ATTACHMENT HEAD FOR VEGETATION CUTTING DEVICES

An attachment head (10) is disclosed for use on rotary vegetation trimming devices, such as for trimming weeds. The attachment head (10) is a unitary design, preferably made from injection molded plastic. The head (10) includes a means (12) for attaching it to a variety of trimmer models, a means (22) for retaining a working portion of cutting line (14) offset from a central rotation axis, and a means (24) for storing extra cutting line within the head (10). Serrated cutting blades (16) may be installed on one embodiment of the head (10) instead of cutting line (14). Collapsible plastic fasteners (30) are used to pivotally secure the blades (16) to reduce cost and allow the blades (16) to be installed quickly without tools. Preferably, a metal sleeve (40) is installed between the fasteners (30) and the blades (16). The inventive design allows the head (10) to be produced inexpensively and increases ease of use.
### FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>AL</td>
<td>Albania</td>
<td>ES</td>
<td>Spain</td>
<td>LS</td>
<td>Lesotho</td>
</tr>
<tr>
<td>AM</td>
<td>Armenia</td>
<td>FI</td>
<td>Finland</td>
<td>LT</td>
<td>Lithuania</td>
</tr>
<tr>
<td>AT</td>
<td>Austria</td>
<td>FR</td>
<td>France</td>
<td>LU</td>
<td>Luxembourg</td>
</tr>
<tr>
<td>AU</td>
<td>Australia</td>
<td>GA</td>
<td>Gabon</td>
<td>LV</td>
<td>Latvia</td>
</tr>
<tr>
<td>AZ</td>
<td>Azerbaijan</td>
<td>GB</td>
<td>United Kingdom</td>
<td>MC</td>
<td>Monaco</td>
</tr>
<tr>
<td>BA</td>
<td>Bosnia and Herzegovina</td>
<td>GE</td>
<td>Georgia</td>
<td>MD</td>
<td>Republic of Moldova</td>
</tr>
<tr>
<td>BB</td>
<td>Barbados</td>
<td>GH</td>
<td>Ghana</td>
<td>MG</td>
<td>Madagascar</td>
</tr>
<tr>
<td>BE</td>
<td>Belgium</td>
<td>GN</td>
<td>Guinea</td>
<td>MK</td>
<td>The former Yugoslav</td>
</tr>
<tr>
<td>BF</td>
<td>Burkina Faso</td>
<td>GR</td>
<td>Greece</td>
<td>ML</td>
<td>Republic of Macedonia</td>
</tr>
<tr>
<td>BG</td>
<td>Bulgaria</td>
<td>HU</td>
<td>Hungary</td>
<td>MN</td>
<td>Mongolia</td>
</tr>
<tr>
<td>BJ</td>
<td>Benin</td>
<td>IE</td>
<td>Ireland</td>
<td>MR</td>
<td>Mauritania</td>
</tr>
<tr>
<td>BR</td>
<td>Brazil</td>
<td>IL</td>
<td>Israel</td>
<td>MW</td>
<td>Malawi</td>
</tr>
<tr>
<td>BY</td>
<td>Belarus</td>
<td>IS</td>
<td>Iceland</td>
<td>MX</td>
<td>Mexico</td>
</tr>
<tr>
<td>CA</td>
<td>Canada</td>
<td>IT</td>
<td>Italy</td>
<td>NE</td>
<td>Niger</td>
</tr>
<tr>
<td>CF</td>
<td>Central African Republic</td>
<td>JP</td>
<td>Japan</td>
<td>NL</td>
<td>Netherlands</td>
</tr>
<tr>
<td>CG</td>
<td>Congo</td>
<td>KE</td>
<td>Kenya</td>
<td>NO</td>
<td>Norway</td>
</tr>
<tr>
<td>CH</td>
<td>Switzerland</td>
<td>KG</td>
<td>Kyrgyzstan</td>
<td>NZ</td>
<td>New Zealand</td>
</tr>
<tr>
<td>CI</td>
<td>Côte d'Ivoire</td>
<td>KP</td>
<td>Democratic People's</td>
<td>PL</td>
<td>Poland</td>
</tr>
<tr>
<td>CM</td>
<td>Cameroon</td>
<td>KR</td>
<td>Republic of Korea</td>
<td>PT</td>
<td>Portugal</td>
</tr>
<tr>
<td>CN</td>
<td>China</td>
<td>KZ</td>
<td>Kazakhstan</td>
<td>RO</td>
<td>Romania</td>
</tr>
<tr>
<td>CU</td>
<td>Cuba</td>
<td>LC</td>
<td>Saint Lucia</td>
<td>RU</td>
<td>Russian Federation</td>
</tr>
<tr>
<td>CZ</td>
<td>Czech Republic</td>
<td>LI</td>
<td>Liechtenstein</td>
<td>SD</td>
<td>Sudan</td>
</tr>
<tr>
<td>DE</td>
<td>Germany</td>
<td>LK</td>
<td>Sri Lanka</td>
<td>SE</td>
<td>Sweden</td>
</tr>
<tr>
<td>DK</td>
<td>Denmark</td>
<td>LR</td>
<td>Liberia</td>
<td>SG</td>
<td>Singapore</td>
</tr>
<tr>
<td>EE</td>
<td>Estonia</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SI</td>
<td>Slovenia</td>
<td>SK</td>
<td>Slovakia</td>
<td>SN</td>
<td>Senegal</td>
</tr>
<tr>
<td>SZ</td>
<td>Swaziland</td>
<td>TG</td>
<td>Togo</td>
<td>TD</td>
<td>Chad</td>
</tr>
<tr>
<td>TJ</td>
<td>Tajikistan</td>
<td>TM</td>
<td>Turkmenistan</td>
<td>TR</td>
<td>Turkey</td>
</tr>
<tr>
<td>TT</td>
<td>Trinidad and Tobago</td>
<td>UA</td>
<td>Ukraine</td>
<td>UK</td>
<td>Uganda</td>
</tr>
<tr>
<td>US</td>
<td>United States of America</td>
<td></td>
<td></td>
<td>US</td>
<td>United States of America</td>
</tr>
<tr>
<td>UZ</td>
<td>Uzbekistan</td>
<td>VN</td>
<td>Viet Nam</td>
<td>YU</td>
<td>Yugoslavia</td>
</tr>
<tr>
<td>ZW</td>
<td>Zimbabwe</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ATTACHMENT HEAD FOR VEGETATION CUTTING DEVICES

