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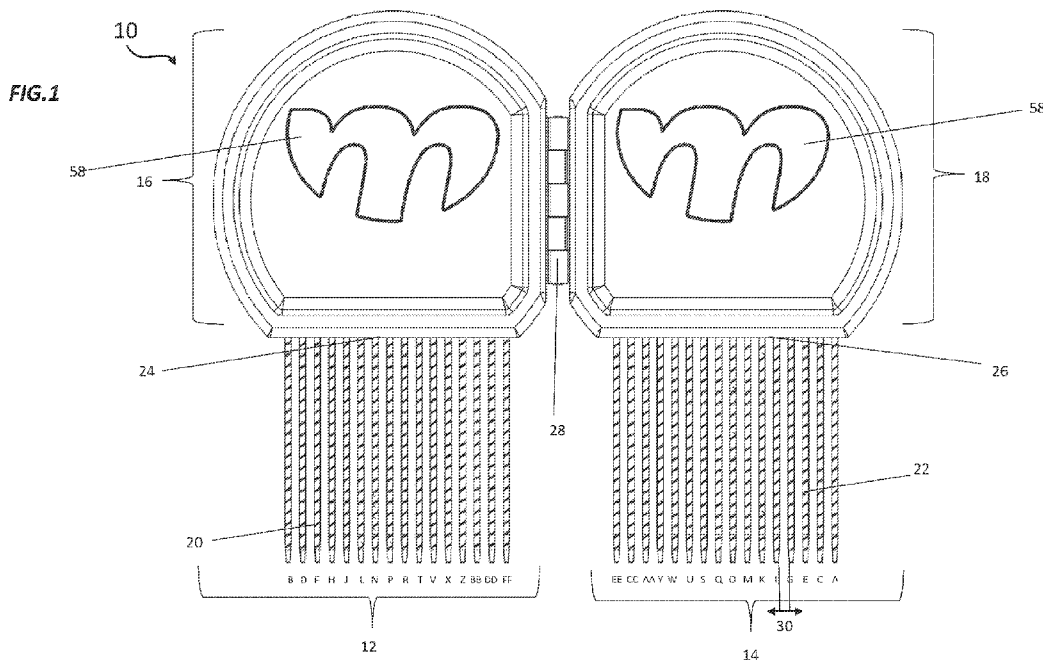
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(54) Title: EASY-CLEANING FOLDING LICE COMB



(57) Abstract: An easy-cleaning folding comb is disclosed for removing lice or nits from the hair. The comb comprises a first member hingedly attached to a second member via a hinge; both the first member and the second member comprise a hand-held portion and a parallel series of teeth which extend outwardly from a teeth-retaining end of the hand-held portion.



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Published:

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EASY-CLEANING FOLDING LICE COMB

RELATED APPLICATION/S

5 This application claims the benefit of priority of Israel Patent Application No. 300889, filed on February 22, 2023, the contents of which are incorporated herein by reference in their entirety.

FIELD AND BACKGROUND OF THE INVENTION

10 The present invention, in some embodiments thereof, relates to an easy-cleaning folding comb for removing lice or nits from the hair.

Head lice (*Pediculus capitis*) are small parasitic insects exquisitely adapted to live on the scalp and neck hairs of their human host, and are highly communicable.

15 Head lice infestation (pediculosis) is a common problem, particularly among school-aged children. Signs of infestation include small red marks on the scalp caused by the lice biting, and acute itching. In order to effectively treat pediculosis, it is important not only to eradicate the adult lice, but also to remove any unhatched eggs, or nits, which are deposited by adult females on the head. Although insecticidal shampoos will help rid the scalp of adult lice, it is not fully effective. Therefore, most treatments also include manual removal of lice and nits. It is recommended that this is carried out for at least ten days. This can be a painstaking, frustrating and time-consuming process as the nits are very small in size, usually about 0.3 mm, and stick like glue to the strands of hair. Each nit must be grabbed firmly and slid down the hair shaft in order to be detached.

20 Removal can be accomplished by using fingernails, tweezers, or preferably by using specially developed lice combs having very close spacing between the teeth of the comb. Lice combs with different teeth sizes, shapes and roughness patterns are known in the art. To avoid recontamination, the extracted lice must be removed from the comb. However, the density of the teeth of the comb required to remove the lice, hampers cleaning efforts.

Accordingly, there exists a need for a comb which can be efficiently cleaned of captured matter, whilst still being effective at removing lice.

30 US Patent 11,445,793 teaches a lice comb comprising a first member attached to a second member via a perpendicular hinge. The position of the hinge in the lice comb taught in US Patent 11,445,793 does not allow for the teeth to be efficiently cleaned. Since one hand is required to grip the comb at the handle and ensure that the two members stay apart during cleaning, the ability to pry open the teeth and free trapped lice and eggs is hindered.

Additional background art includes US11445793, US5318051, GB2396104, CN203137397, CN103126269, CN202476777, US1651746, IL219899, US2021212434, US5873374, US2002078972, CN Design 303686073, USD854244 and USD770093.

5 SUMMARY OF THE INVENTION

According to an aspect of some embodiments of the present invention there is provided a foldable lice comb for extracting lice or nits from hair or scalp, the comb comprising a first member hingedly attached to a second member via a hinge;

both the first member and the second member comprise a hand-held portion and a parallel series of teeth which extend outwardly from a teeth-retaining end of the hand-held portion; and

the hinge being parallel to the series of teeth and being configured to allow the first member to fold towards the second member to acquire a folded configuration and to fold away from the second member to acquire an unfolded configuration,

the parallel series of teeth being spaced and positioned such that when the comb acquires the folded configuration, the parallel series of teeth of the first member interlace with the parallel series of teeth of the second member to form a comb configured to remove lice or nits from hair or scalp, whereas when the comb acquires the unfolded configuration, the teeth of both the members are in a contiguous orientation.

