May 30, 1961 W. P. SPRATT 2,986,405

WHEELED TOY PROPULSION MECHANISM EMPLOYING DRIVER'S WEIGHT

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FIG_1

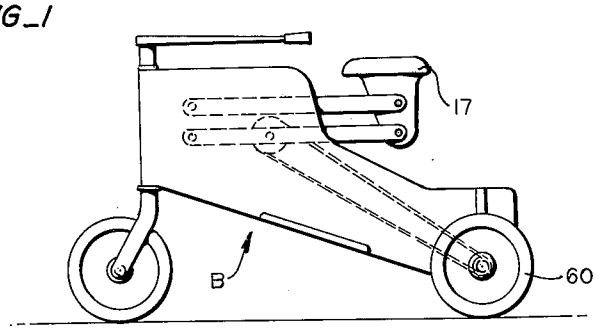


FIG_2

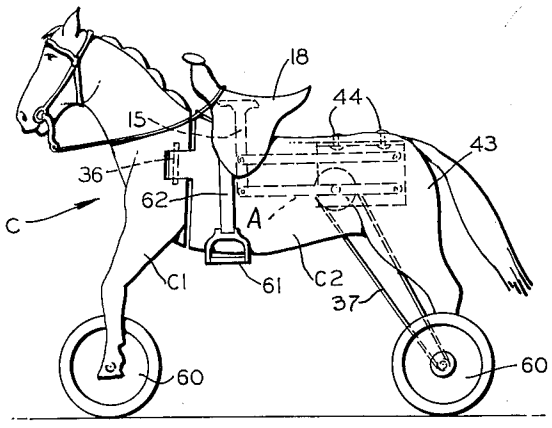
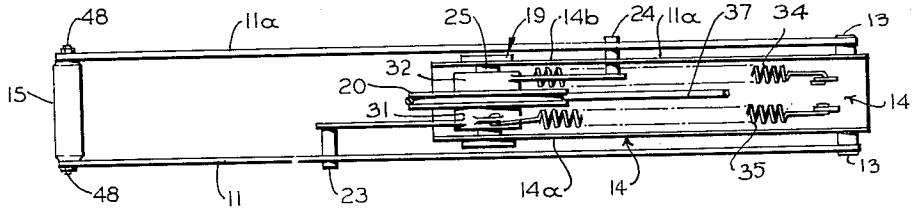


