

March 16, 1954

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2,672,216

SPRING MOTOR CONSTRUCTION FOR TOYS AND THE LIKE

Filed Jan. 23, 1951

Fig. 1

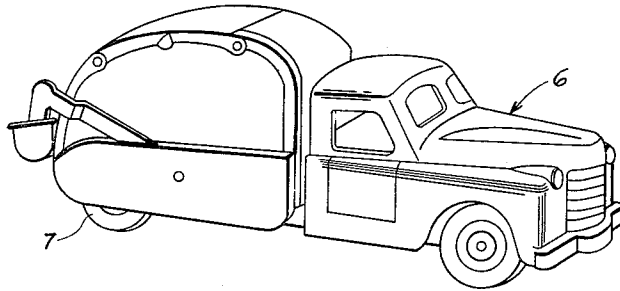


Fig. 2

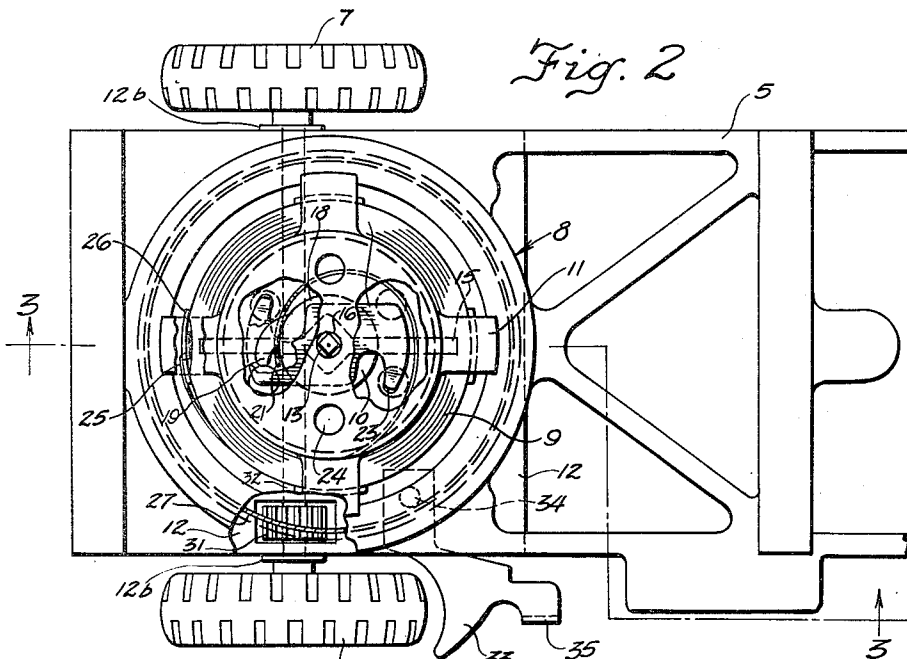
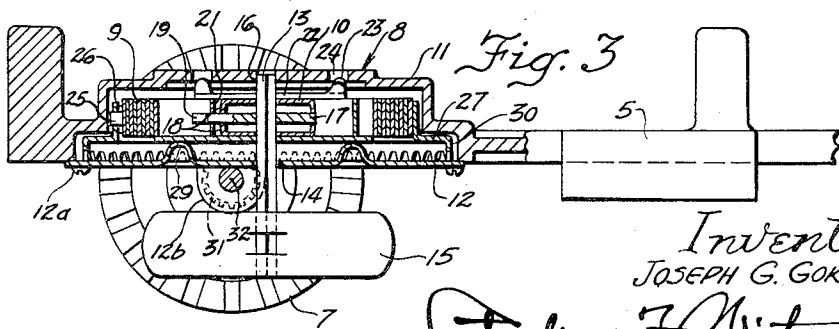


Fig. 3



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2,672,216

SPRING MOTOR CONSTRUCTION FOR TOYS AND THE LIKE

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Application January 23, 1951, Serial No. 207,343

6 Claims. (Cl. 185-37)

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This invention relates to a new and improved spring motor construction for toys and the like, and has for its principal object the provision of a motor in which the inner end of the spiral spring is automatically disconnectible from a hook-shaped tooth on the central winding hub when the motor turning with the driven mechanism overruns the winding mechanism, as, for example, when the toy is operated as a pull-toy, whereby to make such toys fool-proof and not subject to spring breakage by hand operation of the toy.

Another object is to provide a spring motor for the purpose mentioned, of compact and economical construction, utilizing to a large extent stamped sheet metal parts capable of being produced in large quantities at very low cost, and in which the main housing portion of the motor is provided as an integral portion of the frame of the toy for still greater compactness and simplicity and economy of construction.

