June 21, 1960 O. M. BIRDSALL 2,941,330

TOY TRUCK WITH AUTOMATIC LOADING SCOOP

Filed Jan. 7, 1955 2 Sheets-Sheet 1

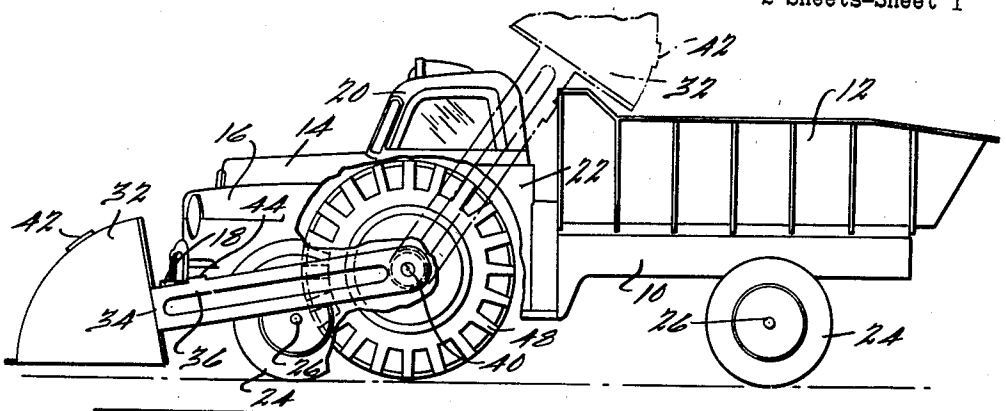


FIG. 1.

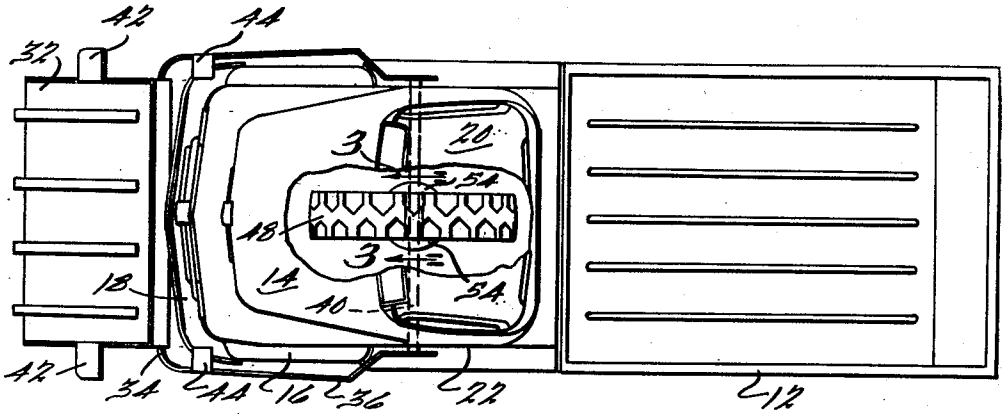


FIG. 2.

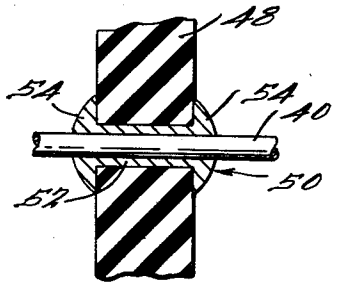


FIG. 3.

INVENTOR.
Oscar M. Birdsall
BY
Harness, Dickey & Pierce
ATTORNEYS

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TOY TRUCK WITH AUTOMATIC LOADING SCOOP

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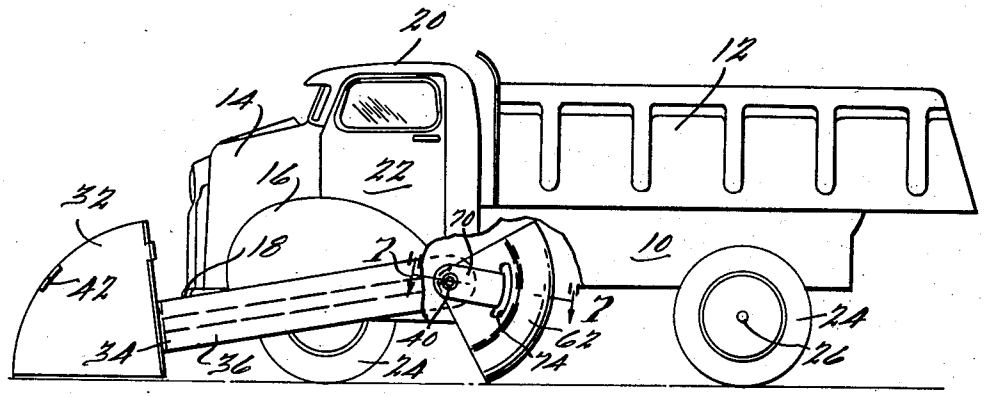


FIG. 4.