According to embodiments of the invention, the hinge comprises a spring hinge, a pivot hinge, a snap hinge and a butt hinge.

According to embodiments of the invention, a spacing between the teeth of the first member is equivalent to a spacing between the teeth of the second member.

According to embodiments of the invention, the teeth of the first member and the second member are evenly spaced.

According to embodiments of the invention, the teeth of the first member and the second member are tapered.

According to embodiments of the invention, the teeth of the first member and the second member are grooved.

According to embodiments of the invention, the teeth of the first member and the second member are helically grooved.

According to embodiments of the invention, the teeth of the first member and the second member are fabricated from stainless steel.

According to embodiments of the invention, the comb further comprises a securing mechanism for securing the comb in its folded configuration.

According to embodiments of the invention, an outer edge of the hand-held portion of each of the first member and the second member is rounded.

According to embodiments of the invention, the hand-held portion of the first member is of the same shape and dimensions as the hand-held portion of the second member, thereby ensuring that when the comb is in its folded configuration, the hand-held portions sit directly on one another to form a single member.

According to embodiments of the invention, the hinge is configured to prevent opening further than 180 degrees in the unfolded configuration.

According to embodiments of the invention, the hinge further comprises a stoppage mechanism that prevents opening further than 180 degrees in the unfolded configuration.

According to embodiments of the invention, the hand-held portion of each member comprises a front piece facing exteriorly when the comb is in the folded configuration and a back piece facing interiorly when the comb is in the folded configuration, the parallel series of teeth extend outwardly from a teeth-retaining end of the back piece of the hand-held portion.

Unless otherwise defined, all technical and/or scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which the invention pertains. Although methods and materials similar or equivalent to those described herein can be used in the practice or testing of embodiments of the invention, exemplary methods and/or materials are described below. In case of conflict, the patent specification, including definitions, will control. In addition, the materials, methods, and examples are illustrative only and are not intended to be necessarily limiting.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

Some embodiments of the invention are herein described, by way of example only, with reference to the accompanying drawings. With specific reference now to the drawings in detail, it is stressed that the particulars shown are by way of example and for purposes of illustrative discussion of embodiments of the invention. In this regard, the description taken with the drawings makes apparent to those skilled in the art how embodiments of the invention may be practiced.

In the drawings:

FIG. 1 is a lice comb depicted in an unfolded configuration in accordance with some exemplary embodiments of the invention. The exterior facing surface of the lice comb is viewed from above.

FIG. 2 is a lice comb depicted in a folded configuration in accordance with some exemplary embodiments of the invention.

FIG. 3 shows the teeth arrangement of the lice comb of Figure 1 when in a folded configuration, as viewed from below.

FIG. 4 is a lice comb depicted in a folded configuration with an opening mechanism.

FIG. 5A is a lice comb depicted in a folded configuration in accordance with some
5 exemplary embodiments of the invention.

FIG. 5B is a cross sectional view of the lice comb (and magnification thereof) illustrating a securing mechanism which secures the comb in its folded configuration.

FIG. 6 is a lice comb depicted in an unfolded configuration in accordance with some
10 exemplary embodiments of the invention. The interior facing surface of the lice comb is viewed from above.

FIG. 7 depicts exemplary components of a lice comb in accordance with some exemplary
embodiments of the invention.

DESCRIPTION OF SPECIFIC EMBODIMENTS OF THE INVENTION

15 The present invention, in some embodiments thereof, relates to an easy-cleaning folding comb for removing lice or nits from the hair.

Before explaining at least one embodiment of the invention in detail, it is to be understood that the invention is not necessarily limited in its application to the details set forth in the following description or exemplified by the Examples. The invention is capable of other embodiments or of
20 being practiced or carried out in various ways.

A variety of combs exist for removing lice and nits from the hair. Such combs are difficult to clean since the removed foreign matter becomes trapped in-between the tightly positioned teeth of the comb. After utilizing the comb, the extracted matter must be completely removed from the comb in order to avoid recontamination of the patient or contamination of another patient. The
25 better the comb is in trapping the foreign matter, the harder they are to clean.

The present inventors have now conceived of a comb which is effective in the removal of lice and nits from hair whilst still being capable of being efficiently and effectively cleaned of captured matter. Effective cleaning is of ultimate importance as it prevents reinfestation. The comb comprises two members hingedly attached to one another, each member with a series of
30 teeth. In the folded position, the two sets of teeth are interlaced forming a single row of teeth. The positioning of the teeth in the folded configuration allows for efficient removal of lice and nits. In the unfolded configuration, the gap between successive teeth of the series allows for easy and efficient cleaning, without the need to distort the teeth of the comb. This serves to extend the life-span of the comb, since otherwise the teeth of the comb would need to be continually prised apart

so as to remove trapped matter. The hinge is in parallel to the series of teeth, allowing the two members to move towards one another and acquire the folded configuration or to move away from one another and to acquire the unfolded configuration (analogous to the opening and closing of a book). This configuration is advantageous since it allows full extension of the comb in its unfolded configuration. The teeth of both members, whilst separated are parallel with one another, forming a single row and being on the same plane. This allows for easy removal of trapped matter. Furthermore, location of the hinge at a position distant from the hand-held portion of the comb, allows for an ergonomic design of the hand-held portion without interference from the hinge.

FIG. 1 is a top view of lice comb **10** comprising two body members **12** and **14**, each having a hand-held portion **16** and **18** and series of teeth **20** and **22**. The teeth in each of the series of teeth **20** and **22** are positioned parallel to one another. The teeth of the series **20** and **22** are elongated, each extending from a teeth-retaining end **24** and **26** of hand-held portion **16** and **18**. Typically, the number of teeth in series **20** is equal to the number of teeth in series **22**. Each series may have between 12 and 20 teeth. In one embodiment, each series has 16 teeth. In order to distinguish between the exterior facing surfaces and the interior facing surfaces (in the folded configuration) of lice comb **10**, body members **12** and **14** are shown with a promotional branding or a design element **58**. Such advertising or artwork can applied using techniques known in the art. It will be appreciated that this is an optional feature and may or may not be applied to any part of the comb.

