ORIGINAL

HAIR RESTORATION SURGERY

ABSTRACT

A surgical apparatus includes an elongated member (1), a dissection module (10), and an extraction module (701). The dissection module is removably attachable to a first end of the elongated member and includes a tissue separating device (10). The extraction module is removably attachable to the first end of the elongated member and includes a suction port and a tissue removal implement (13,14) disposed within the suction port.

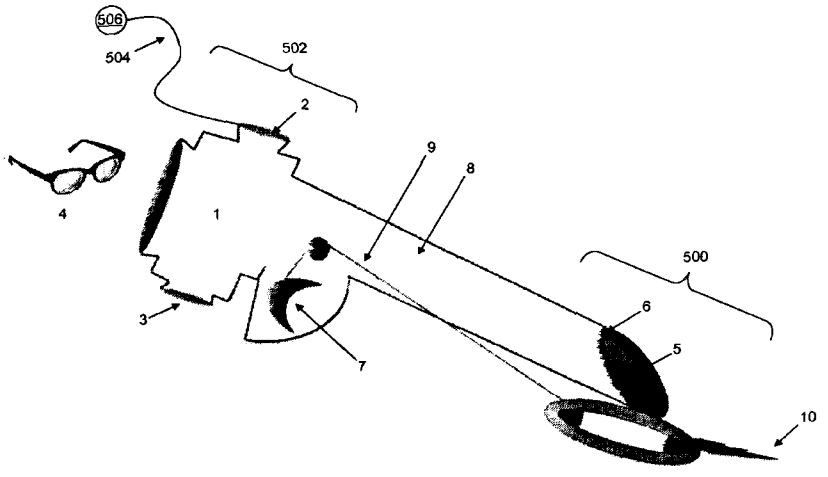

Fig. 5A

I claim:

1. A surgical apparatus, comprising:

an elongated member;

a dissection module removably attachable to a first end of the elongated member, the dissection module including a tissue separating device; and

an extraction module removably attachable to the first end of the elongated member, the extraction module including

a suction port, and

a tissue removal implement disposed within the suction port.

2. The surgical apparatus of claim 1, wherein the apparatus accepts the first module or the second module interchangeably.

3. The surgical apparatus of claim 1, further comprising an imaging system attached to a second end of the elongated member, the imaging system including:

a light source for illuminating a target through a hollow passage in the elongated member between the first end and the second end; and

a viewing port for receiving an image of the target.

4. The surgical apparatus of claim 1, wherein the tissue removal implement is disposed concentrically within the suction port.

5. The surgical apparatus of claim 4, wherein the tissue removal implement is hollow.

6. The surgical apparatus of claim 4, wherein the tissue removal implement is substantially cylindrical.

7. The surgical apparatus of claim 1, wherein the tissue removal implement is configured to separate the target region of tissue from surrounding tissue.

8. The surgical apparatus of claim 1, wherein the tissue removal implement includes a plurality of curved cutting devices disposed around a most superficial border of the tissue removal implement.

9. The surgical apparatus of claim 8, wherein the cutting devices include at least one of sharp blades, blunt blades, arms, levers, chemicals, enzymes, or lasers.

10. The surgical apparatus of claim 1, wherein the tissue removal implement is configured to be operated by an operator.

11. The surgical apparatus of claim 1, wherein the tissue removal implement is configured for automatic operation.

12. The surgical apparatus of claim 1, wherein the tissue removal implement includes a plurality of gripping ledges disposed on an inner surface of the tissue removal implement.

13. The surgical apparatus of claim 1, wherein the target region of tissue includes a hair follicle.

14. The surgical apparatus of claim 1, wherein the suction port is configured to apply suction to a target region of tissue.

15. The surgical apparatus of claim 1, wherein the suction port is oriented at an angle to a longitudinal axis of the elongated member.

16. The surgical apparatus of claim 1, wherein the elongated member includes a control mechanism connectable to the tissue separating device or the tissue removal implement.

17. The surgical apparatus of claim 1, wherein the tissue separating device is configured to move relative to the elongated member.

18. The surgical apparatus of claim 1, wherein the extraction module further comprises a sensor configured to detect a structure of the skin.

19. The surgical apparatus of claim 1, wherein the elongated member is rigid.

20. The surgical apparatus of claim 1, wherein the elongated member is flexible.

21. The surgical apparatus of claim 1, wherein the tissue separating device includes at least one of a sharp blade, a blunt blade, a balloon, an electrocautery device, a device that dispenses a pressurized gas or liquid, an enzymatic or chemical tissue separator, and a laser.

22. The surgical apparatus of claim 1, wherein the suction port is in fluid communication with a reservoir that receives a region of tissue extracted by the tissue removal implement

23. An endoscopic surgery kit comprising:

a dissection device for dissecting a cavity below the skin of a patient, comprising

a first elongated member, and

a tissue separating device attached to a first end of the first elongated member; and

an extraction device for insertion into the cavity, comprising

a second elongated member,

a suction port attached to a first end of the second elongated member, and

a tissue removal implement disposed within the suction port.

24. The endoscopic surgery kit of claim 23, wherein the dissection device further comprises an imaging system positioned at a second end of the first elongated member.

25. The endoscopic surgery kit of claim 24, wherein the imaging system includes:

a light source for illuminating a target located at the first end of the first elongated member through a hollow passage in the first elongated member; and

a viewing port for receiving an image of the target.

26. The endoscopic surgery kit of claim 23, wherein the extraction device further comprises an imaging system positioned at a second end of the second elongated member.

27. The endoscopic surgery kit of claim 23, wherein the tissue removal implement is disposed concentrically within the suction port.

28. The endoscopic surgery kit of claim 23, wherein the suction port is oriented at an angle to a longitudinal axis of the second elongated member.

29. The endoscopic surgery kit of claim 23, further comprising a barrier device configured to be positioned within the cavity and to restrict the operation of the extraction device to a region defined by the barrier device.

30. The endoscopic surgery kit of claim 29, wherein the barrier device is configured to maintain the cavity open.

31. The endoscopic surgery kit of claim 29, wherein the region defined by the barrier device is determined on the basis of a characteristic of the patient.

