

INTELLECTUAL PROPERTY OFFICE OF SINGAPORE
PATENT AGENTS QUALIFYING EXAMINATION 2018

PAPER B: AMENDMENT OF A PATENT SPECIFICATION
23 October 2018, Tuesday
1330 – 1730 hrs

Maximum Time: 4 Hours (includes reading time)

Maximum Marks: 100



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INSTRUCTIONS TO CANDIDATES

1. This Question Paper consists of 34 pages, including this cover page.
2. Type your answers in English. Answers in any other language will not be marked.
3. You are given one hard copy of the Question Paper. The soft copy of the Question Paper is also provided in the given laptop.
4. Only answers and/or drawings typed or indicated in the Answer Script template provided by the Examination Secretariat will be considered. Candidates should not change the given format of the Answer Script or type in the margin.
5. The information provided in the Question Paper may be obtained from actual situations or modified therefrom for the purpose of this examination. You should accept the facts given in the paper and assume that the prior art given is exhaustive.
6. For the purpose of this examination, you do not need to propose any amendments to the description of the Patent Application.
7. The documents provided in this Question Paper are:
 - a. Cover Page (1 page);
 - b. Document A: A Hook-and-Loop Fastener (13 pages including drawings);
 - c. Document B: Written Opinion (2 pages);
 - d. Document C: Client's Letter (2 pages);
 - e. Document D1: Japanese Unexamined Utility Model Publication Number 2-2222 (6 pages including drawings);
 - f. Document D2: EP 3,333,333 (6 pages including drawings); and
 - g. Document D3: "A Hook-and-Loop Fastener", Journal of Fasteners, Loopy *et al* (4 pages including drawings).

END

PAPER B: AMENDMENT OF A PATENT SPECIFICATION
23 October 2018, Tuesday
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Document A: A Hook-and-Loop Fastener (1/13)

Singapore Patent Application No. 10201811111A

Applicant: Fastener Pte Ltd.

5 **Inventor(s): Jeremy Loopy and Gavin Chan**

Technical Field

[001] There is provided a hook-and-loop fastener and a method for making the same.

10

Background

[002] There are a few types of hook-and-loop fasteners that are currently in the market. A first type is one which has a base web and a multiplicity of hook elements and loop elements mounted on the base web. Rows of hook elements and rows of loop elements may be arranged alternatively on the web. Alternatively, hook elements and loop elements are arranged in a mixed state in various ways. However, a disadvantage of this type of hook-and-loop fastener is that two matching pieces of the hook-and-loop fasteners in contact with each other face-to-face are very likely to have almost the same patterns of hook and loop elements with each other. Therefore, almost all hook elements of one piece would touch hook elements of the other piece, while almost all loop elements of one piece touch loop elements of the other piece. Due to fewer engagements of hook elements and loop elements, the intermeshing force of the hook-and-loop fastener is very weak.

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PAPER B: AMENDMENT OF A PATENT SPECIFICATION
23 October 2018, Tuesday
1330 – 1730 hrs

Maximum Time: 4 Hours (includes reading time)

Maximum Marks: 100

Document A: A Hook-and-Loop Fastener (2/13)

[003] A second type of hook-and-loop fastener is often seen on the market. In this conventional hook-and-loop fastener, two rows of hook elements regularly alternate with two rows of loop elements. In addition, each hook element is made of a filamentous material of 360 denier. However, a disadvantage of this type of hook-and-loop fastener is that the hook elements and loop elements are distributed in a ratio of approximately 1 to 1 on a base web. Since fewer loop elements engage with the hook elements, the intermeshing force of the hook-and-loop fasteners is very weak so that when two pieces of the hook-and-loop fasteners are engaged with each other, they are very liable to detachment from each other. Further, the intermeshing forces of the hook-and-loop fasteners vary considerably depending on where the hook-and-loop fasteners are joined.

[004] It is thus an object of this application to provide for a hook-and-loop fastener that ameliorates the disadvantages of the conventional hook-and-loop fasteners as mentioned above.

PAPER B: AMENDMENT OF A PATENT SPECIFICATION
23 October 2018, Tuesday
1330 – 1730 hrs

Maximum Time: 4 Hours (includes reading time)

Maximum Marks: 100

Document A: A Hook-and-Loop Fastener (3/13)

Description

- 5 [005] In one aspect, there is provided a hook-and-loop fastener comprising a base web, a multiplicity of hook elements and loop elements mounted on the base web in rows and columns, each loop element being 0.1 mm to 2.5 mm higher than each hook element and each hook element being made of a filamentous material of 400 to 700 denier.
- 10 [006] The hook-and-loop fastener may have hook elements and loop elements mounted in a mixed state on its single base web. Since both hook elements and loop elements are present on the base web in the mixed state, the hook-and-loop fastener may be used in one piece; it has its one part engaged with the other part by folding it thereon. Alternatively, for the same reason, the hook-and-loop fastener may be cut
- 15 and used in two pieces whereby the matching pieces of hook-and-loop may be engaged with each other. By having the two parts or two matching pieces of different pattern, the intermeshing forces of the parts or matching pieces of the hook-and-loop fastener is very strong.
- 20 [007] In another aspect, there is provided a method of forming a hook-and-loop fastener, comprising the steps of weaving the loop elements into the base web, weaving the filamentous material of 400 to 700 denier into the base web and cutting the filamentous material to form the hook elements such that each loop element is 0.1 mm to 2.5 mm higher than each hook element.

PAPER B: AMENDMENT OF A PATENT SPECIFICATION
23 October 2018, Tuesday
1330 – 1730 hrs

Maximum Time: 4 Hours (includes reading time)

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Document A: A Hook-and-Loop Fastener (4/13)

[008] The method may comprise the step of identifying the positions of the hook elements and loop elements such that the arrangement of the hook elements and loop elements are as discussed below with reference to the figures. The identifying step may be done by computer scanning the base web so as to allocate the positions of the loop elements and the hook elements. This can be done by using a commercially available computer software that scans the base web and assigns points on the base web. A user then manipulates the assigned points and classifies each point as either a loop element or a hook element as well as the distance between each points to achieve the desired arrangement of the loop elements and hook elements on the base web. The software then controls the weaving of the loop elements and the filamentous material into the base web as well as the subsequent cutting of the filamentous material to form the hook elements.

[009] The present application will now be described by the following figures.

Brief Description of Figures

[010] Fig. 1 is a diagrammatical cross-sectional view of a hook-and-loop fastener according to the present application.

[011] Fig. 2 is a view similar to Fig. 1, but showing an embodiment of the present application.

[012] Fig. 3 is a view similar to Fig. 1, but showing another alternative embodiment of the present application.

[013] Fig. 4 is a diagrammatical plan view of the hook-and-loop fastener of Fig. 1.

[014] Fig. 5 is a similar view to Fig. 4, but showing an alternative embodiment of the present application.

[015] Fig. 6 is also a similar view to Fig. 4, but showing another alternative embodiment of the present application.

