

[54] TOY VEHICLE

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[22] Filed: **Feb. 10, 1975**

[21] Appl. No.: **548,830**

[52] U.S. Cl. **46/202; 46/17; 46/221; 46/223**

[51] Int. Cl.² **A63H 11/10**

[58] Field of Search **46/201, 202, 221, 222, 46/223, 39, 17; 35/13**

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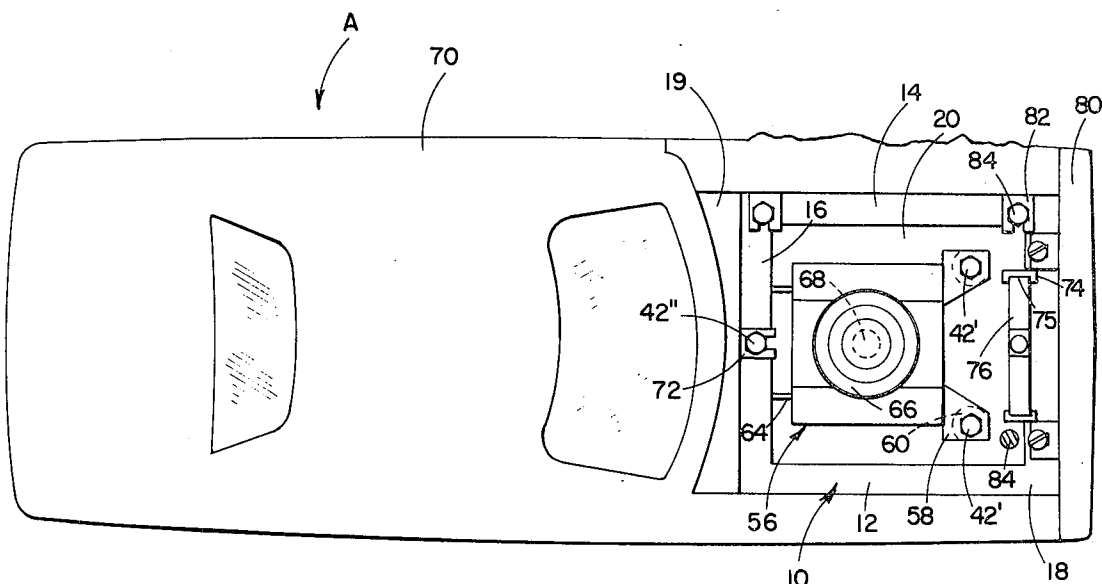
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[57] **ABSTRACT**

A disassemblable toy vehicle set including a toy automotive type vehicle and a powered bolt loosening and tightening assembly operable with the vehicle. The vehicle includes a frame with a body secured to the frame by at least one bolt. The frame also includes four quadrilaterally located outwardly extending cylindrically shaped hubs. Wheels are provided for each of the hubs and each wheel is secured to an associated hub by means of a single bolt. In addition, a tire is provided for each wheel which is removably, but nevertheless snugly, disposed over the annular surface of each wheel. In addition, an engine facsimile and related components are also removably secured to the frame by means of a plurality of bolts similar to the wheel bolts. A radiator fits within a pair of slots formed with the frame and is also removable from the vehicle. The powered bolt loosening and tightening assembly includes a case containing a battery and a conventional switching mechanism which is electrically connected to a hand held tool in the form of a power wrench. This tool contains an electric motor and a socket rotatable by the electric motor in order to engage the bolts for loosening or tightening the bolts in order to remove or replace components on the vehicle.