The invention is illustrated in the accompanying drawing, in which—

Fig. 1 is a perspective view of a dump truck toy, one of the rear drive wheels of which is driven by a spring motor in the manner shown in Figs. 2 and 3;

Fig. 2 is a plan view of the rear portion of the truck chassis, showing the spring motor of my invention built into the frame thereof, and

Fig. 3 is a longitudinal section on the broken line 3-3 of Fig. 2.

The same reference numerals are applied to corresponding parts throughout the views.

The reference numeral 5 designates the frame of the chassis for any toy, like that indicated at 6 in Fig. 1, one of the rear wheels 7 of which is adapted to be driven by a spring motor, the toy being, however, also adapted to be pushed or pulled by hand between spring driven operations. It has long been recognized that spring driven toys in which the spring motor is not automatically disconnectible from the driven wheel are objectionable from the standpoint that a child cannot use them as pull-toys conveniently without skidding the drive wheel, and the drive spring is apt to be broken if the child pushing the toy bears down on it hard enough after the spring has been unwound. The spring motor 3 of my invention avoids the objection mentioned, because, although the outer end of the spiral spring 9 remains permanently connected with the drive wheel, the inner end is automatically disconnectible from the central winding hub 10 and is, therefore, free to overrun this hub when the

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spring is unwound and the toy is thereafter pushed or pulled by hand. This adds greatly to the child's enjoyment of the toy, because he can run it either way at will and he is, therefore, not so apt to tire of a toy having such improved drive means.

The motor 3 comprises a cylindrical housing 11, which is here shown in the form of a spider cast, or otherwise formed, integral with the frame 5, and having a stamped sheet metal cover plate 12 suitably secured to the bottom thereof, as by means of screws 12a. A square winding stem 13 extends with a loose fit vertically through a circular center hole 14 in the cover plate 12 and carries a winding key 15 on its lower end, the upper end being entered with a loose fit in another circular hole 16 provided in the center of the top wall of the housing 11. A circular plate 17 is suitably fixed on the stem 13 in the housing 11, between the rims of two oppositely cupped, stamped, sheet metal, spacer washers 18 that are centrally apertured to receive the stem 13 and give the desired amount of added width to the central winding hub 10, and this plate has a single hook-shaped tooth 19 extending from the periphery of the hub 10 adapted to be detachably engaged in an opening 20 provided therefor in the inner end portion 21 of the spring 9, whereby to permit winding the spring by rotation of the stem 13 in a counterclockwise direction, as the stem is viewed in Fig. 2, but allow the end 21 of the spring to slide forwardly off the tooth 19 in a counterclockwise direction and overrun the tooth when the spring is unwound and the toy is pushed or pulled forwardly. Of course, if the toy is pushed or pulled in the opposite direction, the inner end 21 of the spring then moves in a clockwise direction, as viewed in Fig. 2, and the tooth 19 engages again automatically in the opening 20, and continued movement in this reverse direction serves only to wind up the spring without doing any harm, and some children will find enjoyment in doing this instead of winding the spring by means of the key 15. A ratchet member 22 has a square center hole receiving the square stem 13 for a driving connection, and this member has diametrically opposed spring tongues 23 projecting upwardly from the plane of the member for engagement in holes 24 that are provided in circumferentially spaced relation in the top wall of the housing 11. Thus, when the stem 13 is turned in a counterclockwise direction, as viewed in Fig. 2, these tongues 23 move in the same direction and ride out of and into one after another of the holes 24

in the rotary movement of the stem, and take hold in whichever holes happen to be in register with them when the turning of the stem is stopped, whereby to prevent unwinding of the spring 9 from the inner end 21. The ratchet member 22 above the hub 10 cooperates with the gear 27 below the hub to define an annular channel in which the free inner end of the spring 9 is guided and maintained in clutching relation to the tooth 19 whenever the driven shaft (axle 32) over-runs the drive means (spring 9).