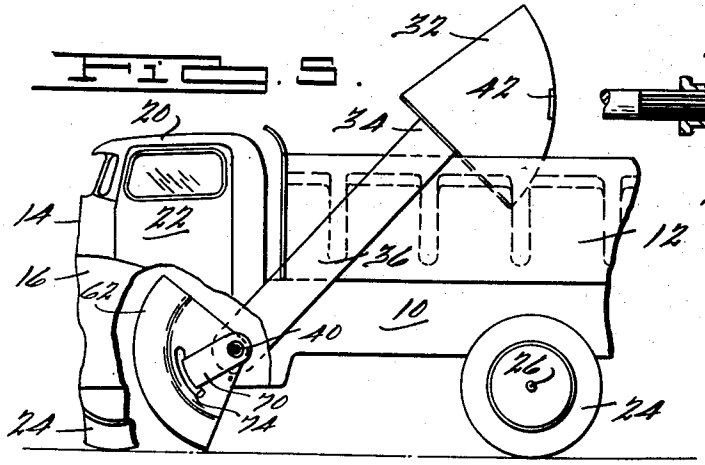


FIG. 5.

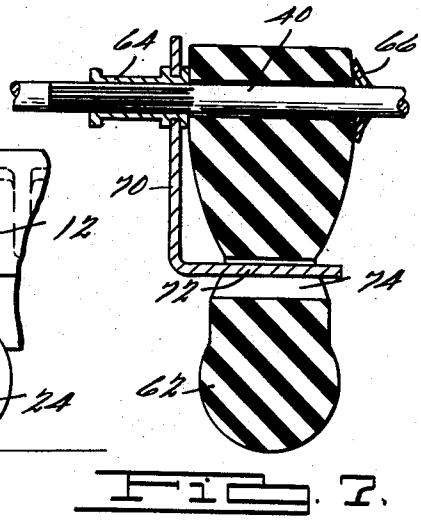


FIG. 7.

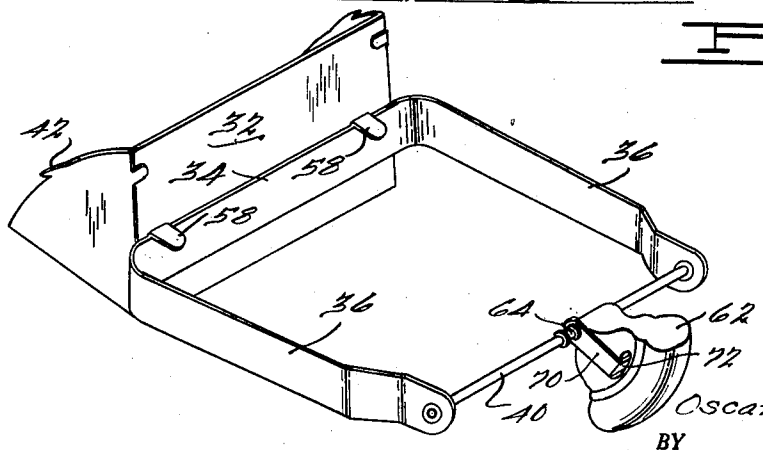


FIG. 6.

INVENTOR.
Oscar M. Birdsall
BY
Harness, Dickey & Pierce
ATTORNEYS.

United States Patent Office 2,941,330 Patented June 21, 1960

2,941,330

TOY TRUCK WITH AUTOMATIC LOADING SCOOP

Oscar M. Birdsall, Wyandotte, Mich., assignor to All Metal Products Company, Wyandotte, Mich., a corporation of Delaware

Filed Jan. 7, 1955, Ser. No. 480,321

8 Claims. (Cl. 46—40)

This invention relates to toy, material-handling vehicles.