32. The endoscopic surgery kit of claim 23, further comprising a reservoir in fluid communication with the suction port.

33. A method comprising:

using a tissue separating device attached to an end of an elongated member, creating a cavity below the skin of a patient;

from the cavity, performing the steps of:

applying suction to a selected portion of skin tissue superficial to the cavity via a suction port attached to the end of the elongated member;

isolating the selected portion of skin tissue from surrounding tissue using a tissue removal implement disposed within the suction port; and

applying a downward force to the selected portion of skin tissue using the tissue removal implement to extract the selected portion of skin tissue from the surrounding tissue without altering an outward appearance of the skin.

34. The method of claim 33, wherein the selected portion of skin tissue includes a hair follicle and creating a cavity below the skin includes creating a cavity in a plane below the hair follicles.

35. The method of claim 33, wherein the elongated member is an endoscope.

36. The method of claim 35, further comprising selecting the selected portion of skin tissue on the basis of an image obtained through the endoscope.

37. The method of claim 33, further comprising obtaining an image of the selected portion of skin tissue, the image obtained from within the cavity.

38. The method of claim 33, wherein applying the downward force includes rotating the tissue removal implement.

39. The method of claim 33, further comprising detecting a position of the tissue removal implement relative to an outer surface of the skin.

40. The method of claim 33, further comprising positioning a barrier device within the cavity, the barrier device configured to restrict the operation of the tissue removal implement to a region defined by the barrier device

41. The method of claim 40, wherein the barrier device is configured to maintain the cavity open.

42. The method of claim40, further comprising determining the region defined by the barrier device on the basis of a characteristic of the patient.

43. The method of claim 33, further comprising storing the extracted tissue in a reservoir.

44. A method comprising:

using a tissue separating device attached to an end of an elongated member, creating a cavity below the skin; and

from the cavity, performing a tissue alteration procedure on a selected portion of skin tissue superficial to the cavity using a tissue alteration implement attached to the end of the elongated member without altering an outward appearance of the skin.

45. The method of claim 44, wherein the selected portion of skin tissue includes a hair follicle.

46. The method of claim 44, wherein the tissue alteration procedure includes at least one of irradiation with a laser, tissue structural alteration, biochemical alteration, application of heat, application of electric current, or application of enzymes.

47. The method of claim 44, wherein the tissue destruction procedure includes removal, ablation, or destruction of the selected portion of skin tissue.

Dated this 20th day of March, 2012.

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of Amarchand & Mangaldas &
Suresh A. Shroff & Co.
Attorneys for the Applicant

ORIGINAL

CARLOS K. WESLEY

2415/DELNP/12

20 MAR 2012

TOTAL NO. OF SHEETS: 15
SHEET 1

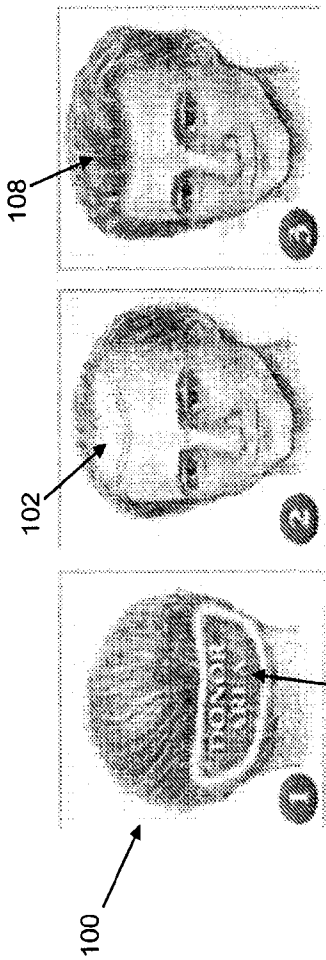

Fig. 1A

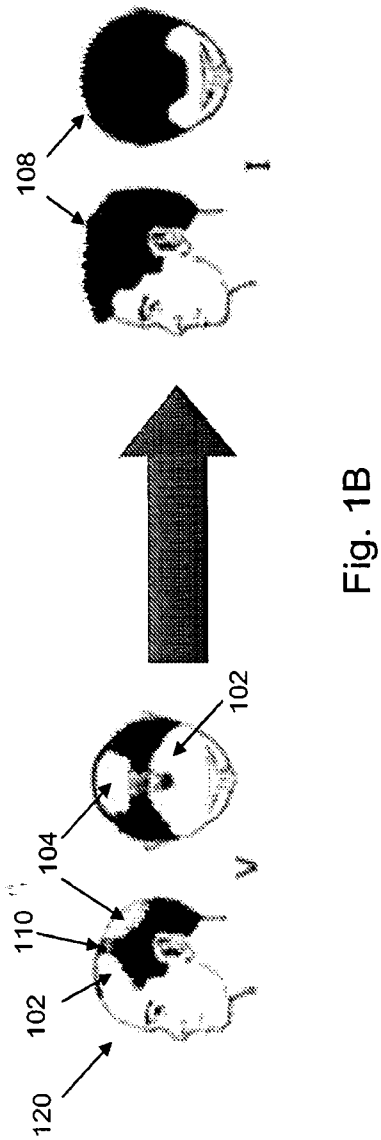

Fig. 1B

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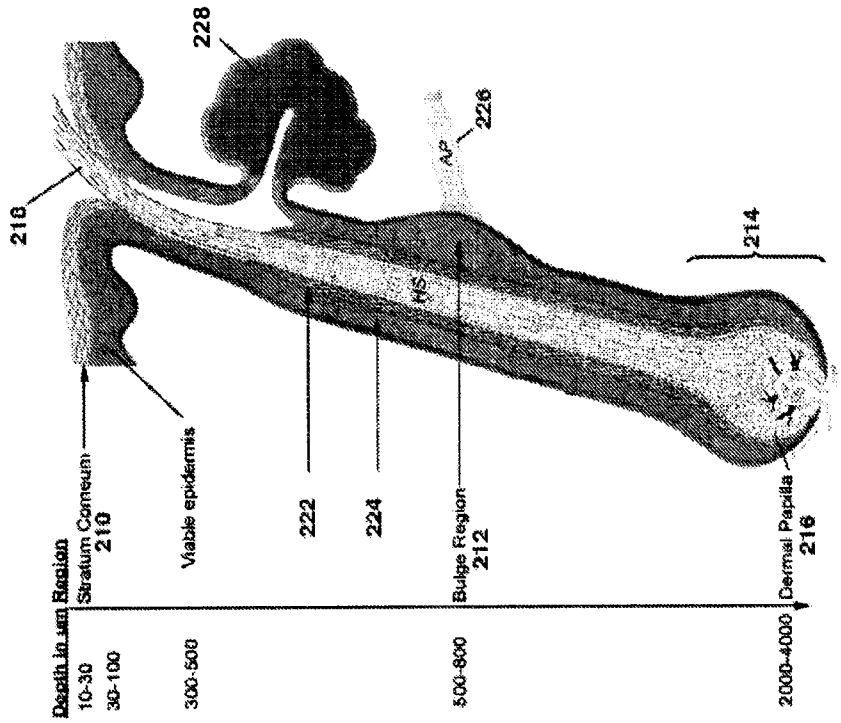

