

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
31 July 2008 (31.07.2008)

PCT

(10) International Publication Number
WO 2008/089533 A1

(51) International Patent Classification:

G10K 5/00 (2006.01)

(21) International Application Number:

PCT/CA2007/001664

(22) International Filing Date:

18 September 2007 (18.09.2007)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

60/886,732

26 January 2007 (26.01.2007) US

(63) Related by continuation (CON) or continuation-in-part (CIP) to earlier application:

US

60/886,732 (CIP)

Filed on

26 January 2007 (26.01.2007)

(71) Applicant (for all designated States except US): **FOX 40 INTERNATIONAL INC.** [CA/CA]; 20 Warrington Street, Hamilton, Ontario L8E 3V1 (CA).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **HILLS, Graham** [CA/CA]; 10-270 Sherman Avenue North, Hamilton, Ontario L8L 6N4 (CA). **ORZEL, Steve** [CA/CA]; 10-270 Sherman Avenue North, Hamilton, Ontario L8L 6N4 (CA). **FOXCROFT, Ron** [CA/CA]; 20 Warrington Street, Hamilton, Ontario L8E 3V1 (CA).

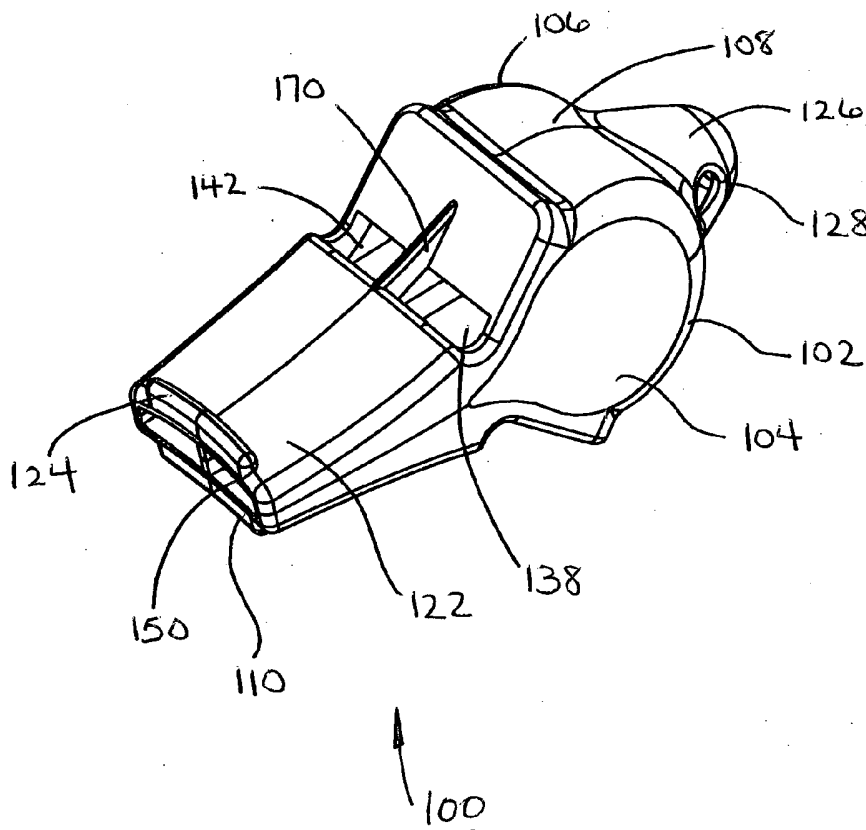
(74) Agent: **KOCH, Mark, Arthur**; 866 Main Street East, Hamilton, Ontario L8M 1L9 (CA).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, 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 (patent), UZ, VC, VN, ZA, ZM, ZW.

[Continued on next page]

(54) Title: MULTI CHAMBERED WHISTLE

FIGURE - 1



(57) Abstract: The present device is a multi chambered whistle which includes a body including a mouthpiece defining an air inlet, the air inlet in fluid communication with sound chambers. The air inlet including a vertical inlet divider for dividing the air flow into a left air flow and a right air flow and the left and right air flow communicated along a primary passage wherein the air flow being further divided into a top airflow and a bottom air flow by a horizontal air divider. Preferably wherein the leading edge of the vertical inlet divider disposed upstream of the leading edge of the horizontal air divider. Preferably wherein the top air flow being exhausted upwardly away from the body and the bottom air flow being exhausted downwardly away from the body.



(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, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*
- *of inventorship (Rule 4.17(iv))*

Published:

- *with international search report*

Title: MULTI CHAMBERED WHISTLE**Field of the Invention**

[001] This device is concerned with improvement in or to relating to whistles.

Background of the Invention

[002] There is an ever increasing need for a high quality whistle which can be produced relatively cheaply for use by the general public, or the use by persons involved in sporting events, by police forces or for marine use. Whistles are based on a fundamental principle that an edge tone is produced by an edge inside a whistle when air is blown into the mouth piece of the whistle and directed over the edge, such that the edge tone is then amplified by resonance in a sound chamber located in the vicinity of the edge. By optimising the number of sound resonance chambers and the structural arrangement of these chambers, one can optimize the volume and the quality of sound produced by the whistle.

Brief Description of the Drawings

[003] Figure 1 is a schematic top perspective view of a multi chambered whistle.

Figure 2 is a schematic left side perspective view of the multi chambered whistle.

Figure 3 is a bottom right side perspective view of the multi chambered whistle.

Figure 4 is a top plan view of the multi chambered whistle shown in Figure 1.

Figure 5 is a bottom plan view of the multi chambered whistle shown in Figure 1.

Figure 6 is a right side elevational view of the multi chambered whistle shown in Figure 1.

