June 26, 1962 P. L. JOLLEY 3,041,485

REMOVABLE POWER PACK FOR REMOTELY CONTROLLED TOYS

Filed May 29, 1958 3 Sheets-Sheet 1

FIG. 1.

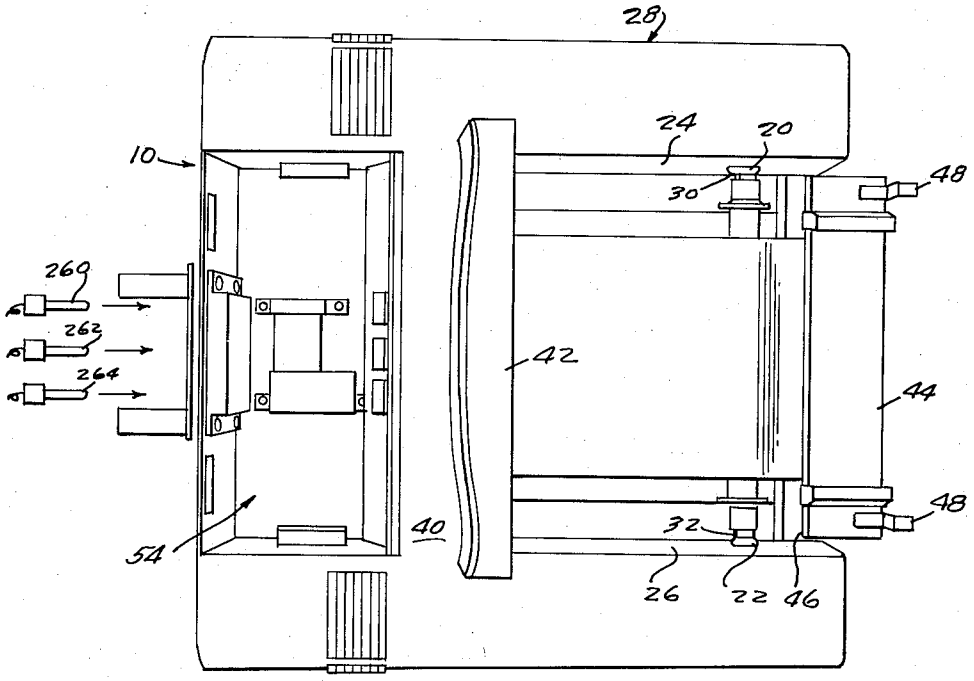
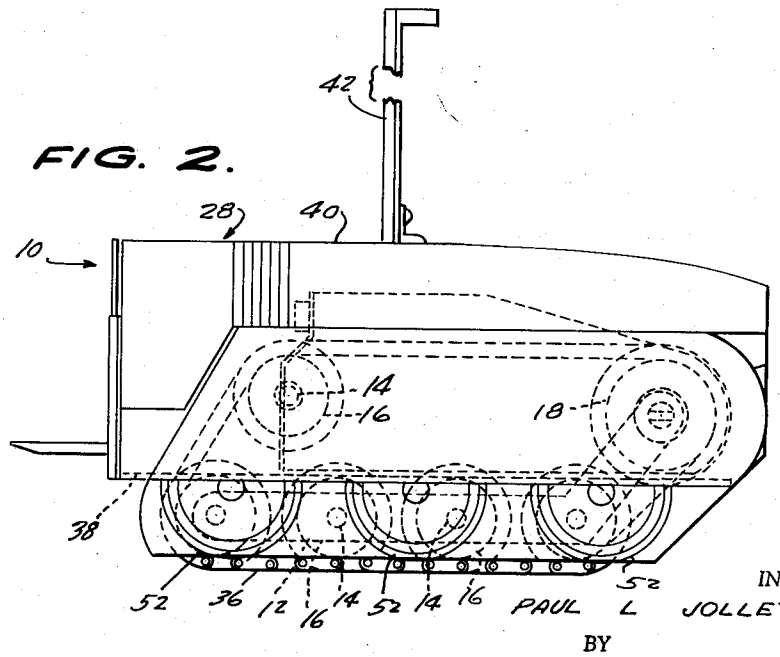


FIG. 2.



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FIG. 3.

