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(54) Title: APPLIANCE FOR MITIGATING SOIL ABRASION WEAR OF TOOL ATTACHMENT FRAME SHANKS

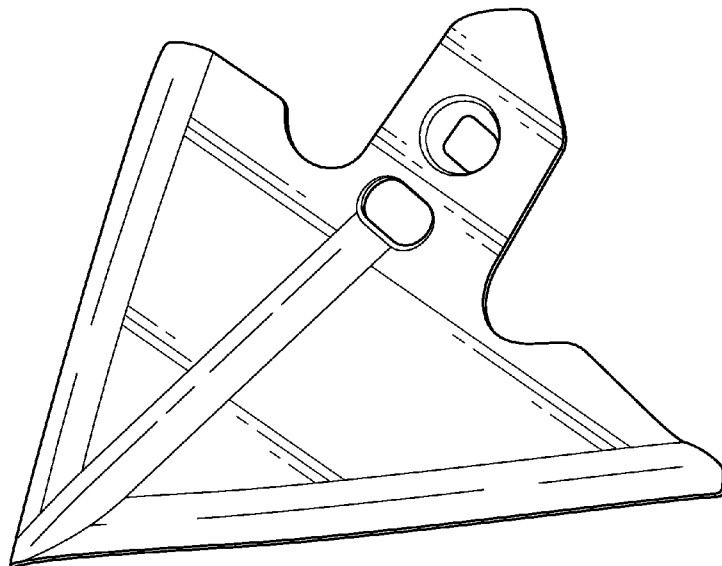


FIG. 1

(57) Abstract: An appliance can be used to mitigate or even eliminate wear from soil abrasion on the tine or shank of a cultivator. The appliances is made of a polymer and is positioned between the tine or shank and a sweep. The appliance is conveniently replaced whenever a worn sweep is replaced. By protecting the tine or shank from wear, the comparatively much more expensive tine or shank can be replaced at much longer intervals. This can save both equipment costs and downtime.



- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

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**TITLE**                    **APPLIANCE FOR MITIGATING SOIL ABRASION  
WEAR OF TOOL ATTACHMENT FRAME SHANKS**

**INVENTOR:**            **GERTSON, Ronald**

### **BACKGROUND**

1.     **Field of the Disclosure**

[0001] The invention relates to farming implement. The invention particularly relates to appliances for mitigating soil abrasion wear of farming implements.

2.     **Background Of The Disclosure**

[0002] The farmers of George Washington's day had no better tools than had the farmers of Julius Caesar's day; in fact, early Roman plows were superior to those in general use in America eighteen centuries later. Mary Bell, *History of the Plow*, <http://inventors.about.com/od/pstartinventions/a/plow.htm>. Patents for plows started appearing in the early 1800's and continued to be refined during the rest of the 19<sup>th</sup> century. Unfortunately plows merely open up the soil and form furrows. Many crops require that soil be conditioned using a cultivator.

[0003] After soil has been plowed, tools used to prepare a seed bed are generally referred to as cultivators. Cultivation is the act of breaking up the soil, that is breaking down large lumps of soil into smaller particles. Early in the history of cultivation a harrow was used for this purpose. It was early in the 18<sup>th</sup> century that crude cultivators began to be employed. The now familiar S-tine (sometimes also referred to as a S-shank or Danish tine) cultivators, C-shank cultivators, and parabolic shank cultivators (sometimes also referred to as ripper shank) cultivators are all widely employed; generally for different purposes in modern farming.

[0004] When employed in modern farming agricultural equipment typically includes a tool frame mounted on a wheel assembly and a trailer hitch for attachment to a tractor or the like. Conventional mounting assemblies used in agricultural equipment provide for rigidly attaching the tool frames to wheel assemblies for mobility.

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Individual cultivator tools are attached to the tool frame. In many instances, it is desirable to put a point (sometimes referred to as a “sweep”) on at least some of the cultivator tools.

[0005] It is to be expected that during the course of use the cultivator sweeps will wear out due to abrasion from the soil being cultivated. It would be desirable in the art to mitigate or eliminate where on the cultivator tines to which the sweeps are attached.

### SUMMARY

[0006] In one aspect, the invention is an appliance useful for eliminating or mitigating wear of a cultivator shank having attached thereto a cultivator sweep, comprising a polymer body configured to attach to the cultivator shank using an attachment device of the cultivator sweep, further configured to shield the wear area on the cultivator shank from wear due to abrasion by soil.