The object of this invention is to improve, simplify and reduce the cost of manufacture of toys simulating the performance of conventional material-handling vehicles.

A feature of this invention is a mechanism for a toy vehicle for selectively moving an auxiliary part of that vehicle as a result of motion of the vehicle.

Another feature of this invention is an attachment for a toy vehicle adapted to be moved to one or the other of two positions as a result of travel of the vehicle in one or the other of two directions.

Another feature of the invention is a two-position attachment for a toy vehicle adapted to be retained in the first of those positions or moved to the second, at the option of the operator, as a result of motion of the vehicle in one direction, and adapted to be retained in the second position or moved to the first, at the option of the operator, as a result of motion of the vehicle in the other direction.

A further feature of this invention is a friction driving means for a toy-vehicle attachment which is rendered effective only as the result of flexure or limited distortion of the vehicle.

A further feature of this invention is a rotatable friction member for moving a load only after a preselected angular and translatory travel of that member.

Another feature of this invention is a means for fixedly establishing each of two limit positions of a movable attachment for a toy vehicle.

The manner of attainment of the foregoing object, the nature of the foregoing features, and other objects and features of the invention will be perceived from the following detailed description of embodiments of the invention when read with reference to the accompanying drawings in which:

Figure 1 is a side elevational view of a first embodiment of the invention, partly cut away to show certain elements of the inner construction more clearly;

Fig. 2 is a top elevational view of the embodiment of the invention shown in Fig. 1, partly cut away to show certain elements of the inner construction more clearly;

Fig. 3 is a section taken substantially along the line 3—3 of Fig. 2;

Fig. 4 is a side elevational view of a second embodiment of the invention, partly cut away to show certain details of the inner construction more clearly;

Fig. 5 is a partial side elevational view of the structure shown in Fig. 4 of the drawings, but with certain of the elements in a different operative position, and with certain of the parts being cut away to show details of the inner construction more clearly;

Fig. 6 is a perspective view of a portion of the structure shown in Figs. 4 and 5 of the drawings in a slightly modified form; and

Fig. 7 is a section taken substantially along the line 7—7 of Fig. 4.

While the principles of the invention may be applied to any multiple-wheeled conveyance of any nature, they are exemplarily applied to a toy truck. While the truck shown in Figs. 1 and 2 of the drawings differs in minor details from the truck shown in Figs. 4 and 5, it is to be understood that both forms of the truck are but exemplary, representing but two of a vast number of variant types of vehicle with which the invention may be associated.

In general, the truck shown in Figs. 1, 2, 4 and 5 of the drawings comprises a chassis **10** supporting a material-carrying body portion **12**, a hood **14**, front fenders **16**, a front bumper **18**, and a cab **20** including side portions **22**. All of the elements heretofore defined may be separately manufactured and assembled or may be stamped or cast as a unit from metal or molded from plastic. However, in one form of the invention, it is necessary that the aforesaid portions, or at least certain of them, be so formed as to be sufficiently flexible to permit a small downward displacement of a portion of the truck as the result of the application of a downward force of a few pounds or less, and yet not assume a permanent set in the process. The amplitude of this movement need not be great, as will be noted hereinafter.

The truck is supported, in a conventional manner, upon four wheels **24** mounted upon axles **26** attached to the chassis **10**. Obviously, either the wheels **24** may be rigidly attached to the axles **26** and the axle journaled to the chassis **10**, or the axles **26** may be fixed upon the chassis **10** and the wheels **24** rotatably mounted thereon.

A scoop **32**, or other accessory, is mounted at the front of the vehicle. The function of the disclosed apparatus representatively embodying the principles of the invention is to move the scoop **32** from this position at the front of the vehicle, as shown in solid lines in Figs. 1, 2, and 4, up and over the cab **20** to a position overlying the body portion **12**, as represented in dotted lines in Fig. 1 and solid lines in Fig. 5 of the drawings, and to restore the scoop **32** to the initial position.

In the embodiment of the invention represented in Figs. 1 to 3 of the drawings, the scoop **32** is affixed to or integral with an essentially U-shaped bracket **34** including support members **36** terminating in spaced proximity to the two side portions **22** of the cab **20**. The support members **36** may be provided with suitable discontinuities to insure clearance from the fenders **16**, as shown. A transversely extending cross shaft **40** is journaled in the side portions **22** of the cab **20** so as to be rotatable relative to those side portions. The support members **36** are staked or otherwise rendered integral with the cross shaft **40** so as to be rotatable therewith but not rotatable thereupon.

