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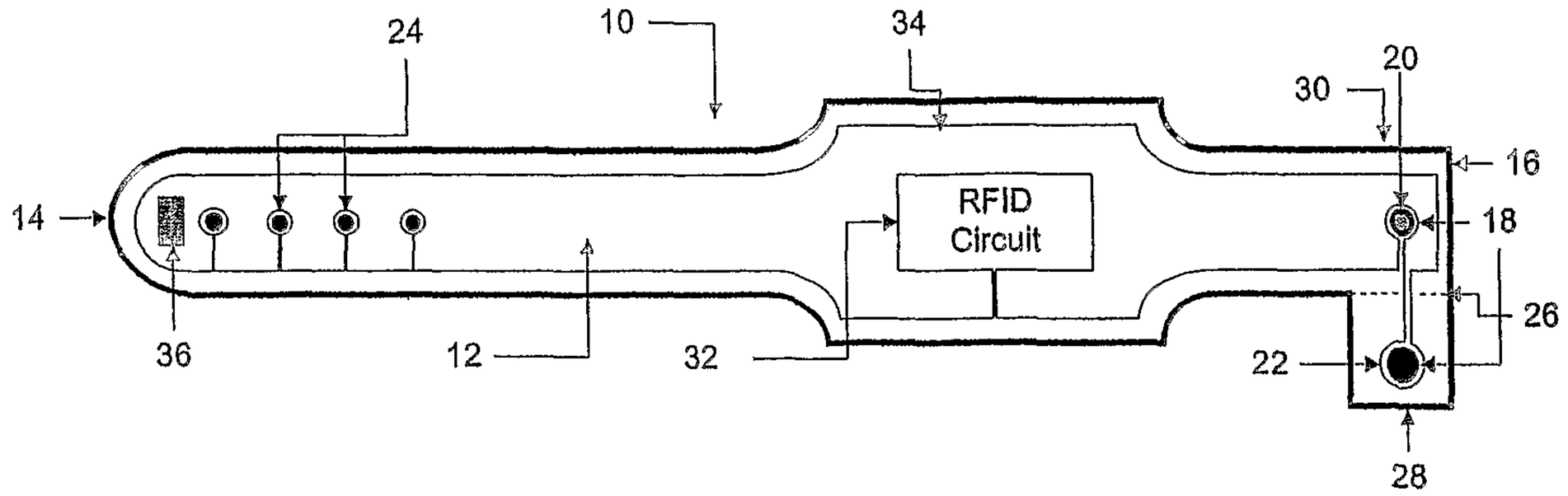
(54) Titre : DISPOSITIF D'IDENTIFICATION A USAGE UNIQUE
(54) Title: NON-REUSABLE IDENTIFICATION DEVICE



(57) Abrégé/Abstract:
An identification device has a band and a non-reusable tamper-resistant fastening arranged to join opposite end regions of the band to fasten it around a limb of a user. A transponder circuit is attached to the band, and is responsive to a received wireless signal. In response to the received wireless signal, the transponder emits a wireless signal representative of information pre-stored in the transponder. An electrically conductive continuous loop on the band extends from the transponder and forms an electrically continuous path along substantially the entire length of the band, the loop being frangible and easily broken in response to an attempt to remove the band from the wearer~s limb. Circuitry in the transponder is electrically connected to the loop and arranged to become inoperative and disable to the transponder if the loop is broken.

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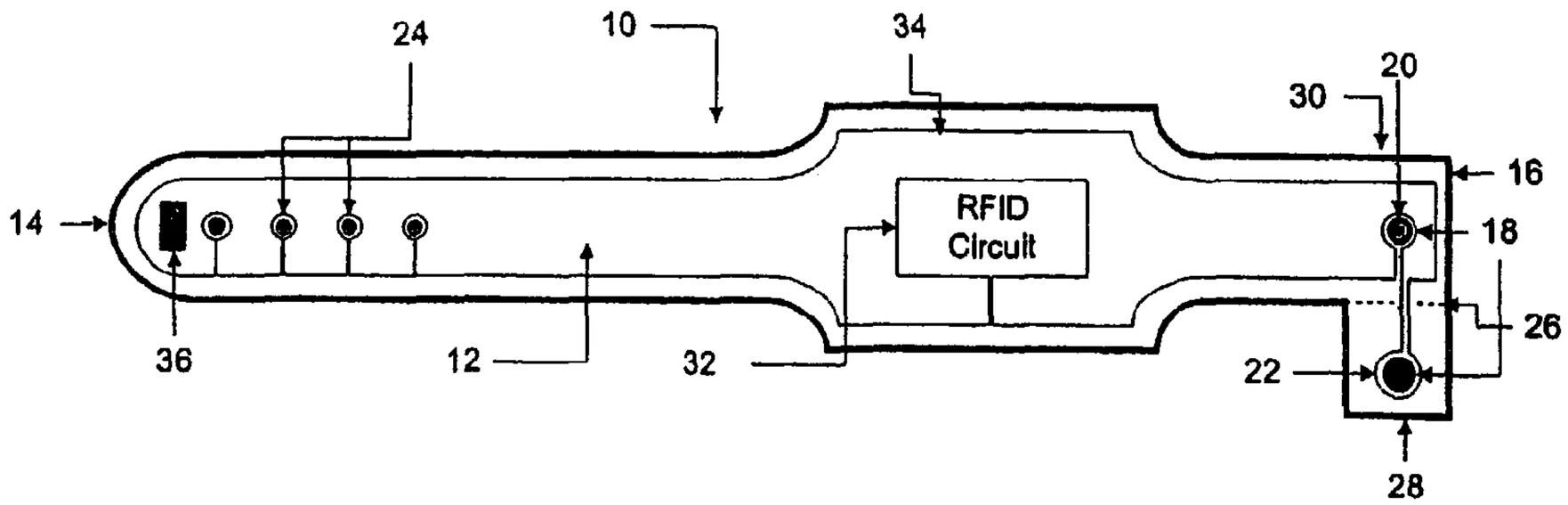
(54) Title: NON-REUSABLE IDENTIFICATION DEVICE



(57) Abstract: An identification device has a band and a non-reusable tamper-resistant fastening arranged to join opposite end regions of the band to fasten it around a limb of a user. A transponder circuit is attached to the band, and is responsive to a received wireless signal. In response to the received wireless signal, the transponder emits a wireless signal representative of information pre-stored in the transponder. An electrically conductive continuous loop on the band extends from the transponder and forms an electrically continuous path along substantially the entire length of the band, the loop being frangible and easily broken in response to an attempt to remove the band from the wearer's limb. Circuitry in the transponder is electrically connected to the loop and arranged to become inoperative and disable to the transponder if the loop is broken.

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NON-REUSABLE IDENTIFICATION DEVICE

FIELD OF THE INVENTION

The present invention deals with a non-reusable identification device for attachment to a body part or to an article of apparel of a wearer and that prevents the wearer from being able to re-use the device once it has been separated from the body part or article of apparel.

