

2019410691 19 May 2021



19 May 2021

**IP Australia – Commissioner of Patents**

PO Box 200

Woden ACT 2606

Australia

Our Ref: SC2/BEEP013AU

**Re: Australian National Phase of PCT/EP2019/086673  
In the name of BEE-IQ SOLUTIONS LIMITED  
Entitled: Anti-predator device for bee hive**

**Amendments in anticipation of examination report**

In anticipation of an examination report, the applicant seeks leave to amend the application under s104 in accordance with the enclosed Statement of Proposed Amendments.

The Examiner is requested to consider the amendments during examination of the application.

Yours faithfully,



**Patent & Trade Mark Attorneys**

**Kieran Williams  
Registered Patent Attorney**



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Our Ref: SC2/BEEP013AU

**Australia**  
*Patents Act 1990*

**Statement of Proposed Amendments – s104**

Application No: Australian National Phase entry of PCT/EP2019/086673  
Applicant: BEE-IQ SOLUTIONS LIMITED

1. Cancel page 2 and replace with new page 2 lodged herewith in duplicate.
2. Cancel all claim pages and replace with new pages 25 to 28 lodged herewith in duplicate.

19 May 2021

**BEE-IQ SOLUTIONS LIMITED**

By Attorneys for the Applicant



**Kieran Williams**  
Registered Patent Attorney

practical as it is desirable to have a relatively large hive entrance to allow for the larger number of bees to enter and exit the hive.

Despite these preventative measures the problem of either total or partial beehive loss due to wasp activity creates a significant economic cost to the bee industry in general. Various lures have been developed to capture wasps outside of hives, however their effectiveness is extremely inconsistent. Chemical control measures have also been developed, such as Vespex®. These appear to be more effective than lures, however the use of toxic poisons create their own set of challenges and user preferences.

A related problem is hive robbing not only by wasps but also by bees from neighbouring, competing hives, especially at times of dwindling resources such as towards the end of the honey season.

Accordingly, it is an object of the invention to provide a device to improve upon one or more of the shortcomings of the prior art, and/or to at least provide the public with a useful choice. In one embodiment, the present invention relates to a method of reducing or even preventing hive attack, invasion and/or robbery by predators such as wasps and other bees. Preferred embodiments provide improved methods of modifying beehives and improved beehives.

## **SUMMARY OF THE INVENTION**

As used herein the terms bee and bees generally refer to domesticated and/or cultivated honey bees. As used herein the terms pest and pests generally refer to wasps, robber bees, hornets or other such predators / pests that raid beehives for resources through the front entrance and generally use avoidance techniques.

Accordingly, in a first aspect, the invention provides a beehive entrance tunnel for a beehive having an outer wall with a beehive entrance aperture, wherein the tunnel comprises:

- an elongate structure having an entrance aperture at a first end and an exit aperture located at or proximate an opposing end; and

- wherein the tunnel further comprises opposing sidewalls, each opposing sidewall comprising an outwardly orientated contour located proximate the entrance

## Claims

1. A beehive entrance tunnel comprising:
  - an elongate tubular tunnel adapted for fitment to the base of a beehive, the tunnel comprising an interior defined by at least an upper tunnel surface portion, wherein the tunnel comprises a first opening located at one end to thereby define a hive entrance;
  - wherein the tunnel has a height providing for no more vertical space than is required by one bee, and
  - wherein the tunnel further comprises a second opening located in the upper tunnel surface portion to thereby define a tunnel exit.
  
2. A beehive entrance tunnel for a beehive having an outer wall with a beehive entrance aperture, wherein the tunnel comprises:
  - an elongate structure having an entrance aperture at a first end and an exit aperture located at or proximate an opposing end; and
  - wherein the tunnel further comprises opposing sidewalls, each opposing sidewall comprising an outwardly orientated contour located proximate the entrance aperture, the contour operable to form a seal with the beehive outer wall and facilitate pivoting of the exit aperture within the beehive while maintaining that seal.
  
3. A beehive entrance tunnel according to claim 1 or claim 2, wherein the tunnel comprises a ceiling surface, and wherein the exit aperture is located in the ceiling surface.
  