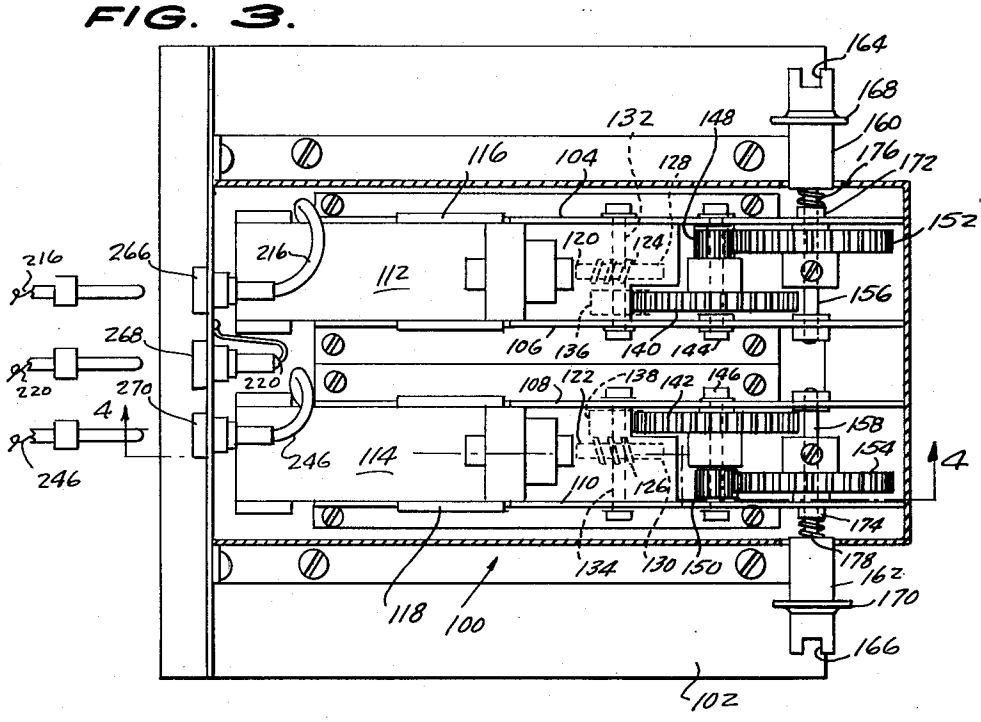
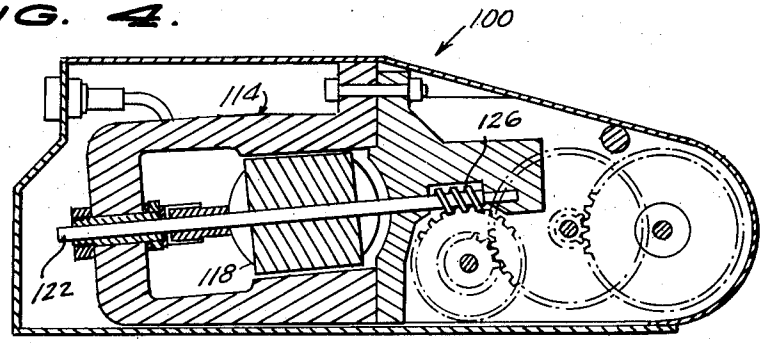


FIG. 4.



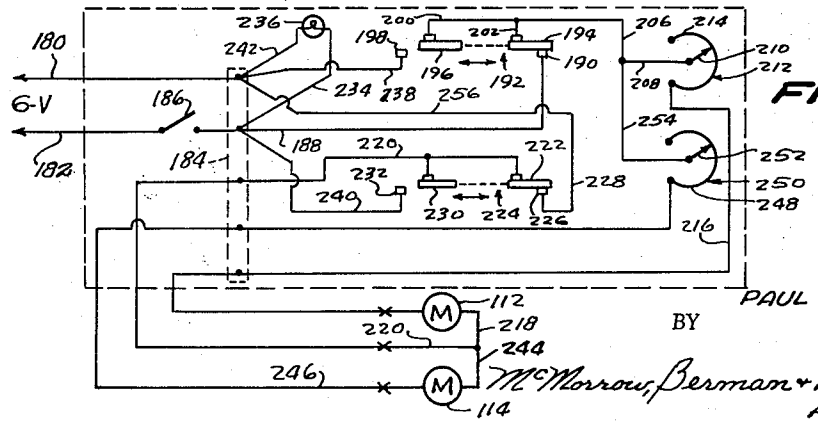


FIG. 5.

