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(54) PIVOTING WHEEL INTERLOCK
VERRIEGELUNG VON SCHWENKBAREN RAD
MOYEN DE BLOCAGE DE ROUE PIVOTANTE

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Description

Technical Field

[0001] This invention relates to a pivoting wheel interlock for lawn and garden care equipment, and more particularly to a walk behind lawn vacuum.

Background Art

[0002] Lawn and garden care equipment having pivoted wheels has been used for many years. Examples include lawn vacuums, lawn blowers, front deck lawn-mowers, and the like. Typically these devices have two wheels which are fixedly connected to the frame for rotation in respect thereto and either one or two pivoting wheels at the other end of the device, which pivoting wheels allow the device to be steered in the operators' direction of choice without having to lift any wheel off the ground in order to accomplish such turn. These devices are functional in that they relieve the operator of the necessity of having to balance the weight of the device on two side by side wheels while at the same time allowing for the relatively unencumbered steering of the device. Most of the time, these devices function as they were designed to. However under certain circumstances the very feature which makes them most convenient, the pivoting wheel, can create complications. An example of this is when an operator is attempting to use a device across the width of a hill - a circumstance under which the device will tend to float downwards though the path of least resistance. Under this condition, the operator has to use a continually fatiguing compensating force on the handle bars in order to keep the device going in a straight direction. This is not desirable.

[0003] EP-A-0 367 891 discloses an hand operated lawn mower which is supported by running wheels, one of which can oscillate about a vertical pivot perpendicular to its wheel axle. This oscillating effect is eliminated by fixing the vertical pivot with the result that the corresponding running wheel becomes rigid.

[0004] The known lawn care appliance has a frame which is supported by two sets of wheels, a rear set fixed to the frame and a front set being connected to the frame by the vertical pivot extending through two adjacent surfaces, a first surface connected to the frame and the second surface associated with the vertical pivot. The known lawn care appliance also comprises locking means in form of a stud to selectively lock the vertical pivot so as to prevent the pivoting of at least one front wheel in respect to the frame. Said locking means have a first and a second end, whereby the second end is selectively positionable in a part of said first surface to engage or disengage said first end with the vertical pivot by connecting the first end with a hole. However, the known locking means cannot be remotely activated. Thus, there is also need to provide a lawn care appliance having locking means which allow a remote activation as well as a manual activation.

Disclosure of the Invention

[0005] It is an object of the present invention to provide for a adaptable pivoting wheel device.

[0006] It is an object of the present invention to simplify the construction of devices including pivoting front wheels.

[0007] It is an object of the present invention to allow for the selective retention of a pivoting wheel in a set angular location in respect to a lawn and garden care device.

[0008] It is still an object of the present invention to simplify the construction of adaptable devices including pivoting wheels.

[0009] It is still a further object of the present invention to allow for the selective compensation of a pivoting wheel in order to adapt the device to certain situations.

[0010] Other objects that are a more complete understanding of the invention may be had by referring to the drawings.

[0011] According to the invention, a lawn care appliance has

- a frame supported by two sets of wheels, a rear set fixed to the frame and a front set being connected to the frame by a vertical pivot extending through two adjacent surfaces, a first surface connected to the frame and the second surface associated with the vertical pivot,

- locking means to selectively lock the vertical pivot so as to prevent the pivoting of at least one front wheel in respect to the frame, said locking means having a first and a second end, said second end being selectively positionable in said first surface to engage or disengage said first end with said vertical pivot.

[0012] Furthermore, said first end has an axis of rotation and said second end has an axis, whereby said axis of said first end and said axis of said second end are substantially parallel to one another.

[0013] The structure, operation, and advantages of the present preferred embodiment of the invention will become further apparent upon consideration of the following description taken in conjunction with the accompanying drawings wherein:

Figure 1 is a perspective view of a front corner of a device incorporating the invention of the application;

Figure 2 is a sideward view of the pivoting wheel of figure 1;

Figure 3 is a downward view of the pivoting wheel of figure 1; and,

Figure 4 is a view of a device incorporating the in-
The invention begins with a set of axle assemblies, at least one of which includes a wheel which is pivoted to the frame so as to allow the angular displacement of such wheel in respect to the frame. While the positioning of these operation of the invention will be described with the pivoting wheel being located on the front of the frame of the device as shown in the preferred embodiment herein.