Figure 7 is a forward end view of the multi chambered whistle shown in Figure 1, together with cross sectional lines A/A and B/B.

Figure 8 is a schematic cross sectional view taken along lines A/A of Figure 7.

Figure 9 is a side cross-sectional view taken along lines B/B of Figure 7.

Figure 10 is a bottom plan view of the multi chambered whistle showing cross sectional lines Section C/C and Section D/D.

Figure 11 is a cross sectional view taken along lines C/C of Figure 10.

Figure 12 is a cross sectional view taken along lines D/D of Figure 10.

Figure 13 is a schematic perspective view of a bottom shell portion of the multi chambered whistle.

Figure 14 is a schematic perspective view of the central portion of the multi chambered whistle.

Figure 15 is a partial assembly perspective view of the bottom shell together with the central portion mounted therein.

Figure 16 is an assembled view of the multi chambered whistle showing the bottom shell having mounted therein the central portion, having mounted there on top the top shell.

Detailed Description of the Preferred Embodiment

[004] The multi chambered whistle shown generally as 100 in the diagrams will now be described by way of example only with reference to the attached figures.

[005] Multi chambered whistle 100 includes the following major components, namely body 102, having a right side 104, a left side 106, a top side 108 and a bottom side 110. Multi chambered whistle 100 is oriented along the longitudinal axis 112 and a transverse axis 114. The multi chambered whistle 100 can roughly be divided into three portions, namely forward portion 116, rear portion 118 and central portion 120.

[006] Forward portion 116 includes a mouth piece 122, having mouth piece protuberance 124 on both the top side 108 and bottom side 110 of multi chambered whistle 100. Rear portion 118 includes boss 126, having a transverse bore 128 defined there through.

[007] The central portion 120 of multi chambered whistle 100 includes four sound

chambers, namely first chamber 130, second chamber 132, third chamber 134 and fourth chamber 136. The central portion 120 of multi chambered whistle 100, also includes four exhaust ports, namely first exhaust port 138, second exhaust port 140, third exhaust port 142 and fourth exhaust port 144.

[008] Mouth piece 122 defines therein a primary passage 150 which is subdivided into four secondary passages which direct air into each individual sound chamber. The secondary passages are first passage 152, second passage 154, third passage 156 and fourth passage 158. The passages direct air across an edge defined in each chamber, namely first edge 160, second edge 162, third edge 164 and fourth edge 166.

[009] The sound chambers 130, 132, 134 and 136 are defined by outer and inner walls of multi chambered whistle 100. The outer walls include top side 108, bottom side 110, right side 104 and left side 106. The inner walls include vertical divider wall 170 and horizontal divider wall 172.

[010] Therefore, the dimensions of first chamber 130 are defined on the top by top side 108, on the bottom by horizontal divider wall 172, on the right by right side 104 and on the left side by vertical divider wall 170. In similar fashion the inner dimensions of second chamber 132, third chamber 134 and fourth chamber 136 are defined. First chamber 130 and

second chamber 132 is oriented one on top of the other in parallel fashion. Similar third chamber 134 and fourth chamber 136 is also oriented one on top of the other in parallel fashion. First chamber 130 is oriented parallel and transverse to third chamber 134. In similar fashion, second chamber 132 is oriented transverse and parallel to fourth chamber 136. The length along the longitudinal axis 112 of each of the sound chambers is delineated by first back wall 180 in the case of first chamber 130, second back wall 182 in the case of second chamber 132, third back wall 184 in the case of third chamber 134 and fourth back wall 186 in the case of fourth chamber 136.

[011] Referring now to Figures 13, 14, 15 and 16 which show schematically and perspective view the portions that make up the multi chambered whistle 100. Multi chambered whistle 100 in practise is manufactured from three injection molding plastic components, namely bottom shell 224 shown in Figure 13, central portion 280 shown in Figure 14 and top shell 226 shown together in assembled view in Figure 16.

[012] Figure 13 showing bottom shell 224 also reveals a portion of vertical divider wall 170 in boss 126.

[013] Figure 14 showing the central portion 280, also revealed air divider 190, the horizontal divider wall 172, right cheek 220 and left cheek 222 of the multi chambered whistle

100.

[014] Figure 15 is a partially assembled view showing the bottom shell 224 having mounted thereon the central portion 280.

[015] Figure 16 is a fully assembled view of the multi chambered whistle 100. Multi chambered whistle 100 as shown in Figures 13 through 16 is made from three components, namely bottom shell 224 having mounted thereon central portion 280, having further mounted thereon top shell 226. The three components, namely bottom shell 224, central portion 280 and top shell 226 are ultrasonically welded together to form a single unit making up multi chambered whistle 100.

[016] The inventors herein contemplate different methods of manufacture of multi chambered whistle 100. At this time, plastic injection molding would appear to be the most economical and least expensive way in order to manufacture multi chambered whistle 100. Other manufacturing techniques such as casting, machining, blow molding and many other manufacturing processes which are known in the art may in fact be equally as useful in producing multi chambered whistle 100. However, the inventors have chosen to use plastic injection molding due to its ease of use, its ease of design and its cost effectiveness in producing a desired shape.

In Use

[017] Using multi chambered whistle 100, one places ones mouth over mouth piece 122 with the aid of mouth piece protuberances 124. Mouth piece protuberances 124 help in retaining multi chambered whistle 100 in the mouth. The user will then blow air into primary passage 150 in the direction air flow 200 shown by the arrows in the diagrams. Primary passage 150 may or may not be divided starting at the air entry point.