Fig. 2B

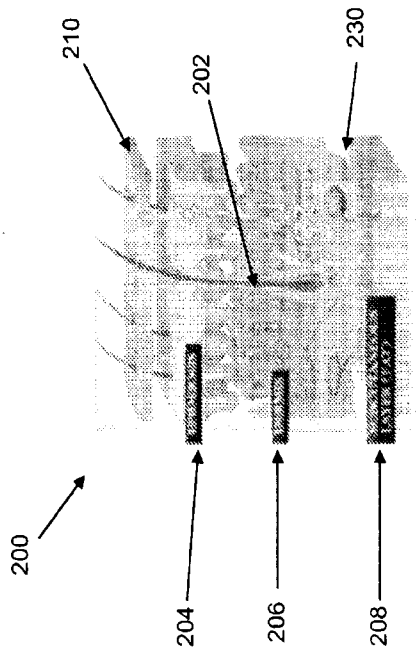

Fig. 2A

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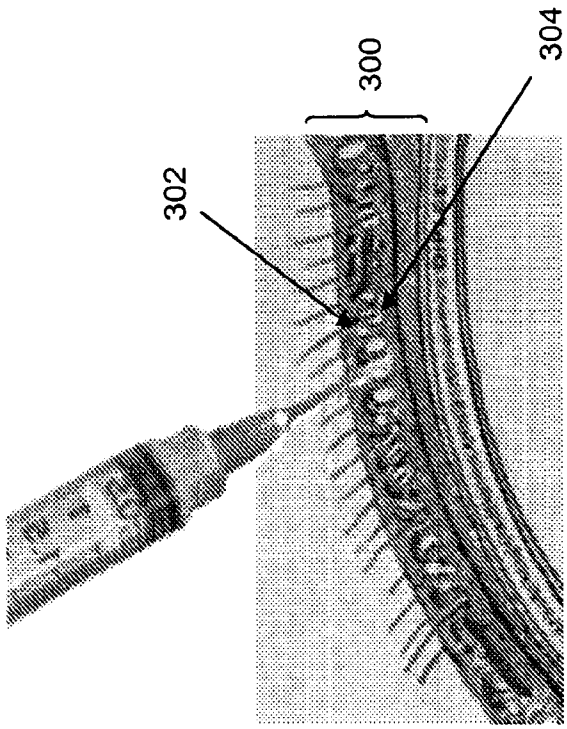

Fig. 3

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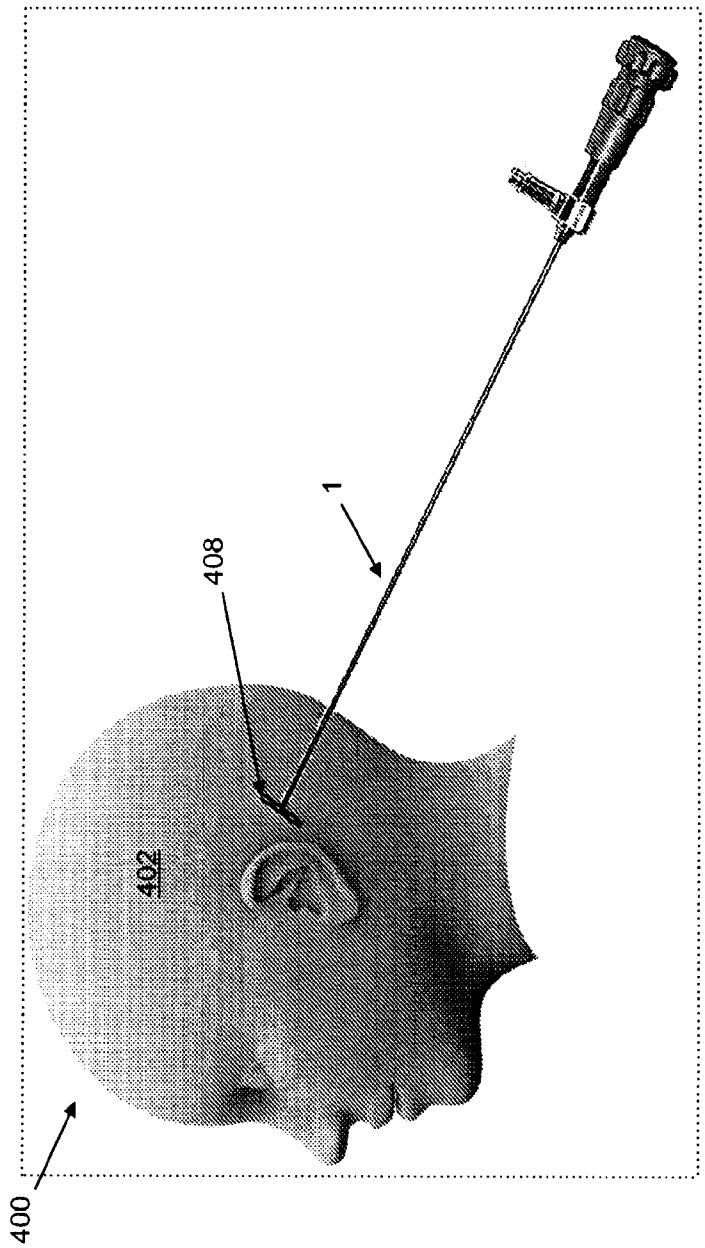