PAPER B: AMENDMENT OF A PATENT SPECIFICATION
23 October 2018, Tuesday
1330 – 1730 hrs

Maximum Time: 4 Hours (includes reading time)

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Document A: A Hook-and-Loop Fastener (5/13)

Detailed Description of Figures

[016] Referring now to Fig. 1, Fig. 2 and Fig. 3, a hook-and-loop fastener according to the present application comprises a woven or knitted base web 1, a multiplicity of loop elements 2 and a multiplicity of hook elements 3 mounted in rows and columns lines on the base web 1. Each loop element 2 is 0.1 mm to 2.5 mm higher than each hook element 3 to increase the intermeshing force of the hook-and-loop fastener and each hook element 3 is made of a filamentous material of 400 to 700 denier. The loop element may be made of a polymeric material. The distribution ratio of the hook elements 3 relative to the total of the hook elements 3 and the loop elements 2 in each row is approximately 33 percent. In each row, each hook element 3 has a loop element 2 on each side thereof. By having the hook element 3 adjoining a loop element 2 on each side thereof and each loop element 2 being higher than each hook element 3 as mentioned above, these two features ensure that when two matching pieces of the hook-and-loop fastener are placed in face-to-face contact with each other, the hook elements 3 and the loop elements 2 of the matching pieces are firmly engaged with each other. Additionally, due to the above distribution ratio that results in a higher number of loop elements per row than any conventional hook-and-loop fastener, the hook-and-loop fastener is still flexible even though the hook elements are made of a filamentous material of 400 to 700 denier (which are harder and more inflexible but stronger than the conventional hook elements of filamentous material of 360 denier as mentioned in the Background section). The above features ensure that the intermeshing forces of the matching pieces are enhanced since the hook elements and loop elements can intermesh with each other firmly than in any conventional hook-and-loop fasteners. The hook-and-loop fastener is also more immune from being accidentally peeled away from a companion hook-and-loop fastener so that the hook-and-loop fastener is not easily detachable. In each row, hook elements 3 and loop elements 2 may be arranged without any regular sequence. In other words, variant numbers of the loop elements 2 may be irregularly interposed between the hook elements 3. When referring to Fig. 1, three, two and one loop elements 2 are interposed between the hook elements 3 in the inter-hook regions A, B and C respectively.

PAPER B: AMENDMENT OF A PATENT SPECIFICATION
23 October 2018, Tuesday
1330 – 1730 hrs

Maximum Time: 4 Hours (includes reading time)

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Document A: A Hook-and-Loop Fastener (6/13)

[017] As shown in Fig. 2, two loop elements 2 may be interposed between every adjacent hook elements 3. In other words, two loop elements 2 may alternate with one hook element 3. Furthermore, the distance between adjacent loop elements 2,2 and the distance between adjacent hook element 3 and loop element 2 may be non-uniform, that, is the distance may vary from one place to another (not shown in Fig. 2). This may help to enhance the intermeshing of the hook-and-loop fastener when two matching pieces are contacted together.

[018] As shown in Fig. 3, one, two or three loop elements 2 may be interposed between every adjacent hook elements 3. In other words, one loop element 2 may alternate with one hook element 3, two loop elements 2 may alternate with one hook element 3, or three loop elements 2 may alternate with one hook element 3. In this embodiment, the distance between each adjacent loop elements 2 in regions D and E of the base web 1 is much less than that in other regions of the base web 1; and the distance between the hook element 3 and the adjacent loop element 2 in region F of the base web 1 is lesser than that in other regions of the base web 1. The non-uniformity in the distance between adjacent loop elements 2,2 and the distance between adjacent hook element 3 and loop element 2 may help to prevent a piece of hook-and-loop fastener from having the same pattern as the matching piece, thus allowing matching pieces to intermesh together when contacted.

PAPER B: AMENDMENT OF A PATENT SPECIFICATION
23 October 2018, Tuesday
1330 – 1730 hrs

Maximum Time: 4 Hours (includes reading time)

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Document A: A Hook-and-Loop Fastener (7/13)

[019] The row arrangement of hook elements 3 and loop elements 2 as shown in Fig. 1 may be repeated in every following row like a, a, a, a, a... (where the rows are depicted by the letter "a"), as shown in Fig. 4, which means that either hook elements 3 or loop elements 2 are arranged in each vertical line (as shown by the columns depicted by the symbol "c."). Alternatively, as shown in Fig. 5, the arrangement may be staggered every other row, like a, b, a, b, a, b, ... (where the rows are depicted by the letter "a" or "b"), such that the row arrangement is different between adjacent rows. When looking at the column (as depicted by the symbol "c."), the column can be all hook elements 3 or all loop elements 2 or a mixture of hook elements 3 and loop elements 2. Still alternatively, as shown in Fig. 6, the arrangement may be staggered every third row, like a, a, a; b, b, b; a, a, a; b, b, b;.... (where the rows are depicted by the letter "a" or "b"). When looking at the column (as depicted by the symbol "c."), the column can be all hook elements 3 or all loop elements 2 or a mixture of hook elements 3 and loop elements 2.

Industrial Applicability

[020] The disclosed hook-and-loop fastener may be used for garments, pouches, baggages, covers, sheets, etc.

[021] Various modifications and variations of the present application are possible in light of the above teaching. It is therefore to be understood that within the scope of the appended claims, the invention may be practiced.

PAPER B: AMENDMENT OF A PATENT SPECIFICATION
23 October 2018, Tuesday
1330 – 1730 hrs

Maximum Time: 4 Hours (includes reading time)

Maximum Marks: 100

Document A: A Hook-and-Loop Fastener (8/13)

Claims

- 5 1. A hook-and-loop fastener comprising a base web, a multiplicity of hook elements and
loop elements mounted on the base web in rows and columns, each loop element
being 0.1 mm to 2.5 mm higher than each hook element and each hook element
being made of a filamentous material of 400 to 700 denier.
- 10 2. The hook-and-loop fastener according to claim 1, wherein the loop element is made
of a polymeric material.
3. The hook-and-loop fastener according to claim 1 or 2, having a ratio of 33 percent.
- 15 4. The hook-and-loop fastener according to any one of the preceding claims, wherein
two loop elements are interposed between every adjacent hook element.
5. The hook-and-loop fastener according to any one of the preceding claims, wherein
the distance is non-uniform.
- 20 6. The hook-and-loop fastener according to any one of the preceding claims, wherein
one, two or three loop elements are interposed between every adjacent hook
element.
- 25 7. The hook-and-loop fastener according to claim 2, wherein the distance in one region
is lesser than the distance in another region.
8. The hook-and-loop fastener according to claim 5, wherein the hook elements and
loop elements arranged in one row are the same as those arranged in another row.
- 30 9. The hook-and-loop fastener according to any one of the preceding claims, wherein
the hook and loop elements arranged in one row are different to those arranged
adjacently.

PAPER B: AMENDMENT OF A PATENT SPECIFICATION
23 October 2018, Tuesday
1330 – 1730 hrs

Maximum Time: 4 Hours (includes reading time)

Maximum Marks: 100

Document A: A Hook-and-Loop Fastener (9/13)

10. The hook-and-loop fastener according to any one of the preceding claims, wherein
the hook and loop elements arranged in three rows are the same as those arranged
in the next three rows.

11. A method of making a hook-and-loop fastener comprising the step of weaving the
loop elements into the base web, weaving the filamentous material of 400 to 700
denier into the base web and cutting the filamentous material to form the hook
elements such that each loop element is 0.1 mm to 2.5 mm higher than each hook
element.

12. The method of claim 11, further comprising the step of identifying positions of the
hook elements and loop elements on the base web.