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to vegetation rotary cutting devices, and in particular to a cutting head for attachment to various brands of such devices.

2. Discussion of the Prior Art

Many manufacturers provide rotary cutting devices for cutting and trimming lawns, weeds, underbrush and the like. These devices typically use a string or line that rotates at a high rate of speed at the end of an elongated, hand-held device. The devices are typically powered by a gasoline engine for professional use, or an electric motor for use by home owners.

Due to the widespread use of such trimming devices, a market has emerged for third parties to supply replacement line and accessory cutting heads for the equipment owners. These replacement items offer advantages not found in the parts supplied by the original equipment manufacturers. For instance, the replacement items offered by third party suppliers cost less partly because of the high volumes afforded by a single accessory fitting many different brands and styles of trimmers. Third party suppliers have advanced trimmer technology by designing more efficient cross-sections on trimmer lines, and by providing serrated plastic blades for replacing trimmer lines to improve cutting performance. New attachment heads offer greater simplicity and ease of use.
Each of the serrated plastic blades of previously existing attachment heads is pivotably secured to the main body of the attachment head by a steel shoulder screw and lock nut. For example, please see U.S. Patent No. 5,430,943 issued to Anthony L. Lee on July 11, 1995, incorporated herein by reference. While this arrangement provides a secure means for fastening the blades, the shoulder screws and nuts are relatively expensive. This attachment method requires significant assembly time during manufacture, further increasing costs. The end user must take extra time and use tools when removing and installing blades. Even with lock nuts, the possibility of the shoulder screws loosening during operation exists, especially if not properly tightened by the user.