Fig. 4

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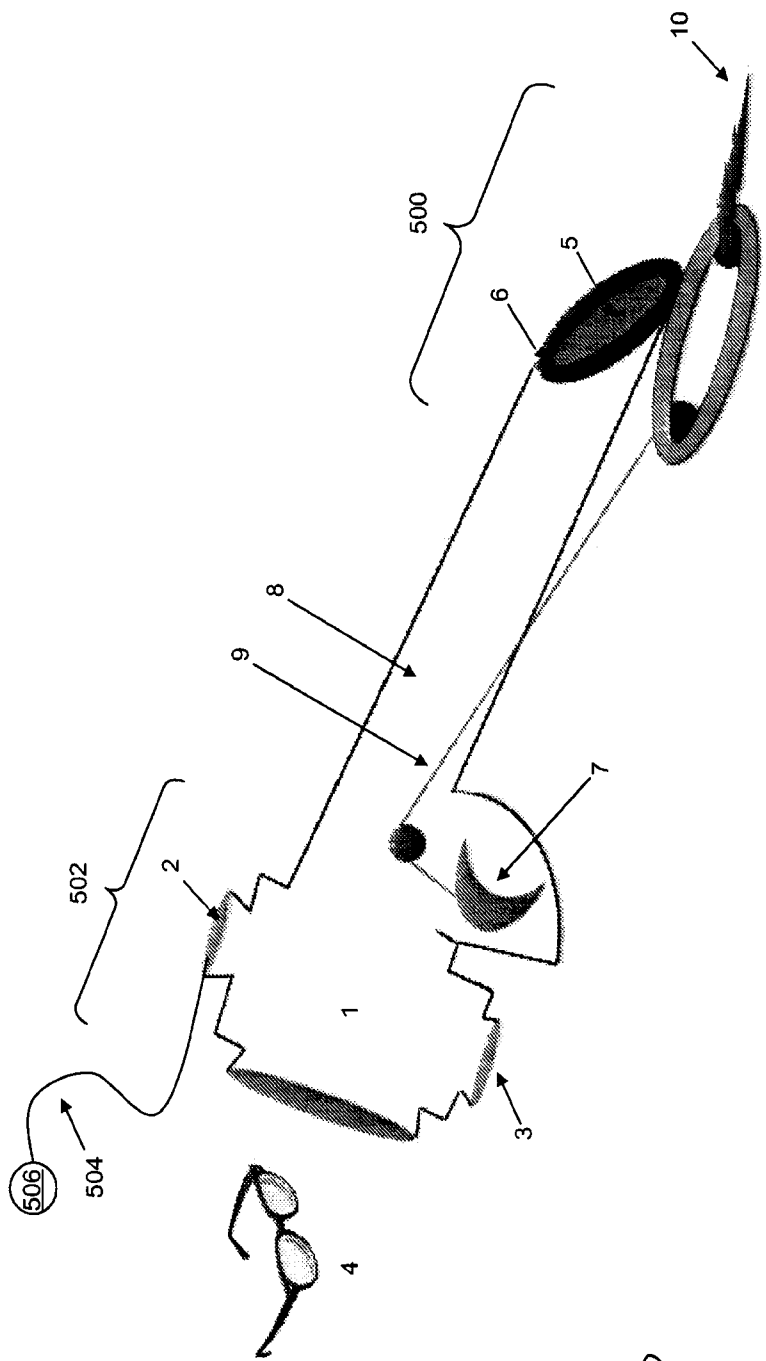

Fig. 5A

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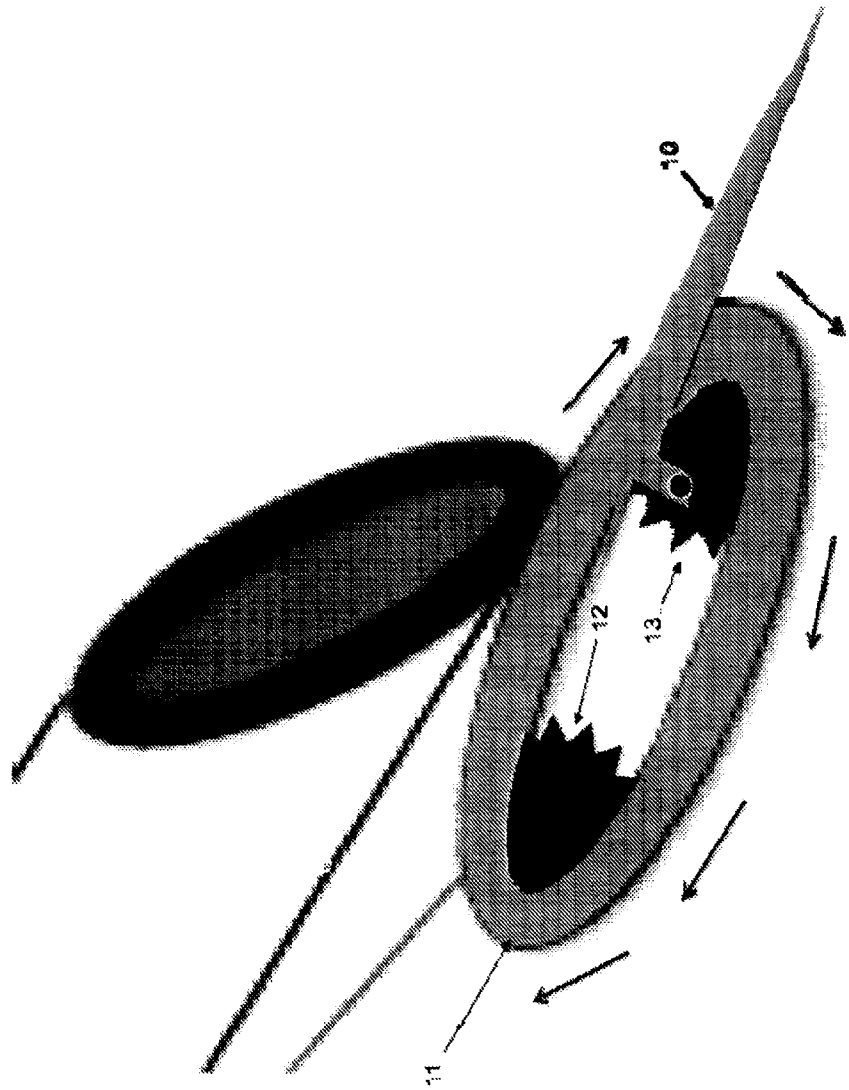