By virtue of the construction so far described, it will be clear that the scoop **32** and its bracket **34** may be manually caused to rotate about the longitudinal axis of shaft **40**, the shaft **40** rotating relative to the side portions **22** of the cab **20**. To facilitate this manual movement of the scoop **32**, a pair of tabs **42** may be provided extending laterally of the scoop **32**.

The lowermost position of the scoop **32** may be defined by the point at which the scoop **32** strikes the earth or floor and the uppermost position may be defined by the point at which any portion of the scoop **32** or bracket **34** strikes any portion of the body **12**, but it is preferred that there be provided a pair of tabs **44** mounted upon and extending laterally and inwardly from the support members **36**.

Tabs 44 are arranged to overlie and strike the front bumper 18 when the scoop 32 is in its lowermost position, and the dimensions are preferably so established that the under surface of the scoop 32 is slightly spaced from the surface upon which the truck rests. By appropriate design, these tabs 44 may also serve to define the upper limit of motion of the scoop 32, those tabs striking the front portion of the body 12, as shown in dotted lines in Fig. 1 of the drawings. By virtue of this arrangement, coupled with the establishment of a scoop width slightly less than the inner width of the body 12, it is insured that the contents of the scoop will be dumped into the body 12.

While the scoop 32 may be manually manipulated as described, additional means are preferably provided for controlling the movement of that scoop. In the embodiment of the invention shown in Figs. 1 to 3 of the drawings, this means comprises a sectorial member 48, representatively a sector bounded by a 360° arc, i.e., a wheel. At least the outer periphery of member 48 is of rubber or other similar material tending to have a relatively high coefficient of friction.

Wheel 48 is mounted upon shaft 40. It is imperative that the wheel 48 not be capable of free rotation upon and relative to the shaft 40. The wheel 48 may be rigidly fixed to the shaft 40 so that these two elements are effectively integral. However, the most desirable arrangement is one in which the wheel 48 is frictionally mounted upon the shaft 40, i.e., in which the relationship between the wheel 48 and the shaft 40 is such as to permit but resist relative rotational motion therebetween. Further, while relative translatory motion between the wheel 48 and the shaft 40 will normally not impair the operation of the toy, it is desirable that the wheel 48 be approximately centered upon the shaft 40 and fixed against motion along the longitudinal axis of that shaft.

A suitable method for meeting these conjoint desiderata is shown particularly in Figs. 2 and 3 of the drawings, and comprises the employment of a compression member 50 which in turn comprises a tubular portion 52 terminating, at each end, in a pair of flanges or heads 54. As before noted, the dimensional relationships may be such that the frictional forces delevloped between the inner surface of the tubular portion 52 and the outer surface of the shaft 40, the frictional forces developed between the outer surface of the tubular portion 52 and the surface of the aperture in the wheel 48, and the frictional forces developed between the inner faces of the flanges or heads 54 and the sides of the tire 48 are such as to effectively prevent relative motion between these parts. However, as also before noted, it has been found to be desirable for the wheel 48 to be capable of being frictionally rotated relative to the shaft 40, e.g., the dimensional and material relationships may be so established that wheel 48 may be rotated relative to shaft 40 under the impetus of a moment in the order of a pound-inch or so, but not with lesser moments. It is, of course, insignificant whether the wheel is fixed relative to the compression member 50 and the compression member 50 is frictionally rotatable upon the shaft 40, or whether the compression member 50 is fixed relative to the shaft 40 and the wheel 48 is frictionally rotatable relative to the compression member 50, or whether an intermediate condition exists.

Any suitable manner of assembly may be employed. Compression member 50 may be manufactured in two sections capable of being screwed together, or compression member 50 may be formed as shown with the tire 48, if entirely of an elastic material, being distorted to permit insertion of the compression member 50 therein during assembly. It may be advantageous to produce compression member 50 in the form of a tubular rivet provided with a single flange 54 and heading over the other flange 54 during the assembly operation. A constant optimum moment required to rotate wheel 48 relative to shaft 40 may thereby be established by adjusting the force exerted by the machine performing the heading-over operation, permitting compensation to be made for dimensional variations among successive lots of wheels, compression members 50 and cross shafts 40.