Hand-held portion **16** and **18** of body member **12** and **14** may be of any shape. In one embodiment, the hand-held portion is of a rounded shape, allowing for easy grip of comb **10**. Hand-held portion **16** and **18** may be fabricated from materials including metal (e.g. stainless steel), plastic, polymer (molded polymer) etc. In one embodiment, the hand-held portion is ergonomically designed for easy grip. The hand-held portions **16** and **18** are typically of a height not greater than two times or three times the height of the teeth **20** and **22**. In a particular embodiment, **16** and **18** are typically of a height not greater than the height of the teeth **20** and **22**. In a particular embodiment, lice comb **10** is devoid of an extended handle. Hand-held portion **16** and **18** are typically located above the longitudinal axis of teeth **20** and **22** (i.e. along the same axis), such that upon gripping lice comb **10**, the hand of the user is positioned above the teeth **20** or **22** and not on the side of the teeth **20** or **22**.

In one embodiment, the spacing between the teeth of the first member **12** is equivalent to the spacing between the teeth of the second member **14**. Additionally, the teeth of the first member **12** and the second member **14** are evenly spaced.

Within the series of teeth **20** and **22**, each tooth has a length of from about 20 mm to about 90 mm (for example about 40 mm). Each tooth has a diameter from about 0.75 mm to 1.5 mm (e.g.

about 1.15 mm). The teeth of series **20** and **22** are evenly spaced. The teeth of series **20** have the same spacing between the teeth of series **22**.

The space **30** between each tooth of series **20** and **22** at its minimum is equivalent to the width of the tooth **34**. Preferably there is an additional gap which is typically 2 times a target gap **32**. The target gap **32** may be defined as the desired gap between the active portions of adjacent teeth when the comb is in the closed position:

$$S_{\text{tooth}} = T_w + 2 * G_{\text{ATC}}$$

where,

S_{tooth} ==Spacing between teeth on the same series of teeth

T_w ==width of the tooth (**34**)

G_{ATC} ==target gap between the active portion of adjacent teeth when the apparatus is in the closed position (**34**).

Target gap **32** is illustrated in FIG. 2.

Different target gaps can be used with this invention depending on the size of the particles the apparatus is designed to remove. For lice and nits this gap is usually between 0.1 mm to 0.5 mm.

In one embodiment, the teeth comprised in the teeth series **20** and **22** can be made of a metal, for example stainless steel, with a peripheral surface either smooth or grooved (e.g. helically grooved). In another embodiment, the teeth of series **20** and **22** may be tapered.

Hinge **28** defines a central axis and connects first body member **12** to second body member **14** allowing the two members to open and close about a central axis. Thus, the lice comb of this aspect of the present invention is configured as in a book, the spine of the book analogous to the hinge, and the open pages on one side of the spine analogous to the first body member and the open pages on the other side of the spine analogous to the second body member. FIG. 1 illustrates the exterior facing side of lice comb **10** in an open configuration. In this configuration series of teeth **20** are in a contiguous orientation with respect to series of teeth **22**. The contiguous orientation of the teeth allows for the teeth to be cleaned with a single swipe under running water.

FIG. 7 illustrates components of an exemplary hinge according to embodiments of the invention.

In this embodiment, hinge pin **46** passes through the perforations in the knuckles **48**, **50** and **52** of the first member **12** and through the perforations in the knuckles **54** and **56** of the second member **14** to connect the two body members. Thus, the hinge pin **46** and knuckles **48**, **50**, **52**, **54** and **56** form the hinge **28**.

Any type of hinge is conceived by the present inventors including but not limited to an external hinge, an internal hinge, a spring hinge, a pivot hinge, a snap hinge and a butt hinge.

In one embodiment, the hinge is configured to prevent opening further than 180 degrees in the unfolded configuration. Additionally or alternatively, the comb 10 comprises an additional
5 stoppage mechanism which prevents the comb from opening beyond 180 degrees in the unfolded configuration.

FIG. 2 illustrates the lice comb 10 in a closed configuration. First body member 12 sits directly on second body member 14. Hand-held portion 16 may be of essentially the identical shape and dimensions as hand-held portion 18. The first series of teeth 20 interlace with the second
10 series of teeth 22 to form a comb configured to effectively remove lice or nits from hair or scalp.

FIG. 3 illustrates how teeth A, C, E, G, I, K, M, O, Q, S, U, W, Y, AA, CC and EE of series 22 interlace with teeth, B, D, F, H, J, L, N, P, R, T, V, X, Z, BB, DD of series 20 to form a comb having a single series 36 of parallel teeth. In one embodiment, the single series is a row.

Lice comb 10 may comprise a securing mechanism for securing the comb in its folded
15 configuration. The securing mechanism may be such that the securing mechanism can be overcome by force (e.g. prising hand-held portion 16 away from hand-held portion 18). In one embodiment, the securing mechanism is hidden when lice comb 10 is folded. Other securing mechanisms are also contemplated including for example, a key, a bolt, a clip, a lever, a spring etc.).

An exemplary securing mechanism is depicted in FIG. 4 and FIG. 5B.

FIG. 4 depicts lice comb 10 in an open (non-folded) configuration, with the interior-facing
20 side shown. Hand-held portion 16 of body member 12 comprises a protrusion 38 which is designed to fit and be retained in a cavity 40 on hand-held portion 18 of body member 14 when in a folded configuration. In this embodiment, the securing mechanism may be overcome by prising open the two members of the comb. The comb may comprise an opening mechanism (e.g. a clip-like
25 mechanism), which aids in the opening. In one embodiment, the outer portion of one of the hand-held portions 16 or 18 may comprise an extension 42 and the other outer portion of the body members comprises an indentation 44. Opening may be effected by moving the thumb and forefinger in opposing directions over the opening mechanism. Other opening mechanisms are also conceived, as known in the art.