The particular frame 11 of the preferred embodiment disclosed is supported for travel over the ground by a rear axle assembly 20 and a front wheel assembly 30.

The invention of the present application, it is possible to selectively lock at least one of the pivoting wheels for the device in order to ensure the accurate tracking of the device 10 across the particular terrain involved. The reason that the device accomplishes this is that, by locking the pivoting assembly 40 against any angular movement in respect to the frame 11, a device is produced which has at least two wheels, preferably longitudinally displaced, which are fixedly connected thereto. This type of interconnection provides a device which will tend to continue in a straight line unless physically manipulated by the operator so as to artificially cause an angular movement. Further, this angular movement can be created by a sliding one wheel across the ground sideways against respect to the friction which is produced thereby or by artificially lifting one wheel above the ground so as to allow its free movement angularly in respect to the direction of travel. These both
require active operator intervention.

[0029] In the preferred particular embodiment disclosed, the pivoting wheel interlock is provided by the separate lock 50. This separate lock 50 is a mechanical piece which interconnects the axle support 41 to the arms of the frame 11 so as to solidly lock the other wise pivoting wheel in a set position in respect to such frame.

[0030] The preferred lock itself is a substantially U-shaped lock piece 52 biased by a spring 51 into a downward position in respect to the arms 14 of the device. This lock piece 52 has two selective positions in respect to its arm.

[0031] In one selective position of the lock piece 52 in respect to the arm 14 (pos A in Figure 3), a nubbin 53 selectively fits through an enlarged hole in the arm 14 to interengage a hole 44 in the upper surface of the axle support 41 so as to solidly interconnect the axle support 41 in fixed angular relationship in respect to the arm. The nubbin 53 thus ensures the solid interconnected between the lock piece 52 and the arm of the frame. (Note that the preferred embodiment disclosed has two front wheels 32. Either or both of these can be locked in an angular position.) The operation of the lock piece 52 is up to the operator. For example locking of one wheel allows some pivoting action of the other (suitable perhaps for movement across a flat surface with ruts) while the locking of both wheels allows none (suitable perhaps for movement sideways across a comparatively steep slope).

[0032] In a secondary position (pos B in Figure 3), the nubbin 53 of the separate lock is interengaged by the spring force into a hole 55 on the arm 14 itself so as to retain the lock piece 52 out of engagement with the axle support 41. This position allows for the free pivoting motion of the axle support 41 in respect to the arm 14 of the frame 11.

[0033] In all instances, the spring 51 provides an engagement bias force for the lock piece 52 so as to ensure that, once selectively engaged, the lock does not inadvertently disengage so as to allow any unintended movement of the axle support 41 (and thus the wheels) in respect to the arms of the frame 11.

[0034] With the separate lock piece 52 engaged, the wheel(s) are held in position in respect to the frame 11 such that they, in combination with the rear wheels of the half section of the frame, allow for the continual movement of the frame 11 in a relative single direction in respect to the terrain. The reason for this is that since neither the otherwise pivoting wheel(s) on the forward section 13 or the wheels on the half section 12 can angularly pivot in respect to the frame 11, the frame 11 will continue along a certain set direction absent a significant manipulating force in respect thereto. An example of this significant manipulating force would be to lift one of the wheels of the forward section 13 or the half section 12 off of the ground so as to artificially manipulated the location of such wheel in respect to the others. However, in the absence of such artificial movement, the frame 11 will tend to continue on in a straight direction. For this reason, it is not necessary for the operator to either face the fatiguing continual compensating force necessary to keep a pivoting wheel device going in a single direction against contrary forces nor is it necessary for the operator to artificially manipulate the device in order to continue its operation in a single direction. Operation efficiency is also enhanced.

[0035] The difference between these two conditions of operation is caused by the engagement of the separate lock piece 52 with the axle support of the pivoting axle assembly. As previously discussed, this engagement is selective depending upon the operators manually overcoming the force of the spring 51 in order to selectively engage this lock.

