THE INVENTION CLAIMED IS:

1. A safety blood collection device comprising:

a holder housing comprising a generally tubular wall extending between a forward end and an open rearward end to define an interior chamber therein, the rearward end of the holder housing adapted to receive a sample collection tube therethrough;

a needle including a puncture tip; and

a retainer co-acting with the holder housing and adapted to maintain the needle in a first position with the puncture tip extending from the forward end of the holder housing, the retainer adapted for activation so as to release the needle, such that the force of gravity acts based on the weight of the needle to move the needle from the first position extending from the forward end of the holder housing to a second position in which the puncture tip is contained within the interior chamber of the holder housing.

2. A safety blood collection device as in claim 1, wherein the retainer comprises structure for establishing interference engagement for maintaining the needle in the first position with the puncture tip extending from the forward end of the holder housing, and wherein the retainer is adapted to move from a first retainer position to a second retainer position upon activation thereof, movement of the retainer from the first retainer position to the second retainer position causing release of the interference engagement, thereby permitting the needle to move to the second position in which the puncture tip is contained within the interior chamber of the holder housing.

3. A safety blood collection device as in claim 2, wherein the needle comprises a needle hub including a needle cannula having the puncture tip at a forward end thereof with the needle hub interconnected with a hub port adjacent the forward end of the holder housing, wherein the retainer structure is in interference engagement with the hub port to retain the hub port from release from the forward end of the housing and to maintain the needle in the first position, and wherein movement of the retainer to the second retainer position releases the interference engagement between the retainer structure and the hub port, thereby permitting the needle to move to the second position.

4. A safety blood collection device as in claim 2, further comprising structure adapted to close the rearward end of the holder housing when the retainer is in the second retainer position to prevent access to the interior chamber through the rearward end.

5. A safety blood collection device as in claim 2, wherein the retainer comprises a flexible band member including a first portion comprising a slot adjacent the forward end of the holder housing when the flexible band member is in the first retainer position, wherein interference engagement with the slot maintains the needle in the first position with the puncture tip extending from the forward end of the holder housing, and wherein movement of the flexible band member toward the second retainer position aligns the needle with a second portion of the flexible band member comprising an opening, thereby releasing the interference engagement and permitting the needle to pass through the opening to the second position in which the puncture tip of the needle is contained within the interior chamber of the holder housing.

6. A safety blood collection device as in claim 5, wherein the flexible band member further includes a third portion adapted to enclose the forward end of the holder housing when the flexible band member is in the second retainer position to prevent re-exposure of the puncture tip of the needle cannula therethrough.

7. A safety blood collection device as in claim 5, wherein the flexible band member includes a finger tab extending through a portion of the housing for causing movement of the flexible band member from the first retainer position to the second retainer position.

8. A safety blood collection device as in claim 5, wherein the flexible band member includes a opening adjacent the rearward end of the holder housing when the flexible band member is in the first retainer position, and wherein the flexible band member further includes a portion adapted to close the rearward end of the holder housing when the flexible band member is in the second retainer position to prevent access to the interior chamber through the rearward end.

9. A safety blood collection device as in claim 5, wherein the flexible band member comprises a continuous band member movable about an interior perimeter of the holder housing.

10. A safety blood collection device as in claim 9, further comprising a holder insert contained within the holder housing, the flexible band member sandwiched between the holder insert and the holder housing for movement therebetween.

11. A safety blood collection device as in claim 1, wherein the needle comprises a needle hub including a needle cannula comprising a first end including the puncture tip extending from a forward end of the hub and a second end including a non-patient puncture tip extending from a rearward end of the hub for engagement with a sample collection tube received through the rearward end of the holder housing with the retainer maintaining the needle in the first position.

12. A safety blood collection device as in claim 1, wherein the retainer comprises a clamping mechanism integrated with the holder housing, the clamping mechanism adapted to move between a first position in which the clamping mechanism secures the needle in the first position with the puncture tip extending from the forward end of the holder housing to a second position in which the needle is released from the clamping mechanism, thereby permitting the needle to move based on the force of gravity to the second position.

