried by the frame 1 of the machine. The resiliency of the spring elements 29 is directed toward the I-beam 12 in order to urge the intermediate run of the endless chains 16 and 17 into frictional engagement therewith. And, as will be seen by reference to Fig. 5, the resiliency of such springs is sufficient to carry the free or intermediate run of the chains 16 to a point beyond the periphery of the sprockets 15. Such a provision has been contemplated

in order to enable the tractor to satisfactorily negotiate curved sections of the monorail.

A suitable electric power conducting trolley, which it has not been deemed expedient to illustrate in the drawings, may be provided in order to supply power to the drive motor 27. It will thus be seen that I have provided a driving tractor for an overhead monorail system which is adapted to make a positive and efficient engagement with the supporting track and obviates the necessity of additional engaging means such as a gear rack, or the like.

It should further be noted that, since the worm gear 21 is of a relatively low pitch, that it will be possible to transmit torque through the worm and gear connection in one direction only, viz., from the driving motor 27 to the endless tracks 16 and 17. The effect of such a torque transmission connection is to positively lock the endless tracks and incidently the tractor, against movement when the motor 27 is at rest or inoperative. This latter feature is particularly advantageous when it is contemplated to use the above described tractor in an angularly inclined or vertical monorail conveying system.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. In a self-propelling vehicle for monorail systems and the like, the combination of an I-monorail, a frame, a driving motor mounted thereon, wheels carried by said frame and contacting with the upper surface of the lower flange of the monorail for supporting said frame and motor in a downwardly depending position, a pair of endless tracks mounted upon said frame, said tracks being driven by said motor and adapted to engage with the web of said monorail, and resilient means carried by said frame and adapted to urge the intermediate run of said tracks beyond the normal line of travel into contact with the web of said monorail.

2. In a self-propelling vehicle for monorail systems and the like, the combination of an I-monorail, a frame, a driving motor mounted thereon, wheels carried by said frame and contacting with the upper surface of the lower flange of the monorail for supporting said frame and motor in a downwardly depending position, a pair of endless tracks mounted upon said frame, said tracks being driven by said motor and adapted to engage with the web of said monorail, a plurality of floating shafts connected to said frame and supporting the intermediate run of said tracks, and resilient means carried by said frame and connected to said shafts for urging the latter into contact with the web of said rail, said shafts and said resilient means being adapted to move said intermediate run beyond the normal line of travel of said tracks.

3. In a self-propelling vehicle for monorail systems and the like, the combination of an I-monorail, a frame, a driving motor mounted thereon, wheels carried by said frame and contacting with the upper surface of the lower flange of the monorail for supporting said frame and motor in a downwardly depending position, a pair of endless tracks mounted longitudinally upon said frame, sprocket wheels carrying said tracks and operatively connected to said motor, and resilient means adapted to urge the intermediate run of said tracks into contact with the web of said rail and to a point substantially beyond the plane of the periphery of said sprocket wheels.

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