[0007] In another aspect, the invention is a system for cultivating soil comprising an appliance useful for eliminating or mitigating wear of a cultivator shank having attached thereto a cultivator sweep, comprising a polymer body configured to attach to the cultivator shank using an attachment device of the cultivator sweep, further configured to shield the wear area on the cultivator shank from wear due to abrasion by soil.

[0008] A method for performing maintenance on a cultivator system wherein the cultivator system comprises an appliance useful for eliminating or mitigating wear of a cultivator shank having attached thereto a cultivator sweep, comprising a polymer body configured to attach to the cultivator shank using an attachment device of the cultivator sweep, further configured to shield the wear area on the cultivator shank from wear due to abrasion by soil, an S-tine shank, and a sweep, the method comprising replacing the appliance when replacing a worn sweep.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

[0009] The other objects, features and advantages will occur to those skilled in the art from the following description of the preferred embodiment and the accompanying drawings in which:

**Figure 1** is an illustration of cultivator sweep;

**Figure 2** is an illustration of an S-tine shank;

**Figure 3** is an illustration of an S-tine shank and sweep attached to a cultivator tool frame;

**Figure 4** is an illustration of an S-tine shank and sweep with an appliance of the application in place;

**Figure 5** is an illustration of a 1<sup>st</sup> face of an appliance of the application; and

**Figure 6** is illustration of a 2<sup>nd</sup> face of the appliance of the application.

### **DESCRIPTION**

[0010] In one embodiment, the invention is an appliance useful for eliminating or mitigating wear of a cultivator shank having attached thereto a cultivator sweep, comprising a polymer body configured to attach to the cultivator shank using an attachment device of the cultivator sweep, further configured to shield the wear area on the cultivator shank from wear due to abrasion by soil.

[0011] For the purposes of this application, the term “sweep” means the article of manufacture illustrated in **Figure 1**. This article is applied to the end of a cultivator tine and functions to penetrate and then break up soil, sweeping the broken ups wall to the side as it is moved through the soil.

[0012] For the purposes of this application the term “S-tine” means the article of manufacture illustrated in **Figure 2**. This article is referenced in the paragraph immediately above. It is shaped like a stylized “S.” in Figure 2, the sweep attaches at the bottom of this figure while the S tine attaches to a cultivator tool frame at the top of this figure. For purposes of clarity, **Figure 3** shows a cultivator tool frame having attached thereto several S-tines cultivators wherein each of the cultivators has attached thereto a sweep.

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[0013] In one embodiment, an appliance of the application is prepared from a polymer. While any polymer known to be useful to those of ordinary skill in the art of making polymer articles of manufacture may be used prepare the appliance, it is desirable that the polymer used be one that will resist where from abrasive contact with soil. It would also be desirable that the polymer be one that is not excessively expensive. In one embodiment, the polymer is polyethylene, polypropylene, high density polyethylene, high density poly propylene, and combinations thereof.

[0014] In another embodiment of the invention, the polymer used to prepare the appliance is an ultra high density polyethylene. In another embodiment, the polymer used to prepare the appliance is an ultra high molecular weight polyethylene. Examples of commercially available ultra-high molecular weight polyethylene include "HI-ZEX MILLION" manufactured by Mitsui Petrochemical Industries, Ltd. and "Hostalen GUR" manufactured by Hoechst AG.

[0015] The appliances of the application are configured to attach to the cultivator shank using an attachment device of the cultivator sweep. Generally speaking, the sweep is attached to the shank or tine of a cultivator by means of a bolt or bolts. However for the purposes of this application the attachment device can be any known to be useful to those of ordinary skill in the art. Such device attachments include but are not limited to screws, cotter pins, clamps, and the like.

[0016] Turning to figure 4, an S-tine shank and sweep with an appliance of the application in place is illustrated (400). The S-tine (401) has a sweep (403) attached. In between the sweep and the S-tine is an appliance of the application (402). Finally, the top of an attachment device (404) can be seen on the face of the sweep.

[0017] Turning to **Figure 5**, a 1<sup>st</sup> face of the appliance is illustrated. This face of the appliance would be turned towards the direction of the soil and away from the tine or shank of the cultivator. The flat portion of the appliance would be that part which extends above the sweep.

