



(51) International Patent Classification:  
A01K 47/04 (2006.01)

(21) International Application Number:  
PCT/TH2023/000022

(22) International Filing Date:  
07 September 2023 (07.09.2023)

(25) Filing Language: Thai

(26) Publication Language: English

(30) Priority Data:  
2203002916 21 October 2022 (21.10.2022) TH

(71) Applicant: SUANSUNANDHA RAJABHAT UNIVERSITY [TH/TH]; 1 U-Thongnok Rd., Dusit, Bangkok, 10300 (TH).

(72) Inventors: THANAKUNWUTTHIROT, Kunyaphat; 87/166 Sao Thong Hin, Bang Yai, Nonthaburi, 11140 (TH). LIMSAKSRI, Doungjai; 99/180 Moo 12, Bang Kaew, Bang Phli, Samut Prakan, 10540 (TH). WORACHAIRUNGREUNG, Morakot; 146 Soi Somdet Phra Chao Tak Sin 4, Bang Yi Ruea, Thon Buri, Bangkok, 10600 (TH). KUMNERDRIT, Thanyaluck; 1/19 Moo 7, Ratchakrut, Mucang Ranong, Ranong Provincce, 85000 (TH).

(74) Agent: SRIBUAKAEW, Waraphorn; 1/145 Phichai Road, Nakhon Chai Si Subdistrict, Dusit, Bangkok, 10300 (TH).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CV, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IQ, IR, IS, IT, JM, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, MG, MK, MN, MU, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, CV, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SC, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, ME, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

(54) Title: BEEKEEPING EQUIPMENT AND HONEY EXTRACTOR

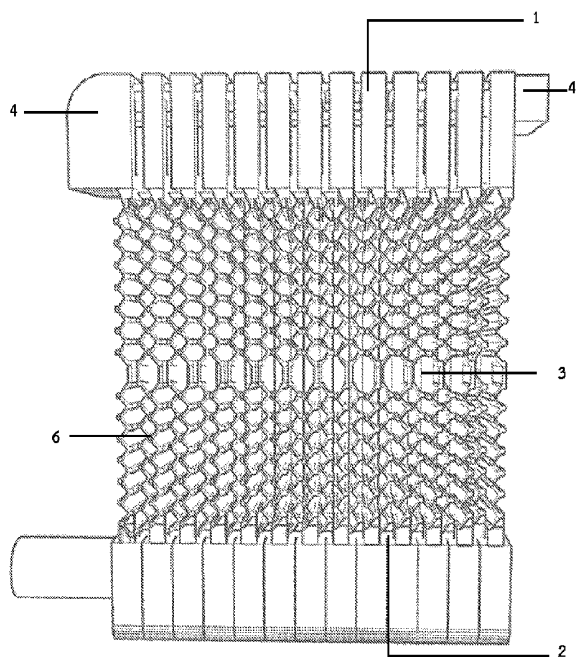


Figure 2

(57) Abstract: Beekeeping equipment and honey extractor consist of wide-frame artificial honeycomb panel paired with narrow-frame artificial honeycomb panels in order to create the movement for honey extraction. This combination constructs an appropriately sized space for Thai honeybees to inhabit and produce honey in the honeycombs. The honeycomb cells come in two sizes, ones for Thai honeybees and the other one for Thai queen bee which will come in larger size to accommodate the queen bee which is larger in size compared with other honey bees. The artificial honeycomb panels made of acrylic material are joined on the sides of the artificial panels to seal them. This will prevent other insects from disturbing the bees in this artificial honeycomb panels. In addition, there is a rod for twisting the narrow-frame artificial honeycomb panel in order to extract honey. During the process of honey extraction, the bees including both bee larvae and all other bees residing in the honeycombs, are not be interrupted. This is because the appropriate spacing between these artificial honeycomb panels. The honey, once completely extracted, flows down to the bottom of the artificial honeycomb panels, and is later directed to the honey clear acrylic funnel.

**Declarations under Rule 4.17:**

- *as to the identity of the inventor (Rule 4.17(i))*
- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
- *of inventorship (Rule 4.17(iv))*

**Published:**

- *with international search report (Art. 21(3))*

## BEEKEEPING EQUIPMENT AND HONEY EXTRACTOR

### Technical Filed Related to the Invention

Engineering Specializing in Beekeeping Equipment and Honey Extractor Technology

### The Background of Art or Related Sciences

5 Department of Agriculture Extension, under the leadership of Mr. Khemkang Yuttithamdamong, the Director-General of the Department of Agriculture Extension, revealed that the Asian honeybee (*Apis cerana*) is a native bee species thrived in every region of Thailand. These bees naturally take part in a crucial role in pollinating agricultural crops and fruit-bearing plants, contributing to biodiversity. Achieving success in beekeeping with  
10 Asian honey bees relies on the diversity and abundance of their natural food sources, as well as a continuous supply of nectar and pollen. New farmers can naturally attract Asian honeybees from their wild habitats and maintain them in hives at a low cost. Honey and honey-related products are natural and good for one's health. Since they have a long shelf life and can be sold at high prices, resulting in highly demanded for these products in the market  
15 (Department of Agriculture Extension, 2022)."

In the year 2021, statistic data indicating that there were more than 23,922 beekeepers with approximately 168,944 beehives. Honey beehives produced by these Asian honeybees is remarkably popular among consumers especially in the southern region due to their confidence in its quality and preference for its unique and captivating aroma. As a result, an  
20 increasing number of farmers from all over the country have shown a keen interest in beekeeping, with the numbers growing each year (Department of Agriculture Extension, 2021) Moreover, Asian honeybees play a significant role in pollinating crops in agricultural areas, which will help. increase productivity of agricultural products. Additionally, the by-products such as honey derived from the Asian honeybees' production, are in remarkably high  
25 demand within the market.

At present, there has been a noticeable decline in the bee population, both at local, national, and global levels. The major contributing factors include chemical substances, and another crucial factor is the certain beekeeping practices, particularly some steps in the process, that have adverse. effects on the bee larvae within their hives. For example, the

practice of using smoke to drive the bees away during honey harvesting can disrupt the continuous development of worker bees to complete their life cycle.