FIG_3



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FIG_4

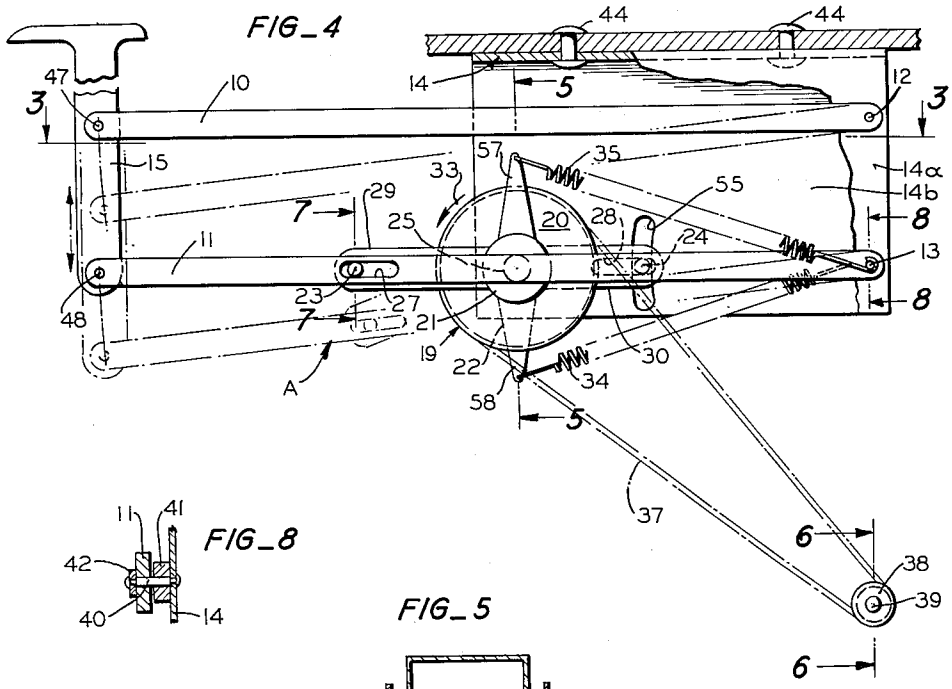


FIG_8

FIG_5

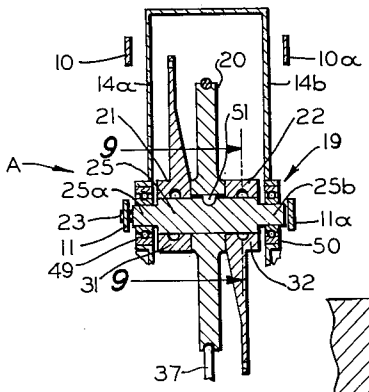
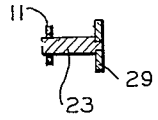


FIG_7



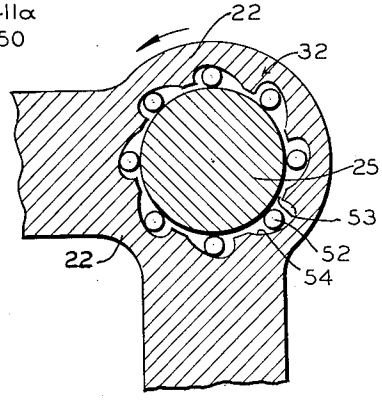


FIG_9

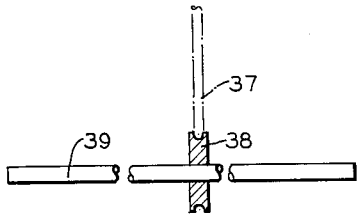


FIG_6

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United States Patent Office

2,986,405

Patented May 30, 1961

2,986,405

WHEELED TOY PROPULSION MECHANISM EMPLOYING DRIVER'S WEIGHT

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Filed Sept. 4, 1959, Ser. No. 838,244

4 Claims. (Cl. 280—226)

The present invention relates to a propulsion mechanism, and pertains more particularly to a propulsion mechanism for wheeled toys, wherein the weight of a rider and the muscles of his legs are alternately employed to propel the vehicle.

In the past, various mechanisms have been devised wherein the weight of a rider, either rocking back and forth or moving up and down, has been employed to propel a vehicle. However, the prior art devices of this nature with which applicant is familiar are either quite complicated and expensive, or else they do not most effectively use the weight and muscle energy available upon an up and down movement of the rider's body.

The present invention contemplates the provision of an improved propulsion mechanism which is particularly adapted to propel a toy vehicle by means of an up and down movement of the driver's body, his feet being supported on a step or in stirrups, and wherein the weight of a driver on a seat on the vehicle serves as a propelling force on a downward movement of the rider's body, and seat return means provide a supplemental propelling force on an elevation of the rider's body by his leg muscles.

A further object of the invention is to provide an improved propulsion mechanism for a wheeled toy vehicle wherein a seat or saddle is supported at one end of two pairs of oscillating parallel links, the other ends of the links being pivotally supported by the vehicle body, and a double clutch actuated drive mechanism, also supported in the frame, is successively driven in the same rotative direction by a pair of alternately clutch engaged levers moved rotatively in opposite directions upon each upward and downward oscillating stroke of the parallel links.

A further object of the invention is to provide an improved and simplified driver's-weight-actuated propulsion mechanism for a wheeled toy vehicle.

These, and other objects and advantages of the invention, will be apparent from the following description and the accompanying drawings, wherein:

Fig. 1 is a side elevational view of a three wheeled toy vehicle embodying the invention, concealed portions of the drive mechanism being outlined in broken lines.