13. A safety blood collection device as in claim 12, wherein the clamping mechanism comprises a pair of claws adjacent the forward end of the holder housing and extending externally of the holder housing, the pair of claws being movable from a first clamping position establishing interference engagement for maintaining the needle in the first position to move to a second release position releasing the interference engagement so as to permit the needle to move based on the force of gravity to the second position.

14. A safety blood collection device as in claim 12, further comprising an internal carrier structure extending within the interior chamber of the holder housing and connected with the needle, the internal carrier structure preventing movement of the needle through the rearward end of the holder housing upon movement of the needle to the second position based on the force of gravity.

15. A safety blood collection device as in claim 14, wherein the needle comprises a needle hub including a needle cannula comprising a first end including the puncture tip extending from a forward end of the hub and a second end including a non-patient puncture tip extending from a rearward end of the hub for engagement with a sample collection tube received through the rearward end of the holder housing with the retainer maintaining the needle in the first position, the internal carrier structure extending beyond the length of the non-patient puncture tip within the interior chamber of the holder housing and including structure for interference engagement with a portion of the holder housing when the needle is in the second position, thereby preventing the non-patient puncture tip from extending through the rearward opening of the holder housing.

16. A safety blood collection device as in claim 1, wherein the retainer comprises a ring structure rotatable with respect to the holder housing about a longitudinal axis between a first retainer position and a second retainer position, the ring structure including a finger in interference engagement with the needle for maintaining the needle in the first position extending from the forward end of the holder housing when the ring structure is in the first retainer position, and wherein rotation of the ring structure to the second retainer position releases the interference engagement between the finger and the needle, thereby permitting the needle to move based on the force of gravity to the second position in which the puncture tip of the needle cannula is contained within the interior chamber of the holder housing.

17. A safety blood collection device as in claim 16, wherein the ring structure extends about an external surface of the holder housing and includes at least one finger extending through the holder housing for interference engagement with the needle.

18. A safety blood collection device as in claim 17, wherein the needle comprises a needle hub including a needle cannula having the puncture tip at a forward end thereof, the needle hub including at least one gap extending about a periphery thereof, and wherein rotation of the ring structure with respect to the holder housing aligns the at least one finger of the ring structure with the at least one gap of the needle hub, thereby releasing the interference engagement between the at least one finger of the needle hub and thereby permitting the needle hub to move to the second position based on the force of gravity.

19. A safety blood collection device as in claim 18, wherein the needle hub further comprises an internal carrier structure extending within the interior chamber of the holder housing, the internal carrier structure preventing movement of the needle hub through the rearward end of the holder housing upon movement of the needle hub to the second position based on the force of gravity.

20. A safety blood collection device as in claim 19, wherein the needle cannula comprises a first end including the puncture tip extending from a forward end of the needle hub and a second end including a non-patient puncture tip extending from a rearward end of the needle hub for engagement with a sample collection tube received through the rearward end of the holder housing with the finger of the ring structure maintaining the needle hub in the first position, the internal carrier structure extending beyond the length of the non-patient puncture tip within the interior chamber of the holder housing and including structure for interference engagement with a portion of the holder housing when the needle hub is in the second position, thereby preventing the non-patient puncture tip from extending through the rearward opening of the holder housing.

21. A method for containing a needle after use in a blood collection procedure comprising:

providing a blood collection device comprising a holder housing comprising a generally tubular wall extending between a forward end and an open rearward end to define an interior chamber therein, and a needle maintained in a first position in which a puncture tip of the needle extends from the forward end of the holder housing through a retainer co-acting with the holder housing and including structure providing for interference engagement with the needle;

activating the retainer so as to release the interference engagement between the retainer and the needle; and

positioning the blood collection device such that gravitational forces move the needle to a second position in which the puncture tip is contained within the interior chamber of the holder housing.