However, there has been a similar prototype of invention related to artificial honeycombs that existed before. These were essentially artificial honeycomb frames made from genuine bee wax or a mixture of bee wax and paraffin wax, which were attached to a wire cord inserted into beehives. A problem or drawback of this approach was that, when collecting honey, bees needed to be driven out of the beehive, preventing them from completing their life cycle and causing disruption to the bees in the hive. Furthermore, these artificial honeycomb frames were not durable and reusable for an extended period.

## 10 **The Characteristics and Objectives of the Invention**

The invention of beekeeping equipment and honey extractor involves the creation of artificial honeycombs made from durable and food-grade materials, namely Polypropylene (PP). These artificial honeycombs have a life span for over 5 years, depending on their types of usage. The size of the honeycomb cells in the artificial frames are designed to be suitable for the Thai honeybee species. Artificial honeycombs have a honeycomb cell, that is large in size that can accommodate queen bee.

This honeycomb for queen bee is larger compared with the other honeycombs. One of the unique features of this invention is the mechanism for extracting honey from the honeycombs without the need to use smoke to drive the bees away. This feature allows the bee larvae to develop continuously into worker bees without disruption during honey harvesting process. The structure of the artificial honeycombs is made up of two Polypropylene (PP) panels which consist of a wide-frame panel and a narrow-frame panels which are placed together to form a hexagonal cell shape of honeycomb. To harvest honey, simply turn the twisting rod located at the top part of the artificial honeycomb frames. This action will cause the honey-extraction mechanism, causing the two Polypropylene (PP) panels that make up each pair of artificial honeycombs frames to shift sideways within the frame. This operation will cause the honey to run from the top down to the base of the artificial honeycomb until it gets to the honey funnel located at the bottom of the artificial honeycomb frame. This design eliminates the beekeeping process steps and minimizes the need for bees to build new honeycombs, even after harvesting honey. In addition, if honey is collected, the bees can continue to produce honey without any interruption as the twisting of the rod at the

top of the artificial honeycomb frame reverts the paired Polypropylene (PP) sheets to their original hexagonal cell shape of honeycombs. This is to ensure that the bee larvae in the honeycomb cells remain unharmed and can continue to develop and grow into worker bees uninterrupted and completing their life cycle.

## 5 **The Complete Disclosure of the Invention**

**beekeeping equipment and honey extractor** comprise the following pieces of components: wide-frame artificial honeycomb panel (1), narrow-frame artificial honeycomb panel (2), artificial honeycomb cell for queen bee (3), attaching frame panels (4), rod (5), and acrylic funnel (6).

10 Figure 1 illustrates **beekeeping equipment and honey extractor**.

According to this invention, the bee feeder and honey extractor comprises a wide-frame honeycomb panel made of Polypropylene (PP) material (1), is placed in conjunction with a narrow-frame honeycomb panels to create movement to extract honey (2). This arrangement establishes an appropriate honeycomb-sized space for Thai honeybees to inhabit and produce honey within the honeycomb. There is a central honeycomb-like structure intended specially to accommodate the queen bee (3), which is larger in size than the other honeycomb cells. When the wide-frame artificial honeycomb panel (1) and the narrow-frame artificial honeycomb panel (2) are placed together in pairs, assemble multiples or several more pairs as appropriate and suitable for the size of the beehive. Beekeeping Equipment and Honey Extractor can be hung inside the house. This setup enables the bees to readily move into this artificial honeycomb directly and eliminate the need for bees to build their own honeycombs themselves.

Moreover, there will be attaching clear acrylic frame panels (4) attached to the sides of all the artificial honeycomb panels to seal and prevent other insects to disturb or interrupt the bees while they reside in this artificial honeycombs. To operate the honey extraction process, a rod (5) is needed to twist the narrow-frame artificial honeycomb panels (2) to create honey extraction. When the rod is twisted, all narrow-frame artificial honeycomb panels simultaneously move. This mechanism causes all narrow-frame artificial honeycomb panels (2) to move at the same time for honey extraction. When honey extraction is in operation, all the bees in the honeycombs can continue to inhabit freely without any disruption.

Because there is no need to smoke the bees out from their hive, ensuring that all bee larvae and other bees in honeycomb frame can continue to inhabit. The space between these honeycomb-like structures is appropriately sized to accommodate all bees without causing any harm. In this operation, the extracted honey flows down to the bottom of the artificial honeycomb panels and is directed to the honey funnel made of transparent acrylic material (6). Containers then can be utilized to collect the honey directly from this artificial bee feeder and honey extractor.

### **Short Description of the Figures**

Figure 1 illustrates beekeeping equipment and honey extractor according to this invention.

Figure 2 illustrates the side view of the bee feeder and honey extractor before twisting the honey extraction rod, according to this invention.

Figure 3 illustrates the side view of beekeeping equipment and honey extractor while twisting the honey extraction rod, according to this invention.

Figure 4 illustrates the top view of the bee feeder and honey extractor, according to this invention.

Figure 5 illustrates the bottom view of beekeeping equipment and honey extractor, according to this invention.

Figure 6 illustrates the left-side view of the bee feeder and honey extractor, according to this invention.

Figure 7 illustrates the right-side view of beekeeping equipment and honey extractor, according to this invention.

Figure 8 illustrates the front view of beekeeping equipment and honey extractor, according to this invention.

Figure 9 illustrates the rear view of the bee feeder and honey extractor, according to this invention.

Figure 10 illustrates the separated components of the wide-frame artificial honeycomb panel and the narrow-frame artificial honeycomb panel for pairing to create honeycomb like structures suitable for Thai honeybees and the queen bee, according to this invention.

### **The Best Practice for the Manufacturing Process**

As disclosed in the section on the complete disclosure of the invention.

## Claims

1. **Beekeeping equipment and honey extractor** consist of wide-frame artificial honeycomb panel (1), narrow-frame artificial honeycomb panel (2), an artificial honeycomb for queen bee (3), attaching honeycomb panels (4), rod (5), and acrylic funnel (6). The special  
5 feature is that the wide-frame artificial honeycomb panel (1) is placed adjacent to the narrow-frame artificial honeycomb panel (2) for movement to extract honey, creating a hexagonal space appropriate for Thai honeybees.