The outer end of the spring 9 has an end portion 25 which is suitably connected with one of four lugs 26 struck up from the body of a stamped sheet metal gear 27. The spring 9 is caged between these four lugs and is thereby held in concentric relationship to the gear, the gear having a circular center hole 28 through which the stem 13 extends freely. The cover plate 12 has a circular rib 29 projecting upwardly therefrom in concentric relation to the center hole 14 serving as a support for the gear 27 and also to keep the ratchet spring member 22 in the closely spaced relationship to the top wall of housing 11 necessary for its proper functioning. The gear 27 is of dished form, and its toothed rim 30 meshes with a pinion 31 fixed on the rear axle 32, to which only one of the wheels 7 is suitably fixed, the other being mounted thereon so as to be free to turn relative to the axle, thus avoiding any need for a differential between the two wheels. A brake member 33 is pivoted, as at 34, to the plate 12 and extends outwardly past the tire of the drive wheel, and is arranged to be moved by means of a handle portion 35 into and out of engagement with the tire, to prevent turning of the driven wheel while the spring motor is being wound, this brake being released usually only after the toy has been placed on the floor and is ready to run.

It is apparent, therefore, that when the spring 9 is wound, whether by means of the key 15 or by running the toy in reverse, the inner end 21 of the spring is held by the ratchet 22 against unwinding, and the torque built up in the spring must, therefore, be expended from the outer end 25 of the spring through the gear 27 to pinion 31 and, thence, through the axle 32 to the one driven wheel 7. When the spring is unwound and drive is transmitted to the spring from the pinion 31 to the gear 27, the inner end 21 of the spring is accordingly moved in a counterclockwise direction, as viewed in Fig. 2, and overruns the tooth 19, there being an audible clicking sound as the end portion 21 rides up, over, and off the tooth 19 once per revolution. That alone is apt to give enjoyment to many children, although the clicking sound is not loud enough to be objectionable to adults.

It is believed the foregoing description conveys a good understanding of the objects and advantages of my invention. The appended claims have been drawn to cover all legitimate modifications and adaptations.

I claim:

1. In a spring motor, a circular housing, a closure plate for said housing, a drive shaft parallel to said plate, a winding stem at right angles to the shaft and extending freely through a hole provided in said plate and engaging in a bearing provided in the center of said housing, a drive gear rotatable on said stem in said housing and meshing with a pinion that is fixed on said shaft, a spiral clock spring caged in coaxial relation to the gear between lugs projecting from said gear in circumferentially spaced

relation, the outer end of said spring being fixed to one of said lugs for a driving connection with the gear, a hook-shaped tooth carried by said stem disposed centrally of said spring and extending in the winding direction and detachably engaged in an opening provided in the inner end of said spring, and a ratchet plate turning with the stem and having a spring tongue engageable selectively in any one of a plurality of circumferentially spaced holes provided in said housing to prevent backward rotation of the winding stem, said closure plate having a circular rib projecting inwardly in concentric relation to the stem and slidably engaging the drive gear for support of the gear and spring in spaced relation to the plate.

2. In a spring motor, a circular housing, a closure plate for said housing, a drive shaft parallel to said plate, a winding stem at right angles to the shaft and extending freely through a hole provided in said plate and engaging in a bearing provided in the center of said housing, a drive gear rotatable on said stem in said housing and meshing with a pinion that is fixed on said shaft, a spiral clock spring caged in coaxial relation to the gear between lugs projecting from said gear in circumferentially spaced relation, the outer end of said spring being fixed to one of said lugs for a driving connection with the gear, a hook-shaped tooth carried by said stem disposed centrally of said spring and extending in the winding direction and detachably engaged in an opening provided in the inner end of said spring, and a ratchet plate turning with the stem and having a spring tongue engageable selectively in any one of a plurality of circumferentially spaced holes provided in said housing to prevent backward rotation of the winding stem, said closure plate having a circular rib projecting inwardly in concentric relation to the stem and slidably engaging the drive gear for support of the gear and spring in spaced relation to the plate, the ratchet plate being disposed on the far side of said spring away from the supporting rib and caged between the spring and the adjacent wall of the housing so as to insure clutching engagement of the spring tongue thereof in the holes provided in said housing wall.

3. In a toy, a frame having a portion thereof formed to provide a circular housing, a closure plate therefor, a drive shaft supported in parallelism to said plate, a winding stem supported in said housing at right angles to said shaft and extending outwardly from the housing, a drive gear rotatable on said stem in said housing and meshing with a pinion fixed on said shaft, a spiral clock spring caged in coaxial relation to the gear between lugs projecting from said gear in circumferentially spaced relation, the outer end of said spring being fixed to one of said lugs for a driving connection with the gear, a hook-shaped tooth carried by said stem disposed centrally of said spring and extending in the winding direction and detachably engaged in an opening provided in the inner end of said spring, and a ratchet plate turning with the stem and having a spring tongue engageable selectively in any one of a plurality of circumferentially spaced holes provided in said housing to prevent backward rotation of the winding stem, said closure plate having a circular rib projecting inwardly in concentric relation to the stem and slidably engaging the drive gear for support of the gear and spring in spaced relation to the plate.