22. A method as in claim 21, wherein the retainer comprises a flexible band member including a slot adjacent the forward end of the holder housing for establishing interference engagement with the needle and an opening adjacent the slot, and wherein the

activating step comprises moving the flexible band member with respect to the holder housing to align the needle with the opening adjacent the slot, thereby releasing the interference engagement between the slot and the needle to allow the needle to pass through the opening during the positioning step.

23. A safety blood collection device comprising:

a needle extending between a forward end having a patient puncture tip and a rearward end having a non-patient puncture tip; and

a needle holder comprising a generally tubular wall extending between a forward end and an open rearward end to define an interior chamber therein, the holder retaining the needle in a first position in which the patient puncture tip extends through the forward end of the holder with the non-patient puncture tip maintained within the interior chamber; and adapted to release the needle such that the force of gravity acts based on the weight of the needle to move the needle from the first position to a second position in which the patient puncture tip and the non-patient puncture tip are contained within the interior chamber of the holder.

24. A safety blood collection device as in claim 23, wherein the needle holder comprises a retainer adapted to maintain the needle in the first position, the retainer adapted for activation so as to release the needle from the first position to permit movement to the second position.

25. A safety blood collection device as in claim 23, wherein the needle is contained and maintained within the interior of the holder after release and movement of the needle from the first position to the second position by structure covering the open rearward end of the needle holder.

Claims

1. A safety blood collection device comprising:

a holder housing comprising a generally tubular wall extending between a forward end and an open rearward end to define an interior chamber therein, the rearward end of the holder housing adapted to receive a sample collection tube therethrough;

a needle including a forward end having a puncture tip and a rearward end having a non-puncture tip; and

a retainer co-acting with the holder housing and adapted to maintain the needle in a first position with the puncture tip extending from the forward end of the holder housing, the retainer adapted for activation between a first position and a second position so as to release the needle, such that when the device is in an upright position, the force of gravity is the sole force which acts based on the weight of the needle to move the needle from the first position extending from the forward end of the holder housing to a second position in which the puncture tip is contained within the interior chamber of the holder housing,

wherein movement of the retainer from the first position toward the second position causes the needle to be automatically contained within the interior chamber of the holder housing without further action by an operator,

wherein one of the retainer of a needle carrier is configured to have a length which is at least equal to a length of the rearward end of the needle.

2. A safety blood collection device as in claim 1, wherein the retainer comprises structure for establishing interference engagement for maintaining the needle in the first position with the puncture tip extending from the forward end of the holder housing, and wherein the retainer is adapted to move from a first retainer position to a second retainer position upon activation thereof, movement of the retainer from the first retainer position to the second retainer position causing release of the interference engagement, thereby permitting the needle to move to the second position in which the puncture tip is contained within the interior chamber of the holder housing.

3. A safety blood collection device as in claim 2, wherein the needle comprises a needle hub including the needle having the puncture tip at the forward end thereof with the needle hub interconnected with a hub port adjacent the forward end of the holder housing, wherein the retainer structure is in interference engagement with the hub port

to retain the hub port from release from the forward end of the housing and to maintain the needle in the first position, and wherein movement of the retainer to the second retainer position releases the interference engagement between the retainer structure and the hub port, thereby permitting the needle to move to the second position.

4. A safety blood collection device as in claim 2, further comprising structure adapted to close the rearward end of the holder housing when the retainer is in the second retainer position to prevent access to the interior chamber through the rearward end.

5. A safety blood collection device as in claim 2, wherein the retainer comprises a flexible band member including a first portion comprising a slot adjacent the forward end of the holder housing when the flexible band member is in the first retainer position, wherein interference engagement with the slot maintains the needle in the first position with the puncture tip extending from the forward end of the holder housing, and wherein movement of the flexible band member toward the second retainer position aligns the needle with a second portion of the flexible band member comprising an opening, thereby releasing the interference engagement and permitting the needle to pass through the opening to the second position in which the puncture tip of the needle is contained within the interior chamber of the holder housing.

