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(54) **MAGNETIC REMOVABLE CLOSURE SYSTEM**

ABNEHMBARES MAGNETVERSCHLUSSSYSTEM

SYSTÈME DE FERMETURE MAGNÉTIQUE AMOVIBLE

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Description

TECHNICAL FIELD

[0001] The present invention relates to the Magnetic Removable Closure System and, in particular, to closure/opening system for pieces of clothing (as called above) of all types, including: clothing, underclothing, leather goods, shoes, bags, any accessories and for any other field of application. This system consists of several components which together compose new multipurpose method and improved approach for keeping parts of clothing, underclothing, leather goods, bags, shoes, any accessories and other fields of application closed, arranged, fastened and adjusted.

BACKGROUND ART

[0002] There are several mostly known methods of closure system in the field of clothing, underclothing, leather goods, bags, shoes, accessories, fabric materials and other field of application that permit to keep two or more components together. The best known and widely used are the buttons (classical, automatic or magnetic), snaps, hook-and-eye fastener, clasps, the zipper, hook-and-loop (Velcro), buckles, laces, magnetic bands etc.

[0003] All these closure devices permanently attached to the garment must be mechanically manipulated at the length of opening/closing and may be unacceptable for a wide range of people (permanently and/or temporary physically disabled, blind etc). Additionally, any of these devices create some other inconveniences in application and use (that will be mentioned below) that make them unpractical, uncomfortable and expensive.

[0004] The present state of art creates necessity and need for new innovative closure/opening system which will resolve inconveniences and difficulty for disabled, blind people as well as other categorizes of the people, for example the elderly, pregnant women, children etc, optimizing weight, flexibility, reliability, cost, easy washing, insertion and withdrawal of closure system but will be fashionable, practical, comfortable to use in all other fields of application such as casual clothing, business clothing, evening clothing, as well as professional wear and other.

[0005] The system which represents this invention and will be described in details below is the closure/opening system which meets all these requirements.

[0006] Classical buttons, snaps, hook-and-eye, fasteners, clasps represent traditional closure methods, although create inconveniences for user obliging to re-sew or remove components to change the fit or in case of loss of labeled parts. They also have a disadvantage of leaving a gap or opening between the parts which can cause unpleasant effect in case the person is overweight or undersized. For producers in the field of clothing and in any other fields adjustment and application of these closure devices require additional work and expenses. But

one of the most evident disadvantages of these devices is that its use can be inconvenient and difficult for handicapped people, elderly, pregnant women, children, while they require mechanical manipulation for being closed/opened.

[0007] The zipper and hook-and-loop closure (known also as Velcro™) are intended to avoid some of these problems but they create new inconveniences. So the zipper often causes jamming of fabric and leather parts inside that complicate a lot the closure process. It can not be applied to light fabrics, permit no lateral adjustment, add expense and other inconvenience. The hook-and-loop closure is used to avoid some inconveniences, but is not easily washable while it catches other fabrics and become clogged with lint, wool, hair, dust etc.. It also can damage skin and fabric if it is not aligned perfectly together. Furthermore, all these closing systems are visible, complicate design of the pieces of clothing in which they are hidden and require additional processes during production phase (for example shirts with hidden buttons, jackets with hidden zipper).

[0008] Previously there were several attempts to develop commercially successful magnetic closure devices trying to resolve inconveniences during closing clothing, shoes and any other accessories. More specifically, magnetic coupling devices are known to consist of basically familiar, expected and obvious structural configurations (magnets, polymers etc.) that were incorporated and attached to the items of clothing, underclothing and other field of application. Some of them resolve manipulation problem, but do not resolve other problems described above.

[0009] Known prior devices were described in:

US 6,412,116; US6301754; EP0958750; US7607205; US6954968; WO2000/33328; WO2003/056956; WO2008/025905; US7992264.

[0010] As mentioned, magnetic closure devices have been presented in many forms.