FIG. 5A depicts lice comb 10 in a closed (folded) configuration. The dotted line depicts
30 the location of cross-sectional cut illustrated in FIG. 5B. Body member 16 comprises a protrusion 38 which fits into cavity 40 on body member 18.

FIG. 6 depicts lice comb 10 in a closed (folded) configuration, with opening mechanism 42 seen protruding from the outer edge of body member 16 or 18.

FIG. 7 illustrates components of an exemplary comb according to embodiments of the invention.

Body member **12** and body member **14** comprise two components, a front piece **60** and **62** respectively facing exteriorly when the comb is in the folded configuration and a back piece **64** and **66** facing interiorly when the comb is in the folded configuration. Parallel series of teeth **20** extends outwardly from a teeth-retaining end **68** of back piece **64** of member **12**. Parallel series of teeth **22** extends outwardly from a teeth-retaining end **70** of back piece **66** of member **14**. At least front piece **60** and/or front piece **62** may comprise a promotional branding or a design element **58**.

As used herein the term “about” refers to $\pm 10\%$

The terms "comprises", "comprising", "includes", "including", “having” and their conjugates mean "including but not limited to".

The term “consisting of means “including and limited to”.

The term "consisting essentially of" means that the composition, method or structure may include additional ingredients, steps and/or parts, but only if the additional ingredients, steps and/or parts do not materially alter the basic and novel characteristics of the claimed composition, method or structure.

Throughout this application, various embodiments of this invention may be presented in a range format. It should be understood that the description in range format is merely for convenience and brevity and should not be construed as an inflexible limitation on the scope of the invention. Accordingly, the description of a range should be considered to have specifically disclosed all the possible subranges as well as individual numerical values within that range. For example, description of a range such as from 1 to 6 should be considered to have specifically disclosed subranges such as from 1 to 3, from 1 to 4, from 1 to 5, from 2 to 4, from 2 to 6, from 3 to 6 etc., as well as individual numbers within that range, for example, 1, 2, 3, 4, 5, and 6. This applies regardless of the breadth of the range.

It is appreciated that certain features of the invention, which are, for clarity, described in the context of separate embodiments, may also be provided in combination in a single embodiment. Conversely, various features of the invention, which are, for brevity, described in the context of a single embodiment, may also be provided separately or in any suitable subcombination or as suitable in any other described embodiment of the invention. Certain features described in the context of various embodiments are not to be considered essential features of those embodiments, unless the embodiment is inoperative without those elements.

Although the invention has been described in conjunction with specific embodiments thereof, it is evident that many alternatives, modifications and variations will be apparent to those skilled in the art. Accordingly, it is intended to embrace all such alternatives, modifications and variations that fall within the spirit and broad scope of the appended claims.

5 All publications, patents and patent applications mentioned in this specification are herein incorporated in their entirety by reference into the specification, to the same extent as if each individual publication, patent or patent application was specifically and individually indicated to be incorporated herein by reference. In addition, citation or identification of any reference in this application shall not be construed as an admission that such reference is available as prior art to the
10 present invention. To the extent that section headings are used, they should not be construed as necessarily limiting.

WHAT IS CLAIMED IS:

1. A foldable lice comb for extracting lice or nits from hair or scalp, the comb comprising a first member hingedly attached to a second member via a hinge;

both said first member and said second member comprise a hand-held portion and a parallel series of teeth which extend outwardly from a teeth-retaining end of said hand-held portion; and said hinge being parallel to said series of teeth and being configured to allow said first member to fold towards said second member to acquire a folded configuration and to fold away from said second member to acquire an unfolded configuration,

said parallel series of teeth being spaced and positioned such that when the comb acquires said folded configuration, said parallel series of teeth of said first member interlace with said parallel series of teeth of said second member to form a comb configured to remove lice or nits from hair or scalp, whereas when the comb acquires said unfolded configuration, said teeth of both said members are in a contiguous orientation.

2. The foldable lice comb of claim 1, wherein said hinge comprises a spring hinge, a pivot hinge, a snap hinge and a butt hinge.

3. The foldable lice comb of claim 1, wherein a spacing between the teeth of the first member is equivalent to a spacing between the teeth of the second member.

4. The foldable lice comb of claim 1, wherein the teeth of the first member and the second member are evenly spaced.

5. The foldable lice comb of claim 1, wherein the teeth of the first member and the second member are tapered.

6. The folded lice comb of claim 1, wherein the teeth of the first member and the second member are grooved.

7. The folded lice comb of claim 6, wherein the teeth of the first member and the second member are helically grooved.

8. The folded lice comb of claim 1, wherein the teeth of the first member and the second member are fabricated from stainless steel.

9. The foldable lice comb of claim 1, further comprising a securing mechanism for securing the comb in its folded configuration.

10. The foldable lice comb of claim 1, wherein an outer edge of said hand-held portion of each of said first member and said second member is rounded.

11. The foldable lice comb of claim 1, wherein said hand-held portion of said first member is of the same shape and dimensions as said hand-held portion of said second member, thereby ensuring that when the comb is in its folded configuration, said hand-held portions sit directly on one another to form a single member.

12. The foldable lice comb of claim 1, wherein said hinge is configured to prevent opening further than 180 degrees in said unfolded configuration.

13. The foldable lice comb of claim 1, further comprising a stoppage mechanism that prevents opening further than 180 degrees in said unfolded configuration.

14. The foldable lice comb of claim 1, wherein said hand-held portion of each member comprises a front piece facing exteriorly when the comb is in said folded configuration and a back piece facing interiorly when the comb is in said folded configuration, said parallel series of teeth extend outwardly from a teeth-retaining end of said back piece of said hand-held portion.