6. A safety blood collection device as in claim 5, wherein the flexible band member further includes a third portion adapted to enclose the forward end of the holder housing when the flexible band member is in the second retainer position to prevent re-exposure of the puncture tip of the needle cannula therethrough.

7. A safety blood collection device as in claim 5, wherein the flexible band member includes a finger tab extending through a portion of the housing for causing movement of the flexible band member from the first retainer position to the second retainer position.

8. A safety blood collection device as in claim 5, wherein the flexible band member includes an opening adjacent the rearward end of the holder housing when the flexible band member is in the first retainer position, and wherein the flexible band member further includes a portion adapted to close the rearward end of the holder housing when the

flexible band member is in the second retainer position to prevent access to the interior chamber through the rearward end.

9. A safety blood collection device as in claim 5, wherein the flexible band member comprises a continuous band member movable about an interior perimeter of the holder housing.

10. A safety blood collection device as in claim 9, further comprising a holder insert contained within the holder housing, the flexible band member sandwiched between the holder insert and the holder housing for movement therebetween.

11. A safety blood collection device as in claim 1, wherein the needle comprises a needle hub including the needle comprising a first end including the puncture tip extending from the forward end of the hub and a second end including the non-patient puncture tip extending from the rearward end of the hub for engagement with a sample collection tube received through the rearward end of the holder housing with the retainer maintaining the needle in the first position.

12. A safety blood collection device as in claim 1, wherein the retainer comprises a clamping mechanism integrated with the holder housing, the clamping mechanism adapted to move between a first position in which the clamping mechanism secures the needle in the first position with the puncture tip extending from the forward end of the holder housing to a second position in which the needle is released from the clamping mechanism, thereby permitting the needle to move based on the force of gravity to the second position.

13. A safety blood collection device as in claim 12, wherein the clamping mechanism comprises a pair of claws adjacent the forward end of the holder housing and extending externally of the holder housing, the pair of claws being movable from a first clamping position establishing interference engagement for maintaining the needle in the first position to move to a second release position releasing the interference engagement so as to permit the needle to move based on the force of gravity to the second position.

14. A safety blood collection device as in claim 12, further comprising an internal carrier structure extending within the interior chamber of the holder housing and connected with the needle, the internal carrier structure preventing movement of the needle through the rearward end of the holder housing upon movement of the needle to the second position based on the force of gravity.

15. A safety blood collection device as in claim 14, wherein the needle comprises a needle hub including the needle comprising a first end including the puncture tip extending from a forward end of the hub and a second end including the non-patient puncture tip extending from a rearward end of the hub for engagement with a sample collection tube received through the rearward end of the holder housing with the retainer maintaining the needle in the first position, the internal carrier structure extending beyond the length of the non-patient puncture tip within the interior chamber of the holder housing and including structure for interference engagement with a portion of the holder housing when the needle is in the second position, thereby preventing the non-patient puncture tip from extending through the rearward opening of the holder housing.

16. A safety blood collection device as in claim 1, wherein the retainer comprises a ring structure rotatable with respect to the holder housing about a longitudinal axis between a first retainer position and a second retainer position, the ring structure including a finger in interference engagement with the needle for maintaining the needle in the first position extending from the forward end of the holder housing when the ring structure is in the first retainer position, and wherein rotation of the ring structure to the second retainer position releases the interference engagement between the finger and the needle, thereby permitting the needle to move based on the force of gravity to the second position in which the puncture tip of the needle cannula is contained within the interior chamber of the holder housing.

17. A safety blood collection device as in claim 16, wherein the ring structure extends about an external surface of the holder housing and includes at least one finger extending through the holder housing for interference engagement with the needle.