Fig. 2 is a side elevational view of a wheeled toy horse embodying the invention, the drive mechanism also being indicated in broken lines.

Fig. 3 is a sectional view taken along line 3—3 of Fig. 4.

Fig. 4 is an enlarged, side elevational view of the drive mechanism of Fig. 2 as it appears when removed from the vehicle, portions being broken away.

Fig. 5 is a sectional view taken along line 5—5 of Fig. 4.

Fig. 6 is a sectional view taken along line 6—6 of Fig. 4.

Fig. 7 is a sectional view taken along line 7—7 of Fig. 4.

Fig. 8 is an enlarged sectional view taken along line 8—8 of Fig. 4.

Fig. 9 is an enlarged sectional view taken along line 9—9 of Fig. 5.

Briefly, in the form A of the invention illustrated in Figs. 2–9, two pairs of parallel links **10** and **11** are provided, one pair being mounted directly above the other, on parallel, fixed axes **12** and **13**. The links **10** and **11** are pivotally mounted on a frame **14**, which is fixedly attached to a supporting vehicle, such as the vehicle B of Fig. 1, or the toy horse C of Fig. 2.

The free ends of both pairs of links **10** and **11** are pivotally connected, in the form of a parallelogram, to an upright seat support **15** having a seat **17** (Fig. 1) or saddle **18** (Fig. 2) mounted thereon.

A clutch drive assembly **19** is mounted within the frame **14**, and comprises a clutch shaft **25** driven rotatively in a constant direction by successive clutch engagement with two bell crank levers **21** and **22** mounted thereon. The bell crank levers are driven in opposite rotative directions upon each downward and upward swinging movement of the lower links **11** and **11***a* by pins **23** and **24** on the levers **21** and **22**, riding in slots **27** and **28**, respectively, in the lower links **11** and **11***a*, respectively.

Cam and ball or roller clutches **31** and **32** (Figs. 5 and 9) mounted in the hubs of the bell crank levers **21** and **22**, respectively, release the clutch shaft **25** except when the bell crank levers are turning in the direction of the arrow **33** in Fig. 4 faster than the clutch shaft **25** is rotating. Tension coil springs **34** and **35** tend to return the parallel links to their upper limit of movement when pivotally displaced therefrom. A drive belt **37** operatively connects a drive pulley **20** on the clutch shaft **25** to a pulley **38** on the vehicle axle **39** to propel the vehicle forwardly.

The weight of a rider (not shown) when applied to the seat **17** (Fig. 1) or saddle **18** (Fig. 2) urges the seat or saddle downwardly, while the springs **34** and **35** urge the seat upwardly when the rider's weight is removed therefrom.

Referring to the drawings in detail, the two upper links **10** and **10***a* are pivoted on a common axis **12** and are mounted exteriorly of the frame side walls **14***a* and **14***b*, respectively. Each of the links may be mounted on pivot pins **40** (Fig. 8) with a spacing washer **41** interposed between each link and the frame **14**. Each link is retained on its pin **40** by a usual C-washer **42**.

The frame **14** is a sheet metal channel of suitable strength, mounted with its open side downward. The frame **14** is adapted to be secured within the body **43** of the toy horse C (Fig. 2) as by bolts **44** (Fig. 4).

The upright seat support **15** is pivotally connected to the free ends of the upper and lower links **10** and **11**, respectively, by two pairs of co-axial pivot pins **47** and **48**. The axes of these latter pins, are parallel to the fixed axes **12** and **13**, and with them define a parallelogram. The seat support **15** has its upper end formed to support a suitable seat, such as the seat **17** of Fig. 1, or the saddle **18** of Fig. 2.