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REMOVABLE POWER PACK FOR REMOTELY CONTROLLED TOYS

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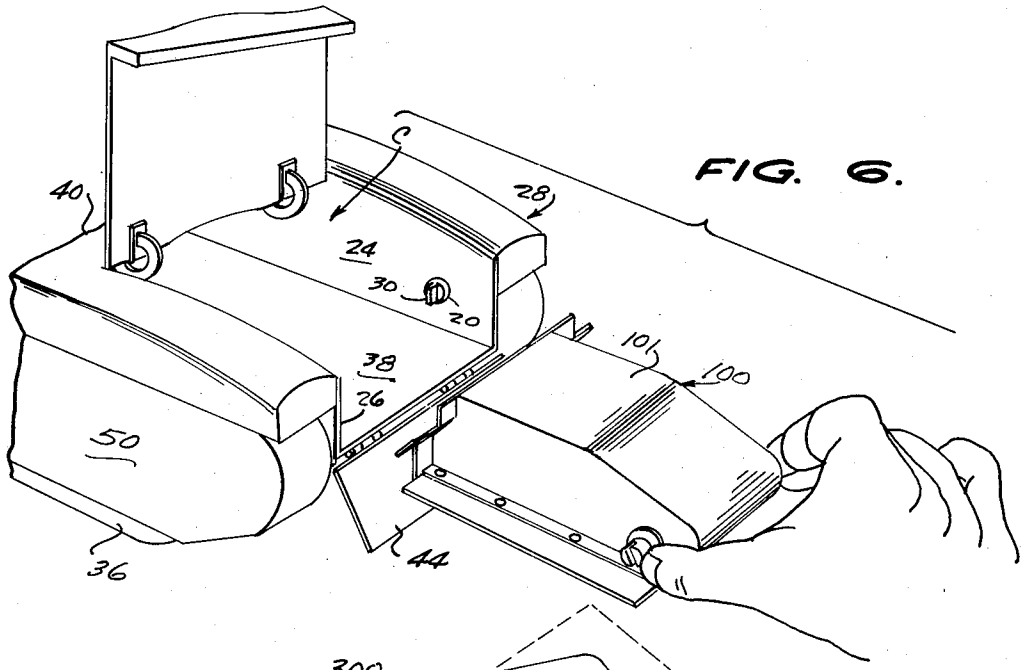


FIG. 6.

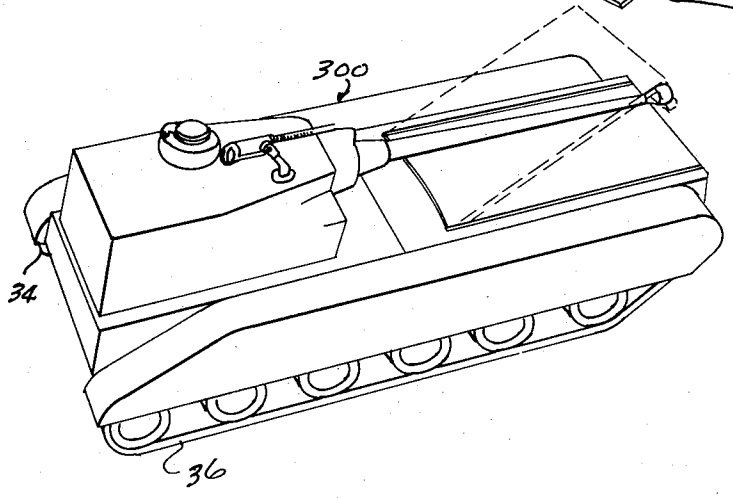


FIG. 7.

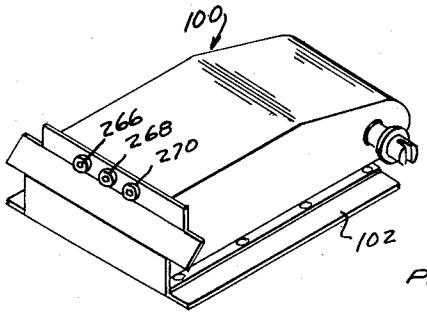


FIG. 8.