[0011] Almost all of them consist of a structure made of polymeric material which added to the weight of magnets makes it heavy and if they are used in light pieces of clothing changes the structure and wear-ability of the clothing, form a lump in the garment which can be both aesthetically displeasing and cause discomfort for the wearer. But the greatest disadvantage is that all these systems are permanently attached to the piece of clothing to be joined or closed. This requires physical (structural) alteration of the item so as to accommodate the magnetic component(s). As a result the cost and the complexity of manufacturing the item and the magnetic device itself is increased. Every piece of clothing requires each own closure device. Additionally, and very significant, when clothing with such magnetic devices are laundered /dried or ironed they become magnetically attached to the drum of washer/dryer or to iron. This creates many

inconveniences and makes it more difficult to remove them from the washer/dryer and can limit washing or drying efficiency, because of a lack of unrestricted agitation and/or tumbling and efficiency of magnets themselves. Additionally, some of the permanently attached magnetic closure devices are left open to the environment, as a result this approach suffers from the disadvantage that it has essentially no resistance to the effects of the ambient such as moisture.

[0012] US 6,412,116 discloses a two part magnetic closure, wherein flexible strips of magnetic material are inserted into pockets in a garment collar. The magnetic strips may be removed prior to washing of the garment.

[0013] To resolve all these inconveniences and difficulties (mentioned above) that are caused by all known closure systems, aimed to keep two parts of clothing, underclothing, leather goods, shoes, any accessories together, the new closure system, which represents this invention, was developed. The system which securely keeps two or more components (garments) together, does not require physical manipulation (to help handicapped people and benefit the practical use and speed of closing/opening), is flexible, light (do not cause alteration of fabric or other material and can be inserted in a variety of clothing and fashion accessories), is not permanently attached to the piece of clothing (in favor of saving magnetic force and it is possible to clean item(s) in the washer, dry in the dryer and iron them without being magnetically attached to the surface), is invisible and does not create unwanted deformations (creates no limits in regard of styling and aesthetic research allowing the greatest freedom in the shapes and types of clothing, underclothing, leather goods, shoes, bags and any accessories), which has low production and sale cost (in favor of producer and consumer), while the same closure system (once standardized) can be applied to different items, avoiding additional expenses.

DISCLOSURE OF INVENTION

[0014] Closure System relates to all purpose closure system which is particularly designed and intended for use in clothing, underclothing, leather goods, shoes, bags, any accessories and any other field of application. The present closure system permits to join securely different components by attractive action of the magnets.

[0015] One of the principal and essential differences of the universal invisible Magnetic Removable Closure System is that the magnetic component is absolutely flexible, repeats naturally the curve even of light fabric. It is easy to insert and remove the magnetic component that makes the article of clothing, underclothing, leather goods, shoes, any accessories and any other field of application easily washable in the washer, dry-able in the dryer and can be ironed without being magnetically attached to the metal surface. The invention consists of three components which ensure its principle characteristics and make it different from any other known closure

system.

1. Fixed part, composed of at least one pocket incorporated into the article(s) or fixed on the surface of the garment (further called "Pockets" or "Eyelet Pocket"). (As used herein, the term "article" or "garment" shall mean any piece of clothing, underclothing, leather goods, shoes, bags, any accessories and any other field of application where the closure system of the present invention may be used.)

2. Movable part, composed of two or more flexible removable magnetic strips (further called "Magnetic Strips")

3. Magnet or magnetic attractable member (e.g. steel, iron etc., but preferably magnet), which helps to insert, to put in, to slide in the magnetic part or magnetic strip (further called "Magnetic Slider") into the "Pocket" or "Eyelet Pocket".

[0016] The Magnetic Strip is being inserted, by means of said Magnetic Slider into said Pocket fixed on the article or into the Pocket incorporated into the article during manufacturing process; the force of magnetic attraction between said Magnetic strips guarantees secure closing of the article.

[0017] Pocket(s) is a bag- or envelope-like receptacle either fastened to or created into an article of clothing, underclothing, leather goods, shoes, any accessories and any other field of application to hold in a flexible, removable magnetic strip. Pocket(s) can be fixed by bonding, basting, gluing, sealing, but preferably by stitching, sewing, seaming to each of the opposing surfaces of the item. Otherwise, the pocket(s) can be formed out of the internal structure of the article (e.g. fabrics, leather and any other) during manufacturing process, (not separate fabric pockets) by making an opening, hole, eyelet in the inside part of the article to be joined by stitching the fabric layers appropriately.

[0018] Magnetic Strip(s) opportunely inserted into the pockets or into the eyelets secure and ensure quick closure or fastening of the components of the article of clothing, underclothing, leather goods, shoes, any accessories and any other field of application by the attractive force of the magnets.

