Feb. 10, 1942. C. E. STOLTZ 2,272,280

MINE LOCOMOTIVE

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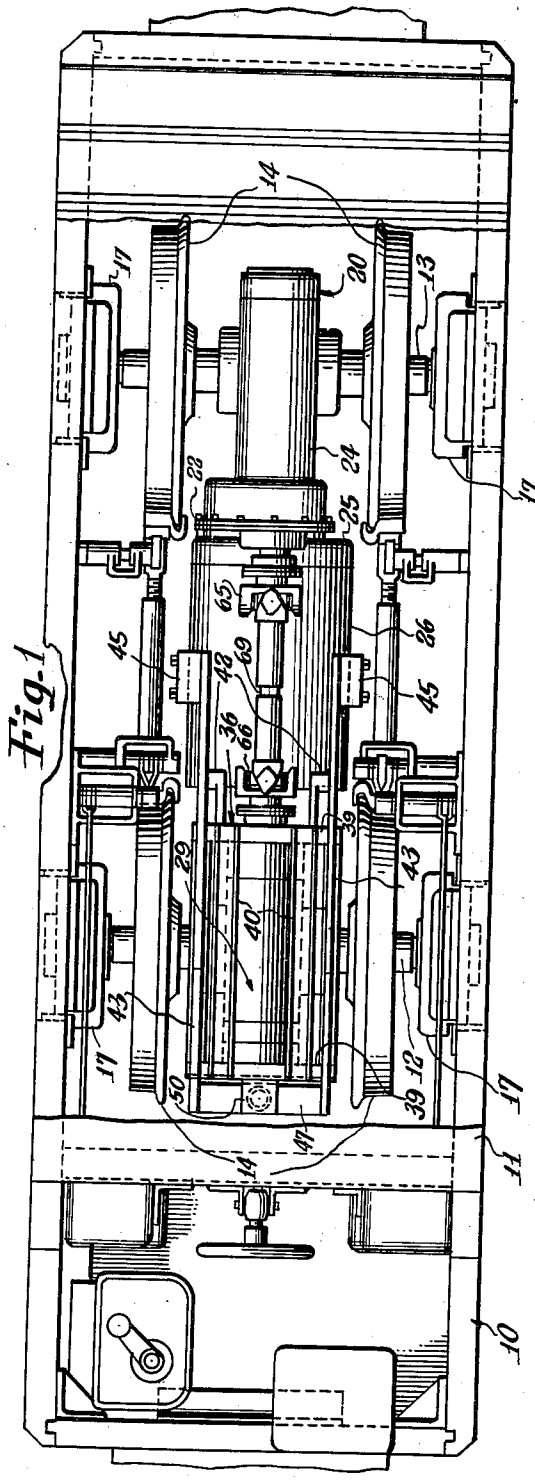