4. In a toy, a frame having a portion thereof formed to provide a circular housing, a closure

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plate therefor, a drive shaft supported in parallelism to said plate, a winding stem supported in said housing at right angles to said shaft and extending outwardly from the housing, a drive gear rotatable on said stem in said housing and meshing with a pinion fixed on said shaft, a spiral clock spring caged in coaxial relation to the gear between lugs projecting from said gear in circumferentially spaced relation, the outer end of said spring being fixed to one of said lugs for a driving connection with the gear, a hook-shaped tooth carried by said stem disposed centrally of said spring and extending in the winding direction and detachably engaged in an opening provided in the inner end of said spring, and a ratchet plate turning with the stem and having a spring tongue engageable selectively in any one of a plurality of circumferentially spaced holes provided in said housing to prevent backward rotation of the winding stem, said closure plate having a circular rib projecting inwardly in concentric relation to the stem and slidably engaging the drive gear for support of the gear and spring in spaced relation to the plate, the ratchet plate being disposed on the far side of said spring away from the supporting rib and caged between the spring and the adjacent wall of the housing so as to insure clutching engagement of the spring tongue thereof in the holes provided in said housing wall.

5. In a spring motor, a housing, a winding stem rotatable in said housing and having a cylindrical hub fixed thereon in said housing provided with a hook-shaped tooth on the periphery thereof extending in the winding direction, a spiral spring disposed in coaxial relation to said stem and hub having the inner end thereof encircling said hub and having a slot provided therein in which said hook-shaped tooth is arranged to be detachably engaged for winding the spring, a drive gear of enlarged radius disposed in abutment with one side of said hub and rotatable on said stem in said housing and having the outer end of said spring connected with it, whereby drive is transmitted from said spring to said gear, and a ratchet plate of enlarged radius in relation to said hub disposed in abutment with the other side of said hub and fixed to turn with said stem and having a spring tongue engageable selectively in any one of a plurality of circumferentially spaced holes provided in said housing to prevent backward rotation of the winding stem, said ratchet plate cooperating with said gear to define an annular channel around said hub within which the inner end of said spring is guided for rotary movement when disconnected from said hook-shaped tooth and maintained in clutching relation to said tooth.

6. In a spring motor, a housing, a winding stem

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rotatable in said housing and having a cylindrical hub fixed thereon in said housing provided with a hook-shaped tooth on the periphery thereof extending in the winding direction, a spiral spring disposed in coaxial relation to said stem and hub having the inner end thereof encircling said hub and having a slot provided therein in which said hook-shaped tooth is arranged to be detachably engaged for winding the spring, a drive gear of enlarged radius disposed in abutment with one side of said hub and rotatable on said stem in said housing and having the outer end of said spring connected with it, whereby drive is transmitted from said spring to said gear, a ratchet plate of enlarged radius in relation to said hub disposed in abutment with the other side of said hub and fixed to turn with said stem and having a spring tongue engageable selectively in any one of a plurality of circumferentially spaced holes provided in said housing to prevent backward rotation of the winding stem, said ratchet plate cooperating with said gear to define an annular channel around said hub within which the inner end of said spring is guided for rotary movement when disconnected from said hook-shaped tooth and maintained in clutching relation to said tooth, and a closure plate for said housing having an opening provided therein in which the winding stem is freely rotatable, said closure plate having a circular rib projecting inwardly in concentric relation to the stem and slidably engaging the drive gear to support the gear and spring in spaced relation to the plate and maintain the ratchet plate in close clutching relationship to that portion of said housing in which the circumferentially spaced holes are provided for clutch engagement of the spring tongue of said ratchet plate.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
430,322	Seinecke -----	June 17, 1890
711,323	Kingsbury -----	Oct. 14, 1902
798,041	Kingsbury -----	Aug. 22, 1905
840,913	Cooke -----	Jan. 8, 1907
1,063,959	Clark -----	June 10, 1913
1,138,556	Greayer -----	May 4, 1915
1,212,788	Magidson -----	Jan. 16, 1917
1,242,194	Jewell -----	Oct. 9, 1917
1,681,310	Reiner -----	Aug. 21, 1928
1,930,450	Langos -----	Oct. 10, 1933
2,057,557	Cookson -----	Oct. 13, 1936
2,233,075	Daily -----	Feb. 25, 1941
2,477,421	Roderick -----	July 26, 1949