[0019] Insertion, sliding of the strips into the pockets is ensured by using of **Magnetic Slider**. By positioning the strip at the end/beginning of the pocket placed slightly into the eyelet (hole), the magnetic force of attraction flowing through the material of the pocket allows to the magnetic strip to slide quickly, following the direction of magnetic slider till the required position. The time of magnetic strip insertion might vary from 0,5 sec. and more, depending on the length and experience of the wearer. The opening of the article is ensured by separating, disengaging boards of the garment onto which the pockets are fixed, which have magnetic strips inside.

[0020] The magnetic part (said magnetic strip) can be easily removed out of the pocket of the article of clothing,

underclothing, leather goods, shoes, any accessories and any other field of application to avoid inconveniences of washing, drying, ironing caused by other permanently attached to the item closure devices/systems.

[0021] This system is very practical in use as for disabled people as for any other category of people. It has advantage, that is the magnetic part can be easily inserted and easily removed from the garment. It is very flexible, naturally repeats bending of any material, without causing any aesthetic problem. It is commercially effective in regard to its production and sale cost.

[0022] The system which securely keeps two or more components (garments) together, does not require physical manipulation (to help handicapped people and benefit the practical use and speed of closing/opening), is flexible, light (do not cause alteration of fabric or other material and can be inserted in a variety of clothing and fashion accessories), is not permanently attached to the piece of clothing (in favor of saving magnetic force and it is possible to clean item(s) in the washer, dry in the dryer and iron them without being magnetically attached to the surface), is invisible and does not create unwanted deformations (**creates** no limits in regard of styling and aesthetic research allowing the greatest freedom in the shapes and types of clothing, underclothing, leather goods, shoes, any accessories), which has low production and sale cost (in favor of producer and consumer), while the same closure system (once standardized) can be applied to different items, avoiding additional expenses.

BRIEF DESCRIPTION OF DRAWINGS

[0023] The characteristics and advantages of the invention will become better apparent from the description of the embodiments thereof, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

FIG.1 schematically shows the fixed component(s) of the present invention: Pocket(s).

Fig. 1(a) schematically shows fixation, application, adjustment of the pocket(s) to the next adjacent internal edge of the article or garment (in this example and other ones it is shown a shirt but the present invention can be applied to any other piece of clothing underclothing, leather goods, shoes, any accessories and any other field of application or its different parts).

Fig.1 (b) schematically shows pocket(s), so called, "Eyelet pocket", incorporated into the garment. It can be formed out of the internal structure of the item (e.g. fabrics, leather and any other) during manufacturing process.

Fig. 1(c) schematically shows the board of the piece of clothing.

FIG.2 schematically shows movable components of the present invention: Magnetic Strips which ensure quick closure or fastening of the components of the article of clothing, underclothing, leather goods, shoes, any accessories and any other field of application by the attractive force of the magnets.

Fig.2(a) schematically shows clasp or hook, called Label, which permits to the magnetic strips to find the right position inside of the "Eyelet pocket(s)".

Fig.2(b) is a perspective view of said Magnetic strip inserted into said Pocket and said Label which may be branded and may be made out of magnetically attractive material.

Fig.2(c) is a cross-section view of magnetic attraction between of said Magnetic strips.

FIG.3 schematically shows the object which helps to insert the magnetic strip(s) inside of the pocket(s): Magnetic Slider.

Fig.3(a) shows cross-section view of said Magnetic slider.

Fig.3(b) schematic perspective view of said Magnetic slider inserting said Magnetic strip inside of said "Eyelet pocket" of the garment.

Fig.3(c) schematically shows the way of inserting of said Magnetic strip(s) into said Pocket by means of said Magnetic slider.

Fig.3(d) schematically shows the point in which said Magnetic strip is achieved required position, said Magnetic slider is blocked in the Pocket by means of said Label or clasp which is closed and does not permit other movement of the Magnetic Slider.

Fig.4(a-b), Fig. 5(a-b) and Fig.6(a-b) schematically represent (only by way of non-limitative example in the accompanying drawings) the detailed application of the closure/opening system, respectively, to the shirt, pants and medical coat and its phase of opening/closing.

BEST MODE FOR CARRYING OUT THE INVENTION

[0024] This description represents one of the possible methods of realization of the present invention called Magnetic Removable Closure System, conserving all rights to make changes in order to improve the system without overcoming the area of the invention.