Fig. 5B

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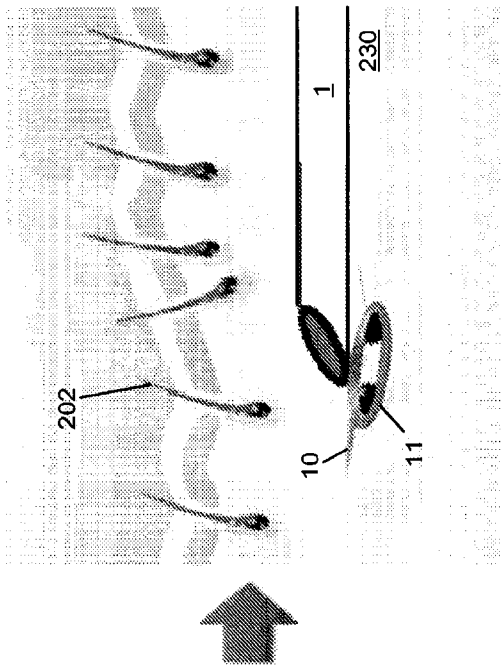

Fig. 5E

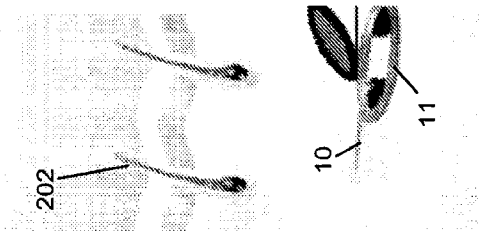

Fig. 5D

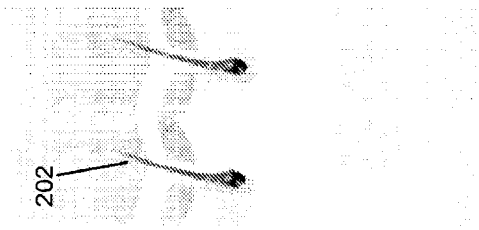

Fig. 5C

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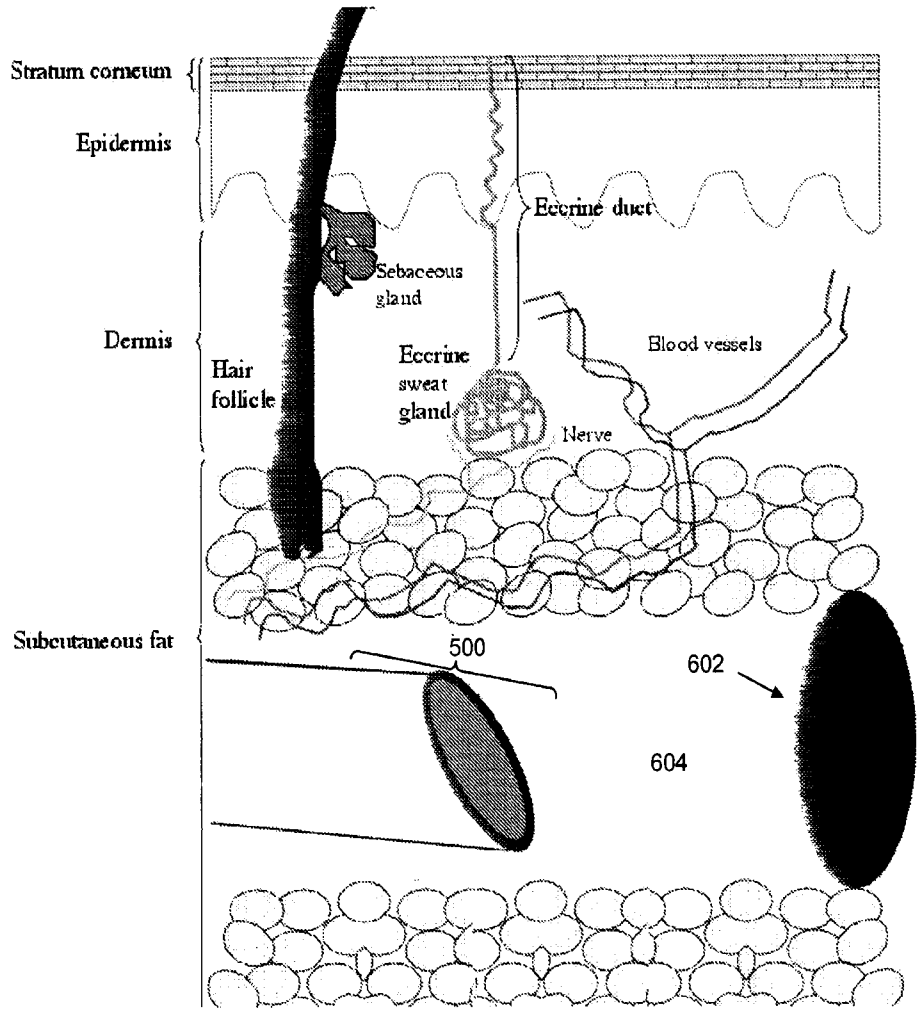