The clutch drive assembly **19** comprises the clutch driven shaft **25**, having end portions **25***a* and **25***b* of reduced diameter and journaled in ball bearings **49** and **50**, respectively. The latter are mounted one in each side wall of the frame **14**. The spacing washers **41** on the pivot pins **40** (Fig. 8) space the links outwardly from the side walls of the frame **14** so that the lower links will clear the bearings **49** and **50**, the clutch driven shaft **25**, and the sides of the frame **14**, as shown in Fig. 5. The drive pulley **20** is secured to the clutch shaft **25** by a usual Woodruff key **51**, and the bell crank levers **21** and **22** are mounted on the clutch shaft **25**, one on each side of the drive pulley **20**. The cam and roller clutches **31** and **32** of the bell crank levers **21** and **22** are of a

well known type, as shown in Fig. 9, wherein a plurality of balls or rollers **52** which may be similar to those used in a conventional ball or roller bearing, are disposed symmetrically around the annular space **53** provided between the clutch shaft **25** and each bell crank lever mounted thereon. The balls or rollers **52** roll freely relative to the shaft **25** when the bell crank lever **22** of Fig. 9 turns clockwise relative to the clutch shaft **25**, and thereby allows free relative rotative movement between the clutch shaft and the bell crank lever **21**. When the latter two are moved rotatively in the opposite direction, however, the balls or rollers **52** roll onto the sloping cam faces **54**, and thereby lock the bell crank lever **21** and clutch shaft **25** together for driven rotation of the shaft **25** in a counter-clockwise direction.

The two bell crank levers **21** and **22** are substantially identical. However, the direction of the cam drive engagement is reversed between these two levers so that both will have driving engagement with the clutch shaft **25** when said levers are moved in the same rotative direction, namely, counter-clockwise as shown in Figs. 4 and 9, and will release such shaft upon a relative rotative movement in the opposite direction.

The pins **23** and **24**, riding in the slots **27** and **28**, drive the bell crank levers **21** and **22** in opposite rotative directions upon each upward and downward pivotal movement of the parallel links. An arcuate opening **55** (Fig. 4) is provided in the side wall **14***b* of the frame **14** to permit free, arcuate, movement of the drive pin **24** therein upon each up and down oscillating movement of the parallel links.

The coil spring **35** is connected under desired tension from the upper end of an upright arm **57** of the bell crank lever **21**, to the lower link **11** adjacent its fixed axis **13**, and the second spring **34** is similarly connected between the lower end of the corresponding arm **58** of the other bell crank lever **22** and the link **11***a*. The action of these springs, as is apparent in Fig. 4, tends to swing the bell crank levers **21** and **22** in opposite rotative directions to urge the lower links **11** and **11***a* upwardly.

The drive belt **37** passes around the drive pulley **20** of the clutch assembly **19**, and also around the driven pulley **38** secured to the vehicle axle **39**. The axle **39** has driving connection with at least one of the rear support wheels **60** (Figs. 1 and 2).

The operation of the propulsion mechanism A as shown in Figs. 2 and 9 is as follows: The coil springs **34** and **35** urge the lower links **11** and **11***a* toward their upward limit of swinging movement as described previously herein, thereby urging the saddle **18** also to its upward limit of movement. When a child mounts the vehicle, he places his feet in a pair of stirrups **61** provided therefor on supporting leathers **62** secured to the body **43** of the toy horse C, and allows his weight to sink onto the saddle **18**. This urges the seat support **15** downwardly, and swings the free ends of all of the links **10** and **11** downwardly with it. During this downward swinging movement of the lower links **11** and **11***a*, the drive pins **23** and **24**, riding in the slots **27** and **28**, urge the bell crank levers **21** and **22** in opposite rotative directions, thereby turning the bell crank lever **21** counter-clockwise, and the other bell crank lever **22** clockwise. The bell crank lever **21**, having clutch engagement with the clutch shaft **25** during its counter-clockwise rotative movement produced by this downward movement of the links, turns the clutch shaft **25** and the drive pulley **20** secured thereto in the direction of the arrow **33** in Fig. 4, and, through the drive belt **37** and driven pulley **38**, drives the rear support wheels **60** to propel the toy horse C forward.