[018] The air flow 200 will enter into primary passage 150 and be divided by air divider 190 and vertical divider wall 170 into a first passage 152, a second passage 154, and a third passage 156 and fourth passage 158. Air divider 190 will divide the air upwardly and downwardly, whereas vertical divider wall 170 will divide the air to the left side and the right side of the whistle. In this manner the incoming air through primary passage 150 is more or less evenly divided into four streams which make their way through first passage 152, second passage 154, third passage 156 and fourth passage 158. The air is directed toward each of the edges associated with each of the sound chambers. Therefore, air travelling through first passage 152 will flow across first edge 160 and be divided such that part of the air flow will exit out of first exhaust port 138 and part of the air flow will flow into first chamber 130. In similar fashion the air flow is directed across second edge 162, third edge 164 and fourth

edge 166.

[019] The reader will notice that the length of the sound chambers is defined by the position of the back walls. Therefore, the length of the first chamber 130 is determined by the position of first back wall 180, second chamber 132 by the position of second back wall 182, third chamber 134 by the position of third back wall 184 and fourth chamber 136 by the position of fourth back wall 186. The air is exhausted upwardly out of first exhaust port 138 and third exhaust port 142. The air is exhausted downwardly out of second exhaust port 140 and fourth exhaust port 144.

[020] The high audibility of the whistle is due in part to the complex beats and harmonics that are produced in and between the elements of different chamber lengths. The chamber length being the distance from the edges such as first edge 160 to the back walls such as first back wall 180 for example. Different fundamental frequencies are produced by blowing air into the various air chambers, namely first chamber 130, second chamber 132, third chamber 134 and fourth chamber 136. The sound quality is also as a result of orienting two chambers horizontally side by side, such that the air is being exhausted upwardly out of the whistle and two chambers side by side, parallel and below the upper two chambers, such that the air exhausted from these two chambers is being exhausted downwardly. In other words, two of the chambers exhaust the air upwardly and two of the chambers exhaust the air

downwardly. The two upper chambers are arranged in tandem side by side and the two lower chambers are arranged in tandem side by side and the two pairs of side by side chambers are stacked vertically, one on top of the other to provide for a compact body 102.

[021] It should be apparent to persons skilled in the arts that various modifications and adaptation of this structure described above are possible without departure from the spirit of the invention the scope of which defined in the appended claim.

We Claim:

- 1) A multi chambered whistle comprising:
 - a) a body including a mouthpiece defining an air inlet, the air inlet in fluid communication with sound chambers,
 - b) the air inlet including a vertical inlet divider for dividing the air flow into a left air flow and a right air flow,
 - c) the left and right air flow communicated along a primary passage wherein the air flow being further divided into a top airflow and a bottom air flow by a horizontal air divider.
- 2) The multi chambered whistle claimed in claim 1 wherein a leading edge of the vertical inlet divider disposed upstream of a leading edge of the horizontal air divider.
- 3) The multi chambered whistle claimed in claim 2 wherein the leading edge of the vertical inlet divider disposed in the mouth piece and the leading edge of the horizontal divider disposed downstream of the leading edge of the vertical inlet divider within the primary passage.

- 4) The multi chambered whistle claimed in claim 1 wherein the top air flow being exhausted upwardly away from the body and the bottom air flow being exhausted downwardly away from the body.
- 5) The multi chambered whistle claimed in claim 1 wherein each sound chamber including a resonating edge and an exhaust port.
- 6) The multi chambered whistle claimed in claim 4 wherein the whistle including at least four sound chambers having two exhaust ports disposed to exhaust air upwardly and two exhaust ports disposed to exhaust air downwardly
- 7) A multi chambered whistle comprising:
 - a) an air inlet in fluid communication with at least four sound chambers,
 - b) the sound chambers disposed side by side in a horizontal plane, and side by side in a vertical plane.
- 8) The multi chambered whistle claimed in claim 7 wherein the sound chambers each having a different chamber length.

- 9) The multi chambered whistle claimed in claim 7 wherein the sound chambers are disposed symmetrically on each side of the vertical plane and symmetrically on each side of the horizontal plane.
- 10) The multi chambered whistle claimed in claim 7 including a common horizontal wall divider separating the sound chambers horizontally and a common vertical wall divider separating the sound chambers vertically.
- 11) The multi chambered whistle claimed in claim 7 wherein the body including tear drop shaped left and right cheeks being mirror images of each other.
- 12) A four chambered whistle comprising:
 - a) a body including a mouthpiece defining an air inlet, the air inlet in fluid communication with sound chambers,
 - b) the body comprised of a top shell, a bottom shell, and a central portion sandwiched between the top shell and bottom shell.
- 13) The multi chambered whistle claimed in claim 12 wherein the central portion

further including a tear drop shaped right cheek and a tear drop shaped left cheek thereby defining the outer shape of the body.

- 14) The multi chambered whistle claimed in claim 12 wherein the central portion further including a horizontal air divider for dividing the air flow horizontally.
- 15) The multi chambered whistle claimed in claim 12 wherein the top shell defining two exhaust ports therein for deflecting the exhaust air upwardly.
- 16) The multi chambered whistle claimed in claim 15 wherein the bottom shell defining two exhaust ports therein for deflecting the exhaust air downwardly.
- 17) The multi chambered whistle claimed in claim 12 wherein the bottom shell including a vertical divider wall for maintaining separation between a left air flow and a right air flow.
- 18) The multi chambered whistle claimed in claim 12 wherein the bottom shell including a vertical inlet divider for dividing the air flow between a left air flow and a right air flow.