12 Claims, 4 Drawing Figures



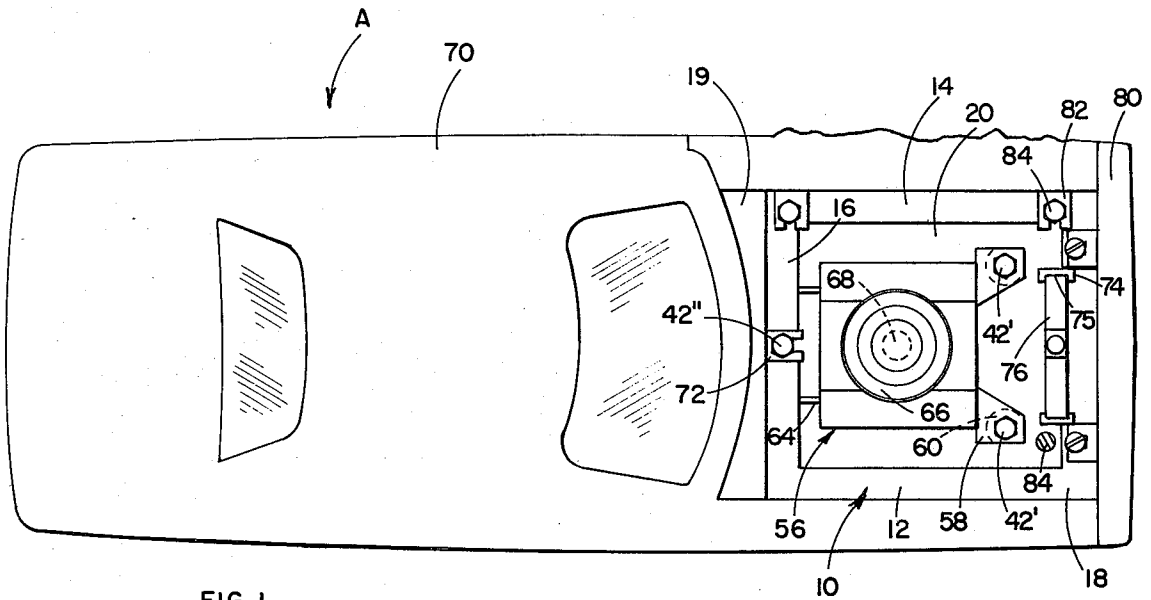


FIG. 1

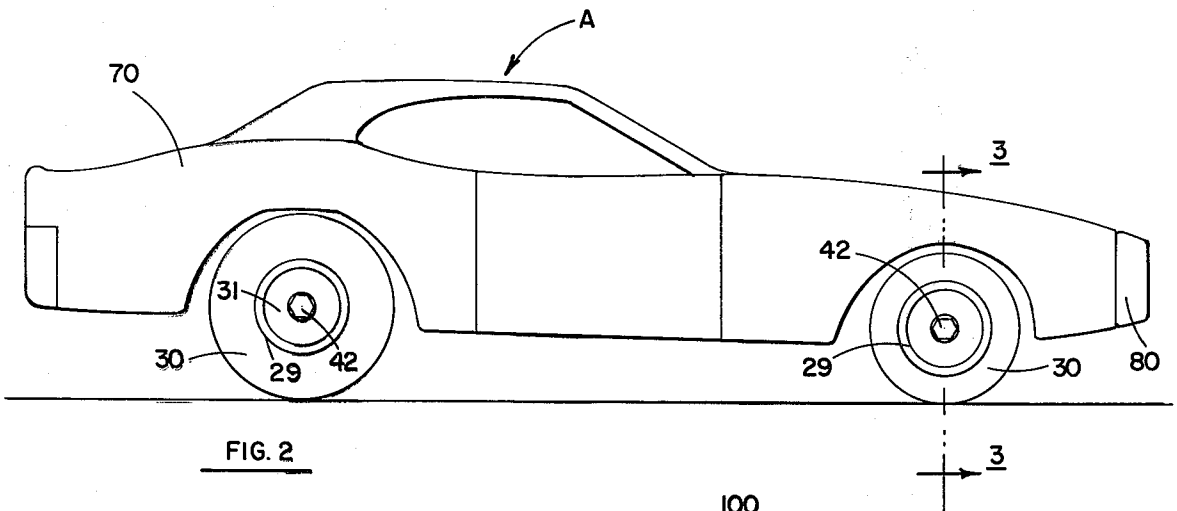


FIG. 2

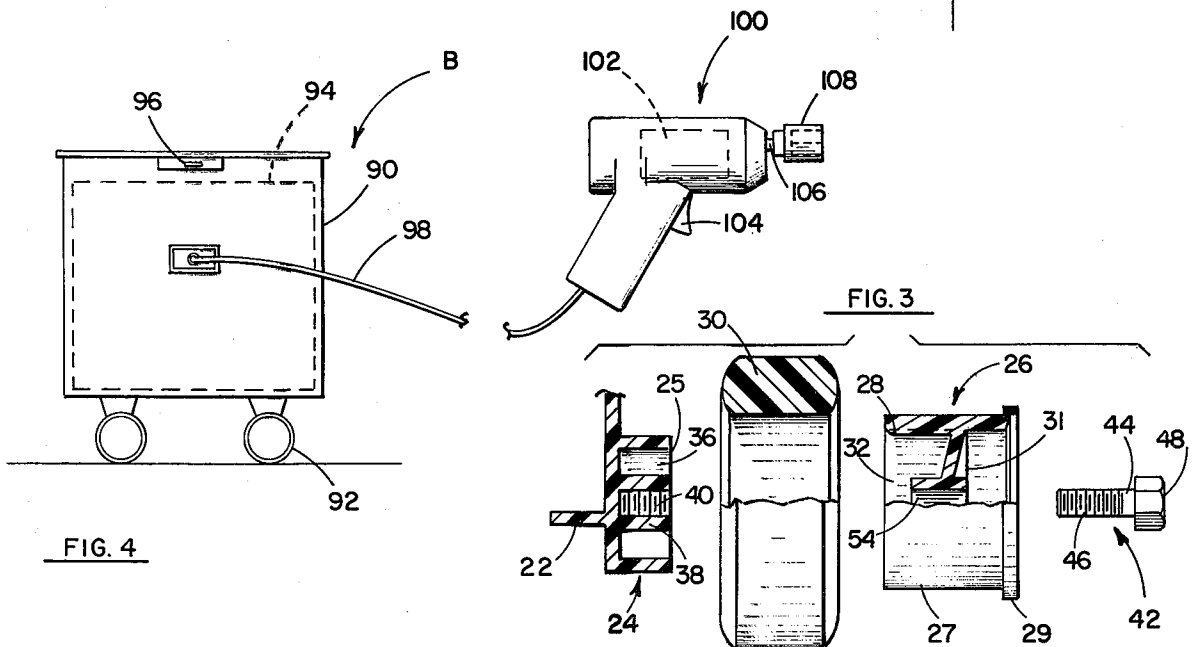


FIG. 3

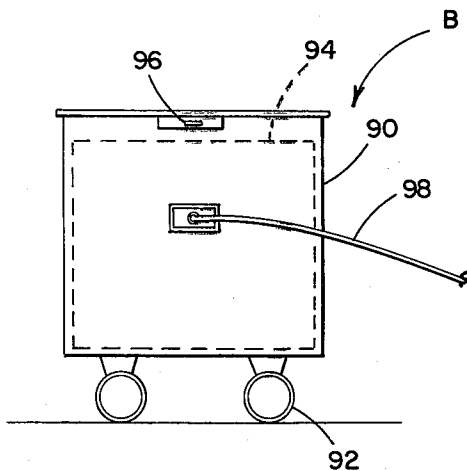


FIG. 4

TOY VEHICLE

BACKGROUND OF THE INVENTION

This invention relates in general to certain new and useful improvements in toy automotive type vehicle sets, and, more particularly, to a set including a toy automotive vehicle which can be assembled and disassembled and an electrically energized hand operated device operable for loosening and tightening bolts on the vehicle.

There are a number of commercially available toy vehicle sets in which components of the toy vehicle are removable and replaceable on the vehicle. However, in each of these commercially available vehicle sets, the components of the vehicle are usually attachable to a frame or other portion of the vehicle by means of a snap-fit arrangement. While this form of toy presumably has some educational value, it does not enable the child using this toy to gain the educational value and acquire manual dexterity by removing or reinserting appropriately located bolts or like fasteners for attaching or removing the various components of the vehicle by means of a powered tool.

Furthermore, these commercially available toy vehicle sets are usually constructed with a large number of relatively fragile and delicate parts which oftentimes leads to premature destruction of the toys. In addition, due to the number of parts required in most of these commercially available vehicle sets, the cost to manufacture these sets may be fairly substantial.

The present invention obviates these and other problems in the provision of a toy vehicle set which includes a toy automotive type vehicle having an engine facsimile and wheels removable from the frame or chassis of the vehicle and replaceable thereon by means of uniform bolts. A bolt loosening and tightening assembly in the form of a hand-held electrically operated powered wrench is provided with a socket for engaging the bolt heads to tighten or loosen the bolts for replacing or removing the various components with respect to the chassis of the vehicle. In this case, the bolts are sufficiently large relative to the normal size of the vehicle components so that the user of the toy vehicle set may readily engage and remove or replace the bolts.

It is therefore the primary object of the present invention to provide a toy vehicle set which includes an automotive vehicle having removable and remountable components and a powered bolt wrench to aid in the removal and replacement of the vehicle components.