BACKGROUND OF THE INVENTION

Disposable bracelets have been used for such things as identification, purchasing goods, and age verification for a number of years. For example, disposable radio-frequency identification (RFID) bracelets are used in water parks and theme parks to quickly and uniquely identify patrons. Unique identification of patrons can be used to control access to restricted areas or limit access to certain rides or attractions. For example, a patron of legal drinking age could purchase a bracelet that indicates that the patron is of legal age and grants the patron access to restricted areas such as beer sales areas. RFID bracelets issued to minors would lack the identification codes that would permit their wearers from gaining access to such areas. As another example, children under a certain age could be issued bracelets with codes that prevent them from gaining access to rides or amusements that are unsafe or otherwise inappropriate for young children. Such bracelets can also be used to locate the wearer, so that lost children can be easily located or so children can be prevented from leaving the amusement park unless accompanied by an authorized adult.

RFID bracelets can be used to allow the purchase of items without the exchange of currency or need for a credit/debit card, or to allow secure communication and monetary exchange among patrons (for example, a parent may authorize credit of funds to a child to allow a purchase up to a preselected amount). Upon entering a park or other venue, a patron can request that the bracelet issued to the patron or the patron's family members be credited for purchases up to a preselected amount. Purchases up to the preselected amount can then be made using the bracelet instead of using cash or credit/debit cards. The bracelet could also be coded so that a wearer would be prevented from making certain purchases, or from making a single purchase above a chosen limit, so that children, for example, are encouraged to spend their allotted funds wisely.

Bracelets of the type described are most often made to be disposable, so that they are inexpensive to produce and easy to use. However, such bracelets are susceptible to misuse and unauthorized use. Some bracelets are easy to remove, yet still function after removal. A bracelet that still functions after it has been removed provides the opportunity for patrons to exchange bracelets. This could provide patrons with the opportunity to give access to a restricted area to an unauthorized patron. A patron with an "adult" bracelet that would allow access to beer sales, for example, could remove and give or sell that bracelet to a patron not of legal drinking age. As another example, a thoughtlessly discarded bracelet that still has funds credited to it could be retrieved and used by an unauthorized individual to purchase goods or services using someone else's account. A bracelet that is rendered non-functional after removal would destroy its value for transfer to another patron, and would safeguard against unauthorized use of bracelets.

A number of mechanical measures have been taken to prevent such bracelets from being transferred. Most prominent are the single-use locking button mechanism found on some plastic bracelets. An example of this approach is found in U.S. patent 5,973,600. Also known are adhesive locking mechanisms with slits that prevent the wearer from peeling the adhesive back and reattaching it. An example of that approach is found in U.S. patent 6,474,557. Those mechanisms render tampering with the locking device obvious to a visual inspection of the bracelet and, in most cases, render the bracelet unwearable after removal. However, tampering with the band portion of the bracelet is not prevented by those mechanisms, nor is the bracelet rendered otherwise inoperative if those mechanisms are tampered with. It is possible for the bracelet to be cut or torn, and reattached with a simple piece of transparent tape. To detect this sort of tampering, the person checking the bracelet would need to either make a full visual inspection of the bracelet or tug very firmly on the bracelet. This is slow, inconvenient, and impractical, especially when large numbers of people require identification. Furthermore, such a visual inspection is subject to human error, the most obvious being the failure of the bracelet checker to perform adequate inspection.

To enhance the capabilities of these bracelets, additional technologies such as bar codes and RFID have been integrated into the bracelets. The use of such technologies has made the process of identifying the bracelet wearer faster and more secure, resulting in an increased use of bracelets for identification purposes and for facilitating transactions. However, this can lead to complacency among those responsible for checking the bracelets,

and has a tendency to reduce the likelihood that the person checking the bracelet wearer will perform an adequate visual or physical inspection. To date, disposable wristbands with added identification technologies have depended upon the previously described mechanical restrictions for transferability.

Special electronic bracelets that prevent transferability for ensuring that hospital patients or prisoners remain within a given proximity of their quarters are known. However, such designs are prohibitively bulky, expensive, and overly complex for use in high-volume applications with short-term use. For example, U.S. patents 5,471,197 and 5,374,921 disclose the use of fiber optics to ensure that the bracelet is not removed. U.S. patent 6,144,303 describes a capacitive coupling between the bracelet and the wearer's skin. When the capacitance changes, indicating bracelet removal, an alarm is tripped. The methods and devices disclosed in those patents are unnecessarily complex and prohibitively expensive for disposable use.

U.S. patents 4,973,944 and 4,980,671 describe bracelets with DC current paths that run around the bracelet and form a closed circuit when the ends of the bracelet are brought together. This method involves complications when one attempts to use it with conventional disposable bracelet designs because it requires a large metal contact area to enable size adjustment of the bracelet. It also does not necessarily solve the problem of tampering because such bracelets are designed to activate an alarm when removed, not necessarily to prevent reattachment. The metal to metal contact surfaces could be easily reattached on a limb of a different user.

SUMMARY OF THE INVENTION

The present invention encompasses an identification device comprising a band and a non-reusable tamper-resistant fastening arranged to join opposite end regions of the band to fasten it around a limb of a user. A transponder circuit is attached to the band, and is responsive to a received wireless signal. In response to the received wireless signal, the transponder emits a wireless signal representative of information pre-stored in the transponder. An electrically conductive continuous loop on the band extends from the transponder and forms an electrically continuous path along substantially the entire length of the band, the loop being frangible and easily broken in response to an attempt to remove the

band from the wearer's limb. Circuitry in the transponder is electrically connected to the loop and arranged to become inoperative and disable the transponder if the loop is broken.

For ease of description, the invention will be described in terms of an RFID bracelet, but it should be understood that the device of the present invention is not limited to RFID or to a bracelet but extends to any device that can be attached to a limb or other body part of a wearer, or to an article of clothing and may include a necklace, an anklet, a belt, or the like.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a schematic representation of one embodiment of the present invention.

FIG. 2 is a schematic representation of another embodiment of the present invention.

FIG. 2A is an enlarged sectional view taken along line A-A of FIG. 2

FIG. 3 is a schematic representation of a transponder circuit for use in the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings in detail, wherein like numerals indicate like elements throughout, there is shown in FIG. 1 one embodiment of the present invention. The invention comprises a bracelet 10 in the form of elongated band 12 with opposite ends 14, 16 that can be brought together and fastened to form a closed loop. Bracelet 10 comprises a mechanical non-reusable tamper-resistant locking mechanism 18 to fasten the opposite ends 14, 16 together and to prevent the user from attempting to open the locking mechanism 18 to remove the bracelet 10 without rendering those tampering efforts visually obvious. Locking mechanism 18 comprises a barbed peg 20 and a locking hole 22 in flap 28 at one end of said band and at least one adjustment opening or adjustment hole 24 at the opposite end of said band. Adjustment holes 24 can be used to adjust the bracelet 10 to conform to body parts of different circumferences. When ends 14, 16 are brought together, the barbed peg 20 is arranged to pass through a selected hole 24 as required for a snug fit. The flap 28 is then folded along imaginary line 26 and barbed peg 20 is then passed through locking hole 22. Peg 20 is shaped to resist removal from said hole 22 without also destroying the locking mechanism 18 and rendering it incapable of being refastened. Alternatively, or in addition, adjustment holes 24 can be designed to replace or supplement locking hole 22 by configuring them in such a way that attempts to remove the bracelet from the barbed peg 20 would also

destroy the hole 24, thereby disabling the bracelet and rendering it incapable of being refastened.