It will be noted that under any of the above-described arrangements, the dimensional relationships between the compression member 50 and the shaft 40 are desirably such as to inhibit movement of the wheel 48 along the longitudinal axis of the shaft 40 thereby to maintain the wheel 48 centered in the area of the cab 20.

The operation of the toy varies not only in accordance with whether the wheel 48 is rigidly fixed to the shaft 40 or frictionally rotatable relative thereto, but also in accordance with the relationship between the periphery of the sectorial member or wheel 48 and the surface upon which the truck rests. In the embodiment of the invention shown in Figs. 1 to 3 of the drawings, the diameter of the wheel 48 and the position of the shaft 40 are such that the wheel 48 does not normally contact the surface upon which the vehicle rests. As a result, regardless whether the scoop 32 is in its lowermost or uppermost position, it will there remain whether the vehicle is moved forwardly or rearwardly upon the floor as a result of the application to the vehicle of a force directed substantially parallel to the floor. If the scoop 32 is resting in its lowermost position at the front of the vehicle, as shown in solid lines in Fig. 1 of the drawings, and it is desired to move it to its uppermost, dotted-line position overlying the body 12 of the vehicle, the vehicle must not only be moved rearwardly but also a downward force must be exerted of sufficient amplitude to flex or distort the body of the truck adequately to bring the wheel 48 into engagement with the surface upon which the vehicle is moving. Rearward movement of the vehicle coupled with engagement between the wheel 48 and the surface upon which the vehicle rests will result in a clockwise (Fig. 1) rotation of the wheel 48 and a resultant rotation of the compression member 50 and the shaft 40. Rotation of the shaft 40 will cause the bracket 34 to be rotated to carry the scoop 32 to its uppermost position as shown. Continued rearward motion of the vehicle coupled with continued application of a downward force will either cause the wheel 48 to slip relative to the surface upon which the vehicle is moving or else will cause the wheel 48 to rotate relative to the shaft 40, in accordance with the particular design and the particular forces applied.

If the downward force is relieved, the vehicle may then be moved either forwardly or rearwardly and the scoop 32 will remain in its upper position. To return the scoop 32 to its lowermost position in front of the vehicle, the vehicle is moved forwardly and a sufficient downward force is applied to cause the wheel 48 to establish frictional engagement with the surface upon which the vehicle rests to rotate the wheel 48, and hence the compression member 50, the shaft 40, the bracket 34 and the scoop 32, in a counterclockwise direction (Fig. 1).

If the position of the shaft 40 and the diameter of the wheel 48 is such that the outer periphery of the wheel 48 normally engages the surface upon which the vehicle rests, then the scoop 32 will always be elevated to its uppermost position upon rearward motion of the vehicle, and will there remain during continued rearward motion, and will always be restored to its lowermost position in front of the vehicle upon forward motion of the vehicle and will there remain during continued forward motion.

The embodiment of the invention shown in Figs. 4 to 7 differs from the above-described embodiment primarily in the nature of the floor-engaging driving member for the scoop, and in the manner in which the rotational forces applied to the driving member are transmitted to cause motion of the scoop 32. The rest of the appara-

tus is substantially identical to that previously described except that the tabs **58** mounted upon the bracket **36** in the view of Fig. 6 of the drawings extend rearwardly, as opposed to the lateral extension of their counterparts, tabs **44**, shown in Fig. 2 of the drawings. As is illustrated in the arrangement of Fig. 4 of the drawings, the tabs **58** may be omitted so that the scoop **32** will rest upon the surface supporting the vehicle.

In the embodiment of the invention represented in Figs. 4 to 7 of the drawings, the driving member **62** is also shown to be sectorial, but is less than a full circle, approximating a quadrant. As may best be seen in Figs. 6 and 7 of the drawings, a bushing **64** is rigidly mounted upon the shaft **40** so as to be rotatable therewith but not rotatable thereupon. The shaft **40** may be knurled over a portion of its length to insure this relationship. The driving member **62** is loose upon the shaft **40** and is preferably fixed against translatory motion along the longitudinal axis of the shaft **40** by having one of its faces engaging a face of bushing **64** and the other of its faces engaged by a spring washer **66**.