Fig. 1

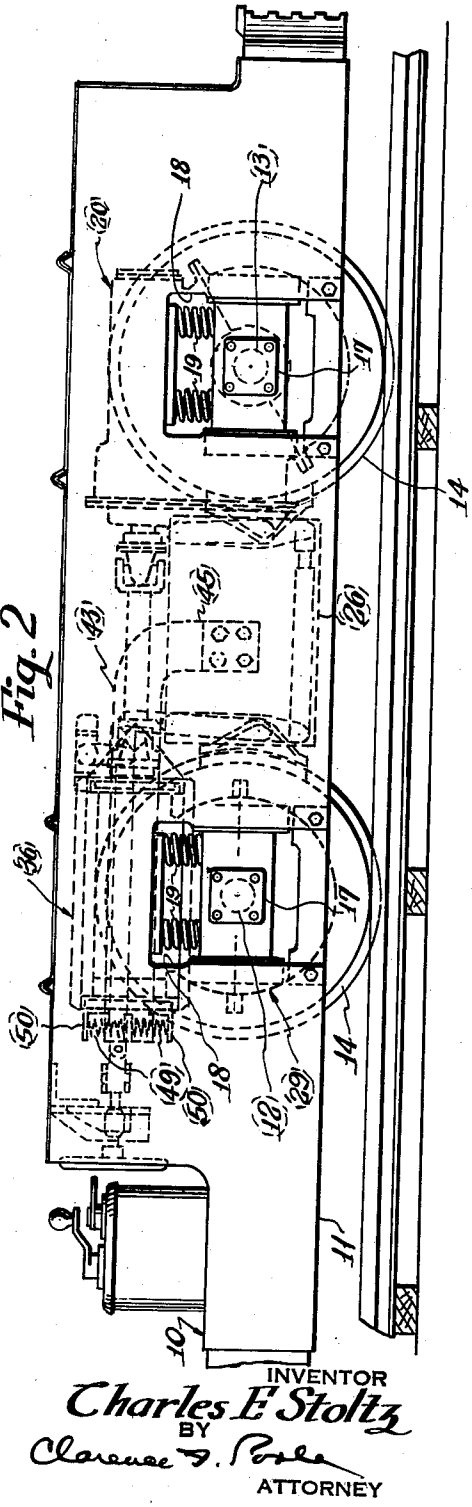


Fig. 2

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Fig. 3

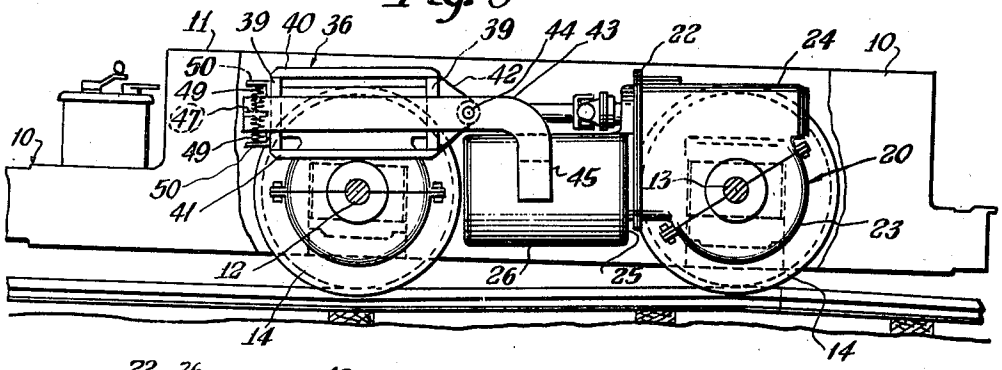


Fig. 5

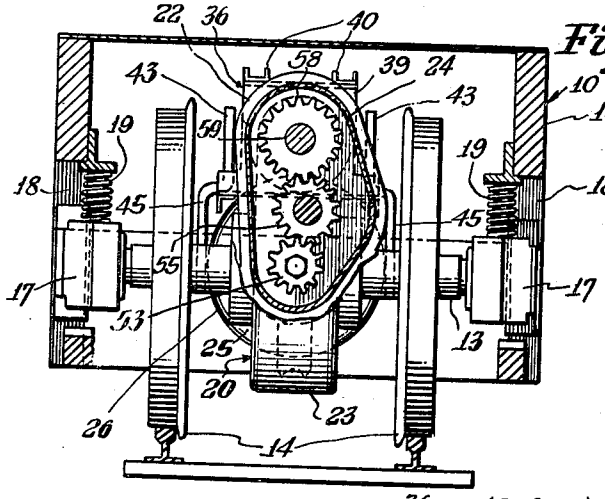
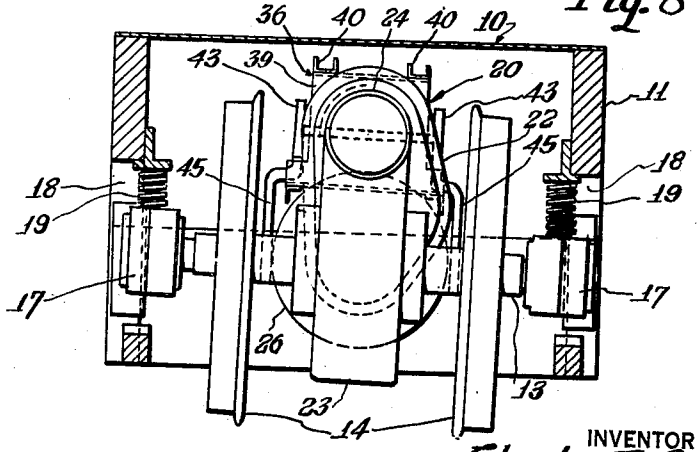