Bracelet 10 also includes a transponder 32. Transponder 32 contains circuitry that responds to an RF interrogation signal and in response emits an RF signal representative of information pre-stored or pre-programmed into the transponder. For example, the information could include the date the bracelet is issued, the date the bracelet expires and will not longer be usable for access, the age status of the wearer, and whether the bracelet can be used for purchasing goods or services. Any other desired information, depending on the context in which the bracelet is to be used, may be pre-stored or pre-programmed in the transponder. The signal may also be used to access information stored in a database

The transponder 32 is electrically connected to and derives power, in known fashion, from a loop antenna in the form of a continuous electrically conductive loop 34 that extends from the transponder and forms an electrically conductive continuous path along substantially the entire length of the band 12 of bracelet 10. Consideration should be given to the distance between the sections of the loop antenna that form loop 34 in order to minimize inductance that can lead to possible interference with the operation of the circuit. Loop 34 is preferably, but not necessarily, made from printed conductive ink that is robust enough to withstand normal handling but fragile enough that it will be broken if a user attempts to remove the bracelet. Alternatively, loop 34 may be a thin wire such as copper wire, a thin foil, or other suitable electrically conductive material that will form an electrically continuous path but will break as a result of tampering. Forming loop 34 with frangible zones, where stresses from tampering attempts are most likely to occur, may facilitate breakage of the conductor. Of course, if the user attempts to remove the bracelet 10 with a cutting implement, the conductor forming loop 34 will also be severed as band 12 is severed.

It will be appreciated that, if the loop 34 is broken and the continuity of the electrical path defined by loop 34 is broken, transponder 32 will be rendered inoperative and the bracelet 10 rendered unusable. Preferably, although not necessarily, loop 34 runs closely around the barbed peg 20 and the locking hole 22 of locking mechanism 18 and also closely around each adjustment hole 24. This prevents a user from making a small incision in the band 12 near an adjustment hole 24 or near locking mechanism 18, and sliding the barb 20 out of the bracelet 10 without also severing loop 34. Bracelet 10 may also be fitted with an adhesive pad 36 to hold the excess band in a tight loop around the wearer's limb. Although

this is not necessary for the bracelet to function, it is a necessary alternative to cutting and removing the excess bracelet, which is standard practice in many cases.

FIGS. 2 and 2A show an alternative embodiment for a bracelet 38 that uses an adhesive to fasten opposite ends, 40 and 42, of the bracelet together. As in the first embodiment, the bracelet 38 comprises a wire loop 34 that runs all the way along the length of the bracelet 38. However, in this embodiment, the loop 34 runs through an adhesive patch 44 attached to one side of the bracelet 38 at a first end 40. The opposite ends 40, 42 of the band can be brought together in overlapping fashion and joined by pressing the adhesive patch 44 against the other end of the bracelet. The adhesive patch 44 has two different adhesives. A first adhesive 46 is initially in contact with one side of the bracelet 38. A portion of loop 34 is passed between first adhesive 46 and a second adhesive 48, which overlies adhesive 46 and makes contact with the opposite side of bracelet 38 at end 42 when the ends are brought together. Adhesive 46 can be weaker either in formula or in quantity than the adhesive 48 which makes contact with the opposite side of bracelet 38. The strength of the bond between the two adhesives 46 and 48 is selected to be greater than the bond between adhesive 46 and bracelet 38. The different adhesive strengths ensures that upon removal, the adhesive patch originally attached to end 40 of the bracelet 38 will remain attached to end 42 of bracelet 38, but will separate from end 40, thereby severing the portion of the conductor that is contained within the adhesive patch from the rest of conductive loop 34. As with the previously described embodiment, conductor 34 can be provided with frangible areas to facilitate breaking. The adhesive patch 44 can be covered with a non-stick releasable seal 50 until it is time to secure the bracelet 38 to the wearer.

In a variation of this embodiment, the adhesive patch 44 can be made from a single adhesive. In that variation the conductor forming loop 34 must still run through or over the adhesive. The adhesive must necessarily be designed such that it will remain attached to the opposite end of the band 38 when any attempt to peel the band apart is made. That way, attempts to peel apart the adhesive will necessarily cause the conductor to break.

Once the bracelet 38 is attached by overlapping the ends 40, 42 and pressing the adhesive patch against the opposite end of the bracelet, it cannot be removed without breaking the loop 34 and thus disabling the transponder 32. If the user attempts to pull off the bracelet 38, as the user pulls the two ends 40, 42 of the bracelet 38 apart the conductor

forming loop 34 and completing the electrical circuit to transponder 32 will break, rendering the bracelet 38 non-operational.

FIG. 3 shows a modification of a transponder circuit used in the present invention. Transponder chip 32 typically has associated with it a capacitor 56 which acts as a power supply. The modification involves extending a wire 54 that connects capacitor 56 and transponder chip 32 to the beginning of the wire loop 52 so that it runs along the length of the bracelet. This point of connection is ideal for a wire etched RFID antenna because it requires minimum modification of the circuit. This is also an ideal connection point because it requires only one wire to cross over the antenna. Such minimal modification clearly is advantageous because it facilitates manufacture.

In operation, one uses the bracelet in the same manner in which conventional RFID bracelets are used. The bracelet is attached to the wrist or other body part of a user and then, when unique identification is necessary, the user must bring the bracelet within a certain distance of an RFID reader, which transmits a wireless signal. When within that distance, the transponder 32 will be powered by the wireless signal from the RFID reader and, in response, transmit to the RFID reader its own wireless signal representative of the unique information pre-stored or pre-programmed in the transponder. The reader may be linked to a microprocessor having a database of relevant information pertaining to the unique bracelet identification. If the bracelet of the present invention is used in a nightclub setting, for example, the information encoded may include: age to allow access to age-restricted areas, debit account balance for payment of food and drink, and identification of the patron's favorite drink to facilitate placing orders in loud, crowded areas. Another example of an application of the bracelet of the present invention is in a hospital setting. The RFID reader may be interfaced with a database of hospital records that would not otherwise be readily available. A physician may require, for example, family medical history records or a listing of previous medications that may have an influence on the immediate diagnosis. Such information is usually found at a patient's family doctor and is not always readily available. The database may also include a photo of the patient for positive identification and to reduce the possibility of human error.

The present invention may be embodied in other specific forms without departing from the spirit thereof and, accordingly, reference should be made to the appended claims, rather than to the foregoing specification, as indicating the scope of the invention.