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3,041,485 REMOVABLE POWER PACK FOR REMOTELY CONTROLLED TOYS

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Filed May 29, 1958, Ser. No. 738,680
5 Claims. (Cl. 310—112)

This invention relates to a power pack unit and, more specifically, the instant invention pertains to an electrically driven power device for actuating toy vehicles.

One of the primary objects of this invention is to provide a driving unit for toy vehicles, the unit being adapted for detachable connection with the driving mechanism of the toy and when installed thereon becomes a composite part thereof.

A further object of this invention is to provide a power pack unit for vehicular toys as well as other types of mechanical toys having drive means incorporated therein, the power pack unit being provided with means for remotely controlling the same.

Another object of this invention is to provide a power pack unit of the type generally described supra, the power pack unit being non-complex in construction and assembly, inexpensive to manufacture, and durable in use.

Other and further objects and advantages of the instant invention will become more evident from a consideration of the following specification when read in conjunction with the annexed drawings, in which:

FIGURE 1 is a top plan view of a toy having a power pack unit installed therein and constructed in accordance with the teachings of this invention;

FIGURE 2 is a side elevational view of the toy illustrated in FIGURE 1;

FIGURE 3 is a top plan view of the power pack unit, partially in cross-section;

FIGURE 4 is a detail longitudinal cross-sectional view of the power pack unit taken substantially on the line 4—4 of FIGURE 3, looking in the direction of the arrows;

FIGURE 5 is a schematic wiring diagram for remotely controlling the power pack unit;

FIGURE 6 illustrates the steps leading to the releasable connection of the power pack unit with a toy vehicle;

FIGURE 7 illustrates the application of the power pack unit to another embodiment of the toy vehicle; and

FIGURE 8 is a perspective view of the power pack unit per se.

Referring now more specifically to the drawings, reference numeral **10** designates, in general, a toy vehicle having a configuration simulating a combat vehicle normally found in the armed services. The specific construction and configuration of this vehicle, per se, is not of import with respect to the instant invention and the same will be but briefly described only for the purpose of lending an environment for the actual invention.

The vehicle **10** includes suitable longitudinally extending chassis side frame members **12** at each longitudinally extending side of the vehicle, the side frame members supporting axles **14** on which are rotatably mounted a plurality of idler sprocket wheels **16**. Drive sprockets **18** are mounted on stub axles **20, 22** supported on the side frame members **12**, the stub axles **20, 22** projecting through opposed inner side walls **24, 26** of the vehicle body **28** in opposed confronting alignment. The projecting confronting ends of the stub axles **20, 22** are reduced to form diametrically extending tongues **30, 32**, respectively, the function of which will be set forth below. Link chains **34, 36** are trained around the sprockets at each side of the vehicle, the chains simulating a caterpillar track in conventional full scale vehicles of a similar type.

From the foregoing description it becomes clear that each of the chains **34, 36** may be driven, independently, in the same or reverse directions simultaneously, or if desired, the chains may be simultaneously driven in contradirections relative to each other.

The vehicle body **28** includes a floor **38**, the side walls **24, 26** mentioned above, a top wall **40** having a hinged section **42** and a rear end wall **44** hingedly connected on a rod **46** extending transversely of the vehicle body **28**. The end wall **44** is provided with a pair of spaced latch bars **48**, the function of which will be described below. Skirts **50** are secured to the side walls **24, 26** and extend over and downwardly along the outer sides of the sprockets **16, 18**. The skirts **50** extend downwardly to a point proximate the ground engaging portions of the chains **34, 36** to conceal and protect the sprockets **16, 18**. Simulated idler sprockets **52** may be painted on the skirts **50** if desired, and a cockpit or vehicle operator's compartment may be simulated at **54**.

The power pack unit for driving the above described vehicle is connoted, in general, by reference numeral **100** and is seen to comprise an elongated substantially rectangular mounting plate **102** from which arise, substantially normal with respect thereto, two pairs of longitudinally extending laterally spaced angle members **104, 106** and **108, 110**.