[0025] The invention consists of three components which ensure its principle characteristics and make it different from any other known closure system. This system is very practical in use as for disabled people as for any other category of people. It has advantage, that is the magnetic part can be easily inserted and easily removed from the garment. It is very flexible, naturally repeats

bending of any material, without causing any aesthetic problem. It is commercially effective in regard to its production and sale cost.

[0026] FIG.1 is a schematic view of The Pocket **1**, which can be made out of any light and flexible material, natural (e.g. cotton, wool, silk, rubber); or synthetic (polyester, rayon, other plastics or polymers) and preferably is fabric material **2** (as called furthermore). Two parts of the fabric material are joined together by any of the methods to keep two materials joined (bonding, basting, gluing, sealing, but preferably by stitching, seaming, Sewing **3** (as called furthermore) along the edge of their length. The fabrics of the Pocket can be made of different materials and can be made of a single band of fabrics sewed along its length at one side, or it can be made of two band of the same size sewed at the both sides. The fabrics could be chosen depending on the criteria of lower friction, in order to permit faster insertion of the magnetic strip inside of the pocket by means of magnetic slider. One of the ends or points of said pocket (called Bottom Part) **4**, should be closed, while another end or point, (called Upper Part) **5**, should remain open. The said pocket is empty, as it can be seen from the top view **5a**.

[0027] FIG. 1(a) The said pocket can be applied or adjusted **6**, by means of Sewing to the next adjacent internal edge **7** of the article or garment **8**. As used herein, the term "article" or "garment" shall mean any piece of clothing, underclothing, leather goods, shoes, bags, any accessories and any other field of application where the closure system of the present invention may be used.

[0028] FIG. 1(b) The so called "eyelet pocket" may be incorporated into the garment. The eyelet can be made in the edging side of the board **7a** of the piece of clothing and respectively folded **6a** and fixed on the internal part of the piece of clothing, in the way to create a new board, empty, with the entry hole. This process structurally modifies pieces of clothing and makes them new and different from any other known ones.

[0029] FIG. 1(c) The Piece of clothing with the Eyelet Pocket on the inside part of the board (edge) **9**. And the bigger picture of the small eyelet **9a** on the internal part of the piece of clothing (which can leave intact the external part (or visible part)).

[0030] FIG.2 The Magnetic Strip(s) **10** (as Eyelet Pockets) can be made out of any flexible material, preferably fabric material **11**. Two parts of the fabric material are joined together by any of the methods to keep two materials joined (bonding, basting, gluing, sealing, but preferably by stitching, seaming, Sewing **12** along the edge of their length. The fabrics of any strip could be made of any material and can consist of a single strip of fabrics sewed on one side along the length, or can be made of two strips of the same size, sewed along the length on both sides. The ferromagnetic objects, preferably permanent magnetic material **13**, are positioned, fixed by bonding, basting, gluing, sealing, but preferably by stitching, sewing, seaming inside of the joined layers. The magnets can have any shape but preferably cylindrical. The mag-

net is preferably a permanent magnet, manufactured of a hard/stiff material (e.g. aluminium-nickel-cobalt, strontium, hard ferrite, samarium cobalt and/or neodymium-iron-boron). Permanent magnets are a class of materials that retain their magnetic properties after the applied field has been removed. There are a number of permanent magnet materials, including aluminium-nickel-cobalt (Al-nico), strontium, hard ferrite, samarium cobalt (Sm-Co) and neodymium-iron-boron (Nd-Fe-B or neodymium). Permanent Samarium Cobalt magnets (Sm-Co) are composed of samarium, cobalt and iron. These rare earth magnets are extremely strong for their small size, metallic in appearance and found in simple shapes such as rings, blocks and discs etc.; plastic: magnetized polymers, or new ones which consists of (V(CO)₆TCNE) vanadium tetracyanoethylene, or any other natural or artificial magnets. The magnets can be sintered or polymer-bonded. For purposes of use in the closure system, neodymium magnets are the current preferred embodiment as they are extremely strong for their small size and found in simple shapes. The length (parallelepiped) or diameters (cylindrical) can vary from 5mm till 30 mm per a magnet, the thickness which can vary from 0,5mm till 4 mm per a magnet, weight which vary from 0,2 gr. till 8 gr. per a magnet, the attraction force can vary from 4N till 30N per a magnet; which can be fixed with the remote distance of approx. 2cm till 10 cm to avoid that the magnets of the same magnetic strip will be attracted between them. The magnets of the same strip are positioned in the same magnetic orientation and could be covered by polymeric material in order to avoid oxidation of the magnets if they contact with body liquids and/or water. Each pair of magnetic strips is composed of magnets of the same form and of approx. the same magnetic field strength (it will facilitate the perfect alignment of magnets) which are positioned at the same distance between them to provide perfect alignment of two edging sides of the article to be closed. The magnets within the same strip is oriented in such a way that the polarity of the magnets is substantially uniform relative to the flexible material. In each pair of said magnetic strips, one magnetic strip has magnets with the negative pole, and another one has magnets with the positive pole to generate interaction between them. The magnetic strips, positioned in the following way of FIG.2, generate magnetic attraction between them **14** which insures closing of the closure system.