Fig. 8



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Fig. 4

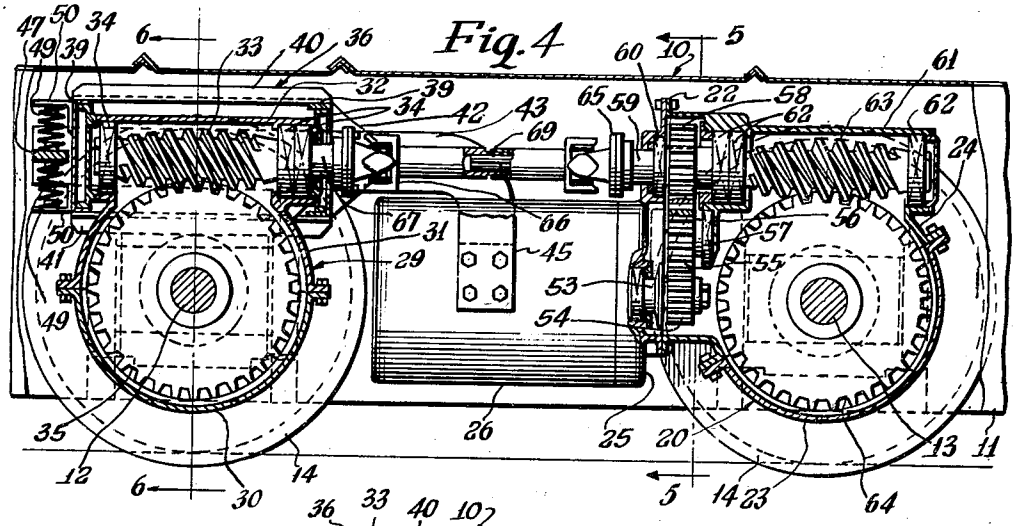


Fig. 6

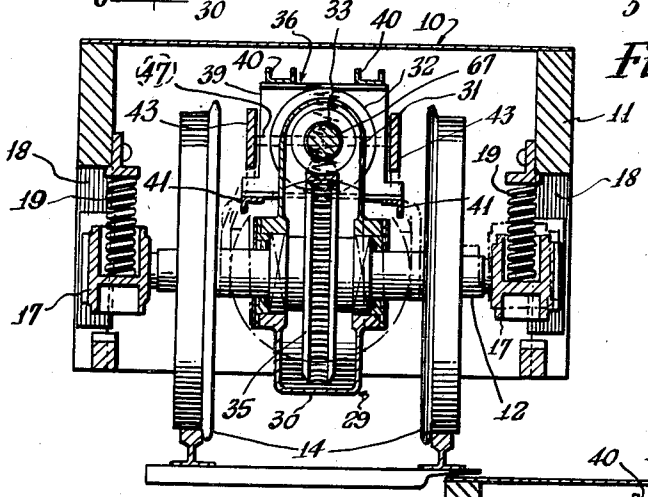


Fig. 9

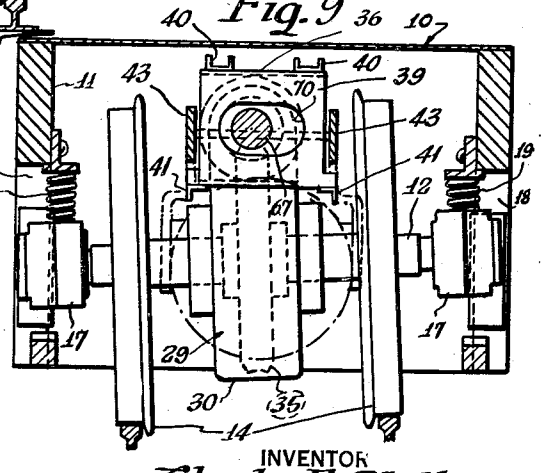
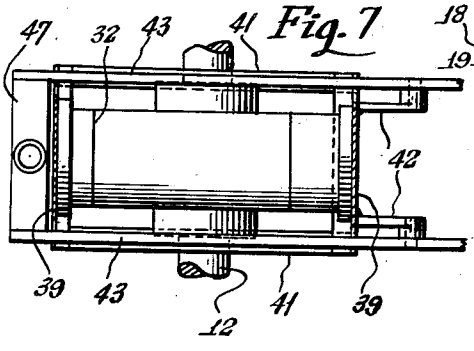


Fig. 7



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Patented Feb. 10, 1942

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UNITED STATES PATENT OFFICE

2,272,280

MINE LOCOMOTIVE

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Application October 28, 1939, Serial No. 301,679

11 Claims. (Cl. 105—119)

This invention relates to improvements in mine locomotives, and has for its principal objects to provide a single motor locomotive with a power drive to a pair of flexible mounted driving axles, together with a novel form of mounting for the motor on each of said axles, permitting flexible movement of the driving axles with respect to each other so all of the wheels will remain on the track where it is rough and uneven, and so a single motor may positively drive all four wheels when in various positions with respect to each other.