As the saddle **18** reaches its downward limit of movement by engaging the body **63**, if the rider allows his weight to remain on the saddle to hold it down, both clutches **31** and **32** will release, allowing the clutch shaft **25** and the drive pulley **20** thereon to continue to rotate freely as long as the wheels move to carry the vehicle ahead. If, however, the driver straightens his legs and raises his body, and thereby allows the springs **34** and **35**, the tension of which was increased by the downward movement of the links, to swing the bell crank levers **21** and **22** in the opposite directions, such action will urge the links **10** and **11** upwardly about their fixed axes **12** and **13** and will thereby elevate the saddle **18**. During this spring urged return movement of the clutch drive mechanism, the bell crank lever **22** is swung in a counter-clockwise direction, thereby causing the roller clutch **31** therein to engage the clutch shaft **25**, and thereby again urging the shaft **25** and drive pulley **20** in the same counter-clockwise rotative direction as that produced on a downward movement of the links to again propel the vehicle forward.

If desired, the rider of the vehicle may grip the seat during an upward movement thereof to thereby assist the springs **34** and **35** in their driving urge on the clutch shaft **25**. As the seat returns to its upper limit of movement, the drive shaft **25** will again be freed from clutch engagement with the bell crank levers **21** and **22** for forward coasting movement.

Any suitable steering mechanism may be provided, for example the body of the horse C may be made in two parts C_1 and C_2 (Fig. 2) connected together by a pivot pin **36** so that the front portion C_1 is steerable by means of the reins **46**.

The propulsion mechanism A for the vehicle B illustrated in Fig. 1 is constructed and operates substantially the same as that A illustrated in Figs. 2–9, and described in detail herein, as will be apparent to one having an understanding of the latter mechanism. The principal difference between the two is that the position of the drive mechanism is reversed, and the direction of clutch engagement is such as to propel the vehicle forward.

The invention provides a simple and effective mechanism for propelling a toy vehicle by intermittent application of the driver's weight to a seat element, and one which intermittently calls the legs muscles, and many of the other muscles of the body into play. The periods of muscular exertion as the body is elevated are interspersed with intermittent short periods of rest as the seat moves downwardly. This type of muscular exercise is considered very beneficial. Furthermore, particularly when the invention is embodied in a toy vehicle the appearance of a horse, as shown in Fig. 2, it provides a very realistic ride for a child.

While I have illustrated and described a preferred embodiment of the present invention, it will be understood, however, that various changes and modifications may be made in the details thereof without departing from the scope of the invention as set forth in the appended claims.

Having thus described the invention, what I claim as new and desire to protect by Letters Patent is defined in the following claims:

1. A propulsion mechanism for a toy vehicle for actuation by alternate up and down movements of a rider's torso by means of his leg muscles, said mechanism comprising a vehicle body, a plurality of support wheels journaled thereon, a foot support on said body, two vertically spaced parallel links pivotally connected at one end thereof to the vehicle body, a seat support pivotally connected at vertically spaced points to the other ends of said links, the pivotal connections of the links defining a parallelogram, a seat upon the seat support, whereby a downward movement of the seat under the weight of a rider's torso swings said links downwardly, spring means urging the seat and the ends of the links connected to the seat support upwardly when relieved from the weight of a rider's torso, a clutch shaft journaled in the vehicle body, a pair of levers journaled on the clutch shaft, and extending in opposite directions from each other, means operatively connecting a terminal portion of each of said levers to one of the links, whereby said levers are swung rotatively in opposite directions upon each up-

ward and downward movement of the links, clutch means embodied in each lever and in clutch engagement with the clutch shaft when said each lever is moved in one rotative direction relative to the clutch shaft, said clutch means releasing said clutch shaft when said each lever is moved in the opposite rotative direction relative to the clutch shaft, and drive means operatively interconnecting the clutch shaft and a supporting wheel of the vehicle, thereby to impart a propulsive impulse to the vehicle upon each successive upward and downward stroke of the links and the seat mounted thereon.