AMENDED CLAIMS

[received by the International Bureau on 10 May 2005 (10.05.05);
original claims 1-13 replaced by amended claims 1-142;
remaining claims unchanged]

1. An identification device, comprising:

a band;

a non-reusable tamper-resistant fastening arranged to join opposite end regions of said band to fasten it around a body part of a user;

a transponder circuit attached to said band, the transponder circuit being responsive to a received wireless signal and in response to said received wireless signal emitting a wireless signal representative of information pre-stored in the transponder;

an electrically conductive continuous loop on said band extending from said transponder and forming an electrically continuous path along substantially the entire length of said band, said loop being frangible and easily broken in response to an attempt to remove the band from the wearer's body part; and

circuitry in said transponder electrically connected to said loop and arranged to become inoperative and disable said transponder if said loop is broken.

2. The identification device of claim 1, wherein said non-reusable tamper-resistant fastening is arranged to damage said frangible loop on being unfastened.

3. The identification device of claim 1, wherein said non-reusable tamper-resistant fastening comprises an adhesive patch comprising an adhesive layer overlying a surface layer of the band and a peelable protective layer overlying said adhesive coating, wherein said peelable layer can be removed without damaging said surface layer and wherein said adhesive coating bonds to an opposite end of said band more strongly than said surface layer is bonded to said band.

4. The identification device of claim 1,

wherein said non-reusable tamper-resistant fastening comprises a hole in one end of said band and a barbed peg on the other end of said band, the barbed peg arranged to pass through said hole and lock into a mating hole shaped to resist removal from said hole, and wherein said frangible loop closely encircles said hole.

5. The identification device of claim 4, further comprising a plurality of said holes such that said identification device may be snugly fitted to a wearer's limb by snapping said peg into a selected one of said holes, and wherein said frangible loop closely encircling each of said holes.

6. The identification device of claim 5, further comprising a portion of said frangible loop closely encircling said peg.

7. The identification device of claim 1, wherein said frangible loop runs along the edges of the band.

8. The identification device of claim 1, wherein said frangible loop includes at least one portion arranged to break before remaining portions of the loop.

9. The identification device of claim 1, wherein said non-reusable tamper resistant fastening comprises at least one hole in one end of said band and a barbed peg on the other end of said band, the barbed peg arranged to pass through said at least one hole and is shaped to resist removal from said hole.

10. The identification device of claim 1, wherein said band is a bracelet.

11. The identification device of claim 1, wherein said band is a belt.

12. The identification device of claim 1, wherein said band is an anklet.

13. An identification device, comprising:

a band;

a non-reusable tamper-resistant fastening arranged to join opposite end regions of said band to fasten it an article of apparel of a user;

a transponder circuit attached to said band, the transponder circuit being responsive to a received wireless signal and in response to said received wireless signal emitting a wireless signal representative of information pre-stored in the transponder;

an electrically conductive continuous loop on said band extending from said transponder and forming an electrically continuous path along substantially the entire length of said band, said loop being frangible and easily broken in response to an attempt to remove the band from the user's article of apparel; and

circuitry in said transponder electrically connected to said loop and arranged to become inoperative and disable said transponder if said loop is broken.

14. A device comprising:

a band;

a non-reusable tamper-resistant fastening arranged to fasten said band around a body part of a user;

a transponder circuit attached to said band, the transponder circuit being responsive to a received wireless signal, and in response to said received wireless signal, transmitting a transmitted wireless signal representative of information pre-stored in the transponder circuit;

an antenna, cooperating with said transponder circuit for receiving and transmitting the received and transmitted wireless signals; and

an electrically conductive loop forming an electrically continuous path along substantially the entire length of said band, said electrically conductive loop also providing an electrical connection between said transponder circuit and said antenna such that said transponder circuit is unable to receive the received wireless signal or unable to transmit the transmitted wireless signal if said loop is broken.

15. The device of claim 14, wherein said non-reusable tamper-resistant fastening is arranged to damage said loop upon being unfastened.

16. The device of claim 14, wherein said non-reusable tamper-resistant fastening comprises an adhesive patch comprising an adhesive layer overlying a surface layer of the band and a peelable protective layer overlying said adhesive coating, wherein said peelable layer can be removed without damaging said surface layer and wherein said adhesive coating bonds to a portion of said band more strongly than said surface layer is bonded to said band.

17. The device of claim 14, wherein said non-reusable tamper-resistant fastening comprises an adjustment hole in one portion of said band and a barbed peg on another portion of said band, the barbed peg arranged to be inserted through said adjustment hole and engage a locking hole, said peg being shaped to resist removal from said locking hole.

18. The device of claim 17, further comprising a plurality of adjustment holes disposed along a portion of the band such that said identification device may be snugly fitted to a user's body part by inserting said peg through a selected one of said adjustment holes, and wherein said electrically conductive loop substantially surrounds at least one of said adjustment holes.

19. The device of claim 18, further comprising a portion of said electrically conductive loop substantially surrounding said peg.

20. The device of claim 14, wherein said band has two lengthwise edges along which run respective portions of the electrically conductive loop.

21. The device of claim 20 wherein said band has two additional edges along respective first and second ends thereof, with the electrically conductive loop also running along the first and second respective ends.

22. The device of claim 14, wherein said electrically conductive loop includes at least one portion arranged to break before remaining portions of the loop break.

23. The device of claim 14, wherein said non-reusable tamper resistant fastening comprises at least one hole in one portion of said band and a barbed peg on another portion of said band, the barbed peg arranged to pass through said at least one hole and is shaped to resist removal from said hole.

24. The device of claim 14, wherein said band is selected from a group consisting of a bracelet, a belt, and an anklet.

25. The device of claim 14, wherein said electrically conductive loop is a single conductor having a first section that runs from said transponder to a first end of said band, and a second section directly connected to and electronically continuous with said first section, the second section running from said first end of the band back to said transponder.

26. The device of claim 25, wherein said band has a second end located in a

portion of said band spaced away from said first end, and said loop runs to the second end.

27. The device of claim 26, wherein said electrically conductive loop further runs from said second end back to said transponder.

28. The device of claim 14, wherein said transponder is located in a portion of said band spaced away from said non-reusable tamper-resistant fastening.

29. The identification device of claim 1 wherein the electrically conductive loop extends out from said transponder along a first edge of the band, and returns back to said transponder along a second edge of said band opposite said first edge.

30. The identification device of claim 1 additionally comprising:

a coiled wire portion disposed adjacent to said transponder circuit and cooperating therewith to emit and receive wireless signals.

31. The identification device of claim 1 wherein said transponder circuit further comprises an integrated circuit.

32. The device of claim 14 wherein the electrically conductive loop extends out from said transponder circuit along a first edge of the band, and returns back to said transponder circuit along a second edge of said band opposite said first edge.

33. The device of claim 14 additionally comprising:

a coiled wire portion disposed adjacent to said transponder circuit and cooperating therewith to emit and receive wireless signals.

AMENDED SHEET (ARTICLE 19)

34. The device of claim 14 wherein said transponder circuit further comprises an integrated circuit.

35. An identification device comprising:

a band of material;

an antenna located on said band;

a transponder chip located on said band; and

an electrically conductive extension wire located on said band, through which current must flow for the transponder chip to transmit a signal, said electrically conductive extension wire also arranged with respect to said antenna and said transponder chip such that current must flow through said electrically conductive extension wire in order for current to flow through at least one of said antenna and said transponder chip, and such that a break in said band prevents current from flowing through said electrically conductive extension wire.