Previously existing attachment heads typically have a main body that is assembled from several plastic pieces. This requires more fasteners or complex manufacturing procedures to form the assembled main body. Metal eyelets are used to line the holes where trimmer line passes through the assembled main body, adding complexity and increasing the molding and/or assembly costs. Separate adapter pieces are typically used to mount the attachment head on the vegetation trimmer, with different adapter pieces used for different trimmers. All of these various parts tend to increase costs, add to user confusion, and increase the potential that a particular piece will be lost, omitted during assembly, or will not fit correctly.

Other drawbacks to previously existing attachment heads include the awkward manner in which fixed trimmer line is replaced (i.e. on heads that do not feed out new trimmer line during use.) Often, tools must be used to take the attachment head apart
and/or off of the trimmer. Spare line is not provided on the attachment head, or if it is, it must be completely removed when replacing the working portion of the fixed trimmer line. Threading new line into the head can also be cumbersome, and sometimes involves additional clamping parts.

What is needed to advance the art of trimmer attachment heads are designs that are even simpler to use and lower in cost, but which maintain the high reliability and performance of existing designs.

SUMMARY OF THE INVENTION

The present invention provides a cutter attachment head that is less expensive to manufacture and easier to use than the prior art.

In accordance with one aspect of the present invention, collapsible plastic fasteners are utilized to attach serrated cutting blades to the main body of the attachment head. This arrangement allows the blades to be changed quickly and without the need for tools. The blade is simply inserted into position, and a plastic fastener is then snapped into place by hand. Once the plastic fastener is snapped into place, it cannot rattle loose. In the preferred embodiment, a metal sleeve is placed over the plastic fastener for added durability.

In accordance with another aspect of the present invention, a main body of the inventive attachment head includes means for retaining the working portion of the trimmer line, means for storing spare line, and means for attaching the main body to the trimmer, yet the main body is formed from a single, unitary piece, preferably of injection molded plastic. In other words, the eyelets, adapter pieces, multi-part bodies, etc. of the previously existing trimmer heads
described above are eliminated by the present invention to yield an attachment head that is low cost, reliable and easy to use.

**BRIEF DESCRIPTION OF THE DRAWINGS**

Figure 1A is a partially broken away top plan view showing a first embodiment of the present invention.

Figure 1B is a cross-sectional, side elevation view taken along line 1B-1B in Fig. 1A.

Figure 1C is a cross-sectional, end elevation view taken along line 1C-1C in Fig. 1A.

Figure 2A is a top plan view similar to Fig. 1A showing the first embodiment configured with trimmer line.

Figure 2B is a cross-sectional, side elevation view similar to Fig. 1B showing the first embodiment configured with trimmer line.

Figure 3A is a top plan view similar to Fig. 1A showing the first embodiment configured with serrated cutting blades.

Figure 3B is a cross-sectional, side elevation view similar to Fig. 1B showing the first embodiment configured with serrated cutting blades.

Figure 4A is a top plan view showing a serrated cutting blade.

Figure 4B is a side elevation view showing a serrated cutting blade.

Figure 4C is an end elevation view showing a serrated cutting blade.

Figure 5A is a side elevation view showing a collapsible pin.

Figure 5B is a top view showing a collapsible pin.

Figure 6A is a top view showing a second embodiment of the present invention.
Figure 6B is a cross-sectional view taken along line 6B-6B in Figure 6A.

Figure 6C is a cross-sectional view taken along line 6C-6C in Figure 6A.

Figure 6D is a bottom view showing the second embodiment.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to Figs. 1A-1C, a first embodiment of the present invention is shown. Combination trimmer attachment head 10 is provided with two barbed fingers 12 for securing head 10 to a vegetation trimmer unit (not shown), such as a 10, 12 or 14 inch trimmer manufactured by The Toro Company of Bloomington, Minnesota. Head 10 snaps into place and is driven by the trimmer in a rotary fashion in the direction of either arrow A or B shown in Fig. 1A, depending on the type of trimmer used. Head 10 can be configured for cutting with trimmer line 14 as shown in Figs. 2A-2B, or with serrated plastic blades 16 as shown in Fig. 3A-3B.