It is another object of the present invention to provide a toy vehicle set of the type stated which is effective in training children in location of components in an automotive vehicle and in the removal and replacement of such components, as well as in the use of powered tools therefor.

It is a further object of the present invention to provide a toy vehicle set of the type stated which is highly durable in its construction and can be produced at a relatively low unit cost.

It is another salient object of the present invention to provide a toy vehicle set of the type stated which is uniquely designed to attract children within a relatively wide age range.

With the above and other objects in view, our invention resides in the novel features of form, construction, arrangement and combination of parts presently described and pointed out in the claims.

SUMMARY OF THE INVENTION

A disassemblable toy automotive type vehicle set which includes a toy automotive type vehicle and a powered bolt loosening and tightening assembly operable with the vehicle. The vehicle in this case includes a frame means somewhat similar to the frame or chassis of a conventional automotive vehicle.

A plurality of cylindrically shaped hubs extend outwardly from this frame means and, furthermore, the cylindrically shaped hubs are preferably quadrilaterally located with respect to the frame means.

A cylindrically shaped vehicle wheel is provided for each of the hubs and each wheel is sized to be removably and rotatably mounted with respect to the associated hubs. Moreover, each of the hubs and wheels have apertures which are capable of being aligned when the wheel is disposed with respect to the hub. A wheel bolt is provided for each wheel which is capable of being inserted into the aligned apertures for securing the wheels to the associated hubs. Each of these wheel bolts has a shank with a threaded section thereon for threaded securement in the hub and, moreover, at their opposite ends, each of the bolts has an enlarged head.

The powered bolt loosening and tightening assembly is provided with a portable source of power, such as dry cell battery power. In addition, an engageable means is provided which engages the bolt heads and loosens or tightens the bolts upon actuation of the source of power.

This latter assembly can be described in further detail in that the battery source of power is contained in a first casing. This assembly also includes a hand-held tool comprising an electric motor which is operable by the battery power. The engageable means is a socket having a recess sized to accommodate the head on the bolt and is rotatable by the motor.

In another preferred aspect of the present invention, a tire facsimile is provided for each wheel and this tire facsimile is capable of being removably disposed on the outer surface of each wheel in snug fitting, but nevertheless removable, contact therewith.

Also in a preferred aspect of the present invention, one or more drive train components may be removably secured to the frame means. These drive train components may be any facsimile of a conventional drive train component, as for example, an engine facsimile. In this case, an engine facsimile is removably secured to the frame means by means of a plurality of engine bolts which are substantially similar to the previously described wheel bolts. Again, a fender may be removably secured to the frame means by a plurality of fender bolts which, again, are substantially similar to the wheel bolts. Moreover, a body may be removably secured to the frame means by at least one body bolt which is also substantially similar to the wheel bolts.

One of the unique aspects of the present invention is that the size of the bolts is proportionately related to the components of the vehicle, such that the bolts are oversized with respect to the vehicle components when compared to a standard automotive vehicle. The relationship of the bolts to the components of the vehicle is more fully defined in detail hereinafter. However, the heads of the wheel bolts compared to the size of the vehicle wheel are at least three times, and preferably four times, larger than the size of conventional automobile wheel bolts or lugs with respect to the conventional automobile wheel.

BRIEF DESCRIPTION OF THE DRAWINGS

Having thus described the invention in general terms, reference will now be made to the accompanying drawings in which:

FIG. 1 is a top plan view of an automotive vehicle forming part of the toy vehicle set of the present invention, and showing the hood portion of this vehicle removed;

FIG. 2 is a side elevational view of the automotive vehicle of FIG. 1;

FIG. 3 is an exploded vertical sectional view taken along 3—3 of FIG. 2; and

FIG. 4 is a side elevational view, partially in section, and showing the bolt loosener and tightener assembly forming part of the present invention.

DETAILED DESCRIPTION

Referring now in more detail, and by reference characters to the drawings which illustrate a practical embodiment of the present invention, A designates a toy automotive vehicle which comprises a frame, or so-called chassis, 10 which is comprised of a pair of opposed parallel, longitudinally extending base plate sections 12 and 14 which are connected at opposite ends by means of transversely extending rear and front base plate sections 16 and 18, in the manner as illustrated in FIG. 1 of the drawings. The base plate section 18 also is integrally provided with an upwardly struck transversely extending firewall 19. The various base plate sections, 12, 14, 16 and 18, define an enlarged central, engine-receiving aperture 20 within the frame 10.