36. The identification device of claim 35, wherein said electrically conductive extension wire includes at least one portion arranged to break before remaining portions of the electrically conductive extension wire break.

37. The identification device of claim 35, wherein said band is selected from a group consisting of a bracelet, a belt, and an anklet.

38. The identification device of claim 35, wherein said electrically conductive extension wire is a single conductor that runs from said transponder chip to a first end of said band, and from said first end of said band back to said transponder chip.

39. The identification device of claim 38, wherein said band has a second end

located in a portion of said band spaced away from said first end, and said electrically conductive extension wire runs to the second end.

40. The identification device of claim 39, wherein said electrically conductive extension wire further runs from said second end back to said transponder chip.

41. The identification device of claim 35 wherein said electrically conductive extension wire extends out from said transponder chip along a first edge of the band, and returns back to said transponder chip along a second edge of said band opposite said first edge.

42. The identification device of claim 35 wherein said antenna contains a coiled wire portion.

43. The identification device of claim 35 wherein said transponder chip further comprises an integrated circuit.

44. An identification device, comprising:

a band having a first end region and second end region and a middle region located between said two end regions;

a non-reusable tamper-resistant fastening arranged to join said first and second end regions of said band to fasten it around a body part of a user;

a transponder circuit attached to said band in said middle region, the transponder circuit being responsive to a received wireless signal and in response to said received wireless signal emitting a wireless signal representative of information pre-stored in the transponder circuit;

an antenna, formed as a coil of conductive material surrounding said transponder circuit, and cooperating with said transponder circuit to receive

and emit wireless signals;

an electrically conductive continuous loop on said band extending from said transponder circuit and said antenna and forming an electrically continuous path along substantially the entire length of said band, running to a point adjacent both said first end of said band and to said second end of said band, said loop being frangible and easily broken in response to an attempt to remove the band from the user's body part;

circuitry in said transponder circuit electrically coupled to said continuous loop and arranged to become inoperative and disable said transponder circuit if said loop is broken; and

wherein said non-reusable tamper-resistant fastening comprises an adjustment hole in one portion of said band and a barbed peg on another portion of said band, the barbed peg arranged to pass through said adjustment hole and lock into a locking hole, the barbed peg shaped to resist removal from said locking hole, and wherein said frangible loop substantially surrounds said adjustment hole.

45. The identification device of claim 44, further comprising a plurality of said adjustment holes such that said identification device may be snugly fitted to the user's body part by inserting said peg into a selected one of said adjustment holes.

46. The identification device of claim 45, further comprising a portion of said frangible loop substantially surrounding said peg.

47. An identification device, comprising:

a band;

a non-reusable tamper-resistant fastening arranged to join opposite end regions of said band around a body part of a user, the fastening further

comprising a barbed peg and a locking hole located on one end of said band, and an adjustment hole located in another portion of said band, the barbed peg arranged to be inserted through said adjustment hole and engage said locking hole;

a transponder circuit attached to said band, the transponder circuit being responsive to a received wireless signal and in response to said received wireless signal emitting a wireless signal representative of information pre-stored in the transponder circuit;

an electrically conductive frangible loop on said, band extending from said transponder circuit and forming an electrically continuous path along substantially the entire length of said band, said loop being easily broken in response to an attempt to remove the band from the wearer's body part, and wherein said loop substantially surrounds said adjustment hole; and

said transponder circuit electrically connected to said loop and arranged to become inoperative and disable said transponder circuit if said loop is broken.

48. The identification device of claim 47 wherein said non-reusable tamper resistant fastening comprises a plurality of adjustment holes spaced along a portion of said band.

49. The identification device of claim 48 wherein said frangible loop substantially surrounds said plurality of adjustment holes.

50. The identification device of claim 47 wherein said frangible loop substantially surrounds said peg.

51. The identification device of claim 47 wherein said frangible loop substantially surrounds said locking hole.

52. A non-reusable identification apparatus comprising:

an attachment, for fastening the identification apparatus to a user;

an identification device, for providing identification information; and

a disabling device, for permanently disabling the identification device after the apparatus is first removed from the user.

53. An apparatus as in claim 52 wherein the attachment further comprises:

a band of material for attaching the identification apparatus to a body part portion of a user.

54. An apparatus as in claim 53 wherein the attachment further comprises:

a band of material having a strip of adhesive on at least one end thereof, the adhesive being used to bond to an opposite end of the band when fastened to the body part of the user.

55. An apparatus as in claim 52 wherein the attachment further comprises:

a band of material having hole formed in one end thereof and a barbed peg on another end thereof, the barbed peg arranged to pass through the hole and lock into a mating hole when attached to the body part of the user.

56. An apparatus as in claim 52 wherein the identification device further comprises:

a strip of material carrying the identification information in printed form.

57. An apparatus as in claim 52 wherein the identification device further comprises:

a transponder circuit arranged to receive a wireless signal, and in

response thereto, to emit a wireless signal representative of the identification information.

58. An apparatus as in claim 54 wherein

at least a portion of the identification device is located adjacent the adhesive material when the identification device is attached to the user, such that when the band is removed from the user by separating the adhesive bond, the identification device is in turn at least partially destroyed.

59. An apparatus as in claim 57 wherein the disabling device further comprises:

a device for causing disablement of the transponder circuit upon removal of the apparatus from the user.

60. An apparatus as in claim 59 wherein the disabling device further comprises:

a device for causing a break in electrical continuity of the components of the transponder circuit.

61. An apparatus as in claim 60 wherein the identification device further comprises:

an electrically conductive loop used as an antenna.

62. An apparatus as in claim 61 wherein the disabling device serves to disconnect the transponder circuit from the antenna upon first removal of the apparatus from the user.

63. An apparatus as in claim 61 wherein the disabling device serves to destroy at least a portion of the antenna.

64. An apparatus as in claim 61 wherein the attachment further comprises a band

of material which is fastened around a body part of a user, and an electrically conductive wire loop is disposed in the band of material.

65. An apparatus as in claim 64 wherein the disabling device causes a break in the wire loop when the band of material is broken.

66. An apparatus as in claim 65 wherein the band of material has one or more holes formed along a length thereof and the electrically conductive wire loop encircles the holes.

67. An apparatus as in claim 57 wherein

the attachment further comprises a band having a strip of adhesive material on at least one end thereof, the adhesive material being used to bond to an opposite end of the band when fastened around a portion of a body part of the user; and

wherein at least a portion of the transponder circuit is located adjacent the adhesive material, such that when the band is removed from the user by separating the adhesive bond, the transponder circuit is at least in part destroyed.

68. A method for operating a non-reusable identification apparatus comprising:

attaching the identification apparatus to a user;

providing identification information as part of the identification apparatus at least when initially attached to the user; and

preventing the apparatus from providing the identification information one the apparatus is first removed from the user.

69. A method as in claim 68 wherein the attaching step further comprises:

attaching a band of material to a body part portion of a user.