[0018] Turning to **Figure 6**, a 2<sup>nd</sup> face the appliance is illustrated. This face of the appliance would be turned towards the direction of the tine or shank. This particular appliance is configured to fit against a rounded cultivator. The cavity could as easily be rectangular to fit against a rectangular cultivator. Note that in both figures 5 and 6

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there's a hole present to allow the attachment device of the sweep to pass through as it connects the sweep to the shank or tine. In some embodiments, where the attachment device is not sufficiently long to allow for the extra space taken by the appliance, a longer attachment device can be employed.

[0019] The appliance body generally speaking has 2 zones. A 1<sup>st</sup> zone which goes between the sweep and the tine or shank; and a 2<sup>nd</sup> zone which extends up above the sweep along the upper face of the tine or shank.

[0020] While an appliance of the application may be employed with any type of cultivator, in some embodiments it may be desirable to employ it with an S-tine shank. S-tine shanks are generally prepared using spring steel. This is in marked contrast to other cultivators. For example C-shank cultivators are generally made out of cast iron or steel.

[0021] The use of spring steel for the S-tine shanks allows more energy to be input in the soil, especially in lateral motions allowing for more effective pulverization of soils, especially soft soils. It is the motion of the spring steel which tends to require more wear resistant polymers when preparing the appliances of the application. The vibrations from the spring stilled in effect create where the S-tines come into contact with the appliance.

[0022] For the purposes of this application the term "wear area" when used in association with an appliance the application means the part of the appliance that is in contact with the S-tine. This is because the S-tine can cause wear due to the vibrational movements of the spring steel.

[0023] Also for the purposes of this application the term "wear area" when used in association with a cultivator shank or tine means that part of the shank or tine which is in contact with the soil when it is moved through a soil.

[0024] The appliances of the application function by shielding the tine or shank of the cultivator from soil as the tine or shank and sweep or moved through soil. By reducing the abrasive wear on the shank or tine, maintenance can be reduced because the user does not have to replace the comparatively expensive shank or tine. In the alternative, the user merely has to replace the appliances as they wear out. Since sweeps wear out much more quickly than tines or shanks, then in one embodiment of

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the invention the appliance of the application would be replaced at the same time as a worn out sweep.

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**CLAIMS**

1. An appliance useful for eliminating or mitigating wear of a cultivator shank or tine having attached thereto a cultivator sweep, comprising a polymer body configured to attach to the cultivator shank using an attachment device of the cultivator sweep, further configured to shield the wear area on the cultivator shank from wear due to abrasion by soil.
2. A system for cultivating soil comprising an appliance of claim 1, an S-tine shank, and a sweep.
3. A method for performing maintenance on a cultivator system wherein the cultivator system comprises an appliance of claim 1, an S-tine shank, and a sweep, the method comprising replacing the appliance when replacing a worn sweep .

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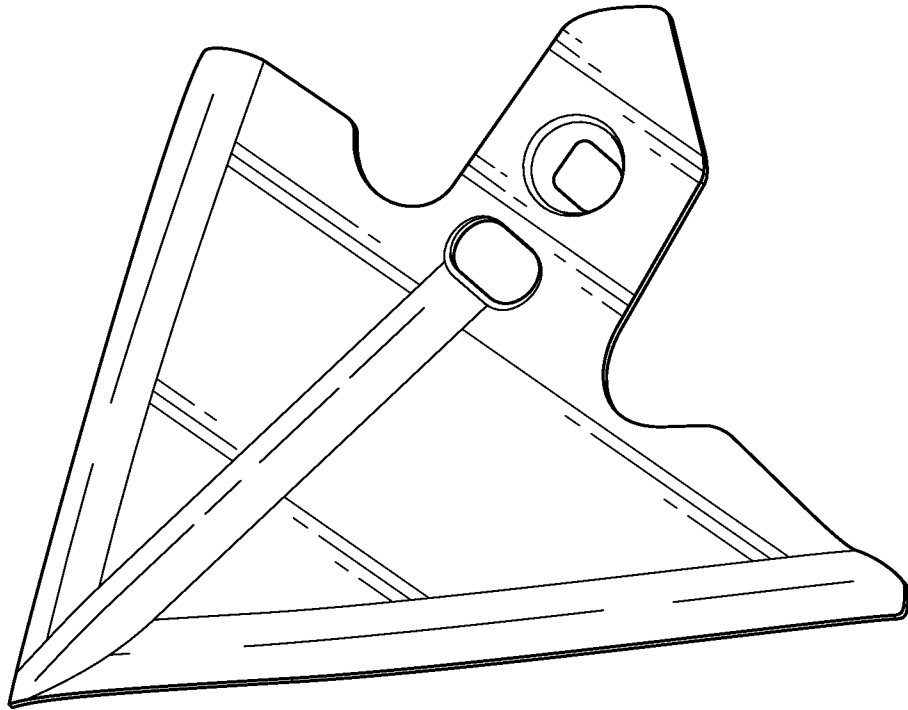


