

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
31 December 2008 (31.12.2008)

PCT

(10) International Publication Number
WO 2009/00344 A1

(51) International Patent Classification:

A01D 34/08 (2006.01) A01D 34/67 (2006.01)
A01D 34/10 (2006.01) A01D 34/68 (2006.01)
A01D 34/46 (2006.01) B60K 17/34 (2006.01)
A01D 34/47 (2006.01)

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(21) International Application Number:

PCT/EP2008/001333

(22) International Filing Date:

18 February 2008 (18.02.2008)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

MI2007A001290 28 June 2007 (28.06.2007) IT

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

(54) Title: REAR WHEEL DRIVE LAWNMOWER PROVIDED WITH CLUTCH DEVICE FOR THE FOUR WHEEL DRIVE

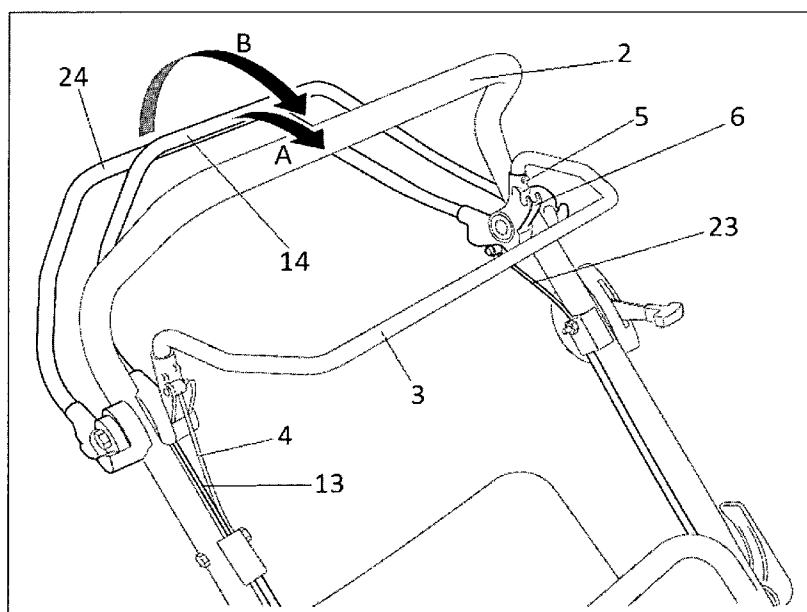


Fig. 2

(57) Abstract: Self propelled lawnmower (1) able to operate either in a rear wheel drive mode or in a four wheel drive mode, the two modes being selectable by rotating two different command levers (14, 24), each operatively connected with a gearbox (10, 20) placed on the rear axle (11) and front axle (21), respectively.



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REAR WHEEL DRIVE LAWNMOWER PROVIDED WITH CLUTCH DEVICE
FOR THE FOUR WHEEL DRIVE

The present invention relates to a self propelled lawnmower for which it is possible to select two different traction modes.

5 Said lawnmower, indeed, beside the conventional traction system on the rear wheels, is able to transmit the movement even to the front wheels. Such possibility is provided to the operator through the drive of an clutch device suitable designed to allow ease and flexibility of the use.

10 The prior art lawnmowers have a single traction system also applied onto either the rear axle, such as it occurs in the most cases, or the front axle. These two known solutions are alternatively utilized for different uses: the rear wheel traction assures more maneuvering ease especially verifiable on complex paths and with high bend sections, whilst the front wheel drive facilitates the cutting operation in presence of medium and high slope lands, but having at the same time considerable steering difficulties.

15 Nevertheless both previously disclosed solutions badly suit cutting on sloping irregular and rough lands and/or characterized by not uniform and high lawn; for such lands the only possible solution is given by a four wheel drive transmission system.

20 Main object of the present invention is, therefore, to provide a self propelled lawnmower which allows for overcoming the abovementioned disadvantages by leaving to the operator the possibility to select either a rear wheel drive mode or a four wheel drive mode, depending on the type of land on which cutting has to be performed.

25 Another object of the present invention is to provide a self propelled lawnmower able to assures high level performances on every type of land and in absolute safety and comfort conditions. In presence of great differences in height, indeed, the conventional lawnmowers take the operator to difficult conditions mainly due to the need of physically pushing the

lawnmower because, in case of rear wheel drive, the traction and therefore the self-propelling operation are no longer assured whilst, in case of front wheel drive traction, the maneuverability is compromised by forcing the operator to push the machine towards the desired direction. It is therefore clear how, in hard conditions in terms of slope or irregularity of the land, the practicability of the cutting operation is jeopardized and the operator safety as well.