In the center of the wide-frame artificial honeycomb panel (1) and the center of the narrow-frame artificial honeycomb panel (2), there is a honeycomb-like shape for the queen  
10 bee (3) that is bigger when comparing to other honeycombs, allowing the queen bee to inhabit. The connecting honeycomb panels (4) are attached to all the sides of the artificial honeycomb panels. The rod (5) for twisting the narrow-frame artificial honeycomb panels (2) has the special feature that when twisting the narrow-frame artificial honeycomb panels (2) to create  
15 movement to extract honey, the rod moves and forces the narrow-frame artificial honeycomb panels (2), causing all the narrow-frame artificial honeycomb panels (2) to move simultaneously. This mechanism allows the narrow-frame artificial honeycomb panels (2) to all move and extract honey. In addition, the special feature is that the honey extracted runs down to the bottom of the artificial honeycomb panels and reaches to the honey funnel tube made of transparent acrylic material (6).

20 2. Beekeeping equipment and honey extractor, according to Patent Claim 1, in which the wide-frame artificial honeycomb panel (1) and narrow-frame artificial beehive panel (2) made from Polypropylene (PP) material are used for molding.

3. Beekeeping equipment and honey extractor, according to Patent Claim 1, in which the attaching transparent acrylic honeycomb panels (4) will have a thickness of 3 centimeters  
25 on the top surface in order to enable it to be hung on the beehive box.