PAPER B: AMENDMENT OF A PATENT SPECIFICATION
23 October 2018, Tuesday
1330 – 1730 hrs

Maximum Time: 4 Hours (includes reading time)

Maximum Marks: 100

Document A: A Hook-and-Loop Fastener (10/13)

Fig. 1

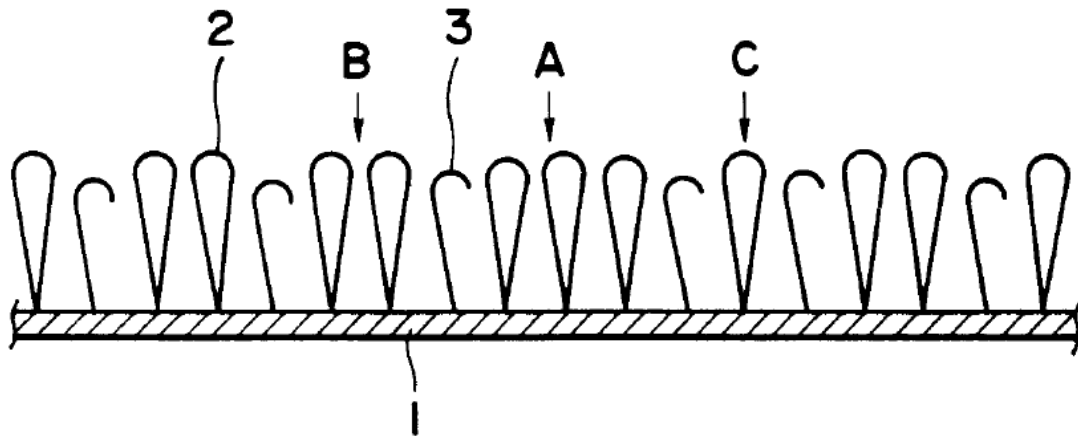
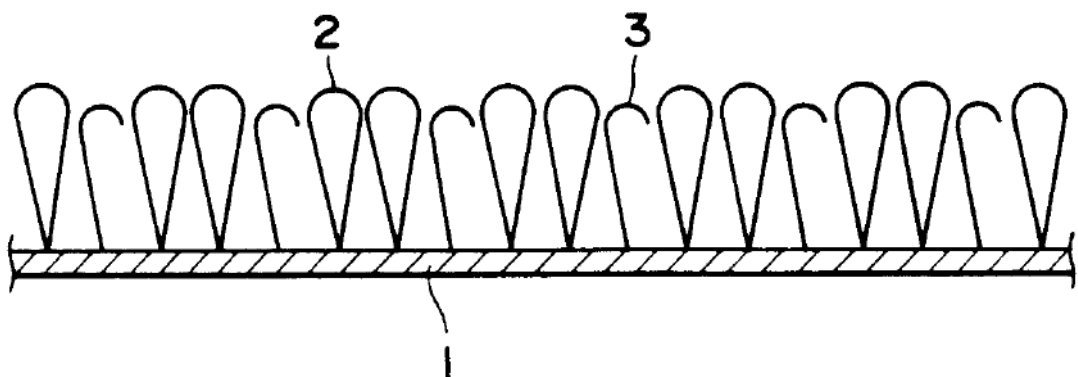
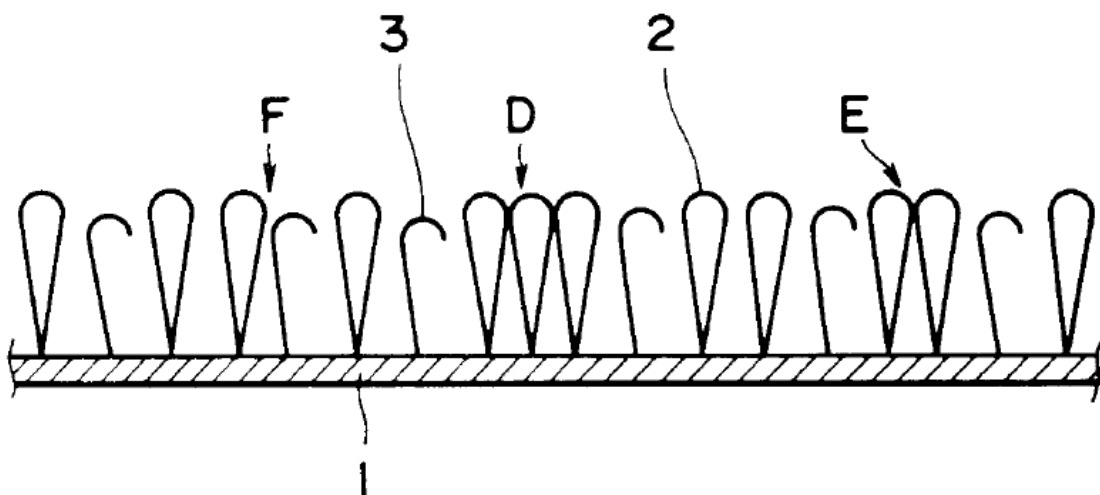


Fig. 2



5

Fig. 3



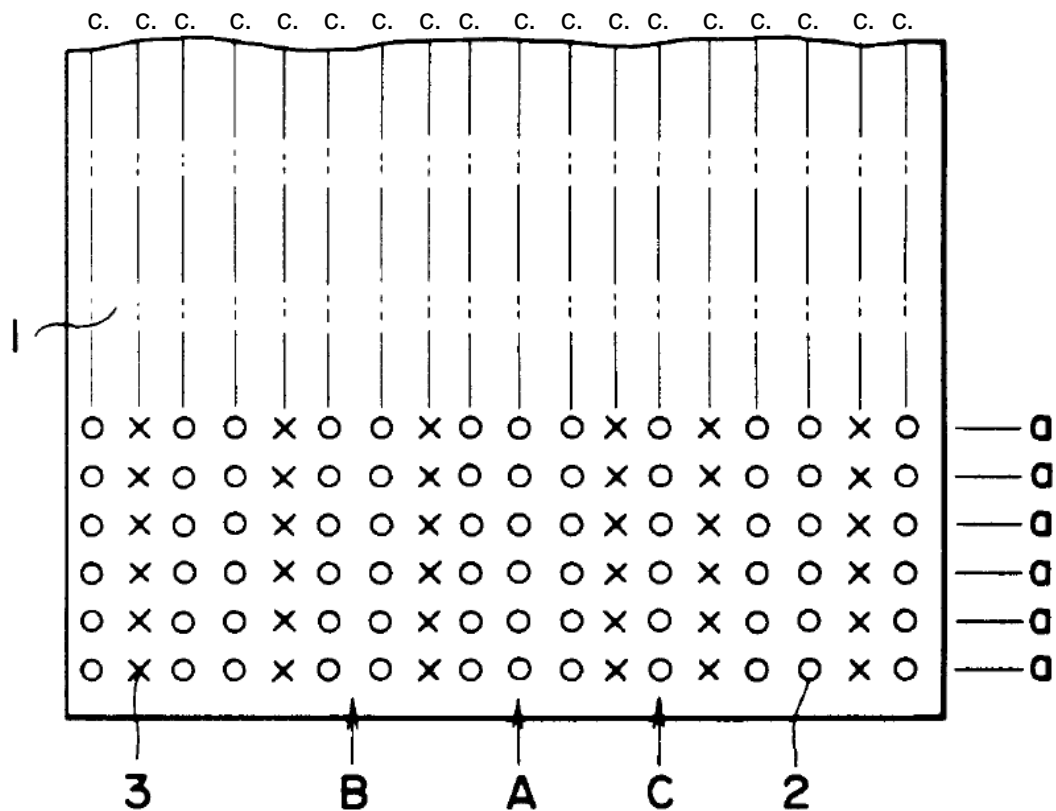
PAPER B: AMENDMENT OF A PATENT SPECIFICATION
23 October 2018, Tuesday
1330 – 1730 hrs

Maximum Time: 4 Hours (includes reading time)

Maximum Marks: 100

Document A: A Hook-and-Loop Fastener (11/13)