Fig. 6A

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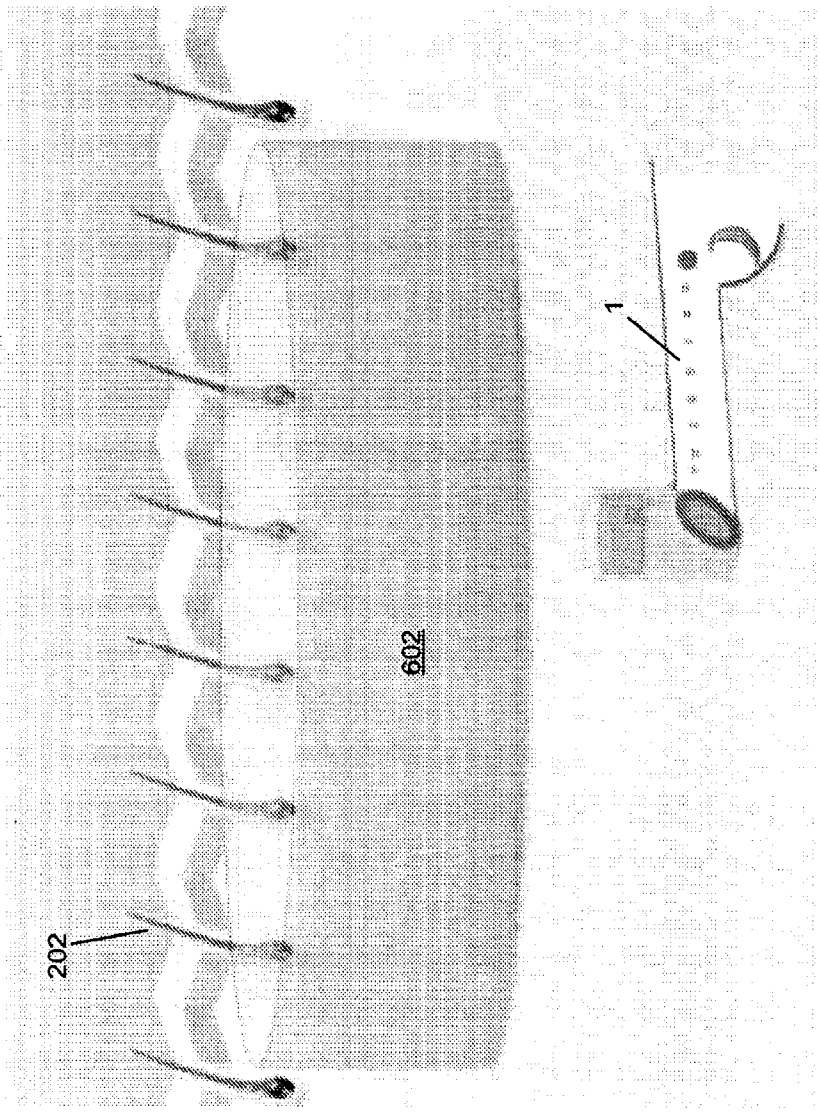

Fig. 6B

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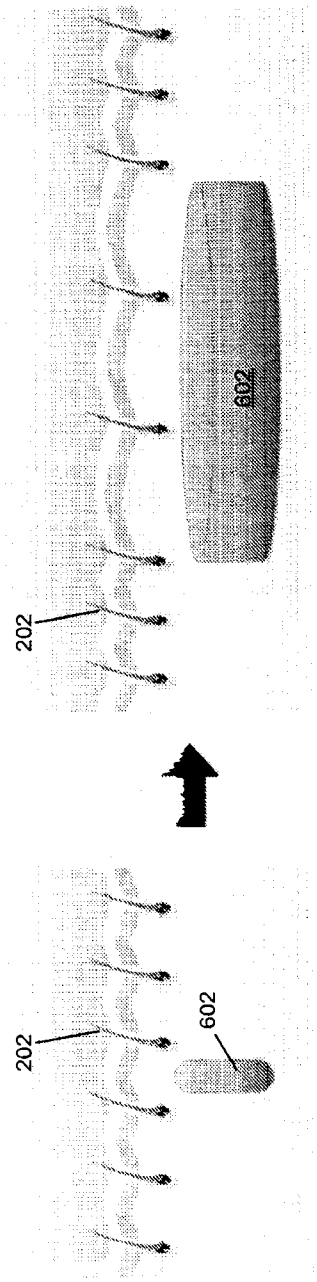

Fig. 6C

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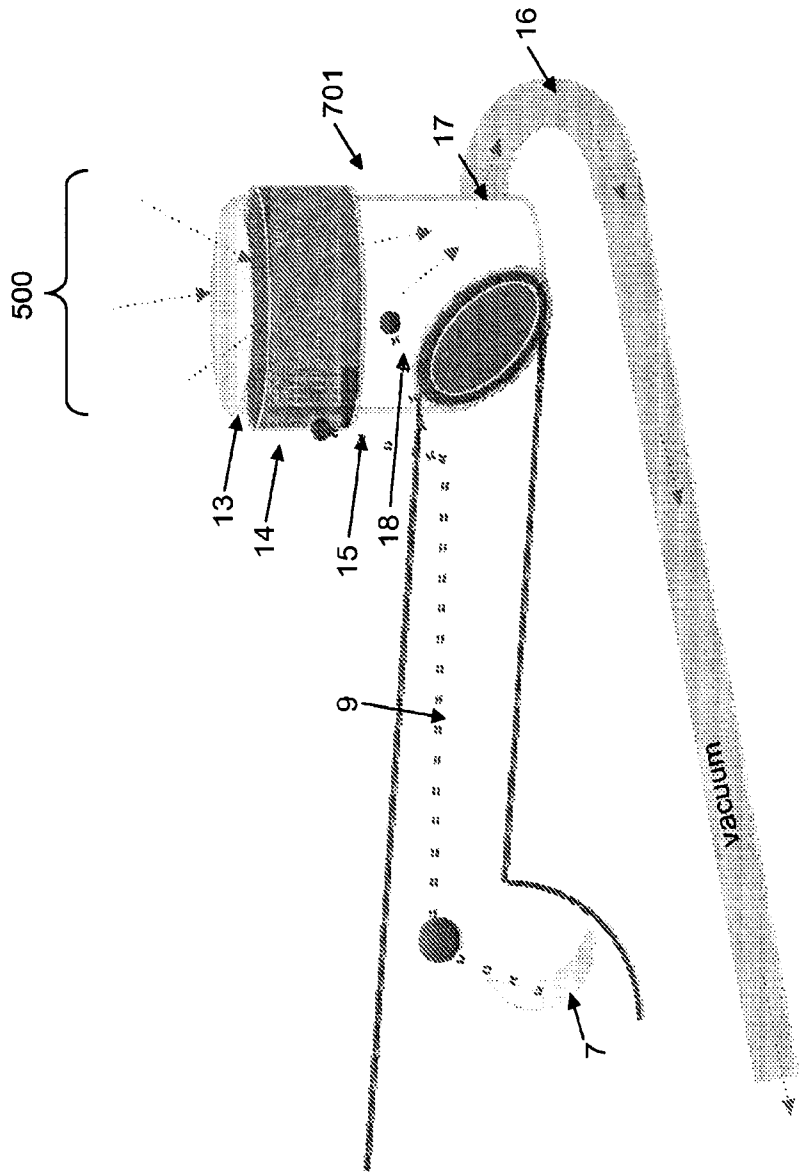