Referring to Fig. 2A-2B, a fixed portion of trimmer line 14 is shown installed on trimmer head 10. Line 14 is inserted into a central, interior region 18 of head 10 through aperture 20, woven through line locking posts 22, and out through another aperture 20 on the opposite side of head 10. A sufficient length of line 14 remains on each side of the exterior of head 10 to allow the lines 10 to cut vegetation when rotating. Locking posts 22 prevent line 10 from shifting during use.

L-shaped securing arms 24 are provided in the interior region 18 of head 10 to hold spare trimmer line (not shown) in a coiled fashion. Each arm 24 has an upright portion 26 for securing the coiled
spare line from radially outward movement, and an inwardly extending portion 27 for securing the line from upward movement. A cutout 28 through the lower portion of head 10 is located adjacent to each arm 24 to allow tooling to form arms 24 during the molding process.

The main body of head 10 (in other words everything shown in Figs. 1A-1C) is formed from a single piece of injection molded plastic. Preferably, a glass filled nylon compound is used to obtain a higher heat deflection temperature (HDT.) Since typical trimmer line 14 and typical prior art heads (not shown) are made of unfilled nylon which has a HDT of about 225°F, the trimmer line will stick to the head if the line reaches this temperature during operation. To eliminate this problem, prior art heads incorporate metal eyelets so that the trimmer line does not directly contact the head when the line passes radially outward through the head.

By forming head 10 from a glass filled nylon compound which has a HDT of about 450°F, and by providing large radius edges 29 on both openings of each aperture 20, it has been discovered that the metal eyelets can be omitted. This not only reduces the number of extra parts, but allows head 10 to be formed in a unitary piece rather than in two halves to accommodate the eyelets. Furthermore, by forming the barbed fingers 12 and the securing arms 24 into the main body of head 10 as shown, no additional parts are required to perform the functions of attaching head 10 to the trimmer or storing extra line 14 in head 10, respectively.

Referring to Figs. 3A-5B, trimmer line 14 can be replaced with serrated plastic blades 16. Blades 16 are pivotally attached to the main body of head 10 by collapsible plastic fasteners 30. As shown in Fig.
4A, blade 16 has a hole 32 through one end, and serrations 34 extending along both edges to its other end. To install blade 16 on head 10, hole 32 in blade 16 is lined up with bore 36 in head 10 as the end of blade 16 is inserted into slot 38 in head 10. Preferably, a tubular metal sleeve 40, such as of brass, is placed over fastener 30 before it is inserted into bore 36 and through hole 32. Fastener 30 has four prongs 42 (best seen in Figs. 5A and 5B) that collapse as they pass through bore 36. As prongs 42 emerge from the upper end of bore 36 into countersink 44, they expand outwardly to lock fastener 30 into place. In other words, once fastener 30 is snapped into place, prongs 42 engage countersink 44 to inhibit fastener 30 from moving downward, and fastener head 46 engages counterbore 48 to prevent fastener 30 from moving upward. Sleeve 40 is captivated between head 46 and stepped down portion 50 of bore 36, and serves to increase the durability of fastener 30.

To remove fastener 30, the user simply pushes down on it through countersink 44 and removes fastener 30 and attached sleeve 40 from bore 36 to release blade 16. As can be seen in Fig. 3B, both ends of fastener 30 are recessed when the trimmer is in use to prevent inadvertent release of blades 16. Accordingly, an extra fastener, pen, stick, nail or other elongated object may be needed to release and remove fastener 30 from bore 36.

In an alternative design configuration (not shown), the orientation of fastener 30, countersink 44, counterbore 48, and stepped down portion 50 can be reversed such that fastener 30 is upside down and is inserted from the top. This allows gravity to urge fastener 30 into the inserted position rather than in the removal direction. In this orientation
the body of the trimmer (not shown) can also be utilized to prevent the removal of fasteners 30 while head 10 is attached to the trimmer.

Referring to Figs. 6A-6D, a second embodiment of the present invention is shown. In this embodiment only trimmer line 14 is used and not serrated blades. This second trimmer head 52 is attached to trimmers that have a center spindle or threaded portion, such as manufactured by Echo, Inc. of Lake Zurich, Illinois, or Ryobi of Chandler, Arizona.