[0031] Label **15** is applied, preferably by stitching, to one of the ends or points (called upper point) of the said magnetic strip(s). It can be made out of any light and flexible material. It plays a role of the final fastener or clasp. Label permits to said magnetic strip(s) **18** to find the right position inside of said pocket (which is described furthermore at the Fig2(a)).

[0032] The bottom part of said magnetic strip is preferably made in the form of triangle or circle and could contain a thin and rigid plastic element to facilitate sliding of said magnetic strip into said pocket. While this innovative closure system method permits use of light flexible

fabric material for production of said magnetic strip, the closure system, namely its said magnetic strip, is very light (for example the closure system for a shirt has a weight of about 6gr.) and imperceptible, and due to that the form of the garment will not be altered, and the closure system will not cause any lumps. Additionally, use of fabric material makes it more sliding and facilitates its insertion by means of Magnetic slider into said pocket of the garment. This fact differs it a lot from previous closure systems, permanently attached to the garment, which applied mostly polymeric materials, which make them too heavy, uncomfortable and deform the shape of article. To avoid undesirable distortions of the piece of clothing, the difference between thickness of the strip and the pocket/eyelet pocket can vary from 0.5 mm e 20 mm, and the length of the pockets can be adjusted depending on the dimensions of the boards of piece of clothing to be closed. The length of the strips depends on dimensions of the magnets sewed inside of them, but is included in the range of measures from 5mm till 45 mm, and could be standardized depending on the attraction force necessary to close the particular piece of clothing.

[0033] The said magnetic strips can be produced of standard sizes, depending on field of application for example, from 1 cm till 10cm of length for trousers, pants, jeans FIG.5 (each of said magnetic strips can have from 1 till 7 magnets inside); from 20 cm till 40 cm for shirts, jackets etc. FIG.4 (each of said magnetic strips can have from 1 till 13 magnets inside); from 40 cm till 150 cm for closing of professional wear (like gowns, lab coats etc.) FIG.6 (each of said magnetic strip can have from 1 till 23 magnets inside). It will permit to use the same pair of said standardized magnetic strips for different articles of the same type in the field of clothing, underclothing, leather goods, shoes, any accessories etc.. This advantage permits to reduce evidently production costs and sale price for consumers.

[0034] FIG.2(a) Label **15** may be magnetically attractive in the upper part **16**, may bend in the central part **17** and is sewn to magnetic strip in the lower part **20**. The bending has a function of fulcrum during rotation movement **18**, which permits moving forward and back of said Label to said magnetic strip, also by means of attractive action of magnet(s) **19** (shown in phantom) inserted into said magnetic strip. Label **15a** can be open to remove the magnetic strip **10** from the pocket **1**, or may be closed **15a** (eventually onto the magnet **19**) to block the movement of magnetic strip in the pocket, in vertical position (thanks to the gravity force) or longitudinal position (if the closure system is positioned not in the vertical position). Label could be made of any material (synthetic: magnetized polymer, plastic, etc., natural material: fabric material etc., mixed material: fabrics with magnets sewed on it, fabrics covered with magnetized polymer. Label, if it is magnetized, will remain closed on magnet close the strip. Label may be branded **24**, contain names of persons, some specifics and other.