[0036] Upon disengagement of the lock 50, the lawn and garden device will operate in a normal manner in that the pivoting wheels will allow for the selective angular displacement of the frame 11 while also returning to the main direction of movement in an intuitive manner without significant resistance. This nonlocked position would be suitable for operation of the lawn and garden device in a selective manner over a flat terrain and/or around numerous interfering objects such as trees, walls, walls and other impediments.

[0037] Note that if desired, the separate lock could be interengaged even on flat surfaces. This interengagement would allow for the lawn and garden device to continue in a preset direction without operator intervention, thus easing the control of the device over such surface. This will be particularly suitable in respect to large flat lawns wherein the constant steering corrections would be tiring and/or the operator desired more direct physical control over the device as opposed to allowing it to freely wander across the lawn. Further note that the separate lock can be remotely activated - for example by a roden wire to a hand control - so as to simplify change-over. This would be particularly appropriate to conditions that might rapidly change.

[0038] Theretofor although the invention has been described in a certain degree of particularity, it is to be understood that numerous changes could be made without deviating the invention as hereinafter claimed.

Claims

1. A Lawn care appliance having

5 - a frame (11, 12, 13, 14) supported by two sets of wheels (20, 21, 30, 32), a rear set (20, 21) fixed to the frame (11, 12, 13) and a front set (30, 32) being connected to the frame (11) by a vertical pivot (45) extending through two adjacent surfaces, a first surface (14) connected to the frame (11) and the second surface (41) associated with the vertical pivot (45),
locking means (44, 50, 51, 52, 53, 55) to selectively lock the vertical pivot (45) so as to prevent the pivoting of at least one front wheel (32) in respect to the frame (11, 12, 13, 14), said locking means (52) having a first and a second end (53), said second end (53) is selectively positionable in said first surface (14) to engage or disengage said first end with said vertical pivot (45),

characterized in that said first end has an axis of rotation and that said second end (53) has an axis, whereby said axis of said first end and said axis of said second end (53) are substantially parallel to one another.

2. Lawn care appliance according to claim 1, characterized in that said locking means include

- a pin (53), said pin (53) being movably connected to one of said first surface (14) or said second surface (41),
- a hole (44, 55), said hole (44, 55) being in the other of said first surface (14) or said second surface (41), and
- means to selectively engage said pin (53) with said hole (44, 55).

3. Lawn care appliance according to claim 2, characterized by the addition of a spring (51) and said spring (51) biasing said pin (53) in said hole (44, 55).

4. Lawn care appliance according to claim 2, characterized in that the vertical pivot (45) has a rotational axis and said pin (53) has an axis being substantially parallel to the rotational axis of the vertical pivot (45).

5. Lawn care appliance according to claim 2, characterized by the addition of means to selectively position said pin out of engagement with said hole (44, 55).

6. Lawn care appliance according to at least one of the preceding claims, characterized in that the locking means (52) comprise a lock piece comprising said pin (53).

7. Lawn care appliance according to claim 6, characterized in that said lock piece (52) is substantially U-shaped.

8. Lawn care appliance according to claim 6 or 7, characterized in that said means to selectively engage said pin (53) with said hole (55) includes releasing said pin (53) from engagement with said frame (11, 12, 13).

9. Lawn care appliance according to claim 6 or 7, characterized in that said means to selectively engage said pin (53) with said hole (44) includes passing said pin (53) through a hole (44) in the frame (11, 12, 13, 14).

10. Lawn care appliance according to claim 6 or 7, characterized in that said pin (53) is biased downwards in respect to the frame (11, 12, 13, 14) by said spring (51).

11. Lawn care appliance according to claim 1, characterized by an arm (14) secured to the frame (11), said vertical pivot (45) is attached to said frame (11, 12, 13) by said arm (14).