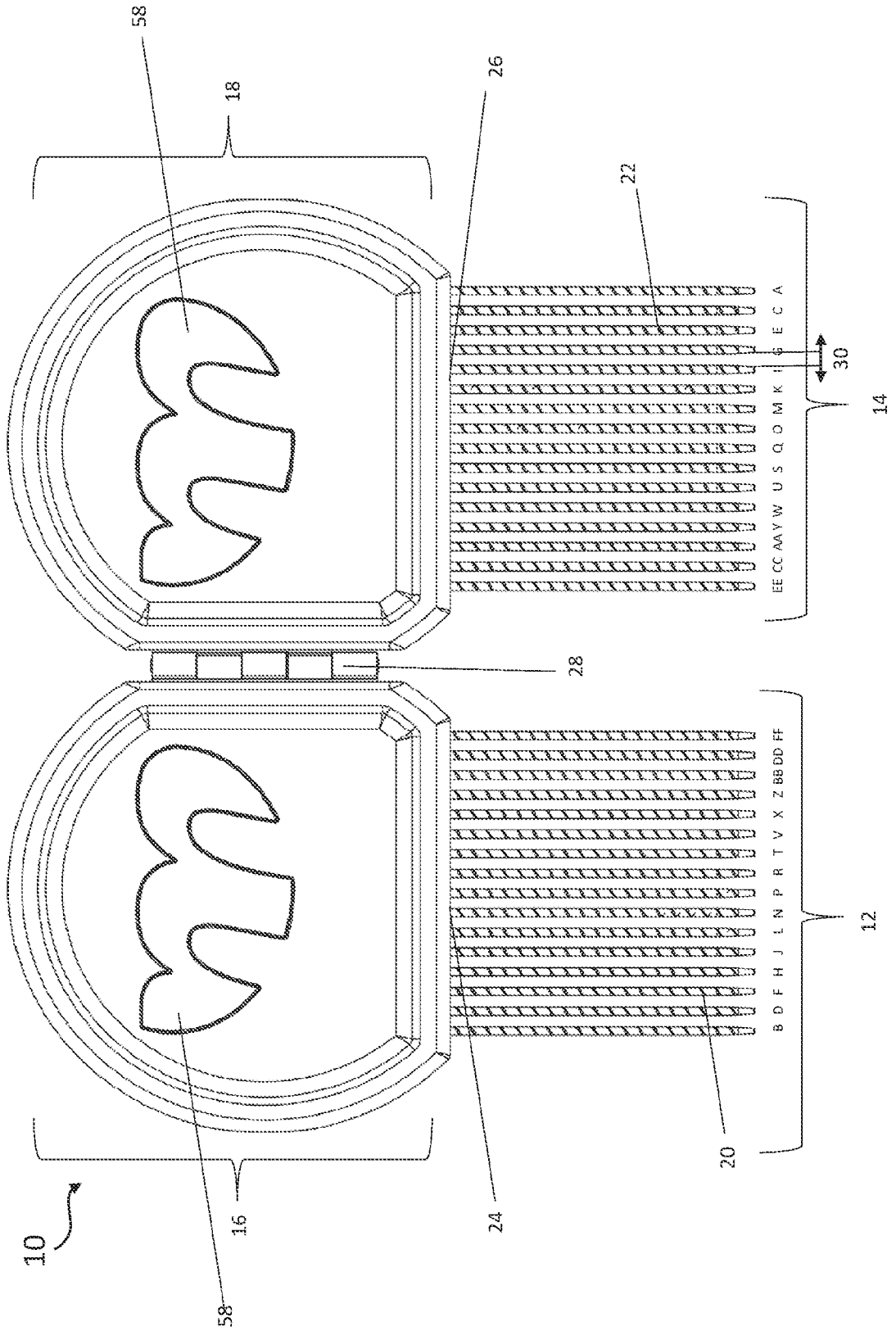


FIG. 1

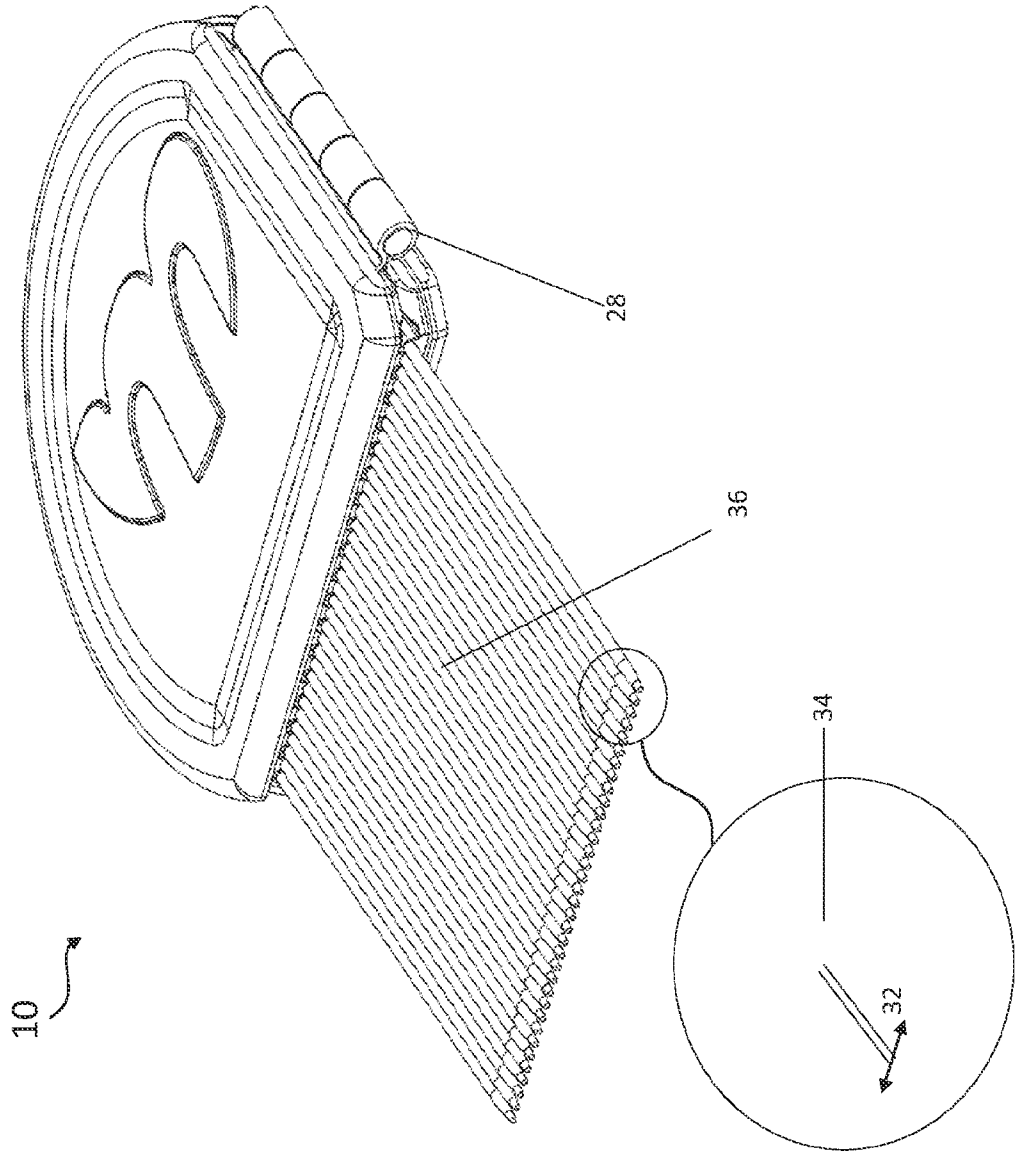