4. A beehive entrance tunnel according to any one of the preceding claims, wherein the tunnel provides a path which extends between the exterior of the beehive to a location near the active cluster within the hive.
  
5. A beehive entrance tunnel according to any one of the preceding claims, wherein the tunnel comprises a sealing surface shaped for engagement with the outer wall of the hive, and shaped to allow movement of the tunnel to desirably position the tunnel exit while retaining the seal with the outer wall of the hive.

6. A beehive entrance tunnel according to any one of the preceding claims, wherein the tunnel comprises an interior height of about 8 to 10mm.
7. A beehive entrance tunnel according to any one of the preceding claims, comprising an entrance width of about 50 to 150mm.
8. A beehive entrance tunnel according to any one of the preceding claims, wherein the tunnel comprises a length of about 50 to 200mm.
9. A method of installing a beehive entrance tunnel in a beehive, wherein the method comprises the steps of:
  - providing the beehive entrance tunnel as claimed in any previous claim;
  - inserting the tunnel into a gap in the outer wall of a beehive such that a seal is created between the region of the tunnel proximate the tunnel entrance and the outer wall of the beehive; and
  - pivoting the tunnel to thereby locate the tunnel exit proximate a hive cluster.
10. A method according to claim 9, wherein the tunnel comprises an interior height of up to 10mm, an entrance width of at least 50mm and a length of at least 50mm.
11. A method of modifying a beehive, comprising:
  - providing a beehive having a hive entrance; and
  - modifying the beehive by adding or forming a beehive entrance tunnel having a proximal entrance end at the hive entrance and a distal exit end that extends into an interior of the hive,
    - wherein the tunnel comprises an interior height of about 8 to 10mm, and
    - wherein invading pests entering the hive encounter host bees in the tunnel.
12. A method according to claim 11, wherein the tunnel comprises at least 2 sections, a first section in which bees must move substantially horizontally to advance towards the hive interior and a second section in which bees must move substantially vertically to exit the tunnel and gain access to the interior.

13. A method according to any one of claims 9 to 12, wherein for a pest at a position inside the hive and not yet in the tunnel, there is no line-of-sight from the position inside the hive to the outside of the hive.

14. A method according to any one of claims 9 to 13,  
wherein during use of the beehive bees enter the beehive by proceeding along the tunnel; and

wherein the tunnel is sufficiently elongated that when host bees are present invading bees or wasps or other pests entering the beehive via the tunnel encounter host bees in the tunnel resulting in attacks in the tunnel by host bees on the invading pests.

15. A method according to any one of claims 9 to 14, wherein when bees are present the tunnel exit is at or adjacent the bee cluster.

16. A method according to any one of claims 9 to 15, wherein the tunnel is 100mm or greater in length, measured from the entrance to the first point at which bees can exit the tunnel.

17. A method according to any one of claims 9 to 16, wherein the tunnel is 150mm or greater in length, measured from the entrance to the first point at which bees can exit the tunnel.

18. A method of modifying a beehive, comprising:  
providing a beehive having an exterior wall, a hive interior and an entrance through the wall that allows access and egress of bees to and from the hive interior;  
and

forming a beehive entrance tunnel sealed to the entrance that is at least 30mm wide, up to 12mm high and extends at least 100mm into the hive interior.

19. A beehive, comprising:  
(i) an exterior wall,  
(ii) a hive interior, and

(iii) an entrance through the wall that allows access and egress of bees to and from the hive interior;

wherein the hive further comprises

(iv) a beehive entrance tunnel according to any one of claims 1 to 10,

wherein bees enter the beehive by proceeding along the tunnel;

wherein in use of the hive the tunnel is sufficiently elongated that when host bees are present invading pests, e.g. bees or wasps, entering the beehive via the tunnel encounter host bees in the tunnel resulting in attacks in the tunnel by host bees on the invading bees or wasps.

20. A beehive according to claim 19, wherein the tunnel is 100mm or greater in length, measured from the entrance to the first point at which bees can exit the tunnel.

21. A beehive according to claim 19, wherein the tunnel is 150mm or greater in length, measured from the entrance to the first point at which bees can exit the tunnel.

practical as it is desirable to have a relatively large hive entrance to allow for the larger number of bees to enter and exit the hive.