The invention consists in the combination construction and arrangement of parts as will hereinafter be described in connection with the accompanying drawings, and more particularly defined in the appended claims.

In the drawings, Figure 1 is a top plan view of the locomotive with parts of the top cover broken away;

Figure 2 is a view in side elevation of the locomotive shown in Figure 1, drawn to a slightly reduced scale;

Figure 3 is a view in side elevation of the locomotive, drawn to a reduced scale, showing the locomotive traveling along an uneven track, and with one of the side plates of the locomotive broken away and certain parts thereof shown in longitudinal section;

Figure 4 is an enlarged fragmentary view in side elevation of the locomotive, with certain parts broken away and certain other parts shown in substantially longitudinal section;

Figure 5 is a partial transverse sectional view taken substantially along line 5—5 of Figure 4;

Figure 6 is a transverse sectional view taken substantially along line 6—6 of Figure 4;

Figure 7 is an enlarged detail view in plan, showing certain details of the support for the motor on one of the gear casings for one set of driving gears;

Figure 8 is a fragmentary front end view of the locomotive with certain parts shown in transverse section, showing the front driving wheels negotiating an uneven track; and

Figure 9 is a fragmentary transverse sectional view of the locomotive showing the rear driving wheels negotiating an uneven track.

In the embodiment of my invention illustrated in the drawings, a locomotive 10 is provided with a main frame 11, a pair of axles 12 and 13, and supporting and driving wheels 14, 14 mounted on said axles. Journal boxes 17, 17, mounted on the outer ends of the axles and guided in vertically extending openings 18, 18 formed in the main frame 11, support said frame by suitable spring supporting devices, such as helical springs, 19, 19.

The axle 13 carries a gear housing 20, which is journaled thereon for movement about the axis of rotation of said axle. Said gear housing, as herein shown, is of a split construction and includes a lower half 23 and an upper half 24, secured thereto by suitable nuts and bolts in a usual manner. Said upper half is provided with a rearwardly projecting portion which is open towards the rear of the locomotive, and has a flanged periphery 22 to which is secured an end plate 25 of a motor 26. Said motor is herein shown as being an electric motor of a usual construction. Said end plate projects upwardly from said motor and forms a casing and bearing support for a part of the locomotive drive gearing.

The axle 12 has a gear housing 29 journaled thereon for movement about the rotation of axis of said axle. Said gear housing is of a split construction and includes a lower half 30 and an upper half 31 secured thereto by means of suitable nuts and bolts. The upper half of said gear housing is provided with a semi-cylindrical portion 32, formed integral therewith and opening into the lower portion of said upper half of said housing. Said semi-cylindrical portion of said upper half of said housing encloses and forms a bearing support for a worm 33 mounted therein on suitable ball bearings 34, 34. Said worm is driven from the motor 26 in a manner which will more clearly appear as this specification proceeds, and meshes with and drives a worm gear 35 mounted on the axle 12, for driving said axle and the wheels 14, 14.

The semi-cylindrical portion of the upper half 31 of the gear casing 29 is guided at its ends in a frame member 36, which frame member has the rear portion of the motor 26 yieldably and pivotally connected thereto in a manner which will hereinafter more clearly appear as this specification proceeds, and serves to limit pivotal movement of the casings 20 and 29 about their respective axles, but permits transverse axial movement of said casings with respect to each other. Said frame member, as herein shown, includes a pair of spaced apart transversely extending facing guide channels 39, 39. Said guide channels are connected together at their upper ends by a pair of spaced apart longitudinally extending channels 40, 40 and at their lower ends by a pair of spaced apart longitudinally extending angles 41, 41 (see Figures 4 and 5). The inner sides of the webs of the channels 39, 39 are adapted to form a guide and engage the

ends of said semi-cylindrical portion, to permit transverse slidable movement of said semi-cylindrical portion with respect to said channels. The forward channel 39 is provided with a pair of spaced apart forwardly projecting members 42, 42 having bearing bosses formed on the ends thereof, to which are pivotally mounted arms 43, 43 on pivotal pins 44, 44. Said arms and frame form a supporting bracket for the rear part of the motor 26 on the rear axle 12, and said arms are provided with a pair of depending forward ends 45, 45, which extend along opposite sides of said motor adjacent the central portion thereof, and which are herein shown as being secured thereto by suitable cap screws.