The components to be hereinafter described which form part of the automotive vehicle A are normally provided with a size and overall configuration and appearance which approximates that of like components on an actual automotive vehicle (with the exception of the bolts to be hereinafter described). However, the frame 10 in the automotive vehicle of the present invention is not equivalent to the typical frame or chassis of an actual automotive vehicle, since the frame 10 actually serves as the major structural element of the entire automotive vehicle, and to which substantially all other components are attached. Thus, for example, the frame 10 includes the integral firewall 19 which would not occur in a normal automotive vehicle.

Extending transversely across the frame 10 and being integral therewith in regions proximate the front and rear wheels of the vehicle are transversely extending front and rear non-rotatable axles 22. The rear axle is not shown, but is substantially similar in construction to the front axle which is partially shown in more detail in FIG. 3 of the drawings. Integrally formed with each of the axles 22 and extending outwardly at each of the opposite ends of the two axles 22 are cylindrically shaped hubs 24 and which are located in a quadrilateral arrangement around the automotive vehicle A. Each of the hubs 24 is provided with an outwardly presented annular margin 25 and is designed to accommodate a wheel 26 having an annular tire receiving surface 27 and an inwardly presented annular margin 28. The wheel 26 is also provided with an outwardly presented peripherally extending enlarged tire retaining flange 29 for retaining a tire 30 on the surface 27 of the wheel 26.

A face plate 31 extends diametrically across the wheel 26 and is located between the annular margin 28 and the flange 29, as illustrated in FIG. 3 of the drawings. Furthermore, a plurality of circumferentially spaced

axially extending protuberances 32 are formed on the interior surface of the wheel 26. These protuberances 32 are designed to engage the outwardly extending annular margin 25 on the hub 24, but the wheels 26 are nevertheless secured to the hubs 24 in rotatable relationship by means of bolts (hereinafter described). Thus, when the relatively friction-free inner margin of the protuberances 32 engages the margin 28, they form a relatively friction-free sliding surface therebetween.

The hub 24 is provided with an enlarged central recess 36 and extending axially within the hub is a boss 38 which is apertured at its outer end and contains an internally threaded section 40 for accommodating a bolt 42, also more fully illustrated in FIG. 3 of the drawings.

The bolt 42 includes a shank 44 which is provided with an externally threaded section 46 at one end thereof. At the other end, the bolt 42 is provided with an enlarged head 48, which preferably has a hexagonal configuration. However, any bolt head configuration may be used in the present invention. In this case, it can be observed that the bolt 42 has a proportionally larger size with respect to the wheel 26 than a normal conventional bolt or lug would have, with respect to a conventional automotive vehicle wheel, and this fact of the invention is described in more detail hereinafter.

While only one wheel and tire combination and hub arrangement was illustrated in FIG. 3 and described in detail, it should be observed that each of the four wheels are removably mounted on the vehicle A with a like construction. The tire 30 is provided with a central recess 50 which is sized to snugly, but nevertheless removably, engage the outer annular surface 27 of the wheel 26. The tire 30 may be suitably molded from any of a number of plastic materials as either a solid or a hollow tubular member and may be suitably provided with markings or other conventional form of tire designation.

When it is desired to mount the wheel 26 and the tire 30 on the automotive vehicle, the tire 30 is first placed on the wheel 26 from the inwardly presented transverse margin 28 until one flat wall of the tire 30 engages the tire retaining flange 32. In this respect, the transverse dimension of the tire 30 is approximately equal to the transverse dimension of the tire receiving surface 27 on the wheel 26.

After the tire 30 has been inserted on the wheel 26, this combination is then mounted with respect to the hub 24, until the inwardly presented margins of the protuberances 32 on the wheel 26 engage the margin 25 on the hub 24. The wheel 26 is generally constructed of a cylindrical shell and includes the transversely extending face plate 31 which is suitably provided with a bolt-receiving aperture 54. Thus, in order to secure the wheel 26 to the hub 24, the bolt 42 is inserted through the aperture 54 so that the threaded end 46 is threadably secured into the threaded section 40 of the boss 38. The wheel 26 can also be removed from the hub 24 and the tire 30 can be removed from the wheel 26 by merely reversing the above-mentioned operation. As indicated previously, all wheels can be removed from and remounted on the vehicle in like manner.