FIGURE - 1

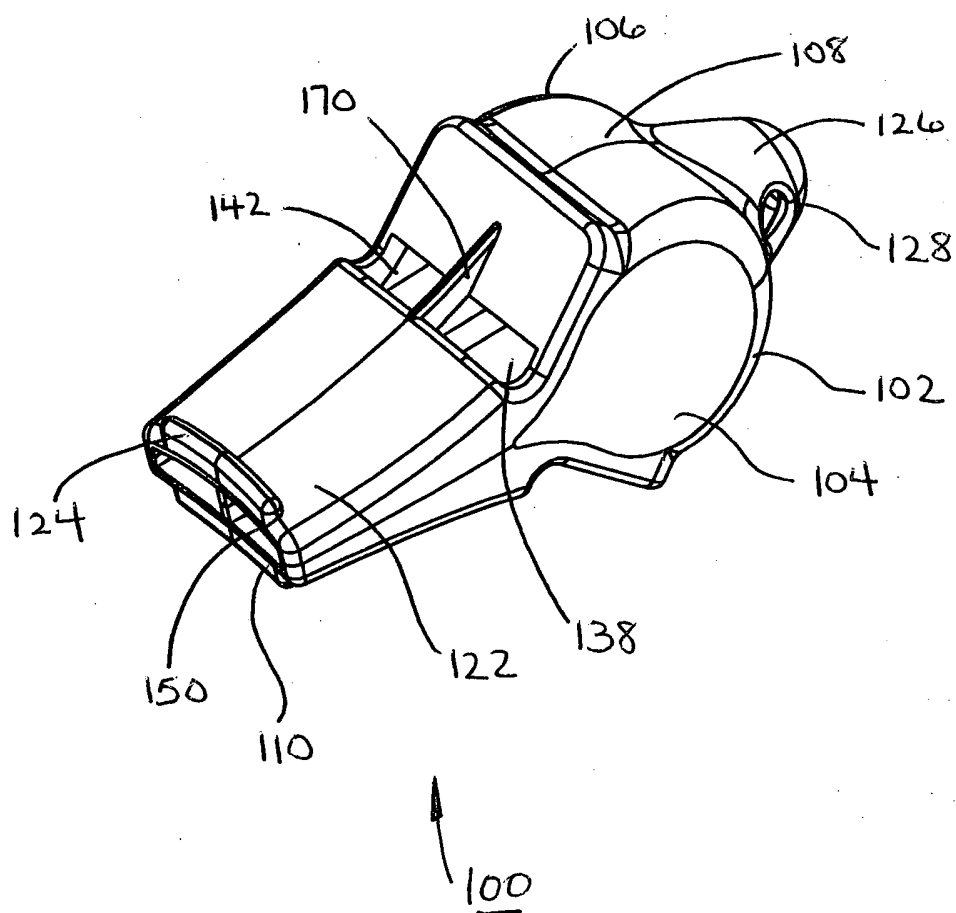


FIGURE - 2

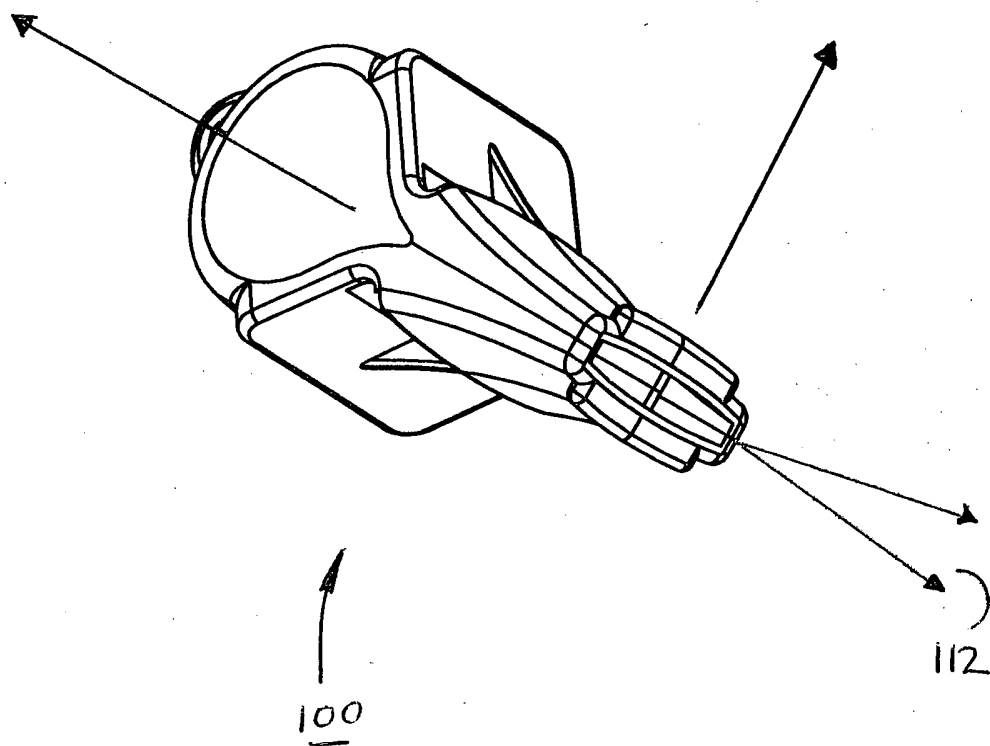


FIGURE - 3

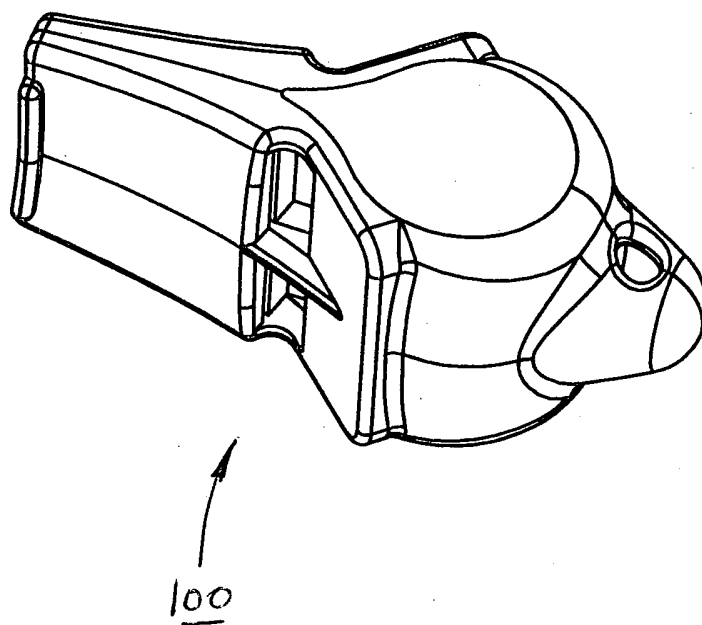