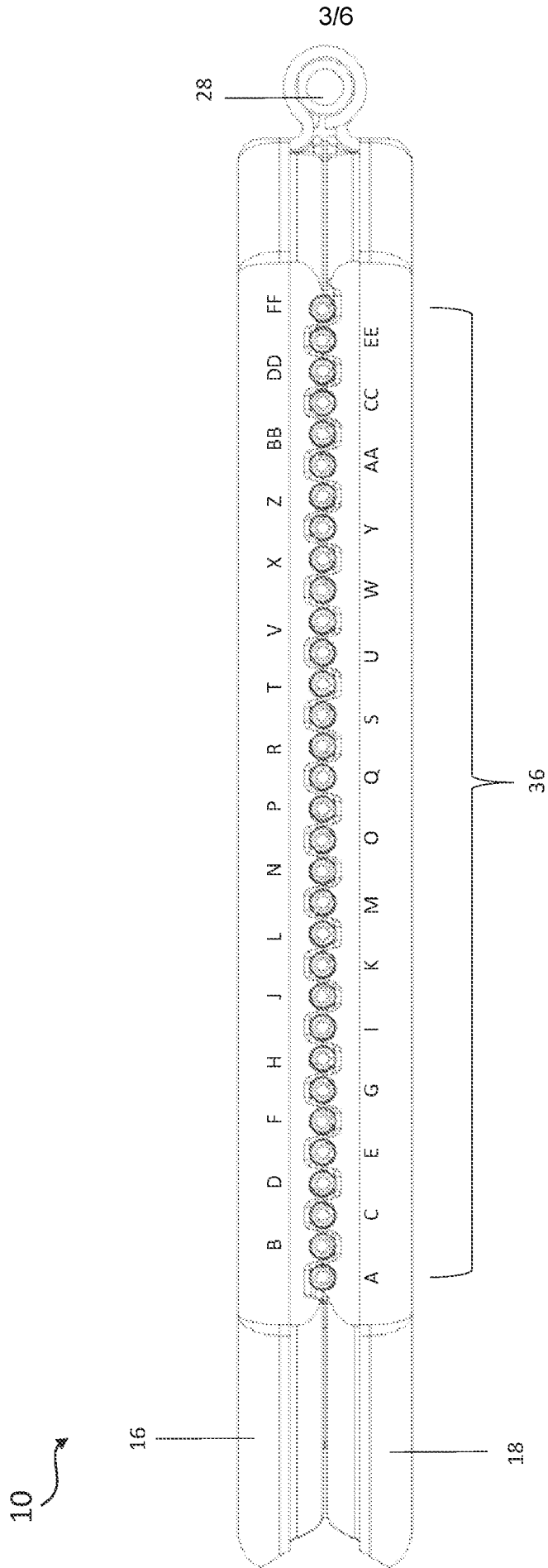