The rear ends of the arms 43, 43 are connected together by a transversely extending member 47 which forms a seating for helical springs 49, 49. Said helical springs abut opposite sides of said member at their inner ends, and their outer ends are seated in the horizontal legs of angles 50, 50, secured to and extending rearwardly from the rear end of the rear channel 39 of the frame member 36, to permit yieldable movement of said bracket and motor with respect to said frame member and with respect to the axle 12 and gear housing 29, and to limit pivotal movement of both gear housings about their respective axles.

With the construction just described, the gear housings 20 and 29 may independently pivot about the pivotal axes of the respective axles to which they are connected, a limited amount, determined by the yieldability of the springs 49, 49, and either gear housing may move vertically with respect to the other in an axial direction, when the locomotive is traveling over an uneven track, due to the slidable guiding connection between the frame member 36 and the ends of the upper semi-cylindrical portion 32 of the gear housing 29, thus providing a flexible mounting for each driving axle, and permitting all four wheels of the locomotive to remain in contact with the rails, while traveling over irregular tracks.

Referring now in particular to the drive gearing for driving the axles 12 and 13 and wheels 14, 14 from the motor 26, said motor is provided with an armature shaft 53 having a spur pinion 54 on the forward end thereof, which meshes with an idler gear 55. Said idler is journaled in a ball bearing 56 mounted on a bearing bracket 57, projecting downwardly from the upper half 24 of the gear casing 20. Said idler gear meshes with a spur gear 58 on a longitudinally extending shaft 59, for driving said shaft. Said shaft is journaled in the end plate 25 of the motor 26 at one of its ends on a ball bearing 60 and is also journaled in a semi-cylindrical portion 61 of said upper half of said gear casing on ball bearings 62, 62, one of which bearings is mounted in the forward end of said semi-cylindrical portion, and two other of which bearings are mounted adjacent the opposite end of said semi-cylindrical portion. A worm 63 is herein shown as being formed integral with said shaft and meshes with and drives a worm gear 64, for driving the forward axle 13.

A universal flexible drive connection, disposed above the motor 26, is provided for connecting the worms 63 and 33 together, to permit simultaneous driving of the front and rear axles, when said axles are in various angular relationships with respect to each other. As herein shown, said drive connection includes a universal joint 65, secured to and projecting rearwardly from the rear end of the shaft 59, and a universal joint 66 projecting forwardly from a shaft 67 formed integral with and projecting forwardly from the worm 33. Said universal joints may be of any well-known construction and are herein shown as being connected together for longitudinal slidable movement with respect to each other by a splined shaft 69. An opening 70 is provided in the forward channel 39, to permit relative movement between the shaft 67 and said channel in a transverse and vertical direction. Excessive distortion of said joints in a horizontal plane is prevented by the springs 49, 49. All four wheels of the locomotive may thus be driven from the motor 26 in a simple and positive manner when the axles 12 and 13 are in various angular positions with respect to each other.

While I have herein shown and described one form in which my invention may be embodied, it will be understood that the construction thereof and the arrangement of the various parts may be altered without departing from the spirit and scope thereof. Furthermore, I do not wish to be construed as limiting my invention to the specific embodiment illustrated, excepting as it may be limited in the appended claims.

I claim as my invention:

1. A locomotive having a main frame, two longitudinally spaced axles, a motor disposed between said axles, spring suspension means for supporting said frame on said axles, supports for said motor journaled on said axles and affording movement of said axles in a vertical plane independently of each other including a gear casing journaled on each of said axles, a positive connection between said motor and one of said gear casings and a yieldable and laterally slidable connection between said motor and said other gear casing, said yieldable and laterally slidable connection including a guide frame having guiding engagement with the upper end of said other gear casing, a bracket secured to said motor, a transverse pivotal connection between the forward end of said guide frame and bracket, and a vertically yieldable connection between the rear end of said guide frame and bracket.