[0035] FIG.2(b) Label serves as a final fastener **21**

which blocks said magnetic strip **10a** (shown in phantom) in the required position, if necessary some empty space **22** can be left in the pocket **1**. This fact also permits to produce the magnetic strips which can be inserted into the pocket(s) or eyelet pocket(s) made in the next adjacent internal edges of the article or garment, of standard sizes and different lengths. The standardization is facilitated by identical positioning of inserted magnets **23** and simplify to recognize the side of insertion (the magnetic pole (for example: Negative) which will be on the same side of the strip (for example, on the side of the Label)). To eliminate undesired twisting of article, the difference of width between said Magnetic strip(s) and said Pocket/Eyelet pocket can vary from 0,5 mm till 200 mm, while the length of said Pocket or said Eyelet Pocket may vary depending on the sizes of the article.

[0036] FIG.2(c) is a cross-section view of said magnetic strip, two layers of fabrics **11a** are joint together, preferably sewn together **12**, with magnets **13** fixed inside. The magnetic attraction **14** between the strips is possible only in case if the strips are positioned correctly (positive attracts negative). That's why it is necessary that every strip has the same orientation of magnets.

[0037] FIG.3 The object which permits simple and fast insertion of said magnetic strip into said pocket, called Magnetic Slider **25**. It consists of a magnet **26** (preferably permanent cylindrical one) or the magnetic attractable member which may comprise any metal material which is magnetically attracted to the magnet (e.g., steel, iron), and/or may also (preferably) comprise a second magnet which has stronger magnetic attraction (shown in phantom) forces of those inserted in said magnetic strip. Magnetic slider can be covered in casing **28** (preferably in polymeric material) and can have a handle **27** which permits simple and practical use. The magnet **26** can be inserted into casing **28** with handle during production process, always in the same direction (the bottom part might have polarity (+) opposite to the polarity (-) of the surface of said magnetic strip on which said Label is being closed. It makes it easier to standardize said magnetic strip and reduce costs of the closure system. Magnetic slider could consist of a magnet which could have magnetic force from 10N till 60N, stronger than the single magnet inserted into the strip. In the upper part it could have a handle which facilitates insertion and in the lower part it could have fabrics to avoid friction between magnet and external part of the pocket (board, eyelet of the piece of clothing).

[0038] FIG.3(a) is a cross-section view of the Magnetic Slider which shows the position of Magnet **26** inside of it, closed with circle component from bottom part, preferably with fabrics or some other sliding material (in order to facilitate sliding on the surface of garment material, which does not permit to the magnet to get out of casing **28**, supplied with handle **27**. The magnet is blocked in thickness **30**, it does not permit any lateral or longitudinal movement of it. (This figure shows one of the possible forms and possible combinations of materials out of

which said Magnetic Slider can be produced.)

[0039] FIG.3(b) The said Magnetic Strip **10a** (shown in phantom) is inserted into said Eyelet pocket **9a** of the garment Fig1(a), The said Label **15** is open and rotation movement **18** is not completed yet. The said Magnetic Slider **25** is put closer to the first magnet inserted into the said Magnetic Strip, which generates strength of magnetic attraction **32**, which goes through the material of garment, permitting to stabilize optimal position and contact between said Magnetic Strip and said Magnetic Slider. Sliding down **31** of said Magnetic Slider will cause sliding of said Magnetic Strip, facilitating it's penetration into said Eyelet pocket. Better sliding of fabrics to fabrics (between said Magnetic Strip and internal part of said Eyelet pocket and between magnetic slider and external part of eyelet pocket) is essential to preserve the quality and duration of use of the garment).

[0040] FIG.3(c) is shown the similar process of Fig.3(b), but the type of the pocket is different. The said Magnetic Strip **10a** (inserted part is shown in phantom) is inserted into the said pocket of the garment Fig 1 (a), the said Label is open and rotation movement **18** is not completed yet. The said Magnetic Slider **25** is put closer to the first magnet inserted into the said Magnetic Strip, which generates strength of magnetic attraction **32**, which goes through the material of garment, permitting to stabilize optimal position and contact between said Magnetic Strip and said Magnetic Slider. Sliding down of said Magnetic Slider will cause sliding in horizontal direction (in this case) **31** of said Magnetic Strip, facilitating it's penetration **31a** into said Eyelet pocket.

[0041] FIG.3(d) When said Magnetic Slider **25** will reach required position (the maximum insertion of said Magnetic Strip **10a** into said pocket **1**), said Label **15** (driven by bending Fig.2(a) **17**), if it is magnetized, will clip and closes (functioning as a clasp or fastener **21**) onto the magnet inserted into said Magnetic Strip), and will block further sliding of said Magnetic Strip even if there is some empty space left in said pocket (like at the Fig.2(b)**22**).