Despite these preventative measures the problem of either total or partial beehive loss due to wasp activity creates a significant economic cost to the bee industry in general. Various lures have been developed to capture wasps outside of hives, however their effectiveness is extremely inconsistent. Chemical control measures have also been developed, such as Vespex®. These appear to be more effective than lures, however the use of toxic poisons create their own set of challenges and user preferences.

A related problem is hive robbing not only by wasps but also by bees from neighbouring, competing hives, especially at times of dwindling resources such as towards the end of the honey season.

Accordingly, it is an object of the invention to provide a device to improve upon one or more of the shortcomings of the prior art, and/or to at least provide the public with a useful choice. ~~Another object is to provide~~In one embodiment, the present invention relates to a method of reducing or even preventing hive attack, invasion and/or robbery by predators such as wasps and other bees. Preferred embodiments provide improved methods of modifying beehives and improved beehives.

## **SUMMARY OF THE INVENTION**

As used herein the terms bee and bees generally refer to domesticated and/or cultivated honey bees. As used herein the terms pest and pests generally refer to wasps, robber bees, hornets or other such predators / pests that raid beehives for resources through the front entrance and generally use avoidance techniques.

Accordingly, in a first aspect, the invention provides a beehive entrance tunnel for a beehive having an outer wall with a beehive entrance aperture, wherein the tunnel comprises:

- an elongate structure having an entrance aperture at a first end and an exit aperture located at or proximate an opposing end; and

- wherein the tunnel further comprises opposing sidewalls, each opposing sidewall comprising an outwardly orientated contour located proximate the entrance

**Claims**

1. A beehive entrance tunnel comprising:
  - an elongate tubular tunnel adapted for fitment to the base of a beehive, the tunnel comprising an interior defined by at least an upper tunnel surface portion, wherein the tunnel comprises a first opening located at one end to thereby define a hive entrance;
    - wherein the tunnel has a height providing for no more vertical space than is required by one bee, and
    - wherein the tunnel further comprises a second opening located in the upper tunnel surface portion to thereby define a tunnel exit.
  
2. A beehive entrance tunnel for a beehive having an outer wall with a beehive entrance aperture, wherein the tunnel comprises:
  - an elongate structure having an entrance aperture at a first end and an exit aperture located at or proximate an opposing end; and
  - wherein the tunnel further comprises opposing sidewalls, each opposing sidewall comprising an outwardly orientated contour located proximate the entrance aperture, the contour operable to form a seal with the beehive outer wall and facilitate pivoting of the exit aperture within the beehive while maintaining that seal.
  
- ~~3. A beehive entrance tunnel comprising:~~
  - ~~a floor surface and a ceiling surface spaced apart by a sidewall;~~
  - ~~a first aperture in the sidewall defined between the floor surface and ceiling surface at a first tunnel end;~~
  - ~~a second aperture located in the ceiling surface and orientated perpendicular to the tunnel entrance.~~
  
34. A beehive entrance tunnel according to ~~any of claims 1 to 2~~claim 1 or claim 2, wherein the tunnel comprises a ceiling surface, and wherein the exit aperture is located in the ceiling surface.

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~~5. A beehive entrance tunnel according to any of claims 1 to 4, wherein the tunnel has a height providing for no more vertical space than is required by one bee.~~

46. A beehive entrance tunnel according to any one of the preceding claims, wherein the tunnel provides a path which extends between the exterior of the beehive to a location near the active cluster within the hive.

57. A beehive entrance tunnel according to any one of the preceding claims, wherein the tunnel comprises a sealing surface shaped for engagement with the outer wall of the hive, and shaped to allow movement of the tunnel to desirably position the tunnel exit while retaining the seal with the outer wall of the hive.

68. A beehive entrance tunnel according to any one of the preceding claims, wherein the tunnel comprises an interior height of about 8 to 10mm.

79. A beehive entrance tunnel according to any one of the preceding claims, comprising an entrance width of about 50 to 150mm.

840. A beehive entrance tunnel according to any one of the preceding claims, wherein the tunnel comprises a length of about 50 to 200mm.