18. A safety blood collection device as in claim 17, wherein the needle comprises a needle hub including the needle having the puncture tip at a forward end thereof,

the needle hub including at least one gap extending about a periphery thereof, and wherein rotation of the ring structure with respect to the holder housing aligns the at least one finger of the ring structure with the at least one gap of the needle hub, thereby releasing the interference engagement between the at least one finger of the needle hub and thereby permitting the needle hub to move to the second position based on the force of gravity.

19. A safety blood collection device as in claim 18, wherein the needle hub further comprises an internal carrier structure extending within the interior chamber of the holder housing, the internal carrier structure preventing movement of the needle hub through the rearward end of the holder housing upon movement of the needle hub to the second position based on the force of gravity.

20. A safety blood collection device as in claim 19, wherein the non-patient puncture tip extends from a rearward end of the needle hub for engagement with a sample collection tube received through the rearward end of the holder housing with the finger of the ring structure maintaining the needle hub in the first position, the internal carrier structure extending beyond the length of the non-patient puncture tip within the interior chamber of the holder housing and including structure for interference engagement with a portion of the holder housing when the needle hub is in the second position, thereby preventing the non-patient puncture tip from extending through the rearward opening of the holder housing.

21. A method for containing a needle after use in a blood collection procedure comprising:

providing a blood collection device comprising a holder housing comprising a generally tubular wall extending between a forward end and an open rearward end to define an interior chamber therein, and a needle maintained in a first position in which a non-patient puncture tip of the needle is maintained within the internal chamber and in which a puncture tip of the needle extends from the forward end of the holder housing through a retainer co-acting with the holder housing and including structure providing for interference engagement with the needle, wherein one of the retainer or a needle carrier is configured to have a length which is at least equal to a length of the rearward end of the needle;

activating the retainer so as to release the interference engagement between the retainer and the needle; and

positioning the blood collection device such that when the device is in an upright positon, gravitational forces automatically and without further action by an operator, is the sole force which acts based on the weight of the needle to move the needle to a second position in which the puncture tip and non-puncture tip are contained within the interior chamber of the holder housing.

22. A method as in claim 21, wherein the retainer comprises a flexible band member including a slot adjacent the forward end of the holder housing for establishing interference engagement with the needle and an opening adjacent the slot, and wherein the activating step comprises moving the flexible band member with respect to the holder housing to align the needle with the opening adjacent the slot, thereby releasing the interference engagement between the slot and the needle to allow the needle to pass through the opening during the positioning step.

23. A safety blood collection device comprising:

a needle extending between a forward end having a patient puncture tip and a rearward end having a non-patient puncture tip; and

a needle holder comprising a generally tubular wall extending between a forward end and an open rearward end to define an interior chamber therein, the holder retaining the needle in a first position in which the patient puncture tip extends through the forward end of the holder with the non-patient puncture tip maintained within the interior chamber, and adapted to release the needle such that when the device is in an upright position, the force of gravity is the sole force which acts based on the weight of the needle to move the needle from the first position to a second position in which the patient puncture tip and the non-patient puncture tip are contained within the interior chamber of the holder,

wherein release of the needle for movement from the first position toward the second position automatically contains the needle within the interior chamber of the holder housing without further action by an operator,

wherein one of the retainer or a needle carrier is configured to have a length which is at least equal to a length of the rearward end of the needle.

24. A safety blood collection device as in claim 23, wherein the needle holder comprises a retainer adapted to maintain the needle in the first position, the retainer

adapted for activation so as to release the needle from the first position to permit movement to the second position.

25. A safety blood collection device as in claim 23, wherein the needle is contained and maintained within the interior of the holder after release and movement of the needle from the first position to the second position by structure covering the open rearward end of the needle holder.

26. A safety blood collection device as in claim 23, wherein the needle is contained and maintained within the interior of the holder after release and movement of the needle from the first position to the second position by a carrier structure preventing movement of the needle through the open rearward end of the needle holder upon movement of the needle to the second position.