Fig. 4



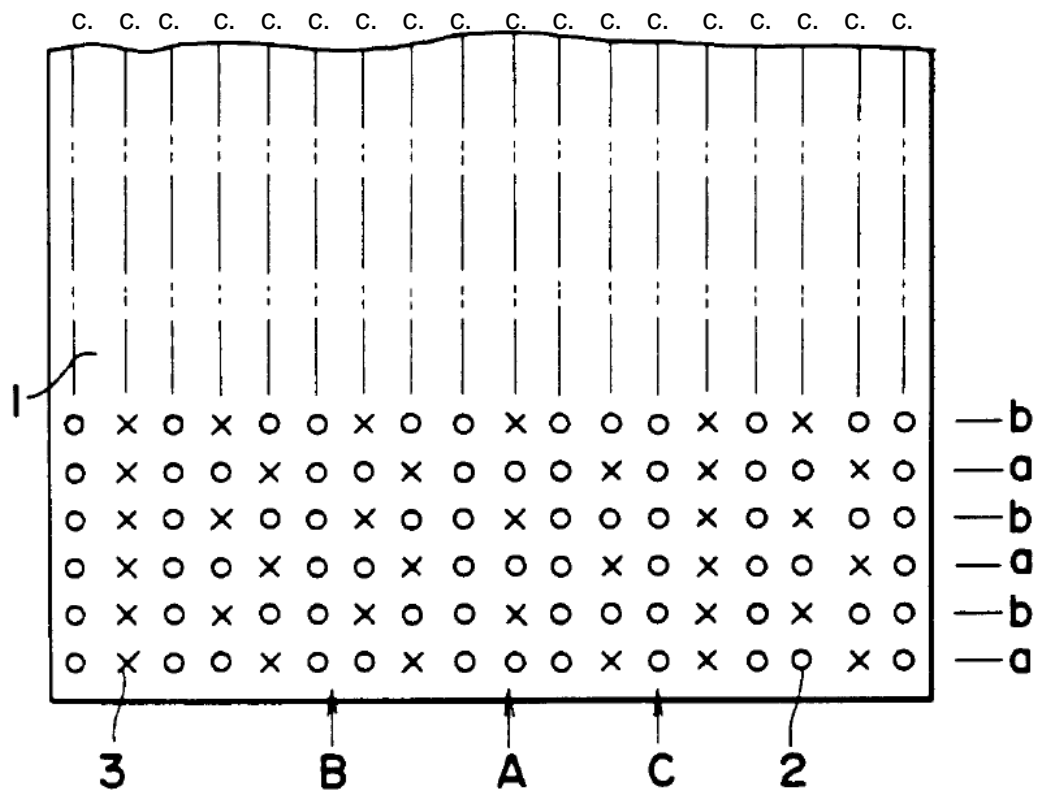
PAPER B: AMENDMENT OF A PATENT SPECIFICATION
23 October 2018, Tuesday
1330 – 1730 hrs

Maximum Time: 4 Hours (includes reading time)

Maximum Marks: 100

Document A: A Hook-and-Loop Fastener (12/13)

Fig. 5



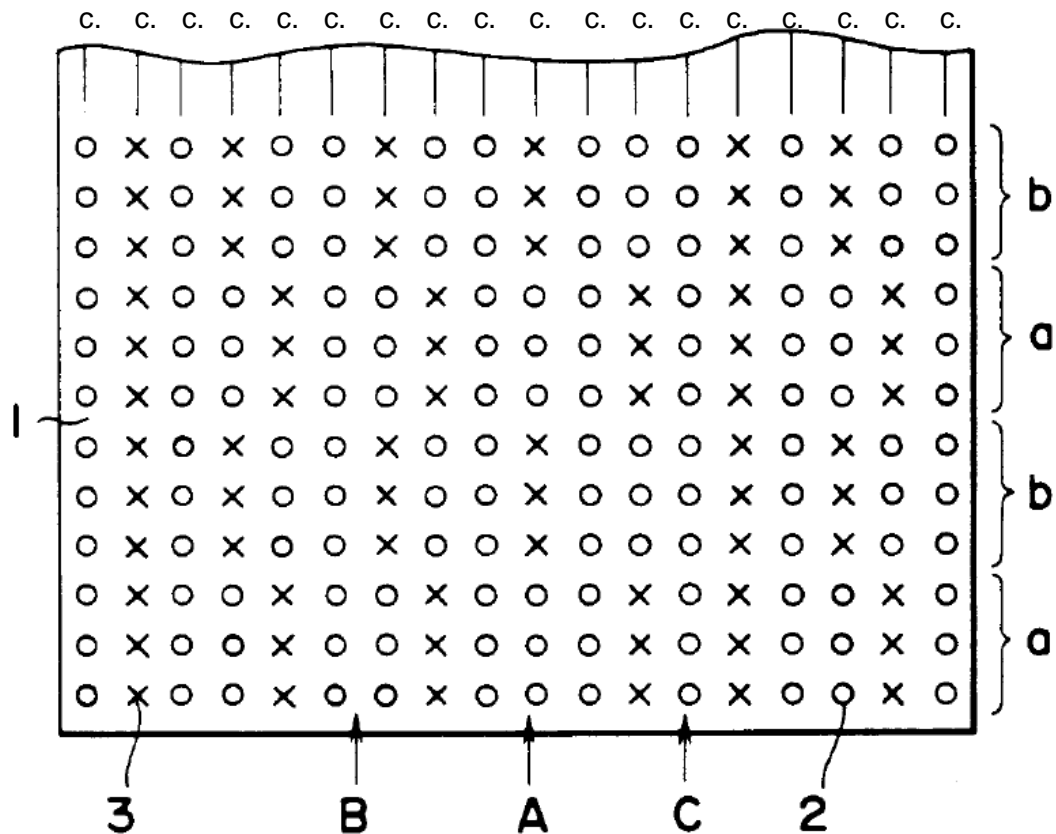
PAPER B: AMENDMENT OF A PATENT SPECIFICATION
23 October 2018, Tuesday
1330 – 1730 hrs

Maximum Time: 4 Hours (includes reading time)

Maximum Marks: 100

Document A: A Hook-and-Loop Fastener (13/13)

Fig. 6



INTELLECTUAL PROPERTY OFFICE OF SINGAPORE
PATENT AGENTS QUALIFYING EXAMINATION 2018

PAPER B: AMENDMENT OF A PATENT SPECIFICATION
23 October 2018, Tuesday
1330 – 1730 hrs

Maximum Time: 4 Hours (includes reading time)

Maximum Marks: 100

Document B: Written Opinion (1/2)

Application No.
10201811111A

Application filing date 30/05/2018	(Earliest) Priority Date -	Examiner's Reference Number IPOS/AAA
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1. This first Written Opinion is issued under Section 29(5) of the *Patents Act* with effect from 30/10/2017.

Statement with regard to novelty, inventive step or industrial applicability

10	Novelty (N)	Claim(s)	<u>NONE</u>	YES
		Claim(s)	<u>1 to 12</u>	NO
	Inventive Step (IS)	Claim(s)	<u>NONE</u>	YES
		Claim(s)	<u>1 to 12</u>	NO
15	Industrial Applicability (IA)	Claim(s)	<u>1 to 12</u>	YES
		Claim(s)	<u>NONE</u>	NO

Citations:

- 20 D1 - Japanese unexamined utility model publication number 2-2222
D2 - EP 3,333,333
D3 - "A Hook-and-Loop Fastener", Journal of Fasteners, Loopy *et al*, pages 1 to 4

PAPER B: AMENDMENT OF A PATENT SPECIFICATION
23 October 2018, Tuesday
1330 – 1730 hrs

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Maximum Marks: 100

Document B: Written Opinion (2/2)

2. Novelty (Section 14 of the *Patents Act*)

D1 describes a hook-and-loop fastener that has a base web, a multiplicity of hook elements and loop elements mounted on the base web in rows and columns. D1 also describes that each loop element is 0.1 mm to 2.0 mm higher than each hook element (which is within the scope of claim 1 that recites that the loop element is 0.1 mm to 2.5 mm higher than each hook element) and each hook element being made of a filamentous material. Although D1 does not specify the denier of the filamentous material, this is inherent in D1 when referring to D2. D1 also describes a method of making a hook-and-loop fastener comprising the step of weaving the loop elements into the base web, weaving the hook material into the base web and cutting the hook material to form the hook elements such that each loop element is higher than each hook element by 0.1 to 2.0 mm.