Fig. 7

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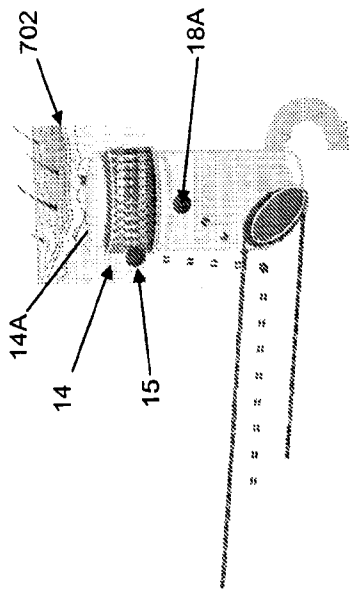

Fig. 7B

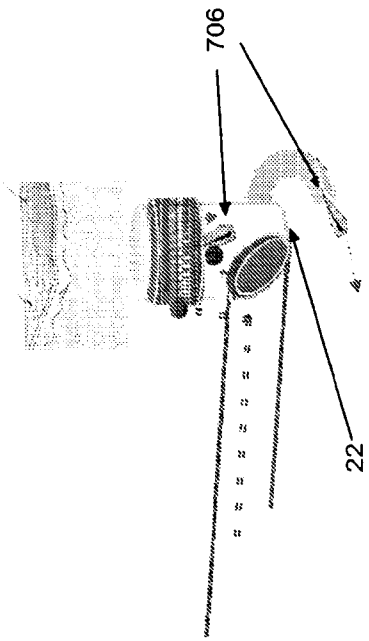

Fig. 7D

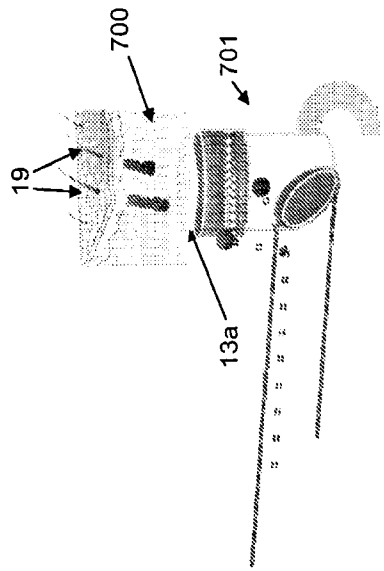

Fig. 7A

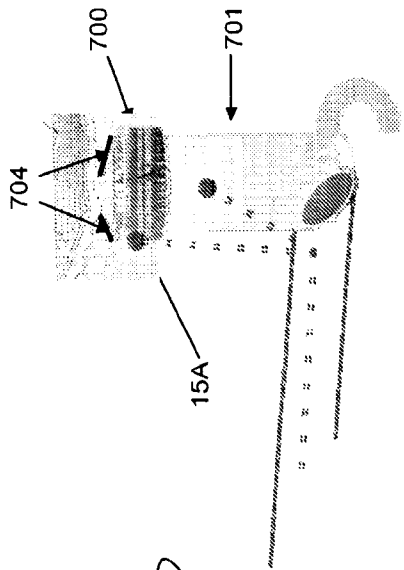

Fig. 7C

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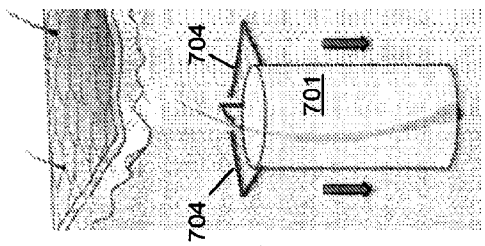

