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(54) Title: SYSTEM AND METHOD FOR ROLLING UP A FLEXIBLE SHEET

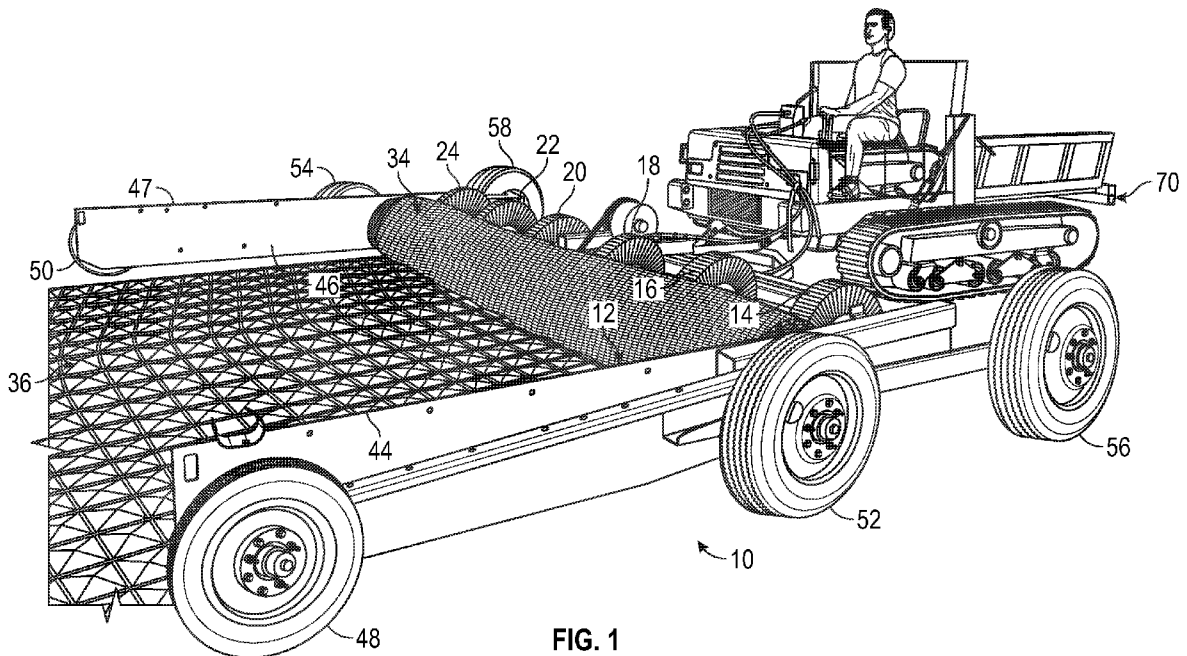


FIG. 1

(57) Abstract: A system for rolling up a flexible sheet may include a frame; a friction element mounted on the frame, the friction element having an endless friction outer surface with a sheet-engaging portion positioned to engage an end of the flexible sheet lying in a substantially horizontal position relative to the frame; and a drive connected to the friction element to move the endless friction outer surface such that the sheet-engaging portions thereof move upwardly to engage the end of the flexible sheet and lift up and roll the end of the flexible sheet over on itself to form a roll.



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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US17/29617

A. CLASSIFICATION OF SUBJECT MATTER

IPC - A01B 45/04; B65H 18/00, 18/02, 18/08, 18/10, 18/14, 18/16, 18/20, 18/22 (2017.01)

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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)

See Search History document

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

See Search History document

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

See Search History document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2015/0225195 A1 (BISHOP A. L.) August 13, 2015; figures 1-4; paragraphs [0046], [0048], [0049]	1, 2, 6, 9
X --- Y	CA 2,201,660 A1 (VISSERS T.) 03 October 1998; figures 1-5; paragraph 1 of page 6; paragraph 4 of page 7; paragraph 4 of page 8; paragraphs 1-2 of page 9	1-6, 9, 11 --- 12
X	US 4,892,153 A (COOLING E. D. et al.) January 9, 1990; figure 1; column 4, lines 50-54; column 5, lines 5-14	1, 2, 6-8, 11
Y	US 5,857,527 A (VAN VUUREN J.) January 12, 1999; figure 1; column 2, lines 31-34	12
A	US 4,084,763 A (ZAMBONI F. J.) April 18, 1978; figures 1-3; column 3, lines 56-65	1-13
A	US 4,890,801 A (BROUWER G. J. et al.) January 2, 1990; figure 1; column 3, lines 56-65; column 6, lines 1-2 and 35-38	1-13
A	US 3,429,377 A (NUNES J. F. JR.) February 25, 1969; entire document	1-13
A	US 3,053,328 A (GEIPEL H. A.) September 11, 1962; entire document	1-13
A	US 6,273,196 B1 (VAN VUUREN J.) August 14, 2001; figures 1-4	1-13

 Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:	"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
"A" document defining the general state of the art which is not considered to be of particular relevance	"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
"E" earlier application or patent but published on or after the international filing date	"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
"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)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US17/29617

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

-***-Please See Within the Next Supplemental Box-***-

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
Group I: Claims 1-13

- Remark on Protest**
- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/US17/29617

.-***-Continued from Box No. III Observations where unity of invention is lacking-***-

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I: Claims 1-13 are directed toward a movable frame having first and second elongate guide walls, a transverse beam connected to the first and second guide walls such that the first and second guide walls are spaced apart sufficiently to straddle the sheet, the frame including wheels supporting the guide walls; an axle rotatably mounted on the frame and extending between the first and the second guide walls; a plurality of discs mounted on the axle.

Group II: Claims 14-20 are directed toward moving the plurality of rotating friction elements in a direction toward the remainder of the flexible sheet, thereby causing the remainder of the flexible sheet to roll up into a spiral configuration

The inventions listed as Groups I-II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

Group I include a system for rolling up a flexible sheet, the system comprising: a movable frame having first and second elongate guide walls, a transverse beam connected to the first and second guide walls such that the first and second guide walls are spaced apart sufficiently to straddle the sheet, the frame including wheels supporting the guide walls; an axle rotatably mounted on the frame and extending between the first and the second guide walls; a plurality of discs mounted on the axle, the plurality of discs optionally joined at outer peripheries thereof by a plurality of axially extending bars, the outer peripheries and optional bars forming an endless friction outer surface with a sheet-engaging portion positioned to engage an end of the flexible sheet when lying in a substantially horizontal position relative to the frame; a motorized cab attached to a side of the frame, the cab having front and rear axles extending across the cab and the frame, each of the front and rear axles having wheels mounted on an outboard side of the cab on one end and on an outboard side of the frame on an opposite end, wherein at least one of the front and rear axles is driven; the motorized cab having a drive motor connected to rotate the axle and the plurality of discs, which are not present in Group II.

Group II include a method for rolling up a flexible sheet, the method comprising: placing the flexible sheet unrolled and flat on a substantially horizontal surface; the sheet engaging portions thereof move upwardly from the horizontal surface; moving the plurality of rotating friction elements in a direction toward the remainder of the flexible sheet, thereby causing the remainder of the flexible sheet to roll up into a spiral configuration, which are not present in Group I.

The common technical features of Groups I and II are a system and a method for rolling up a flexible sheet, the system and method comprising: rotating a plurality of friction elements, each of the plurality of friction elements having an endless friction outer surface with a sheet-engaging portion positioned to engage an end of the flexible sheet when lying in a substantially horizontal position, such that the sheet engaging portions thereof move upwardly; bringing the plurality of rotating friction elements into engagement with an end of the flexible sheet such that the upward movement of the sheet-engaging portions causes the end of the flexible sheet to curl upwardly over a remainder of the sheet to begin the rolling up of the flexible sheet.

These common technical features are disclosed by CA 2,201,660 A1 (VISSERS). Vissers discloses a system and a method for rolling up a flexible sheet (machine and process for forming a sod roll from a strip of sod; paragraph 1 of page 6; paragraphs 1-4 of page 9), the system and method comprising: rotating a plurality of friction elements (rotating the belts 48a and 48b as shown by arrows in figure 4 which engage the leading edge of the strip of sod; figures 3, 4; paragraph 1-2 of page 9), each of the plurality of friction elements having an endless friction outer surface (endless outer surface of belts 48a and 48b; figures 3, 4) with a sheet-engaging portion positioned to engage an end of the flexible sheet when lying in a substantially horizontal position (as shown, as belts 48a and 48b rotate upward in the direction of arrows, the leading edge of the horizontally traveling strip of sod will be picked up and carried upwardly by belts 48a and 48b, causing the leading edge to wrap itself around tube 28; figures 3-5; paragraph 1 of page 9), such that the sheet engaging portions thereof move upwardly (the portion of belts 48a and 48b that engage the leading edge of the strip of sod pick up and carry the sod with it upwardly; paragraph 1 of page 9); bringing the plurality of rotating friction elements into engagement with an end of the flexible sheet such that the upward movement of the sheet-engaging portions causes the end of the flexible sheet to curl upwardly over a remainder of the sheet to begin the rolling up of the flexible sheet (as shown, as belts 48a and 48b rotate upward in the direction of arrows, the leading edge of the strip of sod will be picked up and carried upwardly by belts 48a and 48b, causing the leading edge to wrap itself around tube 28 over the unrolled portion to form a roll of sod; figures 3-5; paragraph 1 of page 9).

Since the common technical features are previously disclosed by the Vissers reference, the common features are not special and so Groups I and II lack unity.