2. A propulsion mechanism for a toy vehicle for actuation by alternate up and down movements of a rider's torso by means of his leg muscles, said mechanism comprising a frame adapted to be mounted in a vehicle body having a plurality of support wheels journaled thereon, and having a foot support on said body; two vertically spaced parallel links pivotally connected at one end thereof to the frame, a seat support pivotally connected to the other ends of said links, the pivotal connections of the links defining a parallelogram, a seat on the seat support, whereby a downward movement of the seat under the weight of a rider's torso urges the ends of said links having the seat support connected thereto downwardly, a clutch shaft journaled in the frame, a pair of lever arms journaled on the clutch shaft, and extending in opposite directions from each other, means operatively connecting a terminal portion of each of said lever arms to one of the links, whereby said levers are swung rotatively in opposite directions upon each upward and downward swinging movement of the links, clutch means embodied in each lever arm and in clutch engagement with the clutch shaft when said each lever arm is moved in one rotative direction relative to the clutch shaft, said clutch means releasing said clutch shaft when said each lever is moved in the opposite rotative direction relative to the clutch shaft, spring means urging the lever arms in a direction to swing the links toward a seat raising position, and drive means operatively interconnecting the clutch shaft and a supporting wheel of the vehicle, thereby to impart a propulsive impulse to the vehicle upon each successive upward and downward stroke of the links and the seat mounted thereon.

3. A propulsion mechanism for a wheel supported toy vehicle having a foot support thereon, said mechanism comprising a frame adapted to be mounted in the body of such vehicle, two vertically spaced parallel links pivotally connected at one end thereof to the frame, a seat support pivotally connected at vertically spaced points to the other ends of said links, the pivotal connections to the links defining a parallelogram, a seat on the seat support, whereby a downward movement of the seat support under the weight of a rider's torso urges the ends of said links having the seat support connected thereto downwardly, a clutch shaft journaled in the frame, a pair of lever arms journaled on the clutch shaft, each extending lengthwise adjacent one of said links and in opposite directions from each other, means operatively connecting a terminal portion of each of said lever arms

to the link adjacent thereto, whereby said levers are swung rotatively in opposite directions upon each upward and downward swinging movement of the links, clutch means embodied in each lever arm and in clutch engagement with the clutch shaft when said each lever arm is moved in one rotative direction relative to the clutch shaft, said clutch means releasing said clutch shaft when said each lever is moved in the opposite rotative direction relative to the clutch shaft, spring means urging the lever arms in a direction to swing the links toward a seat raising position, and drive means operatively interconnecting the clutch shaft and a supporting wheel of such vehicle, thereby to impart a propulsive impulse to such vehicle upon each successive upward and downward stroke of the links and the seat mounted thereon.

4. A propulsion mechanism for a wheel supported toy vehicle having a foot support thereon, said mechanism comprising a frame adapted to be mounted in the body of such vehicle, two vertically spaced parallel links pivotally connected at one end thereof to the frame, a seat support pivotally connected at vertically spaced points to the other ends of said links, the pivotal connections of the links defining a parallelogram, a seat on the seat support, whereby a downward movement of the seat support under the weight of a rider's torso urges the ends of said links having the seat support connected thereto downwardly, a clutch shaft journaled in the frame, a pair of bell crank levers journaled on the clutch shaft, each bell crank lever having one arm thereof extending lengthwise adjacent one of said links and in opposite directions from each other, means operatively connecting a terminal portion of each of said one arms to the link adjacent thereto, whereby said levers are swung rotatively in opposite directions upon each upward and downward swinging movement of the links, clutch means embodied in each bell crank lever and in clutch engagement with the clutch shaft when said each lever arm is moved in one rotative direction relative to the clutch shaft, said clutch means releasing said clutch shaft when said each lever is moved in the opposite rotative direction relative to the clutch shaft, a spring connected to an outer portion of a second arm of each bell crank lever and urging each of the latter a direction to swing the links toward a seat support raising position, and drive means operatively interconnecting the clutch shaft and a supporting wheel of such vehicle, thereby to impart a propulsive impulse to such vehicle upon each successive upward and downward stroke of the links and the seat mounted thereon.

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