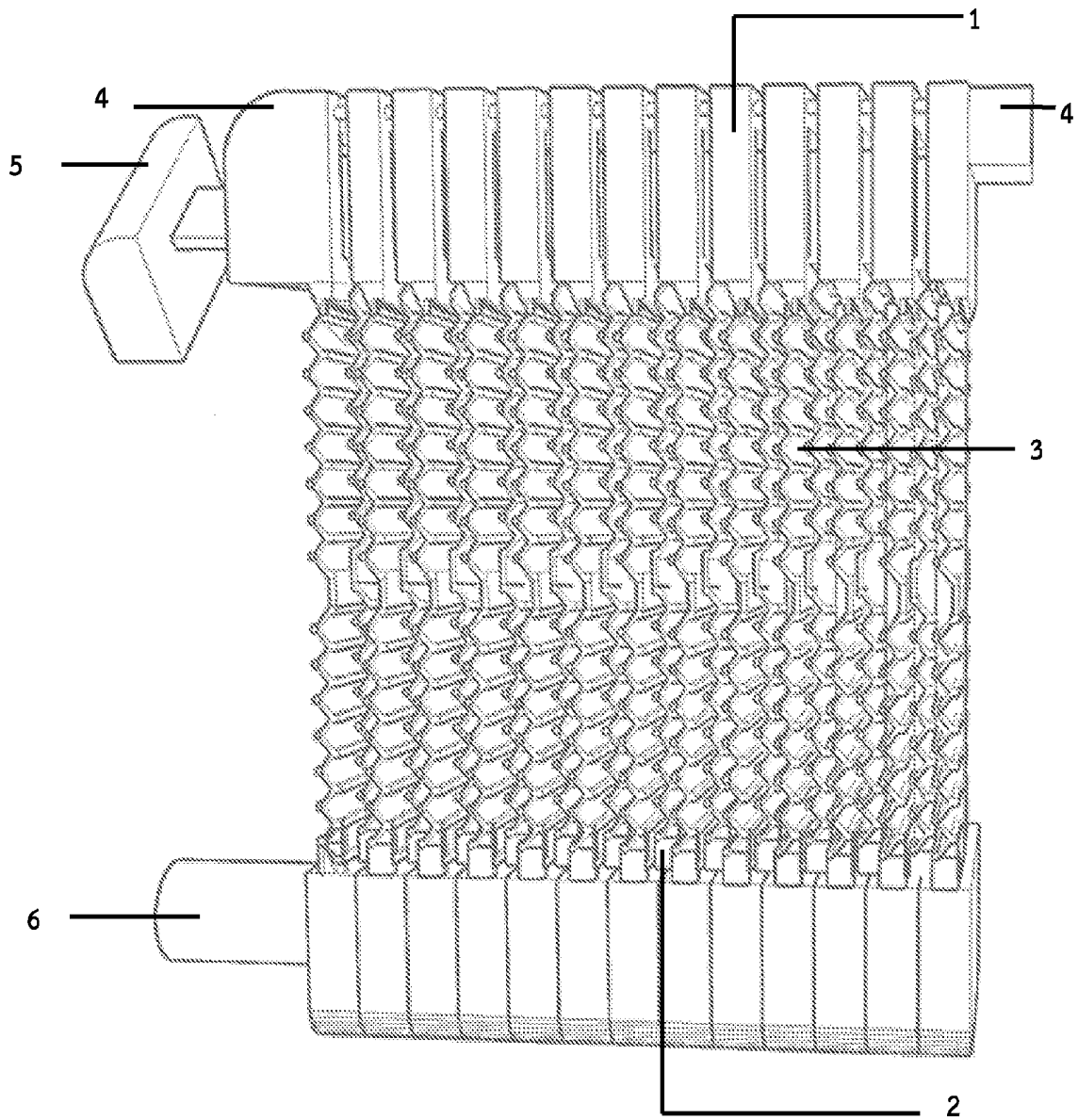


Figure 1

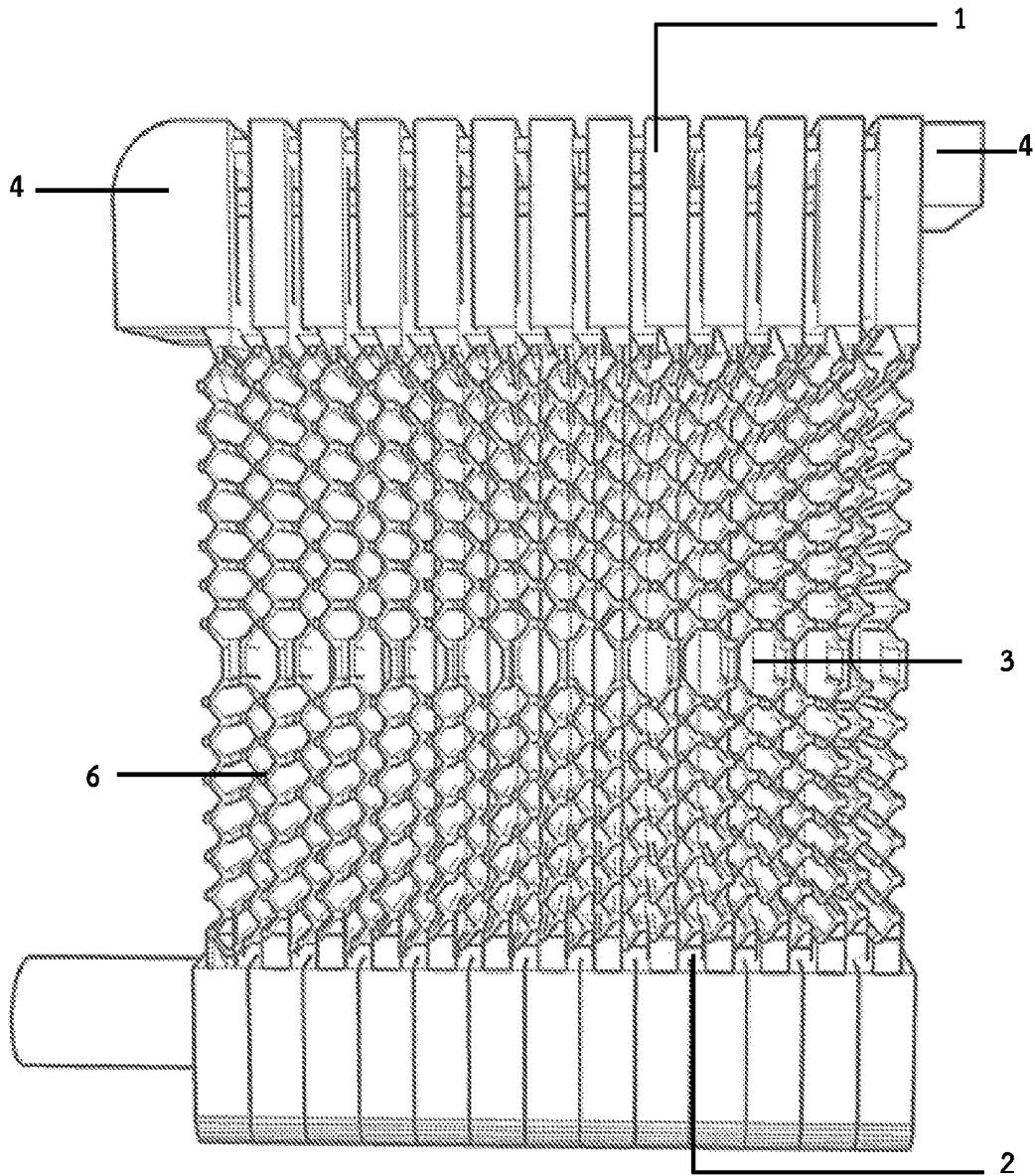


Figure 2

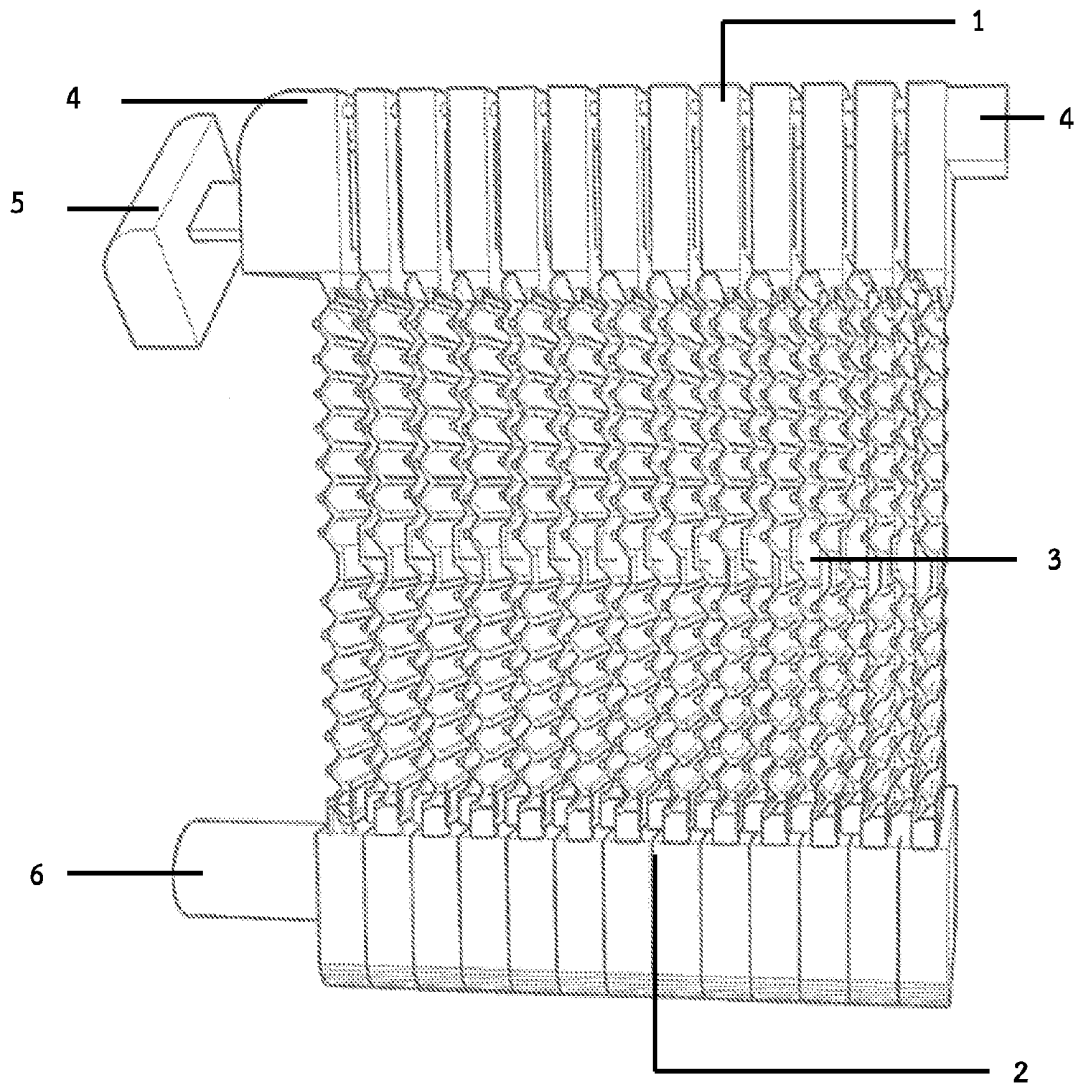


Figure 3

4/8

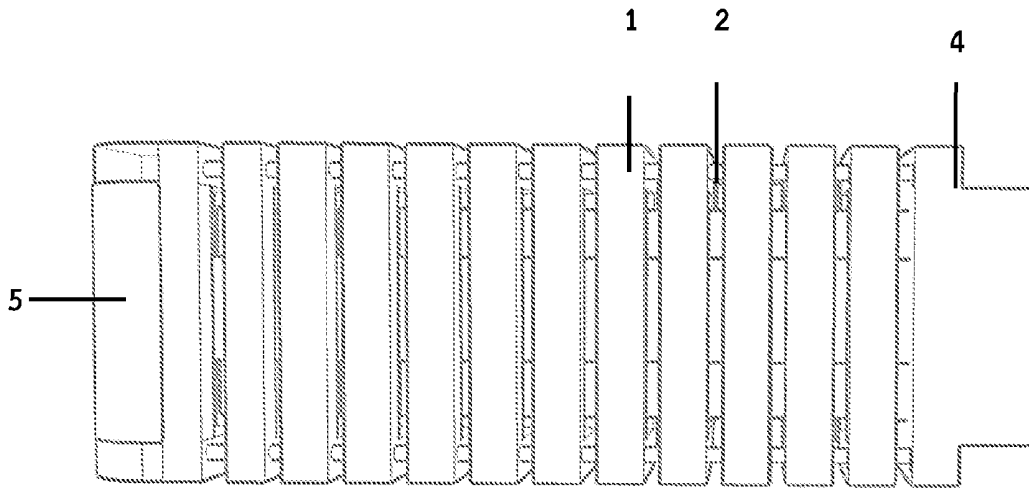


Figure 4

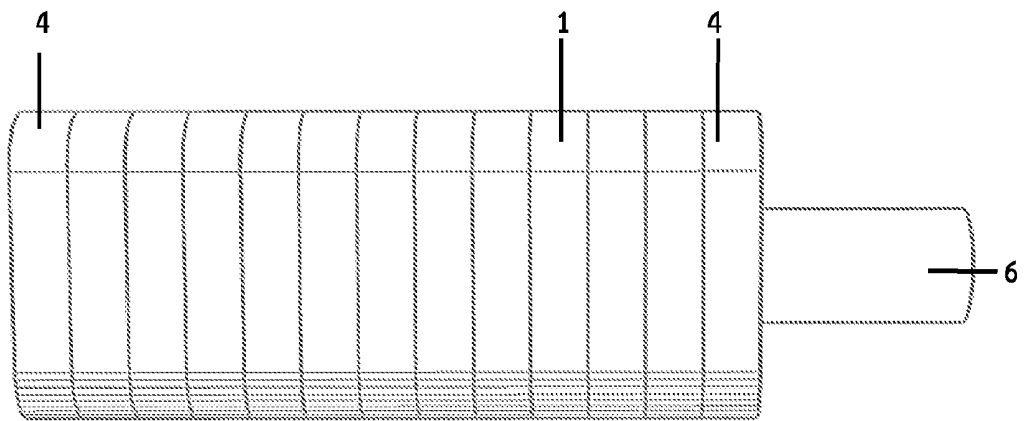


Figure 5

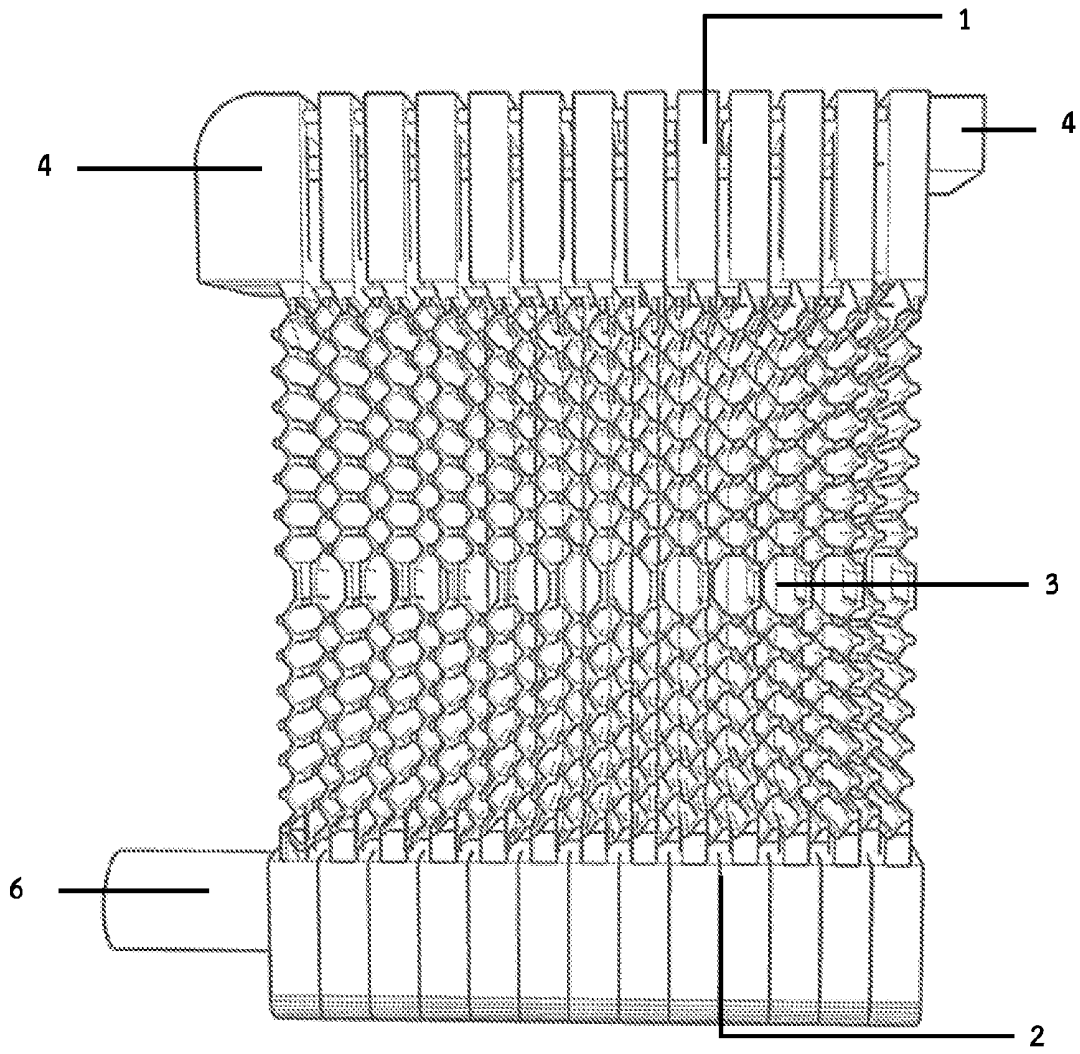


Figure 6

6/8

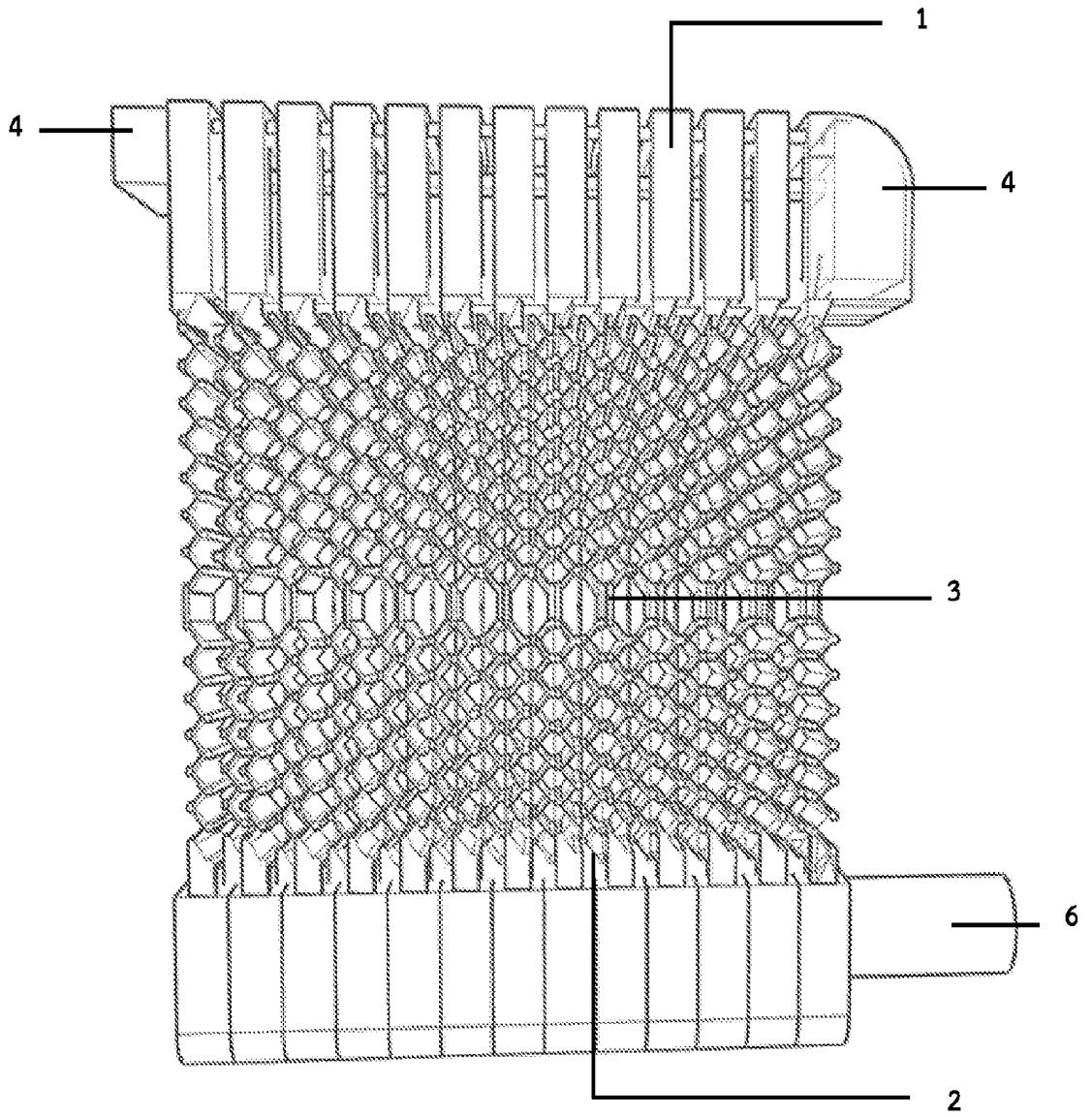


Figure 7

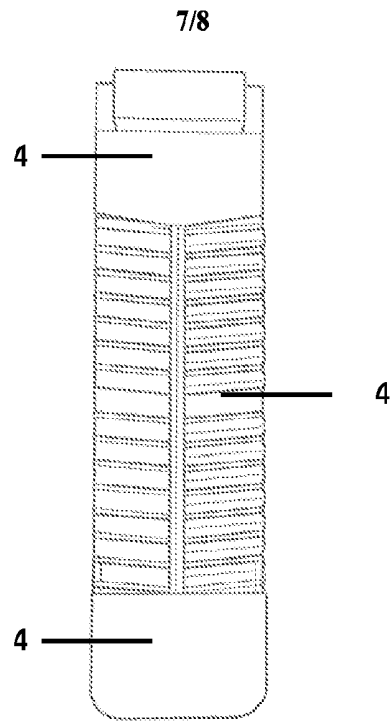


Figure 8

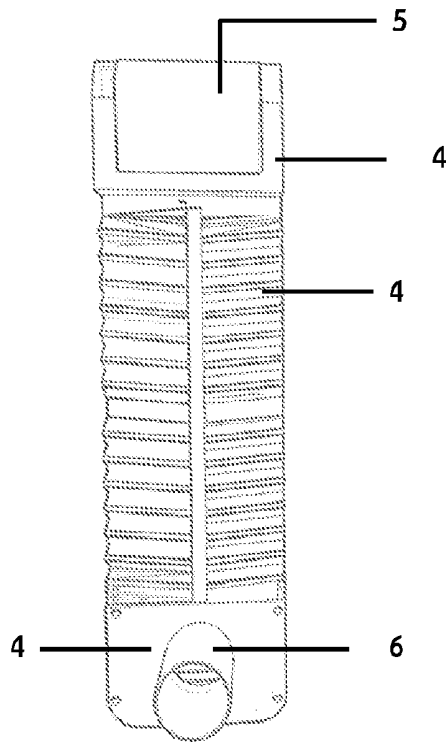


Figure 9

8/8

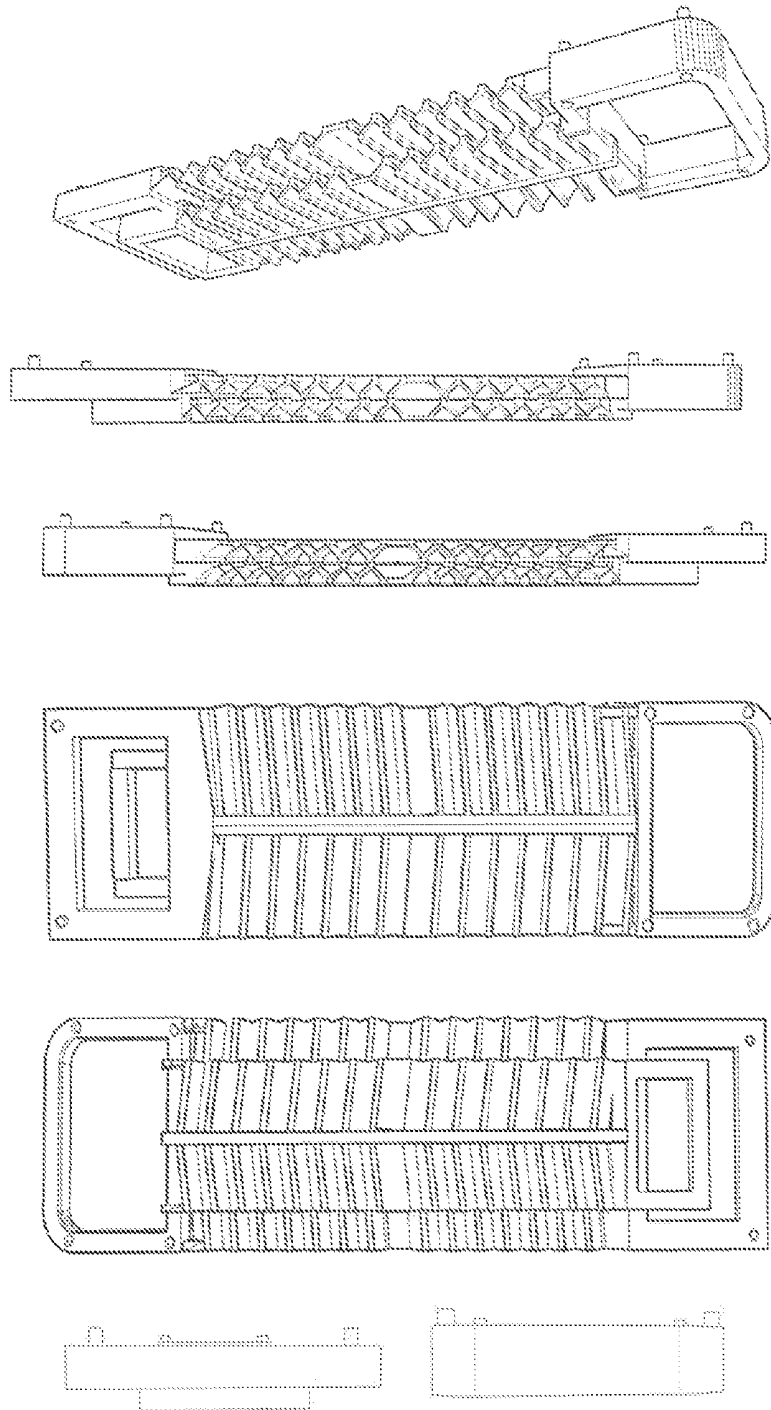


Figure 10

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/TH2023/000022