One of the unique aspects of the present invention is that the bolt 42 can be loosened and tightened by means of a bolt remover and replacer assembly B, which is more fully illustrated in FIG. 4 of the drawings. This device will be described in more detail hereinafter, although it is uniquely sized to be operable with the

bolts 42. In this case, the bolts 42 have a size which is substantially larger relative to the wheels 26 and also to the tires 30 than the normal bolt which would be used to secure a conventional automotive wheel to an automotive vehicle. In the same respect, the head of an actual bolt used on a normal automotive vehicle has substantially the same width as the lug which may be used to secure a wheel to the same conventional automotive vehicle.

Normally, the bolts or lugs used to secure a conventional wheel on a conventional automotive vehicle have approximately a one-inch width. In addition, a normal 15-inch diameter wheel on a conventional automotive vehicle usually has a 16 1/2 inch overall diameter including flange dimensions. In the case of the present invention, the wheel diameter on the vehicle A is approximately 1 1/8 inch and the width of the head bolts is approximately one-fourth inch, thereby providing a wheel diameter to head bolt ratio of approximately 4.5 (or otherwise, a head bolt to wheel diameter ratio of 0.223). In a conventional automotive vehicle using a nominal 15-inch wheel diameter, and a 1-inch bolt head, the wheel diameter to bolt head width ratio is 16.5 (and the bolt head width to wheel diameter ratio is 0.0606). Consequently, it can be observed that the bolt used in the toy vehicle of the present invention is substantially oversized with respect to bolts or hubs normally used in conventional automotive vehicles for securing a wheel to the vehicle. It has been found in connection with the present invention that it is desirable to maintain this ratio between the bolt size and wheel size in order to facilitate the loosening and tightening of the bolt for removal and replacement of components on the vehicle.

While the above ratio of wheel diameter to bolt head width is the most preferred in the present invention, it has also been found that the wheel diameter to bolt head width ratio could be as small as 2.0 and as large as 6.5. However, in a more preferred range of wheel diameter to bolt head width, the ratio could be a minimum of 4.0 and a maximum of 5.0. Again, even within these possible ratio variations, it can be observed that bolt 42 used in the automotive vehicle of the present invention is considerably oversized with respect to the wheel 26 on this toy automotive vehicle A when compared to a conventional automotive wheel and the bolts or lugs used to secure the wheel to the vehicle.

A facsimile of an engine 56, which may be molded as an integral unit, is provided with a pair of forwardly extending transversely spaced flanges 58 which are designed to engage upstanding bosses 60 integrally formed with the frame 10 along the transverse base wall 16 and which bosses 60 are illustrated in dotted lines in FIG. 1. The bosses 60 are similarly apertured and provided with an internally threaded section (not shown) in order to receive bolts substantially similar to the bolts 42' which extend through apertures formed in the flanges 58. Thus, by removing the bolts 42' from the apertures in the flanges 68 and the bosses 60, it is possible to remove the engine 56 from the frame 10. In this respect, the engine 56 is also provided on its rearwardly presented margin with a pair of rearwardly extending fingers 64 which extend into aligned slots (not shown) forming part of the firewall 19 which, as indicated above, is integral with the frame 10.

In like manner, when it is desired to remount the engine to the frame 10, the fingers 64 are inserted in the slots (not shown) of the firewall, and the bolts 42 are

secured through the apertures formed in the bosses 60. In this respect, the engine 56 is provided with a removable facsimile of an oil filter 66 which is conventionally mounted on an upstanding cylindrically shaped stub 68 (illustrated in dotted lines in FIG. 1) molded with the engine 56.

The body 70 of the vehicle is also attachable to the frame 10 by means of a bolt 42'', substantially similar to the bolt 42, and which extends through a flange 72 formed along the body 70 in proximity to the firewall 19 of the frame 10. In this case, the bolt 42'' is inserted through an aperture (not shown) in the flange 72 and into a mating threaded recess (also not shown) on the firewall 19 of the frame 10. A similar bolt (not shown) on the underside of the vehicle frame 10 is secured to the body 70 for retaining the body 70 to the frame 10. By mere removal of these two bolts, it is thereby possible to remove the entire body 70 from the frame 10.