FIGURE - 4

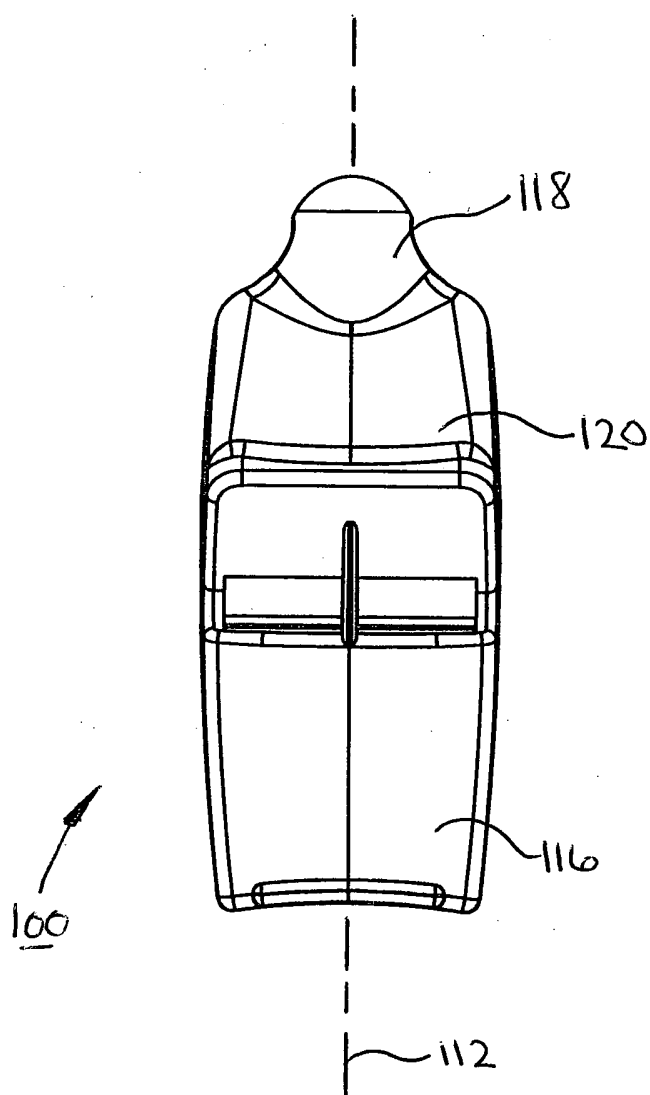


FIGURE - 5

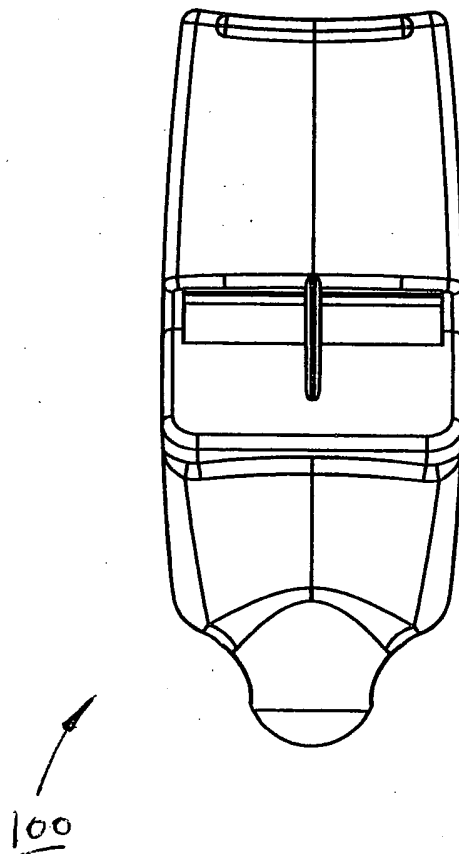


FIGURE - 6

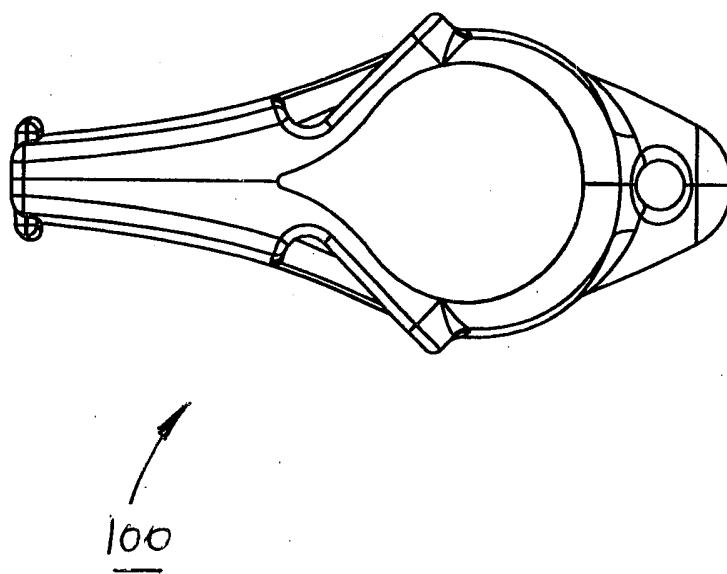