D2 describes a hook-and-loop fastener that has a base web, a multiplicity of hook elements and loop elements mounted on the base web in rows and columns. D2 also describes that each loop element is higher than each hook element and each hook element being made of a filamentous material of 400 to 700 denier.

D3 describes the exact same type of hook-and-loop fastener as in the present application. Based on the above, claims 1 to 12 are not novel.

3. Inventive Step (Section 15 of the *Patents Act*)

As the above claims are not novel, they are also not inventive, whether considering the cited documents singly or when combined with each other.

4. Industrial Applicability (Section 16 of the *Patents Act*)

The present invention can be used in industry, thus, claims 1 to 12 are industrially applicable.

5. Clarity and Support (Section 25(5)(b) and Section 25(5)(c) of the *Patents Act*)

Some of the claims are not clear as there are antecedent issues.

Claim 1 lacks support as it appears that not all of the essential features are present in claim 1.

PAPER B: AMENDMENT OF A PATENT SPECIFICATION
23 October 2018, Tuesday
1330 – 1730 hrs

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Maximum Marks: 100

Document C: Letter from Client (1/2)

Dear Patent Attorney,

5 I received the Written Opinion from you, I noticed that the date of the IPOS letter providing the Written Opinion was 30 July 2018 which means that I need to respond to the Written Opinion by 30 October 2018. In view that there is only one week left to the deadline, please prepare a response and submit it on my behalf.

10 In the Written Opinion, the Examiner seemed to have combined D1 and D2 to object against the novelty of the claims, is this permissible? With regard to D3, it is actually published by my company with my knowledge by my employees in my research team, will this cause any issue in Singapore? Since the D3 publication recites the exact same hook-and-loop fastener as that in my patent application, does this mean that I can no longer
15 patent my hook-and-loop fastener in Singapore?

In any case, my hook-and-loop fastener is better than any in the market because a number of features are present in the hook-and-loop fastener that allows greater intermeshing forces between matching pieces as compared to those in the market so that
20 the matching pieces stay together even when a pulling force is applied to the hook-and-loop fastener.

As you can see from my hook-and-loop fastener, it is in the form of a mat and that was what we have been selling since June this year. My marketing department informed me
25 that a number of customers had provided feedback that the mat form is too big. After reading the D2 cited document, an idea dawned on me that I could have cut my mat-sized hook-and-loop fastener into smaller sized tapes and then package these tapes in the form of a typical tape dispenser. So I bought a typical adhesive tape dispenser, took out the adhesive tape from the dispenser and mounted my tape-sized fastener onto it, thus creating a fastener tape
30 dispenser. I showed this prototype to a number of my customers confidentially and they have expressed interest. I want to protect the tape dispenser containing the tape form of the hook-and-loop fastener. Please advise how best to go about this by considering whether this

INTELLECTUAL PROPERTY OFFICE OF SINGAPORE
PATENT AGENTS QUALIFYING EXAMINATION 2018

PAPER B: AMENDMENT OF A PATENT SPECIFICATION
23 October 2018, Tuesday
1330 – 1730 hrs

Maximum Time: 4 Hours (includes reading time)

Maximum Marks: 100

Document C: Letter from Client (2/2)

should be done in this application or in another application and when (NB: you do not need to consider the patentability of the fastener tape dispenser).

5

Thank you for your time.

Yours faithfully

Macie Wang, CEO, Fastener Pte Ltd.

PAPER B: AMENDMENT OF A PATENT SPECIFICATION
23 October 2018, Tuesday
1330 – 1730 hrs

Maximum Time: 4 Hours (includes reading time)

Maximum Marks: 100

Document D1: Japanese Unexamined Utility Model Publication Number 2-2222 (1/6)

Publication date: 1 January 2018

- 5 (The following is a verified English translation of Japanese unexamined utility model publication number 2-2222, duly sworn by a competent translator who is versed in both English and Japanese)

Title of the Invention

10 **Surface Fastener**

Scope of Claim for Utility Model Registration

- 15 [001] A surface fastener in which hook-like engagement elements and loop-like engagement elements are mixed and provided on a same surface of a base web, characterized in that the height of the loop-like engagements is in the range of 1.5 to 4 mm and is higher than the height of the hook-like engagement elements by 0.1 to 2.0 mm.

Detailed Explanation of the Invention

20 <Industrial Applicability>

- [002] The present invention relates to a surface fastener having a high engagement force and exhibiting a good touch feeling, wherein the positioning of the fastener upon surface contact can be easily carried out and no damage of an engageable cloth such as knit occurs when no surface contact takes place.

25

<Prior Art>

- 30 [003] In a conventional surface fastener in which hook-like engagement elements and loop-like engagement elements are provided on a same surface of a base web, a number of hook-like or mushroom-shaped hook-like engagement elements are provided on a half of the surface or a part thereof, and a number of loop-like engagement elements are provided on the other half of a part of the surface, or the hook-like engagement elements and the loop-like engagement elements are mixed and provided on the same surface of the base web.

PAPER B: AMENDMENT OF A PATENT SPECIFICATION
23 October 2018, Tuesday
1330 – 1730 hrs

Maximum Time: 4 Hours (includes reading time)

Maximum Marks: 100

Document D1: Japanese Unexamined Utility Model Publication Number 2-2222 (2/6)

[004] A problem with such conventional surface fasteners is that if one surface fastener does not engage with another surface fastener, and upon washing, the hook-like engagement elements engage with a fabric of a textile product, such as non-woven fabric, knit, piled fabric, or thin fabric, etc and damage the same or the hook-like engagement elements. Moreover, since the surface fastener has a rough surface, the touch feeling is bad if the surface fastener is attached to cloths.

<Problem to be Solved by the Invention>

[005] It is an object of the present invention to provide a surface fastener having a sufficient engagement force, wherein, in case of absence of engagement, no engagement of the hook-like engagement elements with the fabric of a textile produce occurs, so that the fabric is free from damage or a good touch feeling can be obtained.

<Means for Solving the Problem>

[006] According to the present invention, there is provided a surface fastener in which hook-like engagement elements and loop-like engagement elements are mixed and provided on a same surface of a base web, characterized in that the height of the loop-like engagement elements is in the range of 1.5 to 4 mm and is higher than the height of the hook-like engagement elements by 0.1 to 2.0 mm.

<Mode of Operation>

[007] In a surface fastener according to the present invention, since the hook-like engagement elements and the loop-like engagement elements are provided in mixture on the same surface of the base web so that the hook-like engagement elements are lower in height than the loop-like engagement elements, no accidental engagement of the surface fastener with a fabric of a textile product or the like occurs, thus damage of the fabric does not occur and a good touch feeling can be obtained.