Three different sizes of hex-shaped apertures 54a, 54b, 54c are concentrically located on the central axis 56 for accommodating various sizes and types of fasteners to attach head 52 to the trimmer. For trimmer models having a threaded spindle, head 52 and then the spindle nut are placed over the spindle and are turned together until the nut snugs down into one of the three hex-shaped apertures 54a, 54b, 54c. Similarly, for trimmers having a central threaded portion rather than a spindle, an appropriately sized bolt is placed through center hole 58 until its head drops into one of the three hex-shaped apertures 54a, 54b, 54c. The bolt is then threaded into the center of the trimmer and tightened by turning the entire head 52. Since hex-shaped apertures 54a, 54b, 54c are molded into head 54, no tools are needed to attach head 52 to the trimmer, and there are no separate adapter pieces to install, get misplaced, or increase the cost of head 52.

Referring to Fig. 6D, the preferred installation of trimmer line 14 is shown. Two lines 14 are used to create four ends that extend outside of head 52 for cutting vegetation. Eight apertures are provided through peripheral wall 60 from the interior region 62 of head 10 to the exterior for threading trimmer lines 14. These consist of four evenly spaced main
apertures 64 and four line locking apertures 66 located in pairs between opposite sets of main apertures 64. Each line 14 is inserting into the interior region 62 through a main aperture 64, out through an associated locking aperture 66 and back in through the adjacent locking aperture 66, and out again through the other associated main aperture 64. As with the previous embodiment, this arrangement provides enough curve on line 14 to hold it in place during use, but not so much as to provide a stress concentration on line 14 that could cause it to fail. This arrangement is also simple enough for the user to perform without using tools or disassembling the head. Similar to the first embodiment, a large radius 67 is formed on each side of main apertures 64, and head 52 is preferably made of a glass filled nylon compound. Flanges 68 and 70 are provided above and below apertures 64 and 66 to prevent line 14 from getting sheared off or damaged during use.

As with the first embodiment, L-shaped securing arms 72 are provided in the interior region 62 of head 52 to hold spare trimmer line (not shown) in a coiled fashion. Each arm 72 has a downwardly depending portion 74 for securing the coiled spare line from radially outward movement, and an inwardly extending portion 76 for securing the line from downward movement. A cutout 78 through the angled hub portion 80 is located adjacent to each arm 72 to allow tooling to form arms 72 during the molding process.

The above descriptions and drawings are for illustrative purposes only, and are not exhaustive of possible alternate embodiments of the invention. It is to be understood that the present invention is not limited to the sole embodiments described above and illustrated herein, but encompasses any and all
variations falling within the scope of the appended claims.
What is claimed as the invention is:

1. A trimmer attachment head for cutting vegetation comprising:
   a main body removably attachable to a vegetation cutting device, the main body being rotably drivable by the vegetation cutting device about a central rotation axis of the main body, the main body having a first hole offset from the central rotation axis;
   a rigid blade having a distal and a proximal end, the proximal end having a second hole therethrough for alignment with the first hole and pivotally retaining the rigid blade to the main body, the blade having a sharp edge for cutting vegetation; and
   a collapsible plastic fastener receivable through the first and second holes for pivotally retaining the rigid blade to the main body, thereby allowing the blade to be removably attached to the main body quickly without tools.

2. A trimmer attachment head according to claim 1 further comprising a metal sleeve located over the plastic fastener and interposed between the fastener and the second hole through the blade.

3. A trimmer attachment head for cutting vegetation comprising:
   a main body removably attachable to a vegetation cutting device, the main body being rotably drivable by the vegetation cutting device about a central rotation axis of the main body, the main body having a central interior
region and a periphery region outwardly disposed therefrom;

means for retaining a first cutting line on
the main body offset from the central rotation
axis for cutting vegetation, the retaining means
including at least one aperture through the main
body from the central region to the periphery
region, the first cutting line directly
contacting the edge of the aperture;

means for storing extra cutting line in the
central interior region of the main body for
future use on the retaining means, the storing
means allowing the extra cutting line to be
stored without blocking access to the first
cutting line aperture;

wherein the main body, the retaining means and
the storing means are all formed together on a single
unitary piece.