FIG. 1

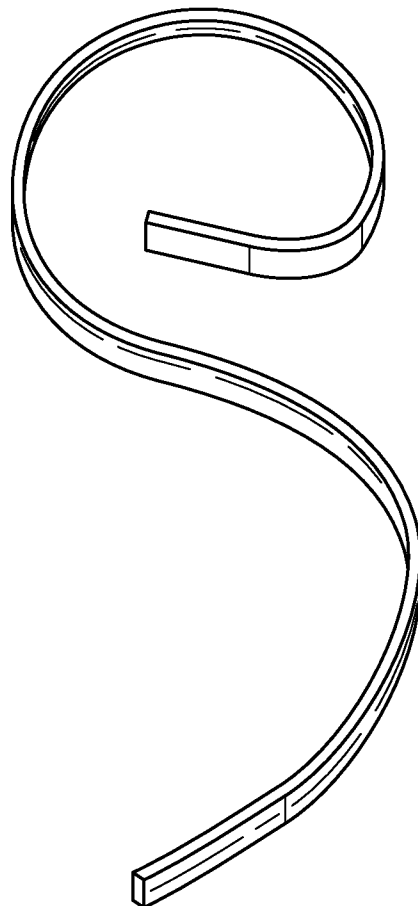


FIG. 2

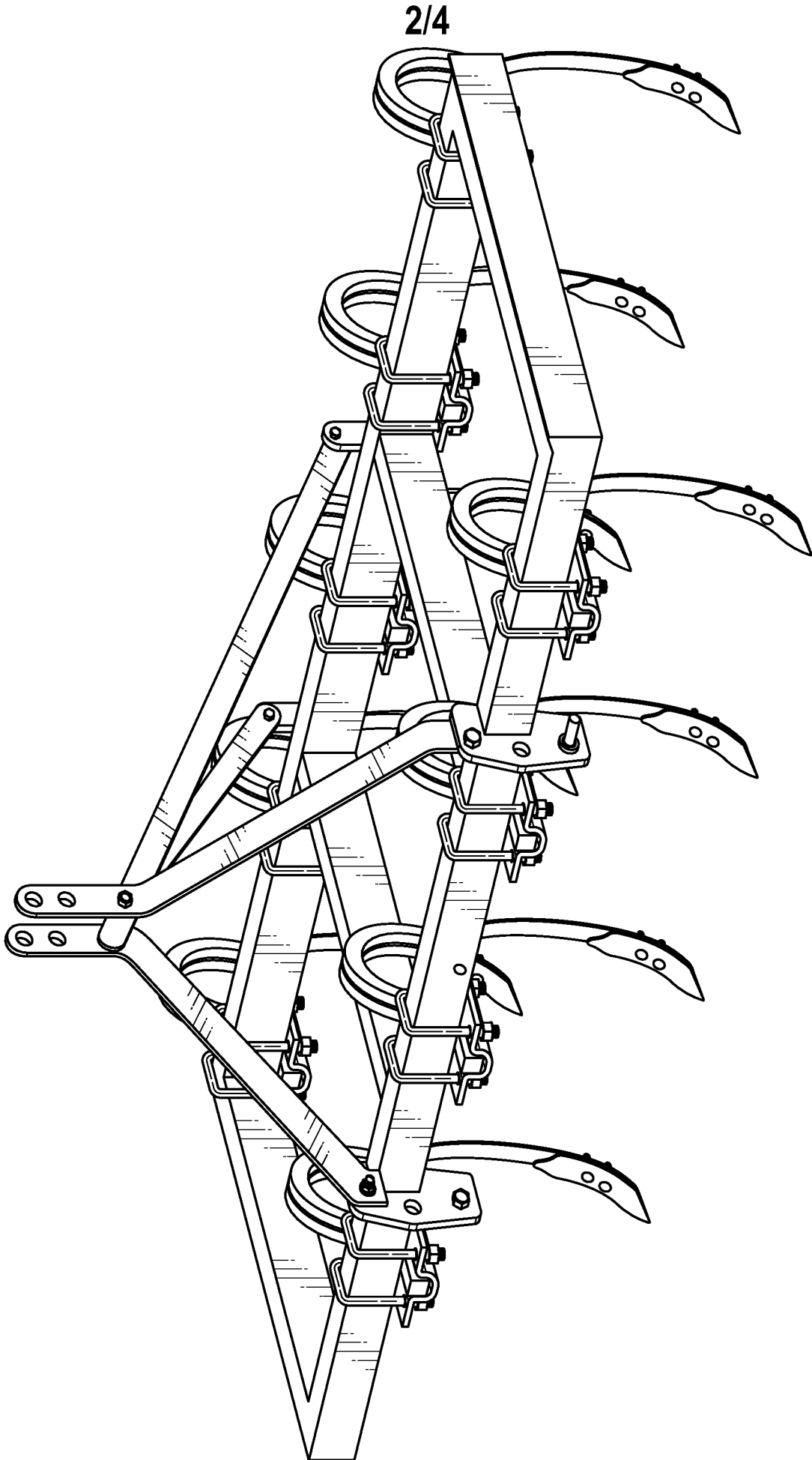


FIG. 3

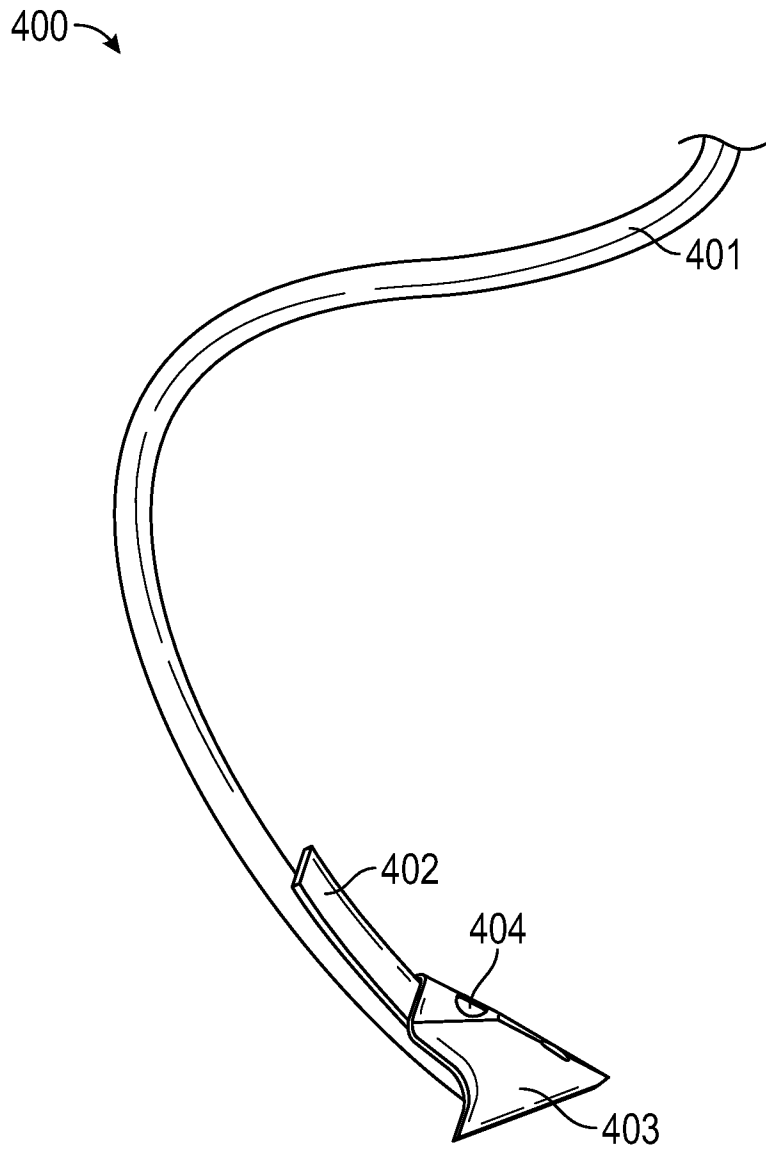


FIG. 4

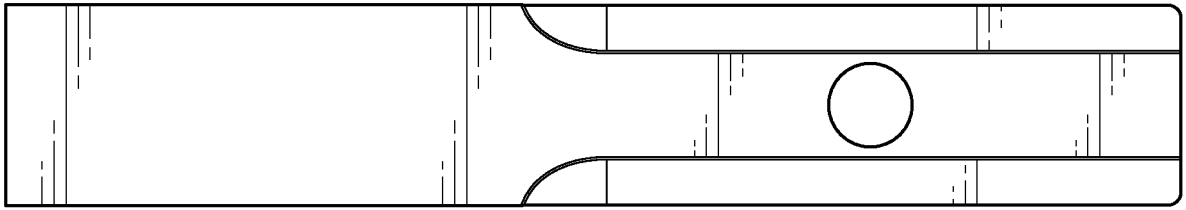


FIG. 5

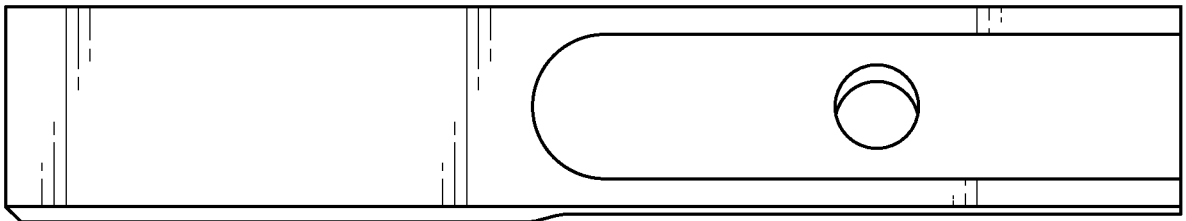


FIG. 6

**A. CLASSIFICATION OF SUBJECT MATTER****A01B 15/02(2006.01)i, A01B 15/06(2006.01)i, A01B 3/00(2006.01)i**

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)

A01B 15/02; A01B 23/02; A01B 39/20; A01B 35/22; A01C 5/00; A01B 35/26; A01B 15/06; A01B 3/00

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

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

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

eKOMPASS(KIPO internal) &amp; Keywords: cultivator shank, cultivator sweep, shield, soil, abrasion

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5456323 A (EARL E. HILL) 10 October 1995 See column 3, line 62 - column 4, line 1, claims 1-2 and figure 5.	1-3