PAPER B: AMENDMENT OF A PATENT SPECIFICATION
23 October 2018, Tuesday
1330 – 1730 hrs

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Document D1: Japanese Unexamined Utility Model Publication Number 2-2222 (3/6)

<Embodiment of the Invention>

[008] An embodiment of a surface fastener according to the present invention will
5 be discussed below with reference to the accompanying drawings.

[009] Fig. 1 shows a schematic sectional view of a surface fastener having hook-
like engagement elements and loop-like engagement elements in mixture on the
same surface of a base web. In Fig. 1, numeral 1 designates the base web made of a
10 woven fabric or knitted fabric, 2 the hook-like engagement elements provided on the
base web, 3 the loop-like engagement elements, respectively.

[010] The loop-like engagement elements 3 and the hook-like engagement
elements 2 are usually made of a filamentous material or a polymeric material.
15 Where a filamentous material is used, reference is made to EP 3,333,333, which
describes a filamentous material, the disclosure of which is incorporated herein by
reference.

[011] The loop-like engagement elements 3 and the hook-like engagement
20 elements 2 are arranged in an alternate fashion for each element or every plural
element. Consequently, the loop-like engagement elements and hook-like
engagement elements occupy almost the same surface area of the base web and in
each row, for every loop-like engagement element, there is a hook-like engagement
element, to obtain the same engagement force as that of a conventional surface
25 fastener.

PAPER B: AMENDMENT OF A PATENT SPECIFICATION
23 October 2018, Tuesday
1330 – 1730 hrs

Maximum Time: 4 Hours (includes reading time)

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Document D1: Japanese Unexamined Utility Model Publication Number 2-2222 (4/6)

[012] The height of the loop-like engagement elements 3 in the present invention is in the range of 1.5 mm to 4 mm and must be higher by 0.1 to 2.0 mm than the hook-like engagement elements 2. If the height of the loop-like engagement elements is set as above, no accidental engagement of the hook-like engagement elements with the fabric of the textile product or the like occurs, such that the fabric is not damaged by the hook-like engagement elements and accordingly it is possible to improve the touch feeling of the surface of the surface fastener. If the height of the loop-like engagement elements is not greater than 1.5 mm, it is difficult to engage the loop-like engagement elements with the hook-like engagement elements. Conversely, if the height of the loop-like engagement elements is not smaller than 4.0 mm, the loop-like engagement elements which engage with the hook-like engagement elements tend to be disengaged therefrom. In order to retain the engagement force of the loop-like engagement elements with the hook-like engagement elements, it is generally preferably that the height of the loop-like engagement elements be in the range of 2 to 3 mm. Moreover, the height of the loop-like engagement elements 3 must be in the range mentioned above and must be higher by 0.1 to 2.0 mm and preferably 0.5 to 2.0 mm than the height of the hook-like engagement elements.

[013] The surface fastener according to the present invention can be easily formed by, for example, weaving the loop-like engagement elements having different heights for every row and thereafter cutting the lower loop-like engagement elements using a cutter having a tapered tip. The same is then done for the hook-like engagement elements while ensuring that during cutting of the loop-like engagement elements or the hook-like engagement elements, the height of the loop-like engagement elements is higher by 0.1 to 2.0 mm than the height of the hook-like engagement elements.

PAPER B: AMENDMENT OF A PATENT SPECIFICATION
23 October 2018, Tuesday
1330 – 1730 hrs

Maximum Time: 4 Hours (includes reading time)

Maximum Marks: 100

Document D1: Japanese Unexamined Utility Model Publication Number 2-2222 (5/6)

[014] A mating surface fastener engaged by the surface fastener of the present invention can be one that has hook-like engagement elements and loop-like engagement elements on the same base web, or a male surface fastener having loop-like engagement elements with a female surface fastener having hoop-like engagement elements.

[015] Fig. 2 shows an arrangement in which a pair of surface fasteners of the present invention are used and the hook-like engagement elements engage with the loop-like engagement elements.

<Effect of the Invention>

[016] According to the present invention, a surface fastener has a sufficient engagement force; no damage of the fabric due to an accidental engagement with the fabric of other textile product occurs, and little damage of the hook-like engagement elements takes place. Moreover, there is no dimensional orientation of the engagement and the positioning upon engagement can be easily carried out and the touch feeling of the surface fastener is good.

[Claims omitted for the purpose of the Patent Agents Qualifying Examination]

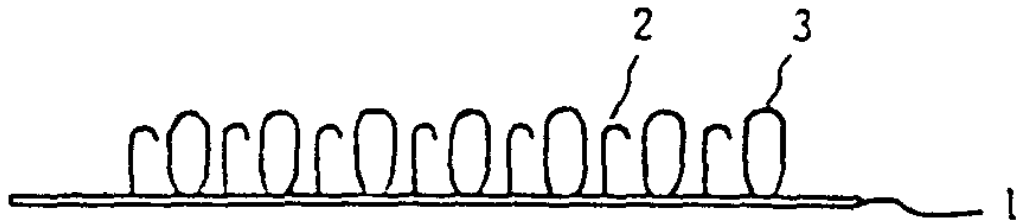
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23 October 2018, Tuesday
1330 – 1730 hrs

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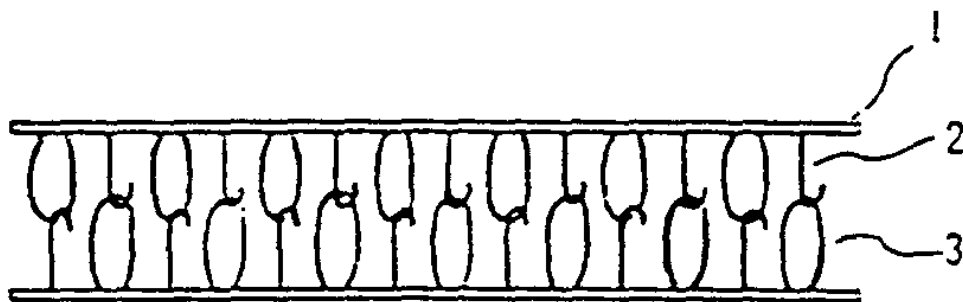
Document D1: Japanese Unexamined Utility Model Publication Number 2-2222 (6/6)

Fig. 1



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Fig. 2



PAPER B: AMENDMENT OF A PATENT SPECIFICATION
23 October 2018, Tuesday
1330 – 1730 hrs

Maximum Time: 4 Hours (includes reading time)

Maximum Marks: 100

Document D2: EP 3,333,333 (1/6)

Publication date: 15 October 2010

5 Fasteners and Method of Producing the Same

[001] This invention relates to fasteners and a method of producing the same and its object is the manufacture of specially economical and useful fasteners.

10 [002] Heretofore, easily attachable and detachable fasteners have been constructed of two opposite and engaging parts of the same type of fabric having a plurality of interengageable hooks, said fabric being made by weaving an auxiliary synthetic resin thread warp with the warp into which the weft is to be woven so as to form a plurality of loops on one surface thereof, said loops being hardened by
15 heating so as to make them project like a pile and being cut at an appropriate place into the interengageable hook form, which can then engage with the loops of another portion or piece of the fastener.

[003] In the prior art, the hooking means are formed from loops all of which are cut,
20 that is, the surfaces are covered exclusively with hooks and manufacture is relatively easy. The loops have a height of 1 mm to 4 mm. However, because the interengaging is carried out in its entirety by hook and hook, and hooking attachment is very weak and because the two fastener parts are easily separated by the application of little force, fasteners of this type are seldom in practical use.

25 [004] It is an object of the present invention to provide easily attachable and detachable fasteners which can be hooked safely and accurately.