Reference numerals **112, 114** denote a pair of low voltage (6–12 volts) D.C. electric motors, the motor **112** being disposed between and secured to the pair of angle members **104, 106** adjacent one of their ends. The motor **114** is disposed between the pair of angle members **108, 110** adjacent one of their respective ends and is rigidly secured thereto as in the preceding case. The electric motors **112, 114** are of the same rating and size.

Each motor includes an armature **116, 118** carried on drive shafts **120, 122**, respectively, having outer ends terminating in worm gears **124, 126**. The worm gears **124, 126** mesh with the gears **128, 130**, respectively, rigidly mounted on cross-shafts **132, 134** supported for rotation on the pairs of angle members **104, 106** and **108, 110**. Each of the shafts **132, 134** have rigidly mounted thereon a second gear **136, 138**, respectively, which mesh with larger gears **140, 142**, respectively, fixedly connected on second cross-shafts **144, 146** supported for rotation between the pairs of angle members **104, 106** and **108, 110**. The cross-shafts **144, 146** carry smaller gears **148, 150**, respectively, which are in mesh with larger gears **152, 154** rigidly secured on cross-shafts **156, 158** also supported for rotation between the pairs of angle members **104, 106** and **108, 110**, respectively.

Mounted for reciprocation on the outer ends of the cross-shafts **156, 158** and driven thereby are a pair of substantially cylindrical coupler elements **160, 162** having diametrically extending slots **164, 166** formed therein to detachably receive the tongues **30, 32** as will be more fully described below. The coupler elements **160, 162** are splined or otherwise keyed to their respective shafts to rotate therewith, and each of the coupler elements have integrally connected therewith adjacent their respective outer ends, an outwardly extending radial flange **168, 170**, respectively.

The cross-shafts **156, 158** have mounted thereon fixed collars **172, 174**, respectively, disposed in axially spaced relation relative to the inner ends of the adjacent coupling elements **160, 162**, and interposed therebetween and surrounding the shafts **156, 158** are a pair of helicoidal springs under compression **176, 178**, respectively, the springs constantly biasing the coupling elements for movement towards the outer ends of their respective shafts.

The motors **112, 114** are selectively and reversibly controlled by an electric circuit shown schematically in FIGURE 5. As illustrated, leads **180, 182** connect with a conventional six or twelve volt D.C. source of E.M.F.

and to a bus board **184** from which extend the several control circuits. The control circuits to the motor **112** include a main control switch **186** in the lead **182** which connects through wire **188** to a switch contact **190** of a reversing switch **192** having switch arms **194**, **196** and a second contact **198**. The arms **194**, **196** are tied together to move as a unit in establishing ultimate contact with either the contact **190** or **196**, and are electrically connected together through wires **200**, **202** to serve a function explained in detail below. The wire **202** connects through wires **206**, **208** with the arm **210** of a rheostat **212** which is in electrical contact with one side of its resistance **214**. Wire **216** connects the other side of the rheostat with one side of the motor **112**, and the other side of the motor connects to wires **218**, **220**, the switch arm **222** of a second switch **224** and its contact **226**, and wire **228** back to the other lead **180**. Thus the motor **112** is energized to rotate in one direction.

Note should be made at this point that the switches **192** and **224** are identical in construction, the latter including an arm **230** mechanically tied to the arm **222** and electrically through the wire **220**, the arm **230** being adapted to alternately make and break a circuit to be described through the switch contact **232**.

To reverse the current flow through the motor **212** and thus reverse the rotation of the drive shaft **120**, the circuit may be traced through the lead **182**, switch **186** and wire **234** to one side of the pilot light **236**; from the other side of the pilot light **236** through the wire **228**, contact **226**, arm **222** and wire **220** to one side of the motor **112**. Wire **216** connects the other side of the motor **112** to one side of the rheostat **212**, the other side of which connects through wires **208**, **206**, arm **196**, contact **198** and wire **238** back to the lead **180**. The current flow now being reversed, the armature **116** rotates in the opposite direction and thereby drives the shaft **120** in the same direction.