Y	US 6315058 B1 (EUGEN J. BIRKENBACH et al.) 13 November 2001 See column 2, lines 16-21, claims 1-3 and figures 1-3.	1-3
A	US 2008-0035359 A1 (DAVE HUNDEBY et al.) 14 February 2008 See claims 1-10 and figure 10.	1-3
A	US 6571884 B1 (LEONARD HORVATH et al.) 03 June 2003 See claim 1 and figures 1-4.	1-3
A	US 2005-0172871 A1 (MARK ANTHONY LINNEBUR et al.) 11 August 2005 See claims 1-5 and figure 2.	1-3

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

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"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)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"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

"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

"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

"&amp;" document member of the same patent family

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Name and mailing address of the ISA/KR

International Application Division

Korean Intellectual Property Office

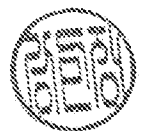
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**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/US2016/065847**

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 05456323 A	10/10/1995	US 6088955 A	18/07/2000
US 6315058 B1	13/11/2001	None	
US 2008-0035359 A1	14/02/2008	CA 2573733 A1	16/02/2006
		CA 2573733 C	18/12/2012
		EP 1776007 A1	25/04/2007
		EP 1776007 B1	14/11/2012
		FR 2872994 A1	20/01/2006
		FR 2872994 B1	02/11/2007
		UA 92151 C2	11/10/2010
		WO 2006-016033 A1	16/02/2006
US 6571884 B1	03/06/2003	AT 271751 T	15/08/2004
		AU 2001-500700 A	10/05/2001
		AU 766213 B2	09/10/2003
		CA 2284457 A1	04/04/2001
		CA 2284457 C	03/12/2002
		DE 60012569 T2	15/09/2005
		DK 1235476 T3	25/10/2004
		EP 1235476 A1	04/09/2002
		EP 1235476 B1	28/07/2004
		ES 2225218 T3	16/03/2005
		WO 01-24603 A1	12/04/2001
US 2005-0172871 A1	11/08/2005	US 7055619 B2	06/06/2006