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> A01K 47/04(2006.01)j  According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>  Minimum documentation searched (classification system followed by classification symbols) A01K 47/04(2006.01); A01K 47/02(2006.01); A01K 47/06(2006.01); A01K 59/00(2006.01)  Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Korean utility models and applications for utility models Japanese utility models and applications for utility models  Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) eKOMPASS(KIPO internal) & Keywords: artificial honeycomb panel, queen bee, acrylic funnel, rod, beehive box		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2018-0035651 A1 (FLOWBEE AUSTRALIA PTY. LTD.) 08 February 2018 (2018-02-08) paragraphs [0099]-[0124], [0129], [0167] and figures 3-26, 42	1-3
Y	KR 10-2014-0118933 A (LEE, YONG SEOG) 08 October 2014 (2014-10-08) paragraphs [0020]-[0025] and figures 1-3	1-3
Y	CN 104823879 A (WANG, LEIPING) 12 August 2015 (2015-08-12) paragraph [0006] and figures 1-2	2
A	CN 207678656 U (LIAO, WANJIE) 03 August 2018 (2018-08-03) claims 1-3 and figures 1-5	1-3
A	KR 10-1590073 B1 (PRESCO CO., LTD.) 01 February 2016 (2016-02-01) claims 1-6 and figures 1-4	1-3
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> 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 "&" document member of the same patent family		
Date of the actual completion of the international search <b>04 January 2024</b>		Date of mailing of the international search report <b>04 January 2024</b>
Name and mailing address of the ISA/KR <b>Korean Intellectual Property Office 189 Cheongsa-ro, Seo-gu, Daejeon 35208, Republic of Korea</b> Facsimile No. +82-42-481-8578		Authorized officer <b>PARK, Tae Wook</b> Telephone No. +82-42-481-3405

**INTERNATIONAL SEARCH REPORT**  
**Information on patent family members**

International application No.