Now if the reversing switch **224** for the motor **114** is moved to break the circuit through the switch arm **222** and contact **226** and the switch arm **230** engages the contact **232** the control for the motor **112** is still maintained. The same may be traced as follows: lead **182**, switch **186**, wire **240**, contact **232**, switch arm **230**, wire **220** to one side of the motor **112**. From the other side of the motor **112** through wire **216** to one side of the rheostat **212**. Through wire **208** from the other side of the rheostat **212**, wire **206**, wire **202**, switch arm **194**, contact **190**, wire **188**, wire **234** to one side of the pilot light **236**. Then current flows through wire **242** making contact with the lead **180**.

Now if the switch **224** is maintained in the above described position, that is, with the switch arm **230** in engagement with the contact **232** and the switch arm **222** out of engagement with the contact **226** the direction of rotation of the motor **112** may be reversed by establishing contact of the switch arm **196** with the contact **198** and simultaneously therewith breaking the engagement of the switch arm **194** with the contact **190**. This reversing circuit may be traced from: lead **182**, switch **186**, wire **240**, contact **232**, switch arm **230**, wire **220** to one side of the motor **112**. From the other side of the motor **112** by wire **216** to one side of the rheostat **212**. From the other side of the rheostat **212** by wire **208**, wire **206**, wire **200**, switch arm **196**, contact **198** and wire **238** to the lead **180**.

From the foregoing it will be understood that regardless of the position of the reversing switch **224**, the reversing switch **192** for the motor **212** may be actuated to control the direction of rotation of the drive shaft **120**.

Referring now to the control circuit for the motor **114**, and with the reversing switches **192**, **224** in the positions illustrated in FIGURE 5, it will be seen that current will pass through lead **182**, switch **186**, and wire **234** to one side of the lamp **236**. From the other side of the lamp **236** current passes through the wire **242**, wire **228**, contact **226**, switch arm **222**, wire **220** and wire **244** to one side of the motor **114**. From the other side of the motor **114** current passes through wire **246** to one side of the resistance **248** of a second rheostat **250**. Current now passes through the control arm **252** of the rheostat **250** and returns through wires **254**, **206**, **202**, switch arm **194**, contact **190** and wire **256** to the other lead **180**.

To reverse the motor **114** the reversing switch **224** is moved to establish contact of the switch arm **230** with the contact **232** and the circuit then reads from the lead **182**, switch **186**, wire **240**, contact **232**, switch arm **230**, and wires **220**, **244** to one side of the motor **114**. The return circuit is traced from the other side of the motor **114**, wire **246** to one side of the rheostat **250**. Current flows from the other side of the rheostat **250** through wires **254**, **206** and **202** to the switch arm **194**, contact **190**, and wires **188**, **234** to one side of the pilot light **236**. From the other side of the pilot light **236** wire **232** connects the circuit to the lead **180**.

Thus, from the above description of the circuits it is seen that the motors **112**, **114** may be driven, simultaneously, in the same direction or the reverse direction, the motors **112**, **114** may be driven in contra-directions simultaneously. The speed of each of the motors **112**, **114** is independently controlled by the actuation of the rheostats **212**, **250**.

It should be now clear that upon energization of the motors **112**, **114** rotary motion will be imparted to the shafts **156**, **158** through the aforedescribed gear trains and this rotary motion will be imparted to the coupling elements **160**, **162**.

FIGURE 6 illustrates the method employed for connecting the detachable power unit with the vehicle **28**. As illustrated therein, the hinge portion **42** of the top wall **40** has been elevated. This exposes a compartment C having a substantially rectangular configuration and which is defined by the opposed pair of side walls **24**, **26**, the bottom wall **38** and the tail gate **44**. The tail gate **44** is now pivoted to its downward position as illustrated in FIGURE 6 to provide access into the interior of the compartment C. The operator now grasps the power unit and with his thumb and finger presses inwardly on the flanges **168**, **170** forcing the same to move inwardly towards each other against the pressure exerted by the springs **176**, **178**. The unit **100** is now inserted into the compartment and the coupling elements **160**, **162** are aligned with the tongues **30**, **32** and are released to permit the coupling elements **160**, **162** to move away from each other causing the slots **164**, **166** to slidably engage the tongues **30**, **32**. The control circuit described above and illustrated in FIGURE 5 is now connected to the motors by means of the jacks **260**, **262** and **264** which are releasably received in the plugs **266**, **268** and **270**, respectively. The tail gate **44** is raised and the hinged portion **42** of the top wall **40** is lowered to frictionally engage behind the latch members **48** and the vehicle **28** is now ready to be actuated. By virtue of the remote control circuit for the motors **112**, **114**, the operator may control, through the rheostats **212**, **250** and the reversing switches **192**, **224** the forward, backward or turning movement of the vehicle **28**.