Contrary to the arrangement described in the first embodiment of the invention, friction member **62** is free to rotate upon the shaft **40**. Further, while the friction member **62** may be spaced from the surface upon which the vehicle rests, it is preferred that the radius of the friction member **62** and the position of the shaft **40** be such that the friction member will normally contact the surface upon which the vehicle rests or moves. The angular length and angular travel of the member **62** are such, however, that after full actuation of the scoop in either direction, the trailing corner of member **62** drags on the floor. As a result, after continued forward motion of the vehicle, the quadrant or friction member **62** will be in the position shown in Fig. 4 of the drawings, whereas after continued rearward motion quadrant **62** will be in the position shown in Fig. 5 of the drawings.

To move the scoop **32**, or other accessory, from the position shown in Fig. 4 to the position shown in Fig. 5, the vehicle is moved rearwardly, imparting a clockwise rotation (Fig. 4) to the friction member **62**. As noted, friction member **62** is relatively free to rotate upon the shaft **40**. However, an actuating arm **70** is rigidly mounted by means of the bushing **64** so as to be incapable of rotating relative to shaft **40**, and is provided with a laterally extending projection **72** engaging an elongated slot or aperture **74** in the friction member **62**. The length of the slot **74** is preferably greater than the width of the projection **72**.

It will be noted that the scoop assembly passes through the vertical during each actuation. It thus falls, under gravity, during the final portion of its travel, carrying the arm **72** away from the driving end of the slot **74**, and the sector reaches the dragging position before the driving end of the slot catches up with the arm. The parts are so proportioned that in both dragging positions the arm is approximately centered in the slot. As a result, the sector drags freely on the floor, and when reverse motion is next imparted to the vehicle, the friction member **62** is free to rotate, through a small angle, with no load, until the opposite end of the slot strikes the projection **72** on the actuating arm **70**, whereafter the actuating arm **70**, the bushing **64**, the cross shaft **40** and the bracket **34**, are caused to rotate. In the case of Fig. 4, reverse motion of the truck will cause clockwise rotation of the sector-foot **62** to transport the scoop **32** from the position shown in Fig. 4 to the position shown in Fig. 5 of the drawings. The dimensional relationships are preferably such that the scoop **32** assumes its rearmost position slightly prior to the time that the trailing edge of the member **62** contacts the surface upon which the vehicle is moving. As a result, the sectorial friction member **62** will or may continue rotating through a slight angle to establish a clearance between the end of the aperture **74** and the projection **72**. As a result, when the vehicle is moved forwardly to restore the scoop **32** to its lowermost position, the friction member **62** may again have a period of free travel during which the periphery of the sector moves into full engagement with the floor and momentum is gained prior to the time that it picks up its load to rotate the bracket **34** and the scoop **32** in a counterclockwise direction to the position shown in Fig. 4 of the drawings.

Obviously, the extent of the arc of the friction member **62** should be selected in the light of the expected arc of travel of the scoop **32**, the former preferably being less than the latter.

The term sectorial member is intended to conote a member which has an arcuate periphery, including an arc as large as 360 degrees. It will be perceived, however, that the friction member need not necessarily be arcuate, particularly in the embodiment represented in Figs. 4 to 6. The friction member there constitutes, in essence, a dragging foot and, as such, may have any of a number of configurations. If the periphery is a point or a non-circular line or surface, it may be desirable either to employ a flexible friction member or to provide a flexible mounting therefor.

It will be recognized that the disclosure of a four-wheeled vehicle with an ancillary fifth wheel is but representative, and that the mechanical parameters may be selected and varied in accordance with the size of the vehicle and the size of the operator.

While it will be apparent that the embodiments of the invention herein disclosed are well calculated to fulfill the objects above stated, it will be appreciated that the invention is susceptible to modification, variation and change without departing from the proper scope or fair meaning of the subjoined claims.

What is claimed is:

1. A toy vehicle comprising a hollow body portion, a plurality of wheels movably supporting said body portion on a surface, a shaft rotatably supported by said vehicle, a scoop, a pair of support members fixed to said scoop and to said shaft, and means for rotating said shaft to move said scoop between a first position and a second position, said means comprising a friction driving member mounted on said shaft and independent of the wheels and normally lying in spaced proximity to said surface, portions of said vehicle being deformable upon the application of a preselected force to bring said driving member into engagement with said surface.