Further object of the present invention is to provide a self propelled lawnmower able to make the shift from a rear wheel drive system to a four drive system particularly easy to be engaged/disengaged, thus supporting even the reduction of consumption and wear connected to four wheel drive, by limiting the use of this traction system for the necessary cases. It is, indeed, expected that the four wheel drive mode can be activated even for few seconds, those necessary, for example, to overcome an obstacle, a subsidence, or to climb a slope in a smooth manner, returning then to the traditional traction, i.e. on the rear axle.

The possibility to obtain the abovementioned functions and the corresponding advantages is assured by the particular technical concept of the transmission members: two different independent gear boxes are indeed provided onto both the rear and front axles. Such configuration has further advantages in terms of reliability: in case of gear box fault on the main rear axle the lawnmower can keep operating only with the front wheel traction engaged in order to complete the just started cutting operation and before proceeding with the repair of the fault member.

The essential features of the self propelled four wheel drive clutching lawnmower are indicated in claim 1, and its advantageous improvements are indicated in the dependant claims. Now a detailed disclosure of the invention follows, made with reference to a preferred embodiment, given by way of illustrative and not limiting example, and illustrated in the annexed drawings, in which:

fig. 1 is a perspective view of the self propelled lawnmower according to a preferred embodiment of the present invention; and

fig. 2 is a perspective view of the traction actuating levers according to a preferred embodiment of the present invention.

5 Referring now to fig. 1, there is shown the lawnmower 1 on which the engine unit 40 is installed operatively connected to the transmission system: such transmission system has a crankshaft 30, connected by suitable transmission belts 12 and 22 to the rear and front gearboxes 10 and 20, all of them shown as a scheme in fig. 1. Each gearbox 10 and 20 is interlocked for the movement transmission onto the corresponding rear and front axles 11 and
10 21. The command signal for actuating said gearboxes 10 and 20 is generated by the pull carried on two proper cables 13 and 23, associated with the gearboxes 10 and 20, respectively.

Referring now to fig. 2, there is shown the handlebar 2 on which the two command levers 14 and 24 are installed, operatively connected to the cables 13 and 23. On said handlebar 2 a third lever 3 is installed, operatively connected to a cable 4 (see also fig. 1) in
15 turn connected, at its opposite end, to the engine unit 40. Even in fig. 1 the arrows A and B are shown pointing the direction to which the command levers 14 and 24, respectively, can be rotated in order to actuate the two different traction modes provided for the lawnmower 1 according to the preferred embodiment of the present invention.

The rear traction mode activation occurs, instead, by rotating the command lever 14
20 towards the direction indicated by the arrow A: thus the cable 13 acts on the clutch device within said gearbox 10 such that by the transmission belt 12 the movement is transmitted from the drive shaft 30 to the rear axle 11, with consequent use of the only rear traction. By acting, then, on the lever 24, i.e. by making it rotating towards the direction of the arrow B a pull is carried on the cable 23 which acts on the clutch device within said gearbox 20 such that
25 by the transmission belt 22 the movement is transmitted from the drive shaft 30 to the front

axle 21: the rotation of the lever 24 towards the direction of the arrow B occurs along a path which, from a given angular position, overlaps the path of the lever 14 and thus forcing the two levers 14 and 24 to rotate together. In such way it is possible to switch from the rear wheel to the four wheel drive traction.

- 5 It is clear to a person skilled in the art that several embodiments can result from the present disclosure which therefore is not to be considered restricted to the preferred embodiment just shown.

CLAIMS

1. A self propelled lawnmower (1) able to operate either in a rear wheel drive mode or in a four wheel drive mode, **characterized by the fact that** the rear (11) and front (21) axles are each provided with a gearbox (10, 20), respectively, independent from each other, each gearbox being operatively connected to the primary transmission (30) of the engine (40) of said lawnmower (1), and engageable with said primary transmission (30) by command devices (14, 24) standing on board of the machine (1), said command devices (14, 24) being operatively connected with said gearboxes (10, 20), respectively.