70. A method as in claim 69 wherein the attaching step further comprises:

attaching the band of material using a strip of adhesive formed on at least one end thereof, such that the adhesive bonds to an opposite end of the band when fastened to the body part of the user.

71. A method as in claim 68 wherein the attaching step further comprises:

attaching the band of material using hole formed in one end thereof and a barbed peg on another end thereof, the barbed peg passing through the hole and lock into a mating hole.

72. A method as in claim 68 wherein the step pf providing identification information further comprises:

providing a strip of material carrying the identification information in printed form on the apparatus.

73. A method as in claim 68 wherein the step of providing identification information further comprises:

operating a transponder circuit to receive a wireless signal, and in response thereto, to emit a wireless signal representative of the identification information.

74. A method as in claim 69 wherein

at least a portion of the identification device is located adjacent the adhesive material when the identification device is attached to the user, such that when the band is removed from the user by separating the adhesive bond, the identification device is in turn at least partially destroyed.

75. A method as in claim 68 wherein the step of disabling comprises:

disabling of the transponder circuit upon removal of the apparatus

from the user.

76. A method as in claim 75 wherein the step of disabling further comprises:

causing a break in electrical continuity of the components of the transponder circuit.

77. A method as in claim 73 wherein the step of identifying further comprises:

operating an electrically conductive wire loop as an antenna.

78. A method as in claim 77 wherein the disabling step disconnects the transponder circuit from the antenna upon first removal of the apparatus from the user.

79. A method as in claim 77 wherein the disabling step destroys at least a portion of the antenna.

80. A method as in claim 77 wherein the attachment step further comprises fastening a band of material around a body part of a user, wherein the band of material includes an electrically conductive wire loop.

81. A method as in claim 80 wherein the disabling step breaks the wire loop when the band of material is broken.

82. A method as in claim 80 wherein the band of material has one or more holes formed along a length thereof and the electrically conductive wire loop encircles the holes.

83. A method as in claim 73 wherein

the attachment step further comprises fastening a band having a strip

of adhesive material on at least one end thereof to a body part of the user, the adhesive material being used to bond to an opposite end of the band; and

wherein the disabling step is further provided by locating at least a portion of the transponder circuit adjacent the adhesive material, such that when the band is removed from the user by separating the adhesive bond, the transponder circuit is at least in part destroyed.

84. An identification apparatus comprising:

a band of material;

a Radio Frequency Identification (RFID) circuit disposed in the band, the RFID circuit comprising:

an antenna; and

a transponder chip, disposed adjacent to the antenna and cooperating therewith for emitting and receiving a wireless signal; and

an electrically conductive loop directly connected to the antenna, the electrically conductive loop forming an electrically conductive continuous path along substantially the entire length of the band.

85. The apparatus of Claim 84, wherein a non-reusable tamper resistant fastening mechanism is used to join opposite end regions of the apparatus.

86. The apparatus of Claim 85, wherein the non-reusable, tamper resistant fastening mechanism is an adhesive layer.

87. The apparatus of Claim 85, wherein the non-reusable, tamper resistant fastening mechanism comprises a hole formed in at least one end of the band and a barbed peg formed on the other end of the band, with the barbed peg arranged to pass through the hole and lock into a mating hole and shaped to resist removal from the mating hole.

88. The apparatus of Claim 87, wherein the electrically conductive loop closely encircles the holes formed in the band.

89. The apparatus of Claim 87, further comprising a plurality of holes formed in the band such that the band may be adjustably fitted to a wrist by passing the peg through a selected one of the holes.

90. The apparatus of Claim 89, wherein the electrically conductive loop closely encircles each one of the holes.

91. The apparatus of Claim 89, wherein a portion of the electrically conductive loop closely encircles the peg.

92. The apparatus of Claim 84, wherein the electrically conductive loop runs along at least two edges of the band.

93. The apparatus of Claim 89, wherein the electrically conductive loop encircles each of the holes and the peg as a single conductive wire trace.

94. The apparatus of Claim 84, wherein the transponder chip and the antenna are located on the same integrated circuit.

95. The apparatus of Claim 84, wherein the RFID circuit is located on a portion of the band inboard of a respective one of the ends.

96. The apparatus of Claim 95, wherein the electrically conductive loop extends as a continuous wire loop outward along the band to an opposite end thereof.

97. The apparatus of Claim 84, wherein the antenna is formed as a conductive

coil.

98. The apparatus of Claim 97, wherein the conductive coil antenna encircles the transponder chip.

99. The apparatus of Claim 84, wherein the electrically conductive loop is frangible and easily broken.

100. The apparatus of Claim 84, wherein the transponder chip and antenna are located on a different substrate than the electrically conductive continuous path.

101. The apparatus of Claim 84, wherein the connection provided by the electrically conductive loop is a series connection between the transponder chip and the antenna.

102. The apparatus of Claim 84, wherein the electrically conductive loop is frangible and easily broken in response to an attempt to remove the apparatus from a wearer's limb.

103. The apparatus of Claim 84, wherein the transponder chip is arranged to become inoperative and disabled if the electrically conductive loop is broken.

104. An identification apparatus comprising:

a band of material;

a Radio Frequency Identification (RFID) circuit disposed in the band, the RFID circuit comprising:

an antenna; and

a transponder chip, cooperating therewith for emitting and receiving a

wireless signal; and

an electrically conductive loop directly connected to the antenna, the combination of the electrically conductive loop and the antenna spanning substantially the entire length of the band.

105. The apparatus of Claim 104, wherein a non-reusable tamper resistant fastening mechanism is used to join opposite end regions of the apparatus.

106. The apparatus of Claim 105, wherein the non-reusable, tamper resistant fastening mechanism is an adhesive layer.

107. The apparatus of Claim 105, wherein the non-reusable, tamper resistant fastening mechanism comprises a hole formed in at least one end of the band and a barbed peg formed on the other end of the band, with the barbed peg arranged to pass through the hole and lock into a mating hole and shaped to resist removal from the mating hole.

108. The apparatus of Claim 107, wherein the electrically conductive loop closely encircles the holes formed in the band.

109. The apparatus of Claim 107, further comprising a plurality of holes formed in the band such that the band may be adjustably fitted to a wrist by passing the peg through a selected one of the holes.

110. The apparatus of Claim 109, wherein the electrically conductive loop closely encircles each one of the holes.

111. The apparatus of Claim 109, wherein a portion of the electrically conductive loop closely encircles the peg.

112. The apparatus of Claim 104, wherein the electrically conductive loop runs along at least two edges of the band.

113. The apparatus of Claim 109, wherein the electrically conductive loop encircles each of the holes and the peg as a single conductive wire trace.

114. The apparatus of Claim 104, wherein the transponder chip and the antenna are located on the same integrated circuit.

115. The apparatus of Claim 104, wherein the RFID circuit is located on a portion of the band inboard of a respective one of the ends.

116. The apparatus of Claim 115, wherein the electrically conductive loop extends as a continuous wire loop outward along the band to an opposite end thereof.