2. A toy vehicle comprising a hollow body portion, a plurality of wheels movably supporting said body portion on a surface, a shaft rotatably supported by said vehicle, a scoop, a pair of support members fixed to said scoop and to said shaft, and means for rotating said shaft to move said scoop between a first position and a second position, said means comprising a quadrantal member mounted on and rotatable relative to said shaft independent of the wheels and engaging said surface, said quadrantal member having an elongated aperture therein, an actuating arm fixed upon said shaft, and a projection on said arm engaging the elongated aperture in said quadrantal member.

3. A toy vehicle comprising a hollow body portion, a plurality of wheels movably supporting said body portion on a surface, a shaft rotatably supported by said vehicle, a scoop, a pair of support members fixed to said scoop and to said shaft, and means for rotating said shaft to move said scoop between a first position and a second position, said means comprising a quadrantal member mounted on and rotatable relative to said shaft independent of the wheels and engaging said surface, said quadrantal member having an elongated aperture therein, an actuating arm fixed upon said shaft, and a projection on said arm engaging the elongated aperture in said quadrantal member, the length of the elongated aperture in said quadrantal member being greater than the breadth

of said projection to permit free motion of said quadrantal member through a small angle.

4. In combination with a toy vehicle structure including a body and wheels spaced longitudinally along the body and upon which it is adapted to be rolled along a surface, a transverse shaft supported by said body, an attachment fixed to said shaft and rotatable therewith, and means for rotating said shaft comprising a friction driving member mounted on said shaft and independent of the wheels and normally lying in spaced proximity to said surface, at least a portion of said vehicle structure being resiliently deformable upon the application of a preselected force to bring said driving member into engagement with said surface, and to separate the driving member from the surface upon relaxation of such pressure.

5. In combination with a toy vehicle structure including a body and wheels spaced longitudinally along the body and upon which it is adapted to be rolled along a surface, a transverse shaft supported by said vehicle, an attachment fixed to said shaft and rotatable therewith through a limited angle, means establishing the limits of arcuate motion of said attachment, and means for rotating said shaft comprising a friction driving member mounted on said shaft and rotatable both with and with respect thereto independently of the wheels and separately engageable with said surface.

6. In combination with a toy vehicle structure including a body and wheels spaced longitudinally along the body and upon which it is adapted to be rolled along a surface, a transverse shaft supported by said vehicle, an attachment fixed to said shaft and rotatable therewith, and means for rotating said shaft comprising a friction driving member loosely journaled on said shaft and engageable with said surface, said driving member having a circumferentially elongated aperture therein, an actuating arm fixed upon said shaft, and a projection on said arm engaging the elongated aperture in said driving member and establishing a lost-motion driving connection between said driving member and attachment.

7. In combination with a toy vehicle structure including a body and wheels spaced longitudinally along the

body and upon which it is adapted to be rolled along a surface, a transverse shaft supported by said vehicle, an attachment fixed to said shaft and rotatable therewith, and means for rotating said shaft comprising a sectorial member journaled on said shaft and independent of the wheels and of a radius sufficient to be engageable with said surface, said sectorial member having a circumferentially elongated aperture therein, an actuating arm fixed upon said shaft, and a projection on said arm engaging the elongated aperture in said sectorial member, the circumferential length of the elongated aperture in said sectorial member being greater than the circumferential breadth of said projection to permit free motion of said sectorial member through a limited angle.

8. In combination with a toy vehicle structure including a body and wheels spaced longitudinally along the body and upon which it is adapted to be rolled along a surface, a transverse shaft supported by said vehicle, an attachment fixed to said shaft and rotatable as a unit therewith through a preselected angle, and means for rotating said shaft comprising a sectorial friction driving member mounted on said shaft and independent of the wheels and having a concentric peripheral portion engageable with said surface, the angle subtended by the peripheral portion of said sectorial member being less than said preselected angle.

References Cited in the file of this patent

UNITED STATES PATENTS

1,655,771	Nichol	Jan. 10, 1928
1,694,344	Koelbel	Dec. 4, 1928
1,804,313	Brubaker	May 5, 1931
2,189,464	Frisbie	Feb. 6, 1940
2,264,050	Newell	Nov. 25, 1941
2,385,965	Bilby	Oct. 2, 1945
2,436,886	Gowland	Mar. 2, 1948
2,453,469	Stapan	Nov. 9, 1948
2,557,851	Warner	June 19, 1951
2,631,406	Wambach	Mar. 17, 1953
2,677,216	Hein	May 4, 1954
2,704,164	David	Mar. 15, 1955