**PCT/TH2023/000022**

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
US	2018-0035651	A1	08 February 2018	AR	103677	A1	24 May 2017
				AU	2016-218946	A1	28 September 2017
				AU	2016-218946	B2	14 January 2021
				DK	3255980	T3	11 July 2022
				EP	3255980	A1	20 December 2017
				EP	3255980	B1	20 April 2022
				ES	2922646	T3	19 September 2022
				LT	3255980	T	25 July 2022
				PT	3255980	T	06 July 2022
				US	11129369	B2	28 September 2021
				US	11540495	B2	03 January 2023
				US	2021-0378217	A1	09 December 2021
				US	2023-0120669	A1	20 April 2023
				WO	2016-127217	A1	18 August 2016
KR	10-2014-0118933	A	08 October 2014	KR	10-1583321	B1	07 January 2016
				WO	2015-186977	A1	10 December 2015
CN	104823879	A	12 August 2015	None			
CN	207678656	U	03 August 2018	None			
KR	10-1590073	B1	01 February 2016	None			

**Bibliographic data: WO2024085816 (A1) — 2024-04-25**

**BEEKEEPING EQUIPMENT AND HONEY EXTRACTOR**

**Inventor(s):** THANAKUNWUTTHIROT KUNYAPHAT [TH]; LIMSAKSRI DOUNGJAI [TH]; WORACHAIRUNGREUNG MORAKOT [TH]; KUMNERDRIT THANYALUCK [TH] ± (THANAKUNWUTTHIROT, Kunyaphat, ; LIMSAKSRI, DOUNGJAI, ; WORACHAIRUNGREUNG, Morakot, ; KUMNERDRIT, Thanyaluck)

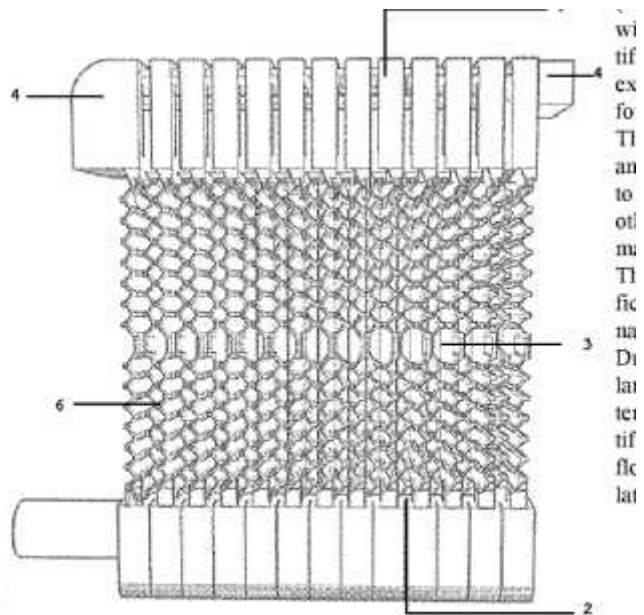
**Applicant(s):** SUANSUNANDHA RAJABHAT UNIV [TH] ± (SUANSUNANDHA RAJABHAT UNIVERSITY)

**Classification:** - **international:** **A01K47/04**  
 - **cooperative:** **A01K59/00 (EP)**  
**Application number:** WO2023TH00022 20230907 [Global Dossier](#)

**Priority number(s):** [TH20223002916U 20221021](#)

**Abstract of WO2024085816 (A1)**

Beekeeping equipment and honey extractor consist of wide-frame artificial honeycomb panel paired with narrow-frame artificial honeycomb panels in order to create the movement for honey extraction. This combination constructs an appropriately sized space for Thai honeybees to inhabit and produce honey in the honeycombs. The honeycomb cells come in two sizes, ones for Thai honeybees and the other one for Thai queen bee which will come in larger size to accommodate the queen bee which is larger in size compared with other honey bees. The artificial honeycomb panels made of acrylic material are joined on the sides of the artificial panels to seal them. This will prevent other insects from disturbing the bees in this artificial honeycomb panels. In addition, there is a rod for twisting the narrow-frame artificial honeycomb panel in order to extract honey. During the process of honey extraction, the bees including both bee larvae and all other bees residing in the honeycombs, are not be interrupted. This is because the appropriate spacing between these artificial honeycomb panels. The honey, once completely



wi  
tif  
ex  
fo  
TI  
an  
to  
oti  
nu  
TI  
fic  
na  
Di  
lat  
ter  
tif  
fic  
lat

extracted, flows down to the bottom of the artificial honeycomb panels, and is later directed to the honey clear acrylic funnel.



Welcome to a more intuitive and efficient search experience. [See what is new](#)

Advanced query

Search within  
Article title, Abstract, Keywords

Search documents \*  
beekeeping AND equipment AND honey AND extractor AND equipment

+ Add search field

Reset Search

Beta

Documents Preprints Patents Secondary documents Research data ↗

# 1 patent found

## Refine search

Search within results

## Filters

### Year

Range  Individual



from - to

### Patent office

World Intellectual Property Organization

1

Show all information

Sort by Date (newest)

Patent name	Inventor(s)/applicant(s)	Patent office	Year	Patent number
1 BEEKEEPING EQUIPMENT AND HONEY EXTRACTOR   ÉQUIPEMENT D'APICULTURE ET EXTRACTEUR DE MIEL	THANAKUNWUTTHIROT, Kunyaphat; LIMSAKSRI, Doungjai; WORACHAIRUNGREUNG, Morakot (...) (SUANSUNANDHA RAJABHAT UNIVERSITY)	Patent Cooperation Treaty Application	2024	WO2024085816

Display 10 results

[Back to top](#)

---

## About Scopus

[What is Scopus](#)

[Content coverage](#)

[Scopus blog](#)

[Scopus API](#)

[Privacy matters](#)

## Language

[日本語版を表示する](#)

[查看简体中文版本](#)

[查看繁體中文版本](#)

[Просмотр версии на русском языке](#)

## Customer Service

[Help](#)

[Tutorials](#)

[Contact us](#)

---

## ELSEVIER

[Terms and conditions](#) ↗ [Privacy policy](#) ↗ [Cookies settings](#)

All content on this site: Copyright © 2024 Elsevier B.V. ↗, its licensors, and contributors. All rights are reserved, including those for text and data mining, AI training, and similar technologies. For all open access content, the Creative Commons licensing terms apply.

We use cookies to help provide and enhance our service and tailor content. By continuing, you agree to the use of cookies ↗.