2. A locomotive having a main frame, two longitudinally spaced axles, a motor disposed between said axles, spring suspension means for supporting said frame on said axles, supports for said motor journaled on said axles for pivotal movement with respect thereto in a vertical plane and affording movement of said axles in a vertical plane independently of each other including a gear casing journaled on each of said axles, a positive connection between said motor and one of said gear casings and a vertically yieldable and laterally slidable connection between said motor and said other gear casing, worm gearing within said casing to which said motor is rigidly connected, a drive connection from said motor to said worm gearing for driving said associated axle and wheels, worm gearing within said other gear casing, and a universal flexible drive connection extending above said motor for connecting said worm gearings together.

3. In a power driven vehicle, a frame, track wheels and axles for supporting said frame, a motor, and means for mounting said motor on said axles, permitting vertical movement of said axles at various angles with respect to each other and permitting said motor to drive all of said track wheels when said axles are in various positions of misalignment with respect to each

other including a casing pivotally mounted on one of said axles, a supporting connection between said casing and one end of said motor, permitting movement of said motor and casing about the axis of rotation of said axle, gearing mounted within said casing for driving said associated wheels from said motor, a casing pivotally mounted on said other axle, gearing mounted within said casing, a connection between said second mentioned casing and motor for limiting tilting movement of said casings about their respective axles, and permitting transverse axial movement of said casings with respect to each other, and a universal flexible coupling extending above said motor and connecting said gearings together for driving one from the other.

4. A power driven vehicle including a frame, axles having track wheels thereon, journal boxes on said axles and a yieldable supporting connection between said journal boxes and said frame, a motor, and means for mounting said motor on said axles, permitting vertical movement of said axles at various angles with respect to each other and permitting said motor to drive all of said track wheels when said axles are in various positions with respect to each other including a casing pivotally mounted on one of said axles, a supporting connection between said casing and one end of said motor, gearing mounted within said casing and connected with said motor for driving said associated wheels from said motor, a casing pivotally mounted on said other axle, gearing mounted within said casing, a universal coupling connecting said gearings together for driving one from the other when said gearings are in various positions with respect to each other, and a yieldable connection between said second mentioned casing and motor for limiting pivotal movement of said casings about their respective axles and permitting transverse movement of said casings with respect to each other.

5. A power driven vehicle including a frame, axles having track wheels thereon, journal boxes on said axles and a yieldable supporting connection between said journal boxes and said frame, a motor, and means for mounting said motor on said axles, permitting vertical movement of said axles at various angles with respect to each other and permitting said motor to drive all of said track wheels when said axles are in various positions with respect to each other including a casing pivotally mounted on one of said axles, a supporting connection between said casing and one end of said motor, gearing mounted within said casing and connected with said motor for driving said associated wheels from said motor, a casing pivotally mounted on said other axle, gearing mounted within said casing, a universal coupling connecting said gearings together for driving one from the other when said gearings are in various positions of adjustment with respect to each other, and a vertically yieldable connection between said second mentioned casing and motor for limiting pivotal movement of said casings about their respective axles and permitting transverse axial movement of said casings with respect to each other including a guide frame forming a transverse guide for the upper portion of said second mentioned casing and a supporting connection between said motor and guide frame.

6. A power driven vehicle including a frame, axles having track wheels thereon, journal boxes on said axles and a yieldable supporting connection between said journal boxes and said frame, a motor, and means for mounting said motor on said axles, permitting vertical movement of said axles at various angles with respect to each other and permitting said motor to drive all of said track wheels when said axles are in various positions with respect to each other including a casing pivotally mounted on one of said axles, a supporting connection between said casing and one end of said motor, gearing mounted within said casing and connected with said motor for driving said associated wheels from said motor, a casing pivotally mounted on said other axle, gearing mounted within said casing, a universal coupling connecting said gearings together for driving one from the other when said gearings are in various angular positions with respect to each other, and a vertically yieldable connection between said second mentioned casing and motor for limiting pivotal movement of said casings about their respective axles and permitting transverse axial movement of said casings with respect to each other including a guide frame forming a transverse guide for the upper portion of said second mentioned casing and a supporting connection between said motor and guide frame including a motor supporting bracket, a pivotal connection between one end of said guide frame and said bracket, and a yieldable connection between the other end of said guide frame and said bracket.