[0042] Magnetic Removable Closure System (two magnetic strips and/or two pockets applied to the piece of garment) for clothing, underclothing, leather goods, shoes, any accessories and for any other field of application is very light, weight varies from 0,8 gr. till 200 gr..

[0043] FIG.4(a-b), 5(a-b), 6(a-b). Only by way of non-limitative example in the accompanying drawings is presented the detailed application of the closure/opening system, respectively, to the shirt, pants and medical coat and its phase of opening/closing. It is presented the Eyelet pocket **9** on which Label **15** (the visible part of the system) is closed and Magnetic strip **10** is inserted into the internal part of the piece of clothing with magnet **13** inside (the invisible part of the system). The system is invisible **33** when garment is fastened and when the garment is opened **35**, just one part of the system **34** (covered with the fabrics of the piece of clothing to which it is applied) remains visible.

[0044] The present invention is susceptible of numerous modifications and variations, all of which are within the scope of the invention as defined by the claims; all the details may furthermore be replaced with other technically equivalent elements. The material, as well as the dimensions, might be adjusted according to requirements.

INDUSTRIAL APPLICABILITY

[0045] The closure system has optimal characteristics of being easy to wear, comfortable, simple in insertion and withdrawal to be laundered, dried and ironed. It creates a different structure of the piece of clothing, but it maintains the original form of the garment which is not altered at all, which make the closure system of the present invention adaptable to any type of styling and to any aesthetic and economical level required by market. It can be used also in shoes and any other field of application. It ensures securely closing of parts of clothing, underclothing, leather goods, shoes, bags, any accessories and for any other field of application (the magnetic force of a single magnet could be till 80 N) in a simpler manner than closure systems known in the state of art. Furthermore, this closure system is commercially valid, while the producer does not need to make buttonholes or sew buttons or other closure devices to the item(s), avoiding costs of manufacturing, while the wearer can use the same Magnetic Strips and Magnetic Slider (once standardized) for different items, avoiding additional expenses.

[0046] Furthermore, the present invention structurally modifies the pieces of clothing to which it is applied, and creates new pieces of clothing which have particularly pocket for insertion of the magnetic part. This fact permits to amplify the number of products known in the actual state of art.

Claims

1. Magnetic Removable Closure System for clothing, underclothing, leather goods, shoes, bags, any accessories and for any other field of application which is flexible and light (weight varies from 0,8 gr. till 200 gr., depending on necessary attractive force), and which consists of three distinct parts (all indispensable):

- Fixed part which consists of at least one Pocket (1) made of flexible material (preferably fabric) fixed by bonding, basting, gluing, sealing, but preferably by stitching, sewing, seaming on each of the opposing boards of the article to be closed/opened, or which consists of at least one Pocket incorporated during manufacturing process into internal opposing boards of the article to be closed/opened.

- Movable part which consists of at least one Magnetic Removable Strip (10) made of flexible material (preferably fabric) inside of which are positioned ferromagnetic objects (preferably cylindrical permanent magnets), one end of the said Magnetic Strip (10) is closed by self-blocking Label which could be magnetized and is made of flexible material (preferably polymer-bonded fabric) which blocks in the right position sliding (insertion) of said Magnetic Strip inside of said Pocket and accelerates removal of said Magnetic Strip from the said Pocket to facilitate laundry, drying and ironing of the article;
 - Magnetic Slider (25) which permits faster sliding (insertion) of said Magnetic Strip (10) into said Pocket (1) which consists of at least one ferromagnetic object (preferably permanent cylindrical magnet) which has stronger magnetic attraction force than magnets inserted in said magnetic strip.
2. Closure system, according to claim 1, which consists of at least one pocket incorporated into internal opposing board (edge, side) of the article by means of different manufacturing process of the board: on one end of the fabric, which is bent over and fixed on the internal part of the article to create an empty board, is made an opening, hole, eyelet aimed to insert said magnetic strip.
 3. Closure system, according to claim 1, which consists of Magnetic Strip made out of two parts of any flexible material, natural (preferably fabric) joined together by bonding, basting, gluing, sealing, but preferably by stitching, sewing, seaming, inside of which are positioned