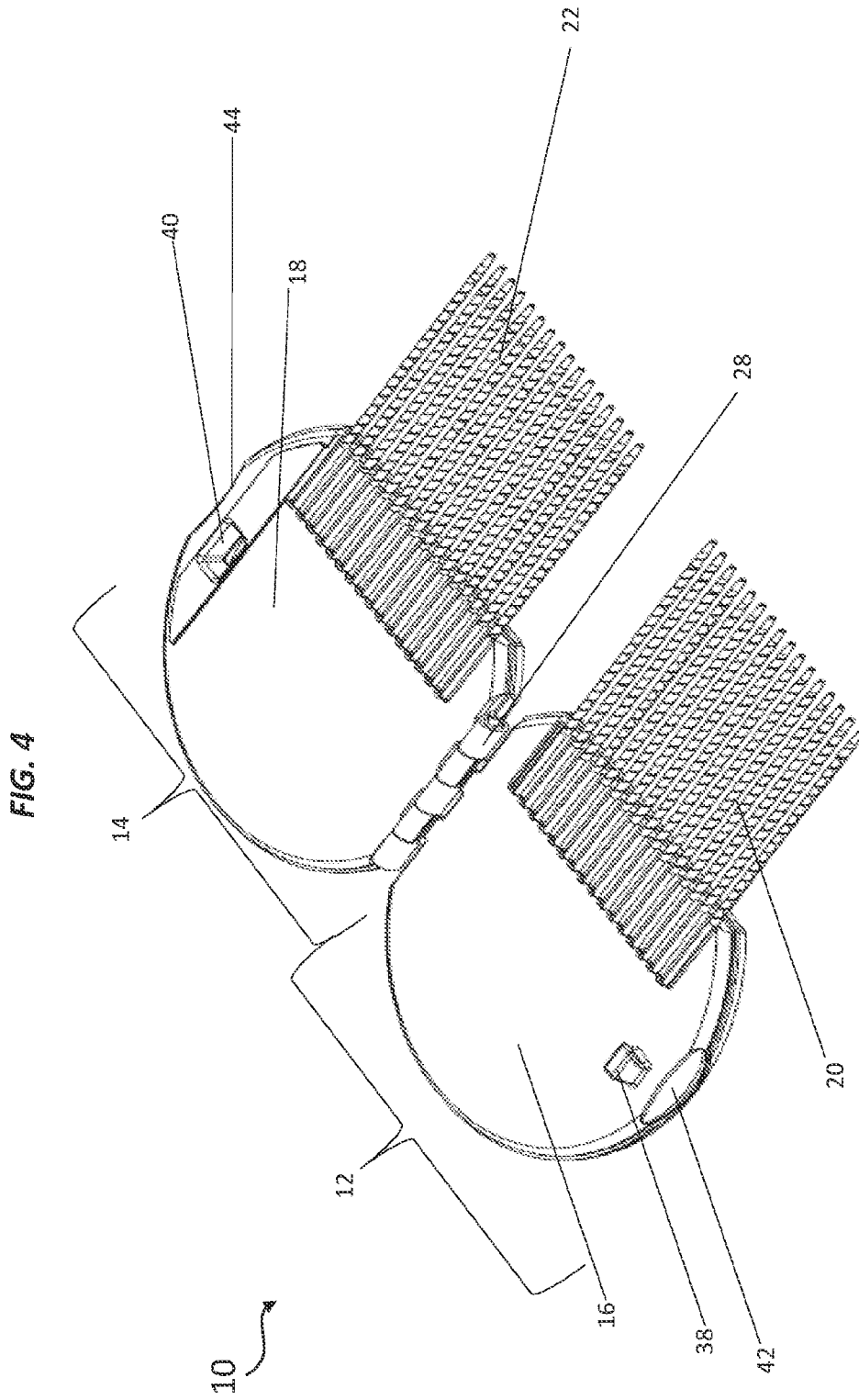
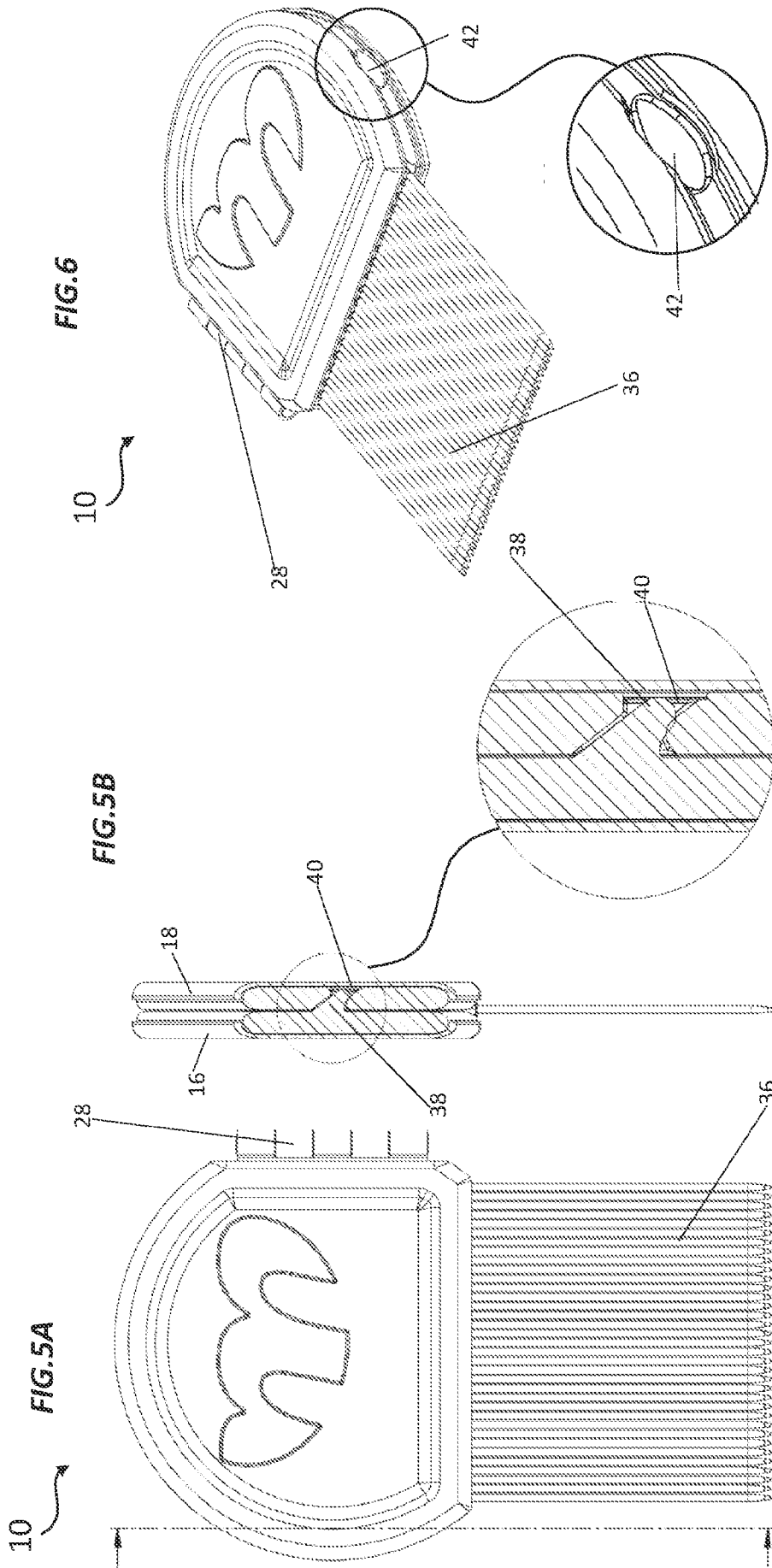