Patentansprüche

1. Eine Rasenpflegevorrichtung mit

- einem Rahmen (11,12,13,14), der durch zwei Sätze von Rädern (20,21,30,32) getragen wird, einem rückseitigen Satz (20,21), der an dem Rahmen (11,12,13) befestigt ist, und einem vorderseitigen Satz (30,32), der mit dem Rahmen (11) durch einen vertikalen Zapfen (45) verbunden ist, der sich durch zwei angrenzende Flächen hindurch erstreckt, einer ersten, mit dem Rahmen (11) verbundenen Fläche (14) und der zweiten, dem vertikalen Zapfen (45) zugeordneten Fläche (41),

- Verschlußmitteln (44,50,51,52,53,55) zur selektiven Verriegelung des vertikalen Zapfens (45), so daß das Drehen mindestens eines der Vorderräder (32) hinsichtlich des Rahmens (11,12,13,14) vermieden wird, wobei die Verschlußmittel (52) ein erstes und ein zweites Ende (53) aufweisen, wobei das erste Ende (53) selektiv in der ersten Fläche (14) positionierbar ist, um das erste Ende mit dem vertikalen Zapfen (45) zu verbinden oder von diesem zu lösen,

dadurch gekennzeichnet, daß das erste Ende eine Rotationsachse aufweist und das zweite Ende (53) eine Achse aufweist, wobei die Achse des ersten Endes und die Achse des zweiten Endes (53) im wesentlichen parallel zueinander sind.

2. Rasenpflegevorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß die Verschlußmittel folgendes umfassen
- einen Stift (53), wobei der Stift (53) in der ersten Fläche (14) oder der zweiten Fläche (41) be- weglich angeordnet ist, und
  - ein Loch (44,55), wobei das Loch (44,55) in der anderen der ersten Fläche (14) oder zweiten Fläche (41) angeordnet ist, und
- Mittel zum selektiven Eingreifen des Stiftes (53) in das Loch (44,55).

3. Rasenpflegevorrichtung nach Anspruch 2, gekennzeichnet durch Hinzufügen einer Feder (51), wobei die Feder (51) den Stift (53) in dem Loch (44,55) beaufschlagt.

4. Rasenpflegevorrichtung nach Anspruch 2, dadurch gekennzeichnet, daß der vertikale Zapfen (45) eine Rotationsachse aufweist und daß der Stift (53) eine Achse aufweist, die im wesentlichen parallel zu der Rotationsachse des vertikalen Stiftes (45) angeordnet ist.


6. Rasenpflegevorrichtung nach mindestens einem der vorangehenden Ansprüche, dadurch gekennzeichnet, daß die Verschlußmittel (44, 50, 51, 52, 53, 55) für verriegeln von der vertikalen Zapfen (45) einer Rotationsachse aufweist und der Stift (53) mit einer Achse aufweist, die im wesentlichen parallel zu der Rotationsachse des vertikalen Stiftes (45) angeordnet ist.

7. Rasenpflegevorrichtung nach Anspruch 2, dadurch gekennzeichnet, daß die Verschlußteile (52) einen ersten und zweiten Teil (53), wobei die zweite Extrême (53) mit der ersten Fläche (14) in einer Weise einander begegnen, die Stift (53) zu befehmen, und in diesem Fall eine Vertikale des Stiftes (53) mit einer ersten Fläche (14) und eine parallele Fläche (41) zu verbinden, wobei die erste Fläche (14) eine Axe von Rotation hat, und dass die zweite Extrême (53) in einer Weise mit der ersten Fläche (14) in einer Weise einander begegnen, die Stift (53) zu befehmen, und die Axe der zweiten Extrême (53) in einer Weise mit einer Axe von Rotation verbunden ist.

8. Rasenpflegevorrichtung nach Anspruch 6 oder 7, dadurch gekennzeichnet, daß die Mittel zum selektiven Eingreifen des Stiftes (53) in das Loch (55) einen Freisetzung des Stiftes (53) vom Eingriff in den Rahmen (11,12,13) beinhaltet.

9. Rasenpflegevorrichtung nach Anspruch 6 oder 7, dadurch gekennzeichnet, daß die Mittel zum selektiven Eingreifen des Stiftes (53) in das Loch (44) einen Hindurchfahren des Stiftes (53) durch das Loch (44) in dem Rahmen (11,12,13,14) beinhaltet.