FIGURE - 7

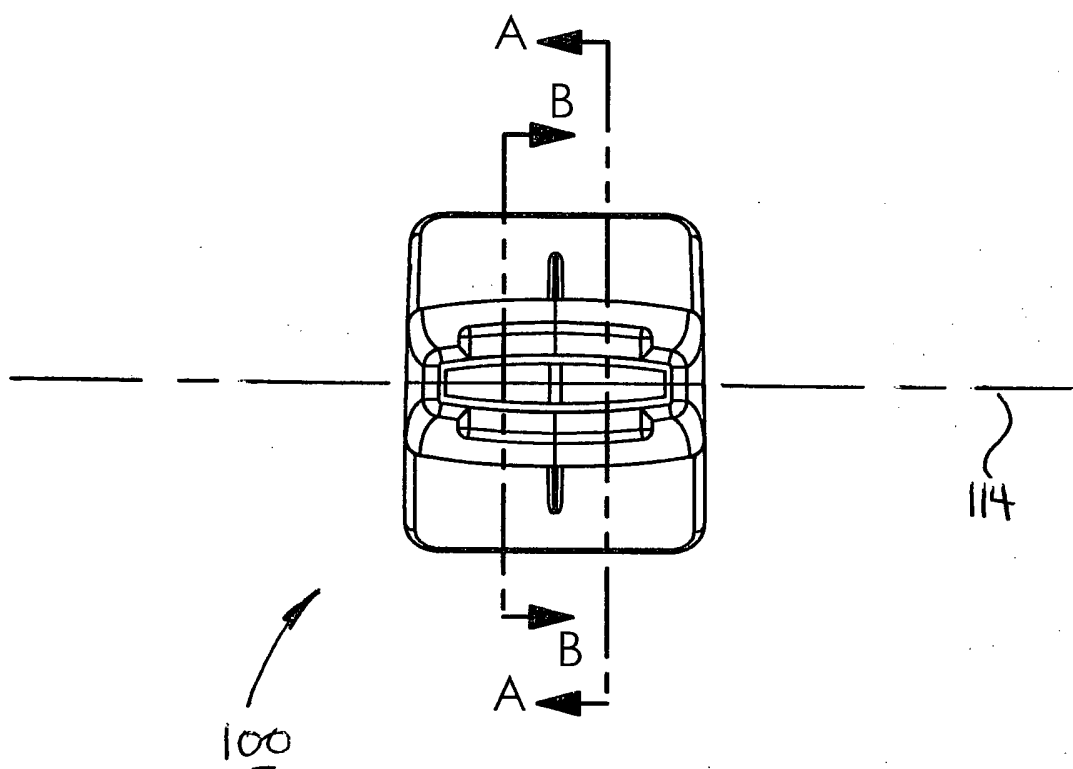


FIGURE - 8

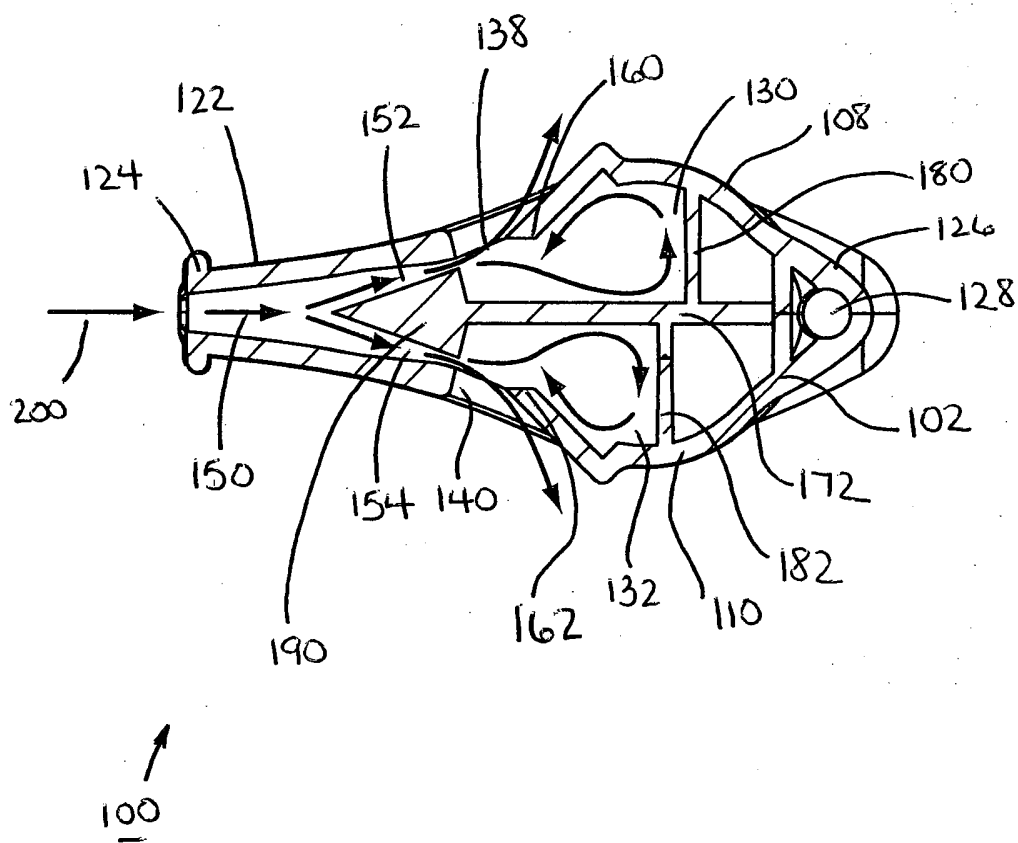


FIGURE - 9

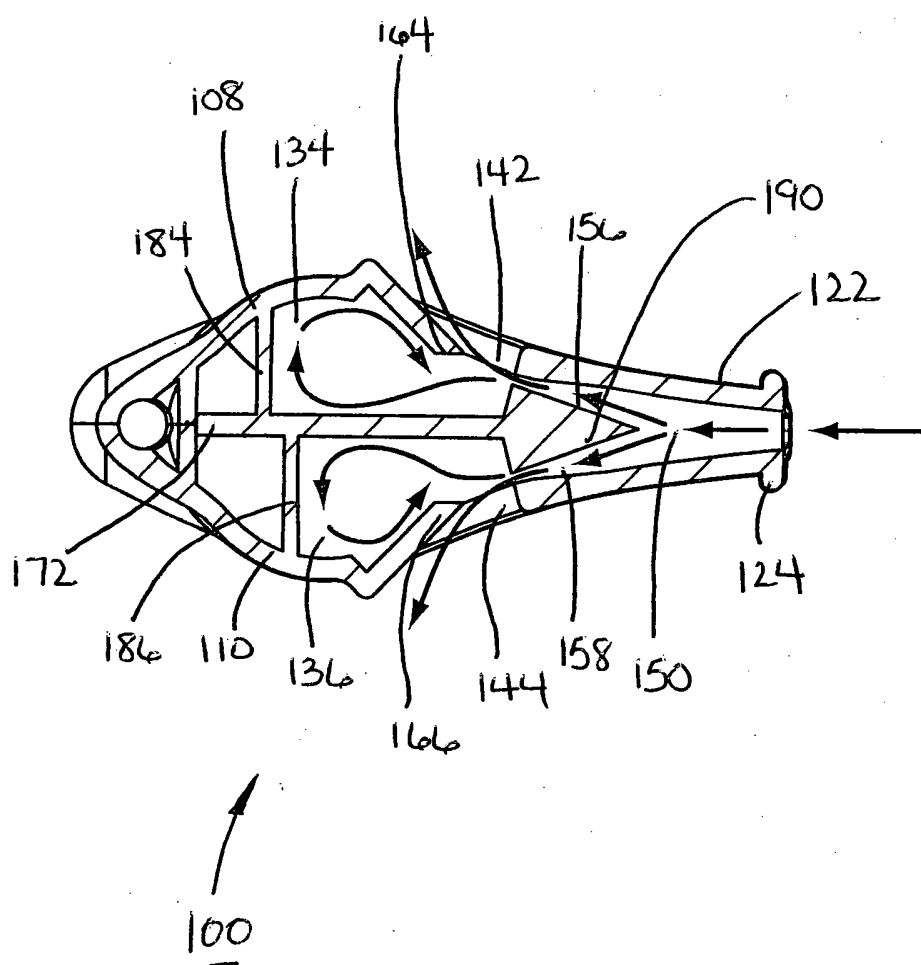