When the vehicle **28** has been maneuvered to a desired position, the operator may de-energize the circuits to the motors **112**, **114**, raise the hinged section **42** of the roof **40** and drop the tail gate **44** to again gain access to the compartment C. Thereafter, the power pack unit **100** may be removed from the vehicle **28** through the simple expedient of again grasping the flanges **168**, **170** with the fingers and reciprocating the same towards each other in the manner described above. This will cause the coupling elements **160**, **162** to become disengaged from tongues **30**, **32** after which the power pack unit **100** may be removed from the vehicle **28** and placed in a second unit having the general configuration of the toy **300** illustrated in FIGURE 7. The toy **300** is identical in con-

struction with respect to the toy **28** with the exception of its outer configuration. In this instance, the vehicle **300** stimulates an armored self-propelled artillery piece which mounts a simulated 155 mm. gun. In all other respects the vehicle **300** is identically constructed with respect to the vehicle **28**.

After the power pack unit **100** has been connected with the vehicle **300**, the vehicle may be moved in the manner described above to be deployed in the desired manner relative to the vehicle **28**. Thereafter, and if desired, the power pack unit **100** may be removed from the vehicle **300** and connected with still a third vehicle having the same or different exterior configuration.

It should now be manifest that an unlimited number of vehicles having different exterior configurations may be employed with the present driving means and power pack unit described and illustrated herein. Additionally, and if desired, a number of power pack units could be used to maneuver the vehicles into predetermined positions closely simulating actual war time conditions.

The spring-loaded, quick-coupling device of the power pack to connect the final drives to the driving sprockets of the track is a novel feature of this invention permitting universal use of a single power unit. The flexibility provided by the novel coupling device also permits use of the power pack unit in two-wheeled toy vehicles such as the models of two-wheeled prime movers for heavy earth moving equipment. Similarly, by providing a pulley recess in the flange **170** of the coupling device, the power pack can be used separate and apart from a vehicle to power structural mechanical toys.

While one of the primary objects of this invention is to provide entertainment, it will now be seen that such toys may be utilized by persons interested in the maneuvering of men, supplies and equipment when resolving tactical and logistical problems.

Having described and illustrated two embodiments of this invention in detail, it will be understood that the same are offered merely by way of example, and that this invention is to be limited only by the scope of the appended claims.

What is claimed is:

1. A self-contained power pack unit for releasable connection with driving means for a vehicle, said driving means being located on each side of said vehicle, respectively, said unit comprising a base plate, two pairs of laterally spaced substantially parallel angle members fixedly secured to said plate and projecting laterally from a side thereof, a pair of electric motors disposed between each pair of angle members and secured thereto and to said base plate, each of said motors having a drive shaft and a worm gear thereon, said worm gears each meshing with the first gear of a speed reducing gear train, respectively, each gear train being supported between each pair of said angle members, respectively, an axle rigidly secured to the final gear of each of said gear trains for rotation therewith, a coupler element for each of said last named axles to effect releasable driving connection with said driving means for said vehicle whereby said unit may be removed from said vehicle as a whole, and means for connecting said motors with the source of E.M.F.

2. A power pack unit as defined in claim 1, wherein said source of E.M.F. includes circuitry for remotely connecting each of said motors in independent control circuits each of which includes, in series, a reversing switch and a control rheostat.

3. A self-contained removable power pack unit for mechanical vehicles having drive means, said unit comprising a base, a pair of electric motors mounted on said base in side-by-side relation, each of said motors having a drive shaft, a driven shaft for each of said drive shafts, said driven shaft being supported for rotation on said base, speed reduction means connected with each of said drive shafts and its respective driven shaft to reduce the speed of the latter, and coupling means on said driven shafts to effect connection thereof with said drive means of one of said vehicles.

4. A power pack unit as defined in claim 3, wherein said coupling means are each spring loaded.

5. A power pack unit as defined in claim 4, and an electric circuit for energizing each of said motors independently, and remote control means connected in each of said circuits.

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