SELF-INJECTION DEVICE

ABSTRACT

A drug delivery device (500), including a body (504) having a needle opening (508) and a reservoir (164, 176) disposed therein for containing a medicament, and an injection needle (152) for penetrating the skin of a patient, the needle (152) providing a path for the medicament between the reservoir (164, 176) and the patient, and selectively protruding from the body (504) through the needle opening (508). The device (500) also includes safety means (576, 548, 552, 532, 512) for automatically retracting the needle (152) within the body (504) and covering the needle opening (508) upon removal of the device (500) from the patient.

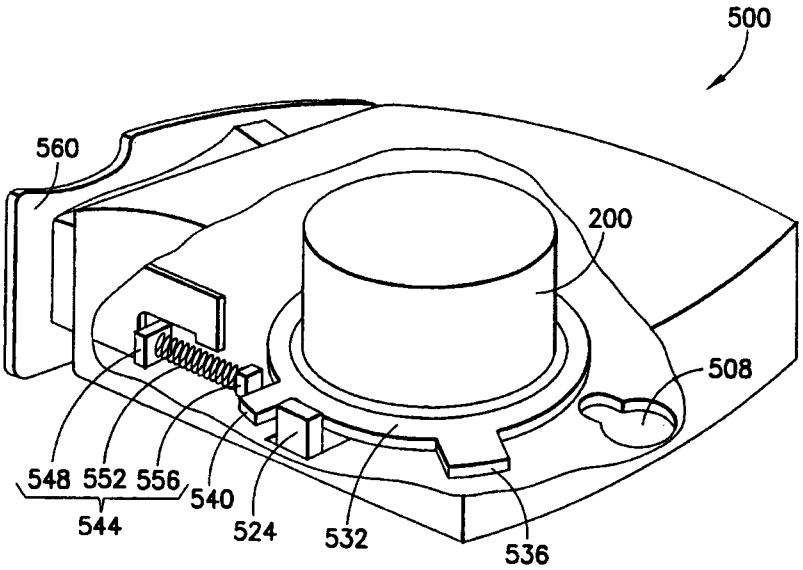

FIG.19

We Claim:

1. A drug delivery device, comprising:

a body having a surface placeable on the skin of a patient, the body having a needle opening and a reservoir disposed therein for containing a medicament;

an injection needle for penetrating the skin of a patient, the needle providing a path for the medicament between the reservoir and the patient, and being selectively movable between a first position, in which a part of the needle is contained within the body, and a second position, in which a part of the needle protrudes from the body through the needle opening; and

safety means for automatically moving the needle from the second position to the first position, and for covering the needle opening upon removal of the device from the skin of the patient.

2. The device according to claim 1, wherein:

the body has a blocker opening; and

the safety means comprises:

a safety member;

a biasing mechanism biasing the safety member toward the needle opening upon activation of the device; and

a blocker movably connected to the body for selectively preventing movement of the safety member toward the needle opening prior to deployment of the safety means;

wherein movement of the safety member to a covered position covering the needle opening retracts the needle within the body.

3. The device according to claim 2, wherein the blocker includes a blocker post extending therefrom for selectively engaging the safety member to prevent movement of the safety member toward the needle opening prior to deployment of the safety means.

4. The device according to claim 3, wherein:

the safety member comprises:

a covering tab extending therefrom for covering the needle opening; and

a blocking tab extending therefrom;

wherein the blocker post engages the blocking tab to prevent movement of the safety member toward the needle opening prior to deployment of the safety means.

5. The device according to claim 4, wherein:

the blocker is hingeably connected with the body;

an external surface of the blocker comprises a blocker adhesive, such that upon removal of the body from the patient, interaction between the blocker adhesive and the patient rotates the blocker away from the body, thereby disengaging the blocker post from the blocking tab and permitting the safety member to move toward the needle opening.

6. The device according to claim 5, wherein:

the external surface of the blocker is substantially flush with a patient-surface of the body in a pre-deployed position of the blocker; and

the blocker is sized to provide a friction fit with the blocker opening to maintain the blocker in the pre-deployed position prior to deployment of the safety means.

7. The device according to claim 5, wherein:

the external surface of the blocker is adjacent to and substantially parallel with the surface of the body in a pre-deployed position of the blocker; and

the blocker post is sized to provide a friction fit with the blocker opening to maintain the blocker in the pre-deployed position prior to deployment of the safety means.

8. The device according to claim 5, wherein:

the device further comprises a body adhesive disposed on the surface of the body for adhering the body to the patient during use; and

the blocker adhesive is stronger than the body adhesive, to ensure rotation of the blocker away from the body during removal of the body from the patient.

9. The device according to claim 4, wherein:

the device further comprises an activator button for activating the device;

the biasing mechanism comprises a biasing member and a biasing spring connected thereto; and

the biasing mechanism is disposed such that upon activation of the device by pressing of the activator button, the activator button contacts the biasing member, which in turn compresses the biasing spring against the blocking tab to bias the safety member toward the needle opening.

10. The device according to claim 4, wherein:

the body comprises a substantially cylindrical housing in which the reservoir is disposed; and

the safety member comprises a covering ring rotatably disposed about the cylindrical housing.

11. The device according to claim 10, wherein rotation of the covering ring to the covered position bends the needle, thereby retracting the needle within the body.

12. The device according to claim 10, wherein:

the device further comprises a needle manifold connected to the needle and disposed on the path between the reservoir and the needle; and

the covering ring comprises a ramp such that during rotation of the covering ring to the covered position, the ramp contacts the needle manifold, thereby retracting the needle within the body.