117. The apparatus of Claim 104, wherein the antenna is formed as a conductive coil.

118. The apparatus of Claim 115, wherein the conductive coil antenna encircles the transponder chip.

119. The apparatus of Claim 104, wherein the electrically conductive loop is frangible and easily broken.

120. The apparatus of Claim 104, wherein the transponder chip and the antenna are located on a different substrate than the conductive loop.

121. The apparatus of Claim 104, wherein the connection provided by the electrically conductive loop is a series connection between the transponder

chip and the antenna.

122. The apparatus of Claim 104, wherein the electrically conductive loop is frangible and easily broken in response to an attempt to remove the apparatus from a wearer's limb.

123. The apparatus of Claim 104, wherein the transponder chip is arranged to become inoperative and disabled conductive if the electrically conductive loop is broken.

124. A wristband mounted identification apparatus comprising:

a Radio Frequency Identification (RFID) circuit comprising:

a transponder chip for receiving and generating signals; and

an antenna;

wherein the apparatus further comprises a continuous conductive path disposed along a length of the wristband, the continuous conductive path serving as an extension of the antenna.

125. The apparatus of Claim 124, wherein the continuous conductive path is an electrically conductive frangible loop.

126. The apparatus of Claim 124, wherein the continuous conductive path extends in a direction away from the antenna.

127. The apparatus of Claim 124, wherein the continuous conductive path extends along substantially the entire length of the wristband.

128. The apparatus of Claim 124, further comprising a non-reusable tamper resistant fastening mechanism for joining opposite end regions of the

wristband.

129. The apparatus of Claim 128, wherein the non-reusable tamper resistant fastening mechanism is an adhesive layer.

130. The apparatus of Claim 128, wherein the non-reusable tamper resistant fastening mechanism comprises a hole formed in at least one end of the wristband and a barbed peg formed on the other end of the wristband, with the barbed peg arranged to pass through the hole and lock into a mating hole and shaped to resist removal from the mating hole.

131. The apparatus of Claim 130, further comprising a plurality of holes formed in the wristband such that the wristband may be adjustably fitted to a wrist by passing the peg through a selected one of the holes.

132. The apparatus of Claim 131, wherein the continuous conductive path closely encircles each one of the holes.

133. The apparatus of Claim 131, wherein a portion of said continuous conductive path closely encircles the peg.

134. The apparatus of Claim 131, wherein the continuous conductive path closely encircles each of the holes and the peg as a single conductive path.

135. The apparatus of Claim 124, wherein the continuous conductive path runs along at least two parallel edges of the wristband.

136. The apparatus of Claim 124, wherein the continuous conductive path runs along an edge region of each of two ends of the wristband.

137. The apparatus of Claim 124, wherein the antenna is located within the transponder chip.

138. The apparatus of Claim 124, wherein the RFID circuit is located on a portion of the wristband inboard of a respective one of the ends.

139. The apparatus of Claim 124, wherein the antenna is formed as a conductive coil.

140. The apparatus of Claim 137, wherein the conductive coil encircles the transponder chip.

141. The apparatus of Claim 124, wherein the transponder chip is electrically connected to the electrically conductive path in such a way as to become inoperative and disable the transponder chip if the continuous conductive path is broken.

142. The apparatus of Claim 124, wherein the antenna and the antenna extension span substantially the entire length of the wristband.