944. A method of installing a beehive entrance tunnel in a beehive, wherein the method comprises the steps of:

providing the beehive entrance tunnel as claimed in any previous claim;

inserting the tunnel into a gap in the outer wall of a beehive such that a seal is created between the region of the tunnel proximate the tunnel entrance and the outer wall of the beehive; and

pivoting the tunnel ~~exit aperture~~ to thereby locate the tunnel exit proximate a hive cluster.

1042. A method according to claim 944, wherein the tunnel comprises an interior height of up to 10mm, an entrance width of at least 50mm and a length of at least 50mm.

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1143. A method of modifying a beehive, comprising:  
 providing a beehive having a hive entrance; and  
 modifying the beehive by adding or forming a beehive entrance tunnel having a proximal entrance end at the hive entrance and a distal exit end that extends into an interior of the hive,  
wherein the tunnel comprises an interior height of about 8 to 10mm, and  
 wherein invading pests entering the hive encounter host bees in the tunnel.

1244. A method according to claim 1143, wherein the tunnel comprises at least 2 sections, a first section in which bees must move substantially horizontally to advance towards the hive interior and a second section in which bees must move substantially vertically to exit the tunnel and gain access to the interior.

1345. A method according to ~~claim 12, 13 or 14~~any one of claims 9 to 12, wherein for a pest at a position inside the hive and not yet in the tunnel, there is no line-of-sight from ~~the~~any position inside the hive to the outside of the hive.

1446. A method according to any one of claims ~~12 to 15~~9 to 13,  
 wherein during use of the beehive bees enter the beehive by proceeding along the tunnel; and  
 wherein the tunnel is sufficiently elongated that when host bees are present invading bees or wasps or other pests entering the beehive via the tunnel encounter host bees in the tunnel resulting in attacks in the tunnel by host bees on the invading pests.

1547. A method according to any one of claims ~~12 to 16~~9 to 14, wherein when bees are present the tunnel exit is at or adjacent the bee cluster.

1648. A method according to any one of claims ~~12 to 17~~9 to 15, wherein the tunnel is 100mm or greater in length, measured from the entrance to the first point at which bees can exit the tunnel.

1719. A method according to any one of claims ~~12 to 189~~ to 16, wherein the tunnel is 150mm or greater in length, measured from the entrance to the first point at which bees can exit the tunnel.

1820. A method of modifying a beehive, comprising:

providing a beehive having an exterior wall, a hive interior and an entrance through the wall that allows access and egress of bees to and from the hive interior; and

forming a beehive entrance tunnel sealed to the entrance that is at least 30mm wide, up to 12mm high and extends at least 100mm into the hive interior.

1921. A beehive, comprising:

(i) an exterior wall,

(ii) a hive interior, and

(iii) an entrance through the wall that allows access and egress of bees to and from the hive interior;

wherein the hive further comprises

(iv) a beehive entrance tunnel ~~having a proximal entrance end at the hive entrance and a distal exit end that extends into the hive interior~~ according to any one of claims 1 to 10,

wherein bees enter the beehive by proceeding along the tunnel;

wherein in use of the hive the tunnel is sufficiently elongated that when host bees are present invading pests, e.g. bees or wasps, entering the beehive via the tunnel encounter host bees in the tunnel resulting in attacks in the tunnel by host bees on the invading bees or wasps.

2022. A beehive according to claim 1921, wherein the tunnel is 100mm or greater in length, measured from the entrance to the first point at which bees can exit the tunnel.

2123. A beehive according to claim 1921, wherein the tunnel is 150mm or greater in length, measured from the entrance to the first point at which bees can exit the tunnel.

~~24.~~ ~~A beehive, comprising:~~

~~(i) an exterior wall,~~

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~~(ii) a hive interior, and  
 (iii) an entrance through the wall that allows access and egress of bees to and from the hive interior;  
 wherein the hive further comprises  
 (iv) a beehive entrance tunnel sealed to the entrance that is at least 30mm wide, up to 12mm high and extends at least 100mm into the hive interior.~~

~~25.—A beehive according to any of claims 21 to 24, wherein the tunnel entrance, also referred to as its proximal entrance end, is sealed to the hive entrance.~~

~~26.—A beehive according to any of claims 21 to 25, comprising a plurality of tunnels (iv).~~