13. A safety mechanism for a drug delivery device including a body having a surface placeable on the skin of a patient and a needle opening, a reservoir disposed in the body for containing a medicament, and an injection needle for penetrating the skin of a patient, the needle providing a path for the medicament between the reservoir and the patient, and being selectively movable between a first position, in which a part of the needle is contained within the body, and a second position, in which a part of the needle protrudes from the body through the needle opening, the safety mechanism comprising:

a safety member movable within the body from a pre-deployed position to a covered position covering the needle opening;

a biasing mechanism biasing the safety member toward the covered position upon activation of the drug delivery device; and

a blocker movably connected to the body for selectively preventing movement of the safety member toward the covered position prior to deployment of the safety mechanism;

wherein movement of the safety member to the covered position retracts the needle within the body.

14. The safety mechanism according to claim 13, wherein:

the biasing mechanism comprises a biasing member and a biasing spring connected thereto; and

the biasing mechanism is disposed such that upon activation of the drug delivery device, the biasing member compresses the biasing spring against the blocking tab to bias the safety member toward the covered position.

15. The safety mechanism according to claim 14, wherein the blocker includes a blocker post extending therefrom for selectively engaging the safety member to prevent movement of the safety member toward the covered position prior to deployment of the safety mechanism.

16. The safety mechanism according to claim 15, wherein:

the safety member comprises:

a covering tab extending therefrom for covering the needle opening; and

a blocking tab extending therefrom;

wherein the blocker post engages the blocking tab prior to deployment of the safety means to prevent movement of the safety member toward the covered position.

17. The safety mechanism according to claim 16, wherein:

the blocker is hingeably connected with the body;

an external surface of the blocker comprises an adhesive, such that upon removal of the drug delivery device from the patient, interaction between the adhesive and the patient rotates the blocker away from the body, thereby disengaging the blocker post from the blocking tab and permitting the safety member to move toward the covered position.

18. The safety mechanism according to claim 17, wherein:

the external surface of the blocker is substantially flush with a patient-surface of the body in a pre-deployed position of the blocker; and

the blocker is sized to provide a friction fit with a blocker opening of the body to maintain the blocker in the pre-deployed position prior to deployment of the safety mechanism.

19. The safety mechanism according to claim 17, wherein:

the external surface of the blocker is adjacent to and substantially parallel with the surface of the body in a pre-deployed position of the blocker; and

the blocker post is sized to provide a friction fit with a blocker opening of the body to maintain the blocker in the pre-deployed position prior to deployment of the safety mechanism.

20. The safety mechanism according to claim 16, wherein:

the body comprises a substantially cylindrical housing in which the reservoir is disposed; and

the safety member comprises a covering ring rotatably disposed about the cylindrical housing.

21. The safety mechanism according to claim 20, wherein rotation of the covering ring to the covered position bends the needle, thereby retracting the needle within the body.

22. The safety mechanism according to claim 20, wherein:

the drug delivery device further comprises a needle manifold connected to the needle and disposed on the path between the reservoir and the needle; and

the covering ring comprises a ramp such that during rotation of the covering ring to the covered position, the ramp contacts the needle manifold, thereby retracting the needle within the body.

23. A drug delivery device, comprising:

a body having a surface placeable on the skin of a patient, the body having a needle opening and a reservoir disposed therein for containing a medicament;

an injection needle for penetrating the skin of a patient, the needle providing a path for the medicament between the reservoir and the patient, and being selectively movable between a first position, in which at least a part of the needle is contained within the body, and a second position, in which at least a part of the needle protrudes from the body through the needle opening; and

a safety mechanism pivotably connected to the body and being selectively pivotable between a retracted position and a deployed position shielding the injection needle, the safety mechanism having a safety surface placeable on the skin of the patient, the safety surface having an adhesive disposed thereon for adhering the safety mechanism to the skin of the patient and thereby automatically pivoting the safety mechanism to the second position upon removal of the drug delivery device from the skin of the patient.

24. The device according to claim 23, wherein the safety mechanism is biased toward the retracted position.

25. The device according to claim 24, wherein the safety mechanism comprises a pair of locking posts disposed to contact opposing edges of the needle opening and bias the safety mechanism toward the first position.

26. The device according to claim 25, wherein each locking post comprises:

a post extending portion extending substantially perpendicularly from an inner surface of the safety mechanism; and

a wedge portion disposed at a distal end of the post extending portion;

wherein as a height of the wedge portion increases with respect to the inner surface of the safety mechanism, a width of the wedge portion increases.

27. The device according to claim 26, wherein:

as the safety mechanism pivots from the retracted position to the deployed position, the wedge portions act against the respective opposing edges of the needle opening causing the locking posts to deform elastically toward one another; and

as the safety mechanism reaches the deployed position, top edges of the wedge portions pass bottom edges of the needle opening and the locking posts snap back to their substantially un-deformed states and contact an external surface of the body to maintain the safety mechanism in the second position.

28. The device according to claim 23, wherein the safety mechanism comprises:

a rim portion defining an external surface of the safety mechanism; and

a shield extending above the rim portion for shielding the injection needle when the safety mechanism is deployed in the deployed position.

29. The device according to claim 23, wherein the device comprises a rotor disposed in the body and being pivotable from a pre-activated position for selectively maintaining the injection needle in the first position to an activated position, the rotor having a safety retaining projection; and

wherein the safety mechanism comprises a guide post extending through the body and engaging the safety retaining projection when the safety mechanism is in the retracted position, for preventing movement of the safety mechanism prior to movement of the injection needle to the second position.

Dated this 13th day of June, 2012.

Becton, Dickinson and Company

(Nitin Masilamani)
of Amarchand & Mangaldas &
Suresh A. Shroff & Co.
Attorneys for the Applicant