[005] According to the invention, there is provided a fastener consisting of two
30 pieces of cloth or plastics sheet material, each piece having a face covered with a like pattern of hooks and loops, spaced apart, and so arranged, that when the face of one piece is placed on the corresponding face of the other, the hooks on one face can engage the loops on the other face, and conversely. The loops are taller than the hooks to achieve tighter engagement.

PAPER B: AMENDMENT OF A PATENT SPECIFICATION
23 October 2018, Tuesday
1330 – 1730 hrs

Maximum Time: 4 Hours (includes reading time)

Maximum Marks: 100

Document D2: EP 3,333,333 (2/6)

[006] The invention further includes a method of making a fastener of the present invention in which a piece of material has loops formed on, or attached to, one surface and is moved past a cutting hand having cutters on the fingers of the hand arranged to cut selected loops and means for rocking or otherwise moving the hand to cause the cutters to cut selected loops on said material whereafter the material is cut up to provide the pieces for the fastener and a device for carrying out the method. In order to control the movement of the cutter to only cut selected loops on the material, a computer software that maps the material and identifies which loops to be cut is used. The cut loop then forms the hooks of the fastener.

[007] The invention will be described in more detail with reference to the embodiment illustrated in the accompanying drawings, in which:

[008] Figure 1 is a perspective view of an intermediate product having a plurality of projecting loops consisting of a filamentous material of 400 to 700 denier formed on the surface of woven cloth or plastics sheet for the purpose of forming the two parts of the fastener of the present invention.

[009] Figure 2 is an enlarged diagram showing a longitudinal partly sectional side view of a cutter cutting selected loops.

[010] Figure 3 is a top plan view of patterns of four alternate examples showing the selective arrangements of the loops which are to be cut, on said intermediate product of Figure 1 by the mean illustrated in Figure 2.

PAPER B: AMENDMENT OF A PATENT SPECIFICATION
23 October 2018, Tuesday
1330 – 1730 hrs

Maximum Time: 4 Hours (includes reading time)

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Document D2: EP 3,333,333 (3/6)

[011] Referring to the drawings, Figure 1 shows an intermediate product to be made first for the purpose of forming and manufacturing the fastener of the present invention, wherein 1 denotes a cloth fabric such as a woven or knitted fabric using thread, or warp and weft, of suitable materials or plastics moulded sheet of a synthetic material. 2 denotes loops all facing in the same direction and slightly projecting from the surface of the fabric or sheet 1. The material constituting these loops may be, for example, a filamentous material of 400 to 700 denier or a polymeric material. The height of the loops follows that of the fastener of the prior art mentioned above.

[012] Referring to Figure 2, the loops of the intermediate product thus formed are then selectively cut by the illustrated means to form the hooks. While cutting, care must be taken to ensure that the loops are higher than the hooks, where the difference in height between the loops and hooks is around 10% the height of the loops. Here, the intermediate product, that is, the cloth or plastics sheet 1 moves, in the direction indicated by the arrow in the drawing, on a cutting wheel 3. A cutting hand 6 having a plurality of supporting fingers 4 and cutting edges 5, each cutting edge 5 being fixed to the respective upper part of each supporting finger 4, is mounted above the cloth or sheet 1 so as to be freely rocked up and down and/or right and left by an appropriate mechanism (not illustrated). The loops 2 on the moving cloth or sheet 1 move towards each supporting finger 4 of the cutting hand 6, touch the cutting edge 5, and are thereby cut at one side to form the hooks. The cuts to be made in the loops 2 are made in respect of selected loops.

PAPER B: AMENDMENT OF A PATENT SPECIFICATION
23 October 2018, Tuesday
1330 – 1730 hrs

Maximum Time: 4 Hours (includes reading time)

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Document D2: EP 3,333,333 (4/6)

[013] In Figure 3, four patterns are illustrated and numbered 1 to 4. In this figure, the symbol x represents loops which have been cut, that is, hooks, and the symbol – denotes closed loops having no cuts. As can be seen in Figure 3, the arrangement of the hooks and loops may be the same from row to row or may be different from row to row. In addition, when looking at each row of the surface fastener, the hooks and loops may be arranged according to a specific pattern or distribution in various distribution ratios, for example, in pattern (2), the distribution ratio of the hooks to the loops in each row can be 0%, 20%, 40%, 60%, 80% and 100% while that in pattern (3) is 33% and 66% and that in pattern (4) is 50%. In manufacturing the fastener parts of the present invention having the arrangement illustrated in the various patterns (1) to (4), this can be keyed into the computer software which then controls the movement of the cutter as the cloth or plastics sheet 1 move along the cutting wheel 3.

[014] The cloth or plastic sheet 1 having the loops and hooks thereon forming the final product can then be cut if needed to form cloth or sheets of various sizes and shapes. The final product can be in the form of mats, tapes or strips.

[015] The present invention is then represented by the following claims.

[Claims omitted for the purpose of the Patent Agents Qualifying Examination]

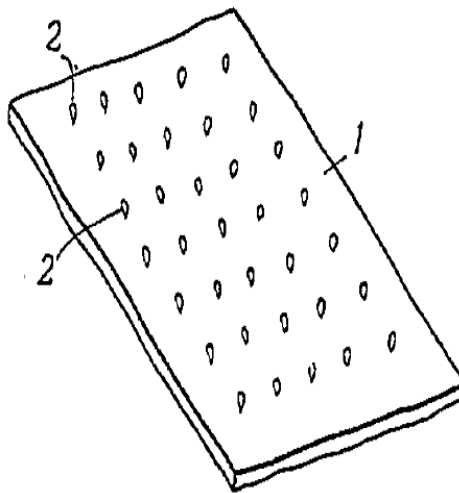
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23 October 2018, Tuesday
1330 – 1730 hrs

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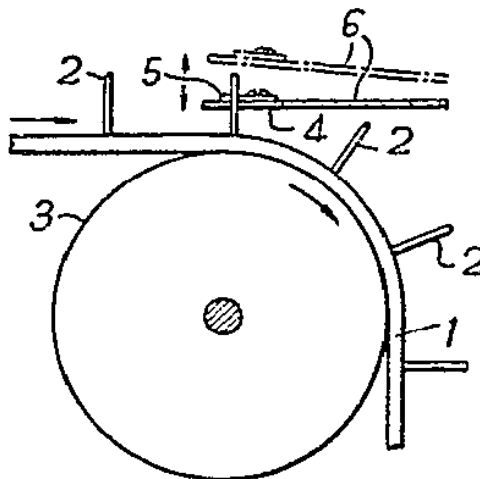
Document D2: EP 3,333,333 (5/6)

Figure 1



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Figure 2



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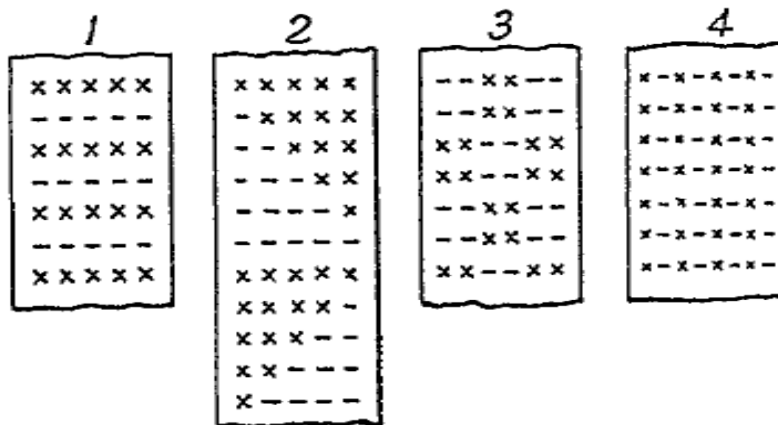
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23 October 2018, Tuesday
1330 – 1730 hrs