Fig. 7H

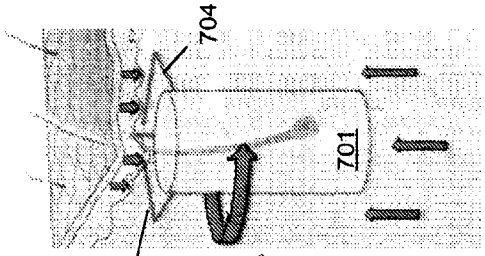

Fig. 7G

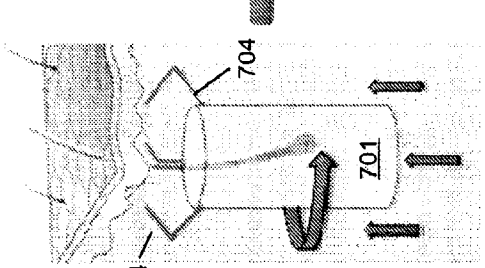

Fig. 7F

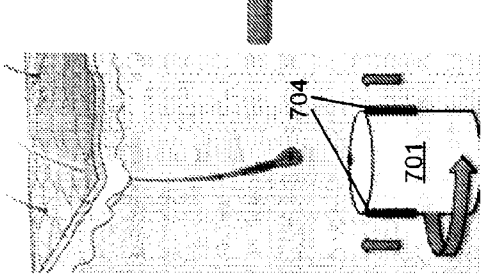

Fig. 7E

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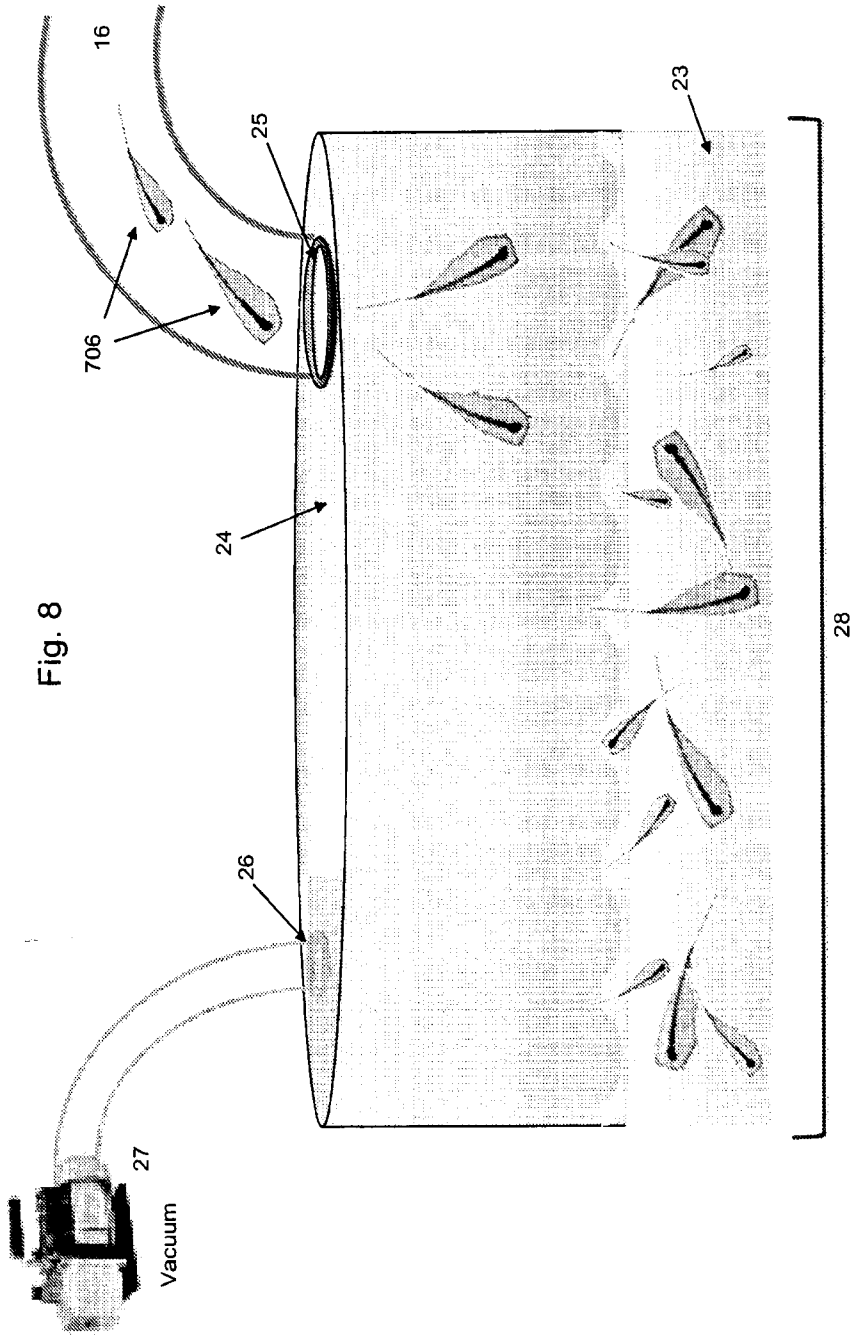

Fig. 8

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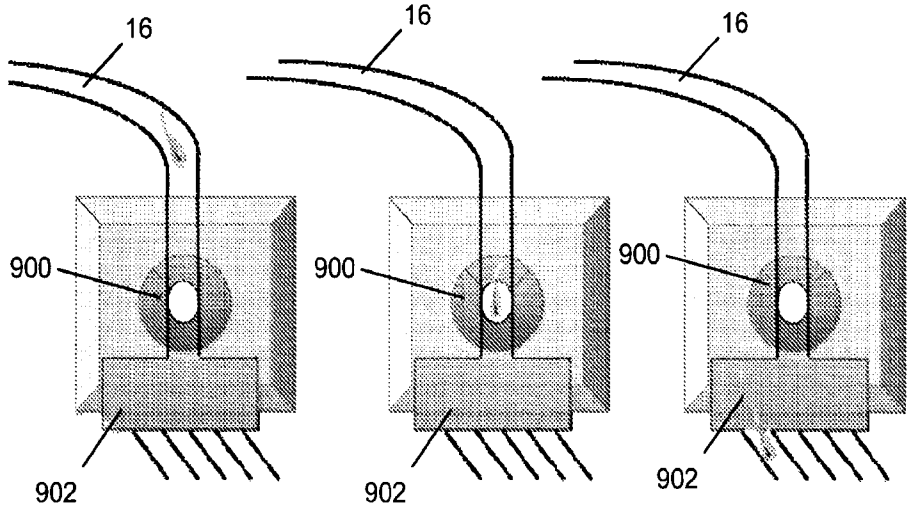

Fig. 9A Fig. 9B Fig. 9C

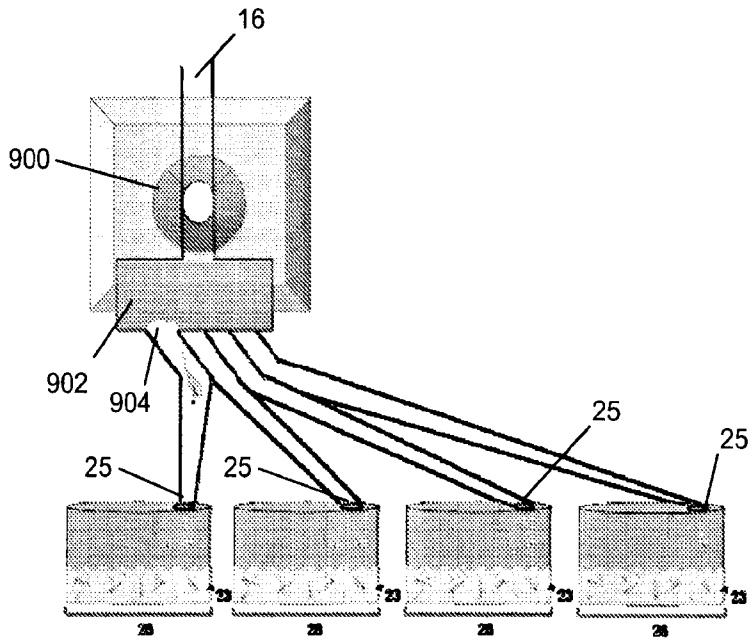

Fig. 9D

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