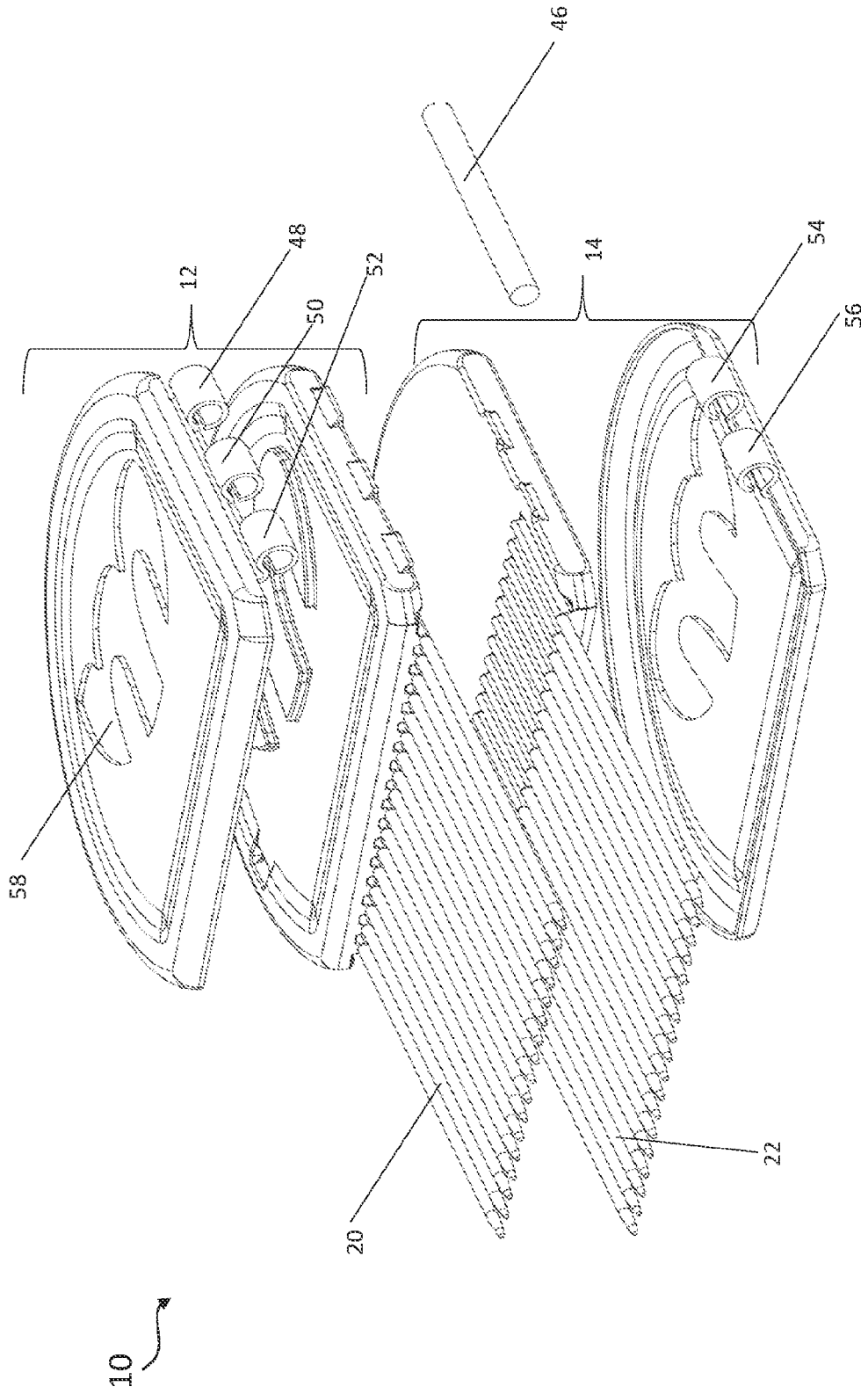
FIG.2

FIG.3









INTERNATIONAL SEARCH REPORT

International application No.

PCT/IL 24/50203

A. CLASSIFICATION OF SUBJECT MATTER
 IPC - INV. A45D 24/06, A61B 17/50 (2024.01)
 ADD. A45D 24/30 (2024.01)

CPC - INV. A45D 24/06, A61B 17/50

ADD. A45D 24/30, A61B 2017/505

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.
A	US 1,705,644 A (PERSON) 19 March 1929 (19.03.1929), entire document, especially Fig 1-3; pg 1, ln 10-18, 26-31, 42-47, 54-75, 81-89	1-14
A	US 11,445,793 B1 (GOLDIN et al.) 20 September 2022 (20.09.2022), entire document, especially Fig 1-6; col 1, ln 7-10; col 2, ln 66-67; col 3, ln 1-4, 11-26, 56-58; col 4, ln 10-13, 49-53, 63-67; col 5, ln 1-3	1-14
A	US 2,241,879 A (FOSTER, JR.) 13 May 1941 (13.05.1941), entire document, especially Fig 1-2; col 1, ln 22-35; col 2, ln 7-13	1-14
A	US 7,089,945 B1 (BARGE) 15 August 2006 (15.08.2006), entire document	1-14
A	US 5,873,374 A (SANZ) 23 February 1999 (23.02.1999), entire document	1-14

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

"D" document cited by the applicant in the international application

"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

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Date of the actual completion of the international search

11 April 2024 (11.04.2024)

Date of mailing of the international search report

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Name and mailing address of the ISA/US

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