4. A trimmer attachment head according to
claim 3 wherein the single unitary piece is made of
injection molded plastic.

5. A trimmer attachment head according to
claim 3 further comprising means for attaching the
main body to the vegetation cutting device, the
attaching means having a plurality of hex-shaped
apertures concentrically located on the central
rotation axis for accommodating various sizes of
fasteners to attach the main body to the vegetation
cutting device, the attaching means being integrally
formed on the single unitary piece.

6. A trimmer attachment head according to
claim 3 wherein the storing means includes a
plurality of L-shaped fingers integrally formed on
the single unitary piece and located radially outward from the central rotation axis, each finger having a proximal portion substantially parallel to the central axis and a distal portion substantially perpendicular to and extending towards the central axis, the fingers cooperating to retain the extra cutting line therebetween in a coiled manner.
**INTERNATIONAL SEARCH REPORT**

**International application No.**

PCT/US97/1619

### A. CLASSIFICATION OF SUBJECT MATTER

- **IPC(6):** A01D 34/63, 55/00
- **US CL:** 30/276, 56/12.7

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)

- **U.S.:** 30/276, 347; 56/12.7, 295

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

none

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

none

### C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>US 4,300,336 A (Miyata) 17 November 1981, Fig.1 and column 3, lines 37-39.</td>
<td>1-2</td>
</tr>
<tr>
<td>A</td>
<td>US 4,856,194 A (Lee) 15 August 1989, the entire document.</td>
<td>1-6</td>
</tr>
<tr>
<td>A</td>
<td>US 5,023,998 A (Masciarella et al.) 18 June 1991, the entire document.</td>
<td>3-6</td>
</tr>
<tr>
<td>A</td>
<td>US 5,267,429 A (Kettler et al.) 07 December, 1993, Fig.6 and column 5, lines 53-57.</td>
<td>1-2</td>
</tr>
<tr>
<td>A</td>
<td>US 5,430,943 A (Lee) 11 July 1995, the entire document.</td>
<td>1-6</td>
</tr>
<tr>
<td>A</td>
<td>US 5,433,006 A (Taguchi) 18 July 1995, the entire document.</td>
<td>3-6</td>
</tr>
</tbody>
</table>

- **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 document 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

- **Other categories:**
  - *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
  - *A* document member of the same patent family

Date of the actual completion of the international search:

08 MARCH 1998

Date of mailing of the international search report:

19 MAR 1998

Name and mailing address of the ISA/US Commissioner of Patents and Trademarks

Box PCT

Washington, D.C. 20231

Facsimile No. (703) 305-3230

Authorized officer

HWEI-SIU PAYER

Paralegal Specialist

Group 3200

Telephone No. (703) 308-1148

Form PCT/ISA/210 (second sheet)(July 1992)*
### Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international 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 II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

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

Please See Extra Sheet.

1. X 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 an additional fee, this Authority did not invite payment of any additional fee.

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.:

**Remark on Protest**

□ The additional search fees were accompanied by the applicant’s protest.

□ No protest accompanied the payment of additional search fees.
BOX II. OBSERVATIONS WHERE UNITY OF INVENTION WAS LACKING
This ISA found multiple inventions as follows:

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

Group I, claims 1-2, drawn to a trimmer attachment head.
Group II, claims 3-6, drawn to a trimmer attachment head.

The inventions listed as Groups I and II do not relate to a single 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:

The special technical feature of claim 1 appears to be the structural connection between the collapsible plastic fastener and the two holes for pivotally retaining the rigid blade to the main body of the trimmer attachment head.

The special technical feature of claim 3 appears to be the structural interrelationship between the main body and the retaining means for retaining a cutting line on the main body and means for storing extra cutting line in the main body of the trimmer attachment head.

Although a technical relationship does exist between Groups I and II, this relationship does not extend to include the special technical feature of claim 1 or claim 3. These two subjects (claim 1 and claim 3) are the proposed solutions to two separate underlying problems, and there is no link between them to form a single general inventive concept.