2. The lawnmower (1) according to claim 1, **characterized by the fact that** the command device (24) of the front gearbox (20) can be actuated only concurrently with the actuation of the command device (14) of the rear gearbox (10).

3. The lawnmower (1) according to claim 1, **characterized by the fact that** said command devices (14, 24) are levers hinged onto the handlebar (2) of said lawnmower (1) and respectively connected to said gearboxes (10, 20), respectively by cables (13, 23).

4. The lawnmower (1) according to claim 1, **characterized by the fact that** the movement transmission system from the crankshaft (30) to each gearbox (10, 20) is obtained by a pair of transmission belts (12, 22), each interlocked to only one of said gearboxes (10, 20).

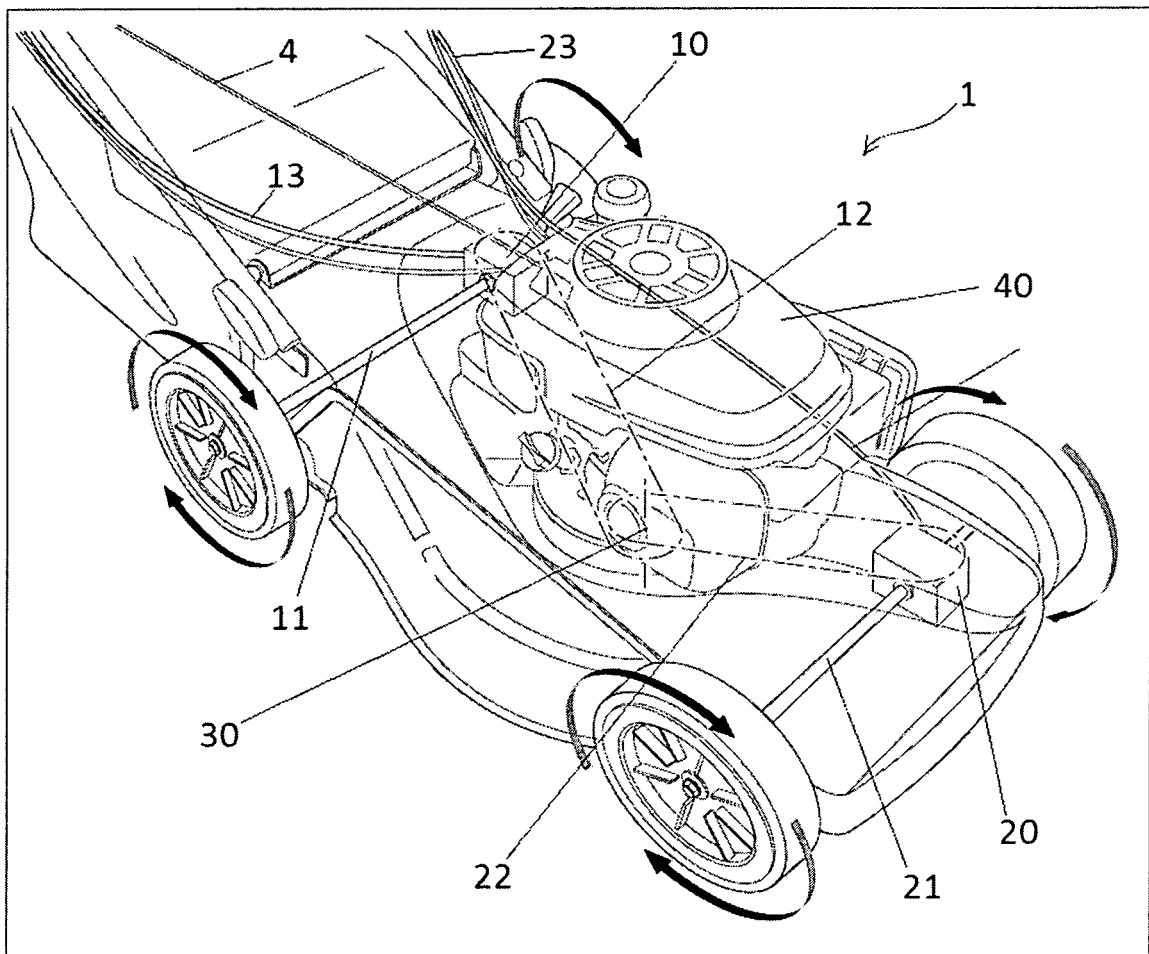


Fig. 1

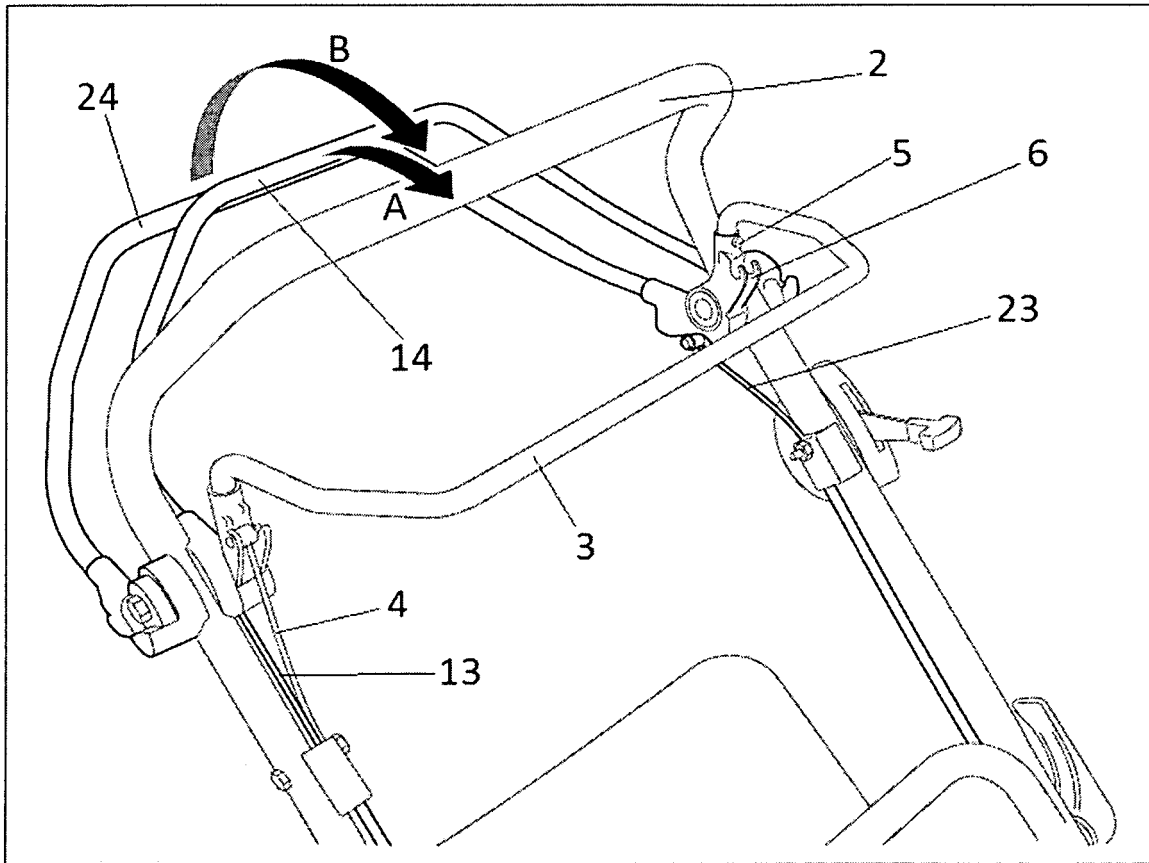


Fig. 2

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2008/001333

A. CLASSIFICATION OF SUBJECT MATTER				
INV. A01D34/08	A01D34/10	A01D34/46	A01D34/47	A01D34/67
A01D34/68	B60K17/34			

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A01D B60K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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A	EP 1 055 358 A (STELLA ENGINEERING GMBH [DE]) 29 November 2000 (2000-11-29) paragraphs [0012], [0013], [0016], [0017]; figures	1
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Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents :

<p>*A* document defining the general state of the art which is not considered to be of particular relevance</p> <p>*E* earlier document but published on or after the international filing date</p> <p>*L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>*O* document referring to an oral disclosure, use, exhibition or other means</p> <p>*P* document published prior to the international filing date but later than the priority date claimed</p>	<p>*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>*Z* document member of the same patent family</p>
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Date of the actual completion of the international search 10 June 2008	Date of mailing of the international search report 30/06/2008
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer Bunn, David

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2008/001333

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2008/001333

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