Figure 1

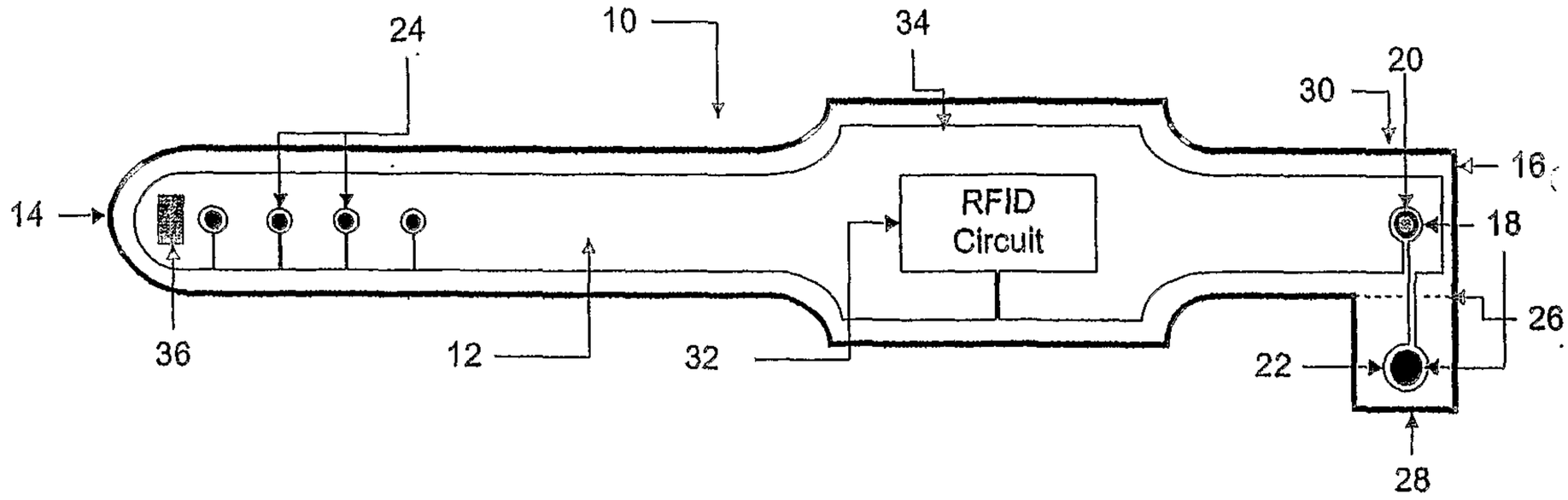


Figure 2

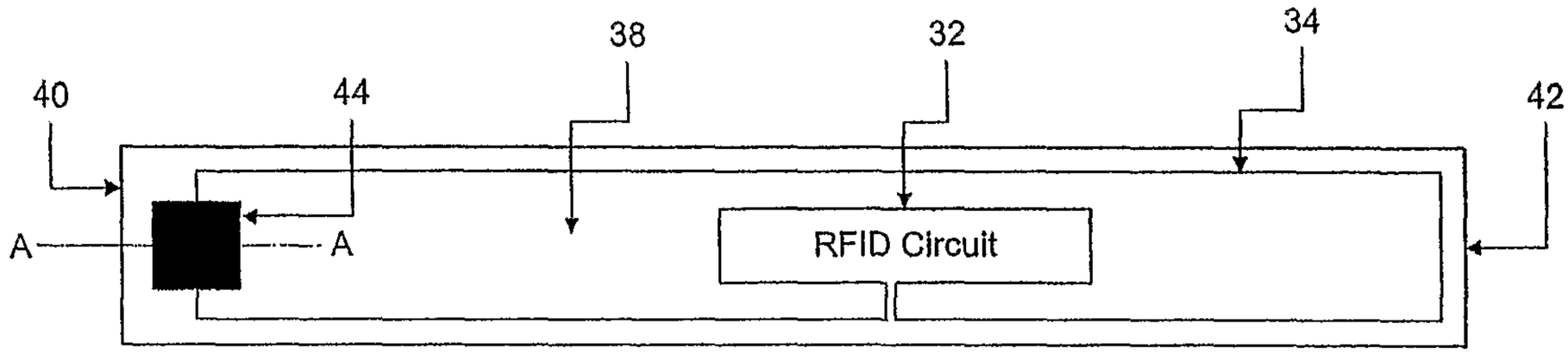


Figure 2A

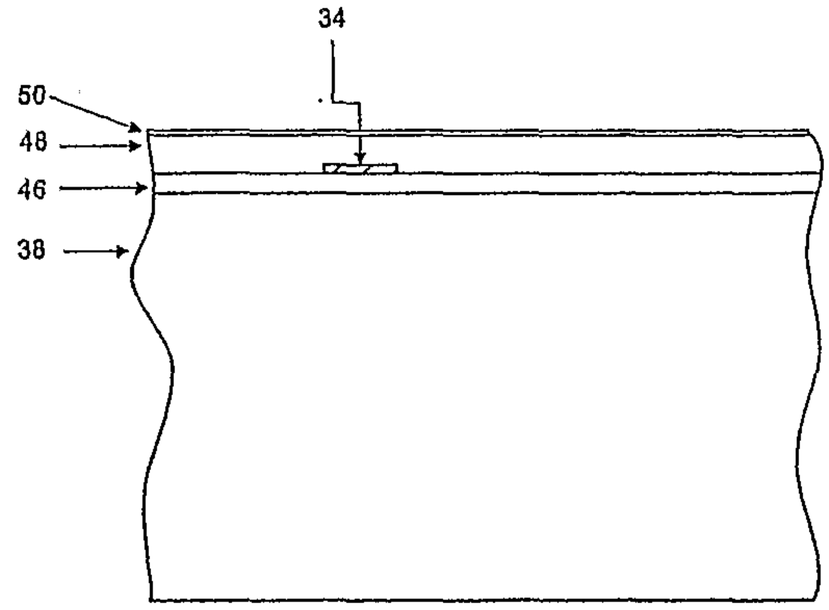
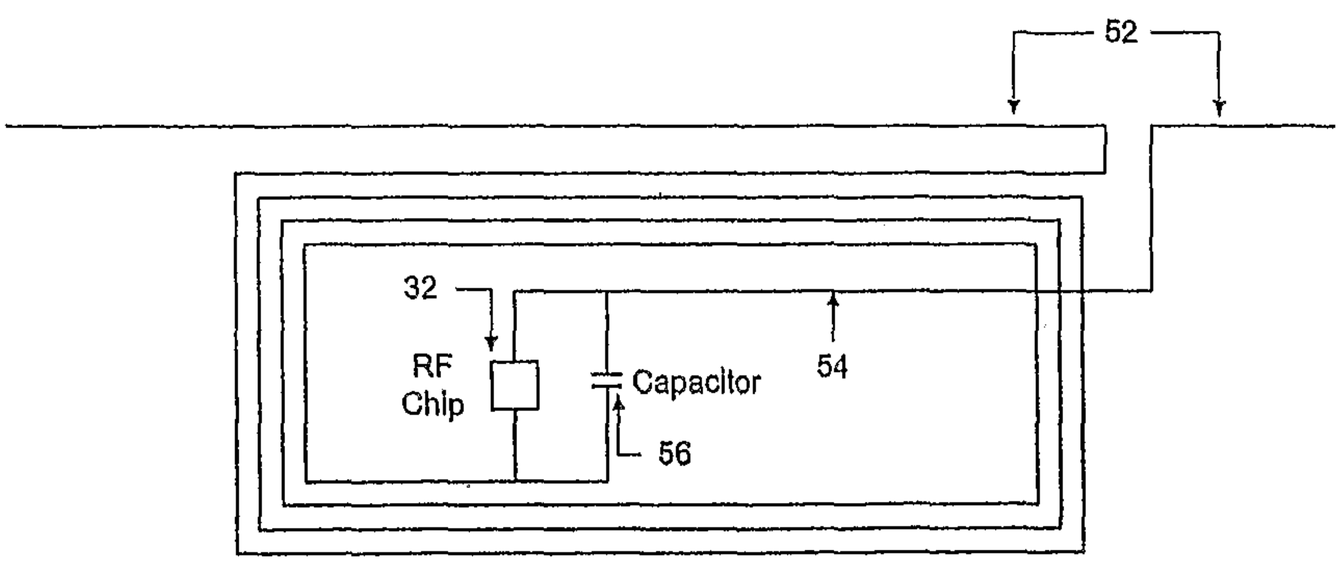
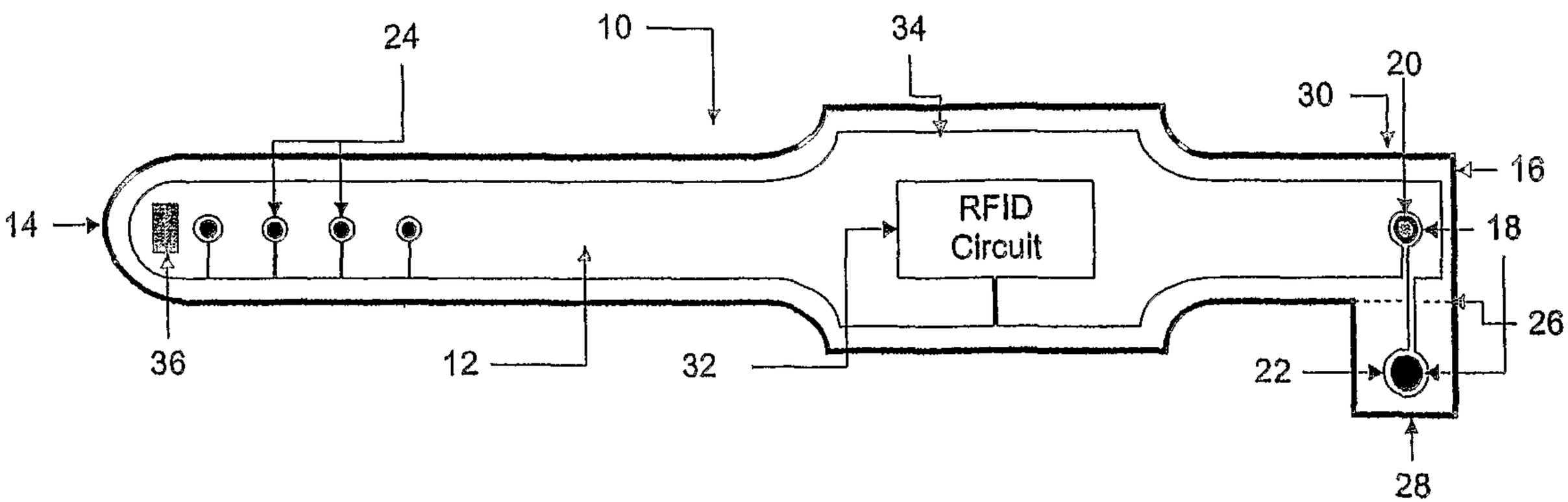


Figure 3

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