10. Rasenpflegevorrichtung nach Anspruch 6 oder 7, dadurch gekennzeichnet, daß die Feder (51) nach unten hinsichtlich des Rahmens (11,12,13,14) beaufschlagt ist.

11. Rasenpflegevorrichtung nach Anspruch 1, gekennzeichnet durch einen Arm (14), der an dem Rahmen (11) befestigt ist, wobei der vertikale Zapfen (45) an dem Rahmen (11,12,13) durch den Arm (14) angebracht ist.

Revendications

1. Dispositif d'entretien de pelouse, ayant :
- un châssis (11, 12, 13, 14), supporté par deux ensembles de roues (20, 21, 30, 32), un ensemble arrière (20, 21) fixé sur le châssis (11, 12, 13) et un ensemble avant (30, 32) étant connecté au châssis (11) par l'intermédiaire d'un pivot vertical (45) s'étendant à travers deux surfaces adjacentes, une première surface (14) connectée au châssis (11) et la seconde surface (41) associée au pivot vertical (45),
- des moyens de verrouillage (44, 50, 51, 52, 53, 55) pour verrouiller de manière sélective le pivot vertical (45) de manière à empêcher le pivotement d'au moins une roue avant (32) par rapport au châssis (11, 12, 13, 14), lesdits moyens de verrouillage (52) ayant une première extrême et une seconde extrême (53), ladite seconde extrême (53) peut être positionnée de manière sélective dans ladite première surface (14) pour faire venir en prise ladite première extrême avec ledit pivot vertical (45), ou pour la libérer,

2. Dispositif d'entretien de pelouse selon la revendication 1, caractérisé en ce que
- une broche (53), ladite broche (53) étant connectée de manière amovible à une première surface parmi ladite première surface (14) ou ladite seconde surface (41),
- un trou (44, 55), ledit trou (44, 55) étant dans l'autre surface parmi ladite première surface (14) et ladite seconde surface (41), et
- des moyens pour faire venir en prise de manière sélective ladite broche (53) avec ledit trou (44, 55).

3. Dispositif d'entretien de pelouse selon la revendication 2, caractérisé par l'ajout d'un ressort (51), et ledit ressort (51) rappelant ladite broche (53) dans ledit trou (44, 55).

4. Dispositif d'entretien de pelouse selon la revendication 2, caractérisé en ce que le pivot vertical (45)
a un axe de rotation, et ladite broche (53) a un axe sensiblement parallèle à l'axe de rotation du pivot vertical (45).

5. Dispositif d'entretien de pelouse selon la revendication 2, **caractérisé par** l'ajout de moyens pour positionner de manière sélective ladite broche hors de prise avec ledit trou (44, 55).

6. Dispositif d'entretien de pelouse selon l'une quelconque des revendications précédentes, **caractérisé en ce que** les moyens de verrouillage (52) comportent une pièce de verrouillage comportant ladite broche (53).

7. Dispositif d'entretien de pelouse selon la revendication 6, **caractérisé en ce que** ladite pièce de verrouillage (52) est sensiblement en forme de U.

8. Dispositif d'entretien de pelouse selon la revendication 6 ou 7, **caractérisé en ce que** lesdits moyens destinés à faire venir en prise de manière sélective ladite broche (53) avec ledit trou (55) comportent la libération de ladite broche (53) de la prise avec ledit châssis (11, 12, 13).

9. Dispositif d'entretien de pelouse selon la revendication 6 ou 7, **caractérisé en ce que** lesdits moyens pour faire venir en prise de manière sélective ladite broche (53) avec ledit trou (44) comportent le passage de ladite broche (53) à travers un trou (44) situé dans le châssis (11, 12, 13, 14).

10. Dispositif d'entretien de pelouse selon la revendication 6 ou 7, **caractérisé en ce que** ladite broche (53) est rappelée vers le bas par rapport au châssis (11, 12, 13, 14) par l'intermédiaire dudit ressort (51).

11. Dispositif d'entretien de pelouse selon la revendication 1, **caractérisé par** un bras (14) fixé sur le châssis (11), ledit pivot vertical (45) étant fixé sur ledit châssis (11, 12, 13) par l'intermédiaire dudit bras (14).