The frame 10 is provided in proximity to the transverse base wall section 18 with a pair of upstanding transversely spaced braces 74 having opposed aligned rectangularly shaped slots 75 which accommodate a facsimile of a radiator 76. The facsimile of the radiator 76 may merely be removed from the vehicle A by pulling up on the radiator 76 and out of the slots 75 formed in the upstanding braces 74. Again, the radiator 76 may also be reintroduced into the vehicle A by merely pushing the facsimile of the radiator 76 downwardly within the inwardly presented slots 75 formed in the upstanding braces 74.

The vehicle A is also provided with a front grill 80 which is integrally provided with a pair of rearwardly extending flanges 82. These flanges 82 are suitably apertured to accommodate screws 84 which extend into bosses (not shown, but beneath the flanges 82) formed on the frame 10. By merely removing the screws 84, it is possible to pull the front grill assembly forwardly of the vehicle. In this respect, the grill assembly 80 is also provided with a pair of rearwardly extending slot receiving elements (not shown) which extend into slots formed in the body 70 for added securement with respect thereto.

The screws 84 which are used to secure the grill 80 are diametrically smaller and are of slightly different construction than the bolts 42. Nevertheless, these screws 84 are also substantially larger than the conventional fasteners which would be used to secure grills and the like to a conventional automotive vehicle.

A bolt loosening and tightening assembly B is more fully illustrated in FIG. 4 of the drawings as aforesaid, and comprises a movable cart 90 which is suitably provided with rollers 92 on its underside. The cart is designed in the form of a conventional tool chest and sized to contain one or more batteries 94 and a conventional, three position switching mechanism 96. In this case, the switching mechanism 96 contains a "reverse", a "forward" and an "off" position, and controls the power output of the batteries 94 through a cord 98 connected to the batteries 94 at one end, and at its other end to a conventional hand-held tool 100.

The tool 100 is designed in the shape of a hand-held gun wrench and includes a conventional electric motor 102 serves as a source of power and which is operated by a trigger switch 104. In this respect the motor could be operated off of wall current e.g., 110 volt power. Moreover, the motor 102 is provided with a drive shaft 106, and at its outer end, is fitted with a conventional socket 108 of the type which is sized to accommodate

the heads 48 of the bolts 42. In this respect, the socket 108 will have an interior hexagonal configuration in order to accommodate the heads 48 of the bolts 42.

The various components which are used in the manufacture of automotive toy vehicle A and the bolt loosening and tightening assembly B are preferably formed of any of a number of conventional plastic materials including polyethylene, polystyrene, polybutadiene and any of a number of vinyladiene copolymers, etc. Again, these components may be made by any of a number of plastic forming operations, including injection molding, thermo-forming, or the like. It should also be understood in connection with the present invention that these components could be made of a variety of other materials including lightweight metals, fiber reinforced plastics, etc.

In connection with the description of the toy automotive vehicle A, various components have been described and include, for example, the motor 56, the radiator 76 and the tires 30, etc. In this respect, it is understood that these terms are not indeed to imply that the engine 56 is an operable engine, but only a facsimile thereof. In like manner, the radiator 76 and the tires 30 are only facsimiles of conventional radiators and tires. The same holds true with the remaining components of this automotive toy vehicle. Nevertheless, these components are uniquely designed in order to have the appearance of the conventional related components on an automotive vehicle. Moreover, all of the components in this automotive vehicle are somewhat approximately sized to the conventional components on the automotive vehicle, with the exceptions of the bolt 42 and the screws 84.

Thus there has been illustrated and described a novel toy assembly which is highly functional in its operation and which may be manufactured at a relatively low unit cost, and which therefore meets all of the objects and advantages sought therefor. Many changes, modifications, variations and other uses and applications of the toy set will become apparent to those skilled in the art after considering this specification and the accompanying drawings. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention which is limited only by the following claims.

Having thus described our invention, what we desire to claim and secure by letters patent is:

1. A disassemblable toy automotive type vehicle set including a toy automotive type vehicle, and a powered wrenching means operable with said vehicle, said vehicle comprising a frame means, a plurality of cylindrically shaped hubs extending outwardly from said frame means, a cylindrically shaped vehicle wheel provided for each of said hubs and each wheel being sized to be removably and rotatably disposed over each associated hub, each said hub and wheel having apertures capable of being aligned when the wheel is disposed on the hub, a wheel bolt provided for each wheel and capable of being inserted in the aligned apertures for securing the wheels to the associated hubs, said wheel bolts each having an enlarged head, the enlarged head of said bolts having a size relative to the size of the wheel which is at least three times greater than the size of a conventional automobile wheel bolt or lug with respect to a conventional automobile wheel, a drive train component also mountable on said frame means, said drive train component having at least one tab and said tab

and frame means having apertures capable of being aligned, a drive component bolt capable of being inserted into said last named aligned apertures to removably secure said component to said frame means, said drive component bolt also having an enlarged bolt head and being of substantially the same size and shape as the wheel bolt, said wrenching means comprising a portable power means, and engageable means sized and shaped to conform to the bolt heads to engage the bolt heads and remove the bolts from the apertures upon actuation of the source of power.