Maximum Time: 4 Hours (includes reading time)

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Document D2: EP 3,333,333 (6/6)

Figure 3



PAPER B: AMENDMENT OF A PATENT SPECIFICATION
23 October 2018, Tuesday
1330 – 1730 hrs

Maximum Time: 4 Hours (includes reading time)

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Document D3: “A Hook-and-Loop Fastener”, Journal of Fasteners, Loopy et al (1/4)

Available online: 1 December 2017

Authors: Jeremy Loopy, Gavin Chan and Clarinda Tee

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A Hook-and-Loop Fastener

Abstract

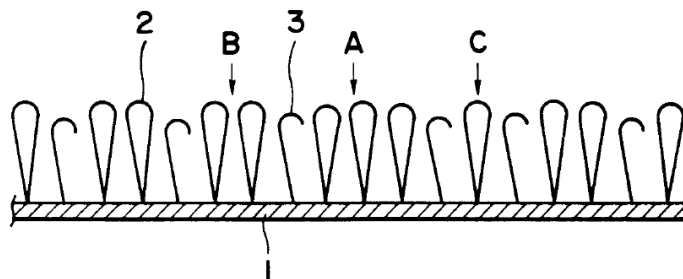
10 We describe a hook-and-loop fastener that has a base web and a multiplicity of hook elements and loop elements mounted on the base web in rows and columns. In the hook-and-loop fastener, each loop element is 0.1 mm to 2.5 mm higher than each hook element and each hook element is made of a filamentous material of 400 to 700 denier.

Description

15 We have come up with a new type of hook-and-loop fastener that can intermesh more strongly than those currently in the market. This new type of hook-and-loop fastener is as described below.

20 Referring now to Figure 1 and Figure 2, we describe a hook-and-loop fastener that has a woven or knitted base web 1, a multiplicity of loop elements 2 and a multiplicity of hook elements 3 mounted in rows and columns lines on the base web 1.

Figure 1:



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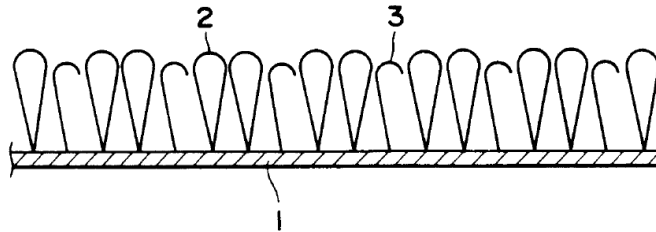
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23 October 2018, Tuesday
1330 – 1730 hrs

Maximum Time: 4 Hours (includes reading time)

Maximum Marks: 100

Document D3: “A Hook-and-Loop Fastener”, Journal of Fasteners, Loopy et al (2/4)

Figure 2:



- 5 Each loop element 2 is 0.1 mm to 2.5 mm higher than each hook element 3 to increase the intermeshing force of the hook-and-loop fastener and each hook element 3 is made of a filamentous material of 400 to 700 denier. The loop element is made of a polymeric material. The distribution ratio of the hook elements 3 relative to the total of the hook elements 3 and the loop elements 2 is approximately 33 percent. In each row, each
- 10 hook element 3 has a loop element 2 on each side thereof. By having the hook element 3 adjoining a loop element 2 on each side thereof and each loop element 2 being higher than each hook element 3 as mentioned above, these two features ensure that when two matching pieces of the hook-and-loop fastener are placed in face-to-face contact with each other, the hook elements 3 and the loop elements 2 of the matching pieces are firmly
- 15 engaged with each other. Additionally, due to the above distribution ratio that results in a higher number of loop elements per a given unit area than any conventional hook-and-loop fastener, the hook-and-loop fastener is still flexible although its hook elements are made of a filamentous material of 400 to 700 denier (which are harder and more inflexible but stronger than the hook elements of filamentous material of 360 denier currently on the market).
- 20 Therefore, the intermeshing forces of the matching pieces are enhanced since the hook elements and loop elements can intermesh with each other firmly compared to hook-and-loop fasteners now on the market. The hook-and-loop fastener is also more immune from being accidentally peeled away from a companion hook-and-loop fastener. In each row, hook elements 3 and loop elements 2 may be arranged without any regular sequence. In
- 25 other words, variant numbers of the loop elements 2 may be irregularly interposed between the hook elements 3. When referring to Figure 1, three, two and one loop elements 2 are interposed between the hook elements 3 in the inter-hook regions A, B and C respectively.

Maximum Marks: 100

As shown in Figure 2, two loop elements 2 may be interposed between every adjacent hook elements 3. In other words, two loop elements 2 may alternate with one hook element 3. Furthermore, the distance between adjacent loop elements 2,2 and the distance between adjacent hook element 3 and loop element 2 may be non-uniform, that, is the distance may vary from one place to another. This may help to enhance the intermeshing of the hook-and-loop fastener when two matching pieces are contacted together.

The row arrangement of hook elements 3 and loop elements 2 as shown in Figure 1 may be repeated in every following row like a, a, a, a, a..., as shown in Figure 3, which means that either hook elements 3 or loop elements 2 are arranged in each vertical line (as shown by the columns).

A diagram of a rectangular lattice of points. The lattice consists of 10 columns and 6 rows of points. The points are arranged in a regular grid. The columns are labeled 1, 2, 3, A, B, and C from left to right. The rows are labeled 1, 2, 3, 4, 5, and 6 from top to bottom. The points are represented by small circles. The labels 1, 2, 3, A, B, and C are placed below the lattice. The label 1 is at the top left, 2 is at the bottom right, 3 is at the bottom left, A is at the bottom center, B is at the bottom left-center, and C is at the bottom right-center.

PAPER B: AMENDMENT OF A PATENT SPECIFICATION
23 October 2018, Tuesday
1330 – 1730 hrs

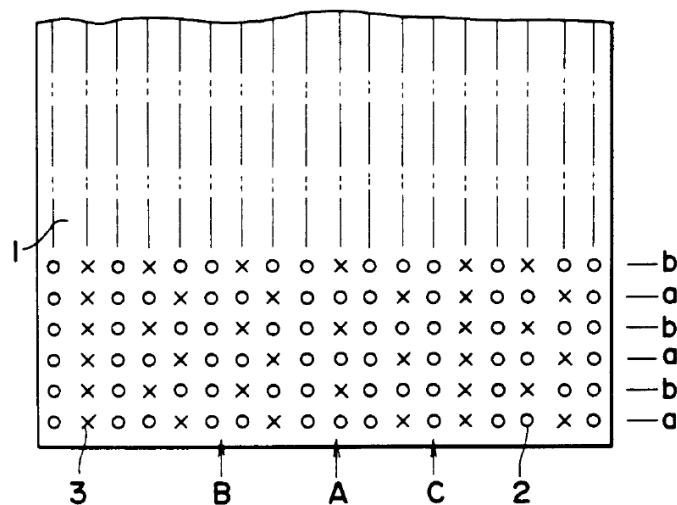
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Maximum Marks: 100

Document D3: “A Hook-and-Loop Fastener”, Journal of Fasteners, Loopy et al (4/4)

Alternatively, as shown in Figure 4, the arrangement may be staggered every other row, like a, b, a, b, a, b, ... such that the row arrangement is different between adjacent rows.

Figure 4:



Therefore, we have come up with a hook-and-loop fastener that has increased intermeshing forces as compared to other hook-and-loop fasteners sold today.

END