7. A power driven vehicle including a frame, axles having track wheels thereon, journal boxes on said axles and a yieldable supporting connection between said journal boxes and said frame, a motor, and means for mounting said motor on said axles, permitting vertical movement of said axles at various angles with respect to each other and permitting said motor to drive all of said track wheels when said axles are in various positions with respect to each other including a casing pivotally mounted on one of said axles, a supporting connection between said casing and one end of said motor, gearing mounted within said casing and connected with said motor for driving said associated wheels from said motor, a casing pivotally mounted on said other axle, gearing mounted within said casing, a universal coupling connecting said gearings together for driving one from the other when said gearings are in various angular positions with respect to each other, and a yieldable connection between said second mentioned casing and motor for limiting pivotal movement of said casings about their respective axles and permitting transverse axial movement of said casings with respect to each other including a guide frame, a transverse slidable guiding connection between the upper portion of said second mentioned casing and said guide frame, a motor supporting bracket including two parallel spaced arms, a transverse pivotal connection between said arms and one end of said guide frame, and a yieldable connection between said arms and the opposite end of said guide frame.

8. In a locomotive, a frame, track wheels and axles, spring means for supporting said frame on said axles, a motor, and means for mounting said motor on said axles, permitting free movement of said axles with respect to each other in a vertical direction and permitting said motor to drive all of said track wheels when said axles are in various positions with respect to each other including a casing pivotally mounted on one of said axles, a supporting connection be-

tween one end of said motor and said casing, gearing mounted within said casing and driven by said motor for driving said associated axle and wheels from said motor, a casing pivotally mounted on said other axle, gearing mounted within said casing for driving said associated axle and wheels from said motor, a universal flexible coupling connecting said gearings together for driving one from the other when said gearings are in various relative angular positions with respect to each other, and means pivotally connecting said second mentioned casing with said motor at a point spaced from the axis of connection of said casing to its associated axle, permitting limited movement of said casings about their respective axles.

9. In a locomotive, a frame, track wheels and axles, spring means for supporting said frame on said axles, a longitudinally extending motor disposed between said axles, and means for mounting said motor on said axles, permitting movement of said axles with respect to each other in a vertical direction and permitting said motor to drive all of said track wheels when said axles are in various positions with respect to each other including a casing pivotally mounted on one of said axles, a supporting connection between one end of said motor and said casing, gearing mounted within said casing for driving said associated axle and wheels from said motor, a casing pivotally mounted on said other axle, gearing mounted within said casing for driving said associated axle and wheels from said motor, a universal flexible coupling connecting said gearings together for driving one from the other when said gearings are in various angular positions with respect to each other, a guide frame having slidable engagement with said casing on said other axle, means pivotally connecting said motor with said guide frame at a point spaced above and to the rear of said motor, and yieldable means interposed between said connecting means and guide frame for limiting pivotal movement of said casings about their respective axles while said guide frame permits independent transverse movement of said casings and axles with respect to each other.

10. A locomotive having a main frame, two longitudinally spaced axles having wheels thereon, spring suspension means for supporting said main frame on said axles, a motor disposed between said axles, for driving said axles, supports for said motor journaled on said axles for pivotal movement about the axes of said axles and permitting independent vertical movement of said axles with respect to each other, said supports for said motor including a gear casing journaled on one of said axles, a fixed connection between said motor and said gear casing, gearing within said casing for driving said associated axle from said motor, a gear casing journaled on said other axle, gearing within said casing for driving said other axle, an extensible drive connection between the gearing within said casings, arranged to drive said gearing in said second mentioned casing from said motor in all positions of said casings with respect to each other, and a vertically yieldable connection between said motor and said other gear casing.

11. A locomotive having a main frame, two longitudinally spaced axles having wheels thereon, spring suspension means for supporting said main frame on said axles, a motor disposed between said axles for driving said axles, supports for said motor journaled on said axles for pivotal movement about the axes of said axles and permitting independent vertical movement of said axles with respect to each other, said supports for said motor including a gear casing journaled on one of said axles, a fixed connection between said motor and said gear casing, gearing within said casing for driving said associated axle from said motor, a gear casing journaled on said other axle, gearing within said casing for driving said other axle, an extensible drive connection between the gearing within said casings, arranged to drive said gearing in said second mentioned casing from said motor in all positions of said casings with respect to each other, and a vertically yieldable and laterally slidable connection between said motor and said other gear casing.

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