2. The vehicle set of claim 1 further characterized in that said wrenching means comprises an outer housing, a source of battery power in said outer housing, a motor operable by said battery power and said engageable means is a socket being rotatable by said motor.

3. The toy vehicle set of claim 1 further characterized in that a tire is provided for each wheel and each tire is capable of being removably disposed on the outer annular surface of each wheel in snug fitting, but removable, contact therewith.

4. The toy vehicle set of claim 1 further characterized in that said bolt has a shank and a head on one end of the shank so that the shank is capable of extending into said apertures and being threadedly secured in said hub and the head engages an outer surface on said wheel.

5. The toy vehicle set of claim 4 further characterized in that the ratio of the wheel diameter to the width of the head is within the range of 2.0 to 6.5.

6. The toy vehicle set of claim 4 further characterized in that the ratio of the wheel diameter to the width of the head is within the range of 4.0 to 5.0.

7. The toy vehicle set of claim 4 further characterized in that the ratio of the wheel diameter to the width of the head is approximately 4.5.

8. The toy vehicle set of claim 4 further characterized in that the drive train component is an engine which is removably secured to said frame means, and the drive component bolt is an engine bolt having a shank and a head to removably secure said engine to said frame means, and wherein the engine bolt has a head width which is substantially the same size as the heads on the wheel bolts.

9. The toy vehicle set of claim 4 further characterized in that a fender is removably secured to said frame means, and a plurality of fender bolts having a shank and a head removably secure said fender to said frame means, and wherein said fender bolts have a head width which is substantially the same size as the heads on the wheel bolts.

10. The toy vehicle set of claim 4 further characterized in that a body is removably secured to said frame means, and at least one body bolt having a shank and a head removably secures said body to said frame means and wherein said body bolts have a head width which is substantially the same size as the heads on the wheel bolts.

11. The toy vehicle set of claim 1 further characterized in that slot means is formed in said frame means and a radiator is removably disposed within said slot means.

12. A disassemblable toy automotive type vehicle set including a toy automotive type vehicle and a powered bolt wrench operable with said vehicle, said vehicle comprising frame means, four quadrilaterally located, cylindrically shaped wheel hubs extending outwardly from said frame means, a cylindrically shaped wheel provided for each wheel hub, and each wheel having a

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cylindrically shaped side wall sized to be removably and rotatably disposed on each of said hubs, and each wheel having a connecting wall extending in substantially perpendicular relationship to said cylindrically shaped side wall of said wheel, each of said hubs and the connecting walls of each of said wheels having apertures capable of being aligned when said wheels are disposed on said hubs, a wheel bolt having a shank with a threaded portion thereon and an enlarged head provided for each wheel, said shank of each wheel bolt being extendible through said aligned apertures and capable of being removably threadedly secured within the hub accommodating each of said wheels, a tire provided for each of said wheels and capable of being disposed over the outer surface of the side wall of each said wheel, the ratio of the wheel diameter to the width of the head of each said bolt being within the range of 2.0 to 6.5, an engine having a plurality of flange sections thereon, a plurality of engine bolts having a head and a shank with a threaded section to secure the engine to the frame means through said flange sections,

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the width of said engine bolts being substantially the same size as the heads on the wheel bolts, a fender provided for removable securement to said frame means, a plurality of fender bolts having a shank and a head to removably secure said fender to said frame means, the heads on said fender bolts having a width substantially equal to the width of the heads on the wheel bolts, a body provided for removable securement to said frame means, at least one body bolt having a shank and an enlarged head to removably secure said body to said frame means, the head of said body bolt having a width substantially equal to the width of the heads on said wheel bolts, means forming aligned slots within said frame means, a radiator removably disposed within the aligned slots, a bolt wrench comprising an outer housing, battery means disposed within said housing, a motor operable by said battery means, and a socket sized to receive the heads of said bolts, said socket being rotatable by energization of said motor.

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