FIGURE - 10

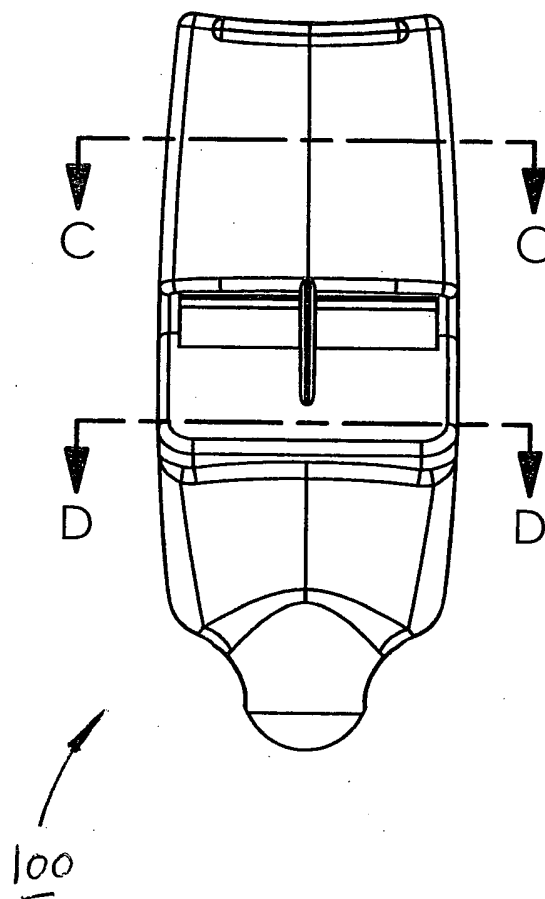


FIGURE - 11

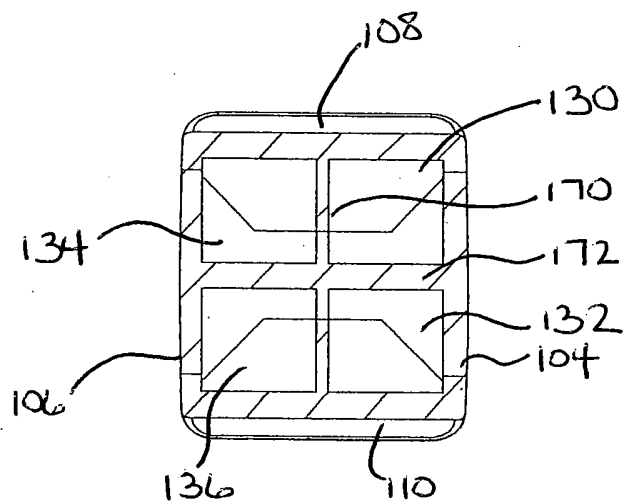
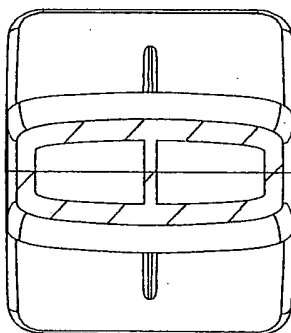


FIGURE - 12

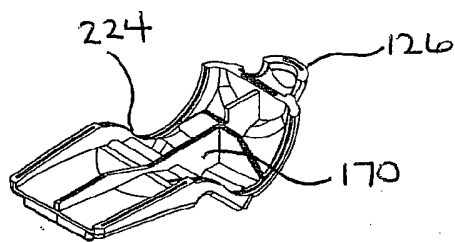


FIGURE - 13

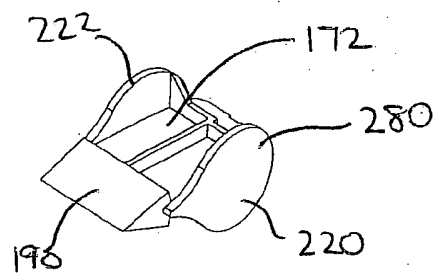


FIGURE - 14

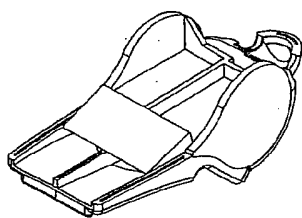


FIGURE - 15

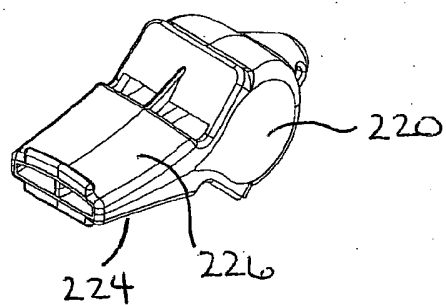


FIGURE - 16

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA2007/001664

<p>A. CLASSIFICATION OF SUBJECT MATTER IPC: G10K 5/00 (2006.01) According to International Patent Classification (IPC) or to both national classification and IPC</p>		
<p>B. FIELDS SEARCHED</p>		
<p>Minimum documentation searched (classification system followed by classification symbols) IPC G10K 5/all</p>		
<p>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched</p>		
<p>Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms used) Canadian Patent Database (Techsource), QPat, WEST. Using keywords: sound, whistle, chamber, multi, multi-chamber, divider, horizontal, vertical, left, right, top, bottom</p>		
<p>C. DOCUMENTS CONSIDERED TO BE RELEVANT</p>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0302645 A2 (Foxcroft et al.) 08 February 1989 (08-02-1989) See Column 5, line 41 to column 6, line 42.	12
A	See the entire document	1-11, 13-18
A	EP 1249015 A2 (Topman et al.) 16 October 2002 (16-10-2002) See the entire document	1-18
A	EP 1020844 A2 (Topman et al.) 19 July 2000 (19-07-2000) See the entire document	1-18
A	US 2006/0272568 A1 (Niedlinger et al.) 07 December 2006 (07-12-2006) See the entire document	1-18
A	US 6837177 (Tanaka) 04 January 2005 (04-01-2005) See the entire document	1-18
<p><input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.</p>		
* Special categories of cited documents :	<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>	
"A" document defining the general state of the art which is not considered to be of particular relevance	<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>	
"E" earlier application or patent but published on or after the international filing date	<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>	
"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>"&" document member of the same patent family</p>	
"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		
Date of the actual completion of the international search	Date of mailing of the international search report	
13 December 2007 (13-12-2007)	14 January 2008 (14-01-2008)	
Name and mailing address of the ISA/CA Canadian Intellectual Property Office Place du Portage I, C114 - 1st Floor, Box PCT 50 Victoria Street Gatineau, Quebec K1A 0C9 Facsimile No.: 001-819-953-2476	Authorized officer Stephen Hartling 819- 953-1014	

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CA2007/001664

Patent Document Cited in Search Report	Publication Date	Patent Family Member(s)	Publication Date
EP0302645	08-02-1989	AT81223T T	15-10-1992
		AU603928B B2	29-11-1990
		AU2244588 A	29-03-1990
		CA1276822 C	27-11-1990
		CN1013415B B	31-07-1991
		DE3875023D D1	05-11-1992
		DE3875023T T2	04-03-1993
		ES2035924T T3	01-05-1993
		JP1065598 A	10-03-1989
		US4821670 A	18-04-1989
EP1249015	16-10-2002	AT279768T T	15-10-2004
		CN1418359 A	14-05-2003
		DE60106387D D1	18-11-2004
		DE60106387T T2	20-10-2005
		GB0000785D D0	08-03-2000
		GB0015384D D0	16-08-2000
		US2003116078 A1	26-06-2003
		WO0152235 A1	19-07-2001
EP1020844	19-07-2000	NONE	
US2006272568	07-12-2006	DE202005002729U U1	06-07-2006
		EP1693825 A1	23-08-2006
US6837177	04-01-2005	DE10135890 A1	18-04-2002
		JP3563046B2 B2	08-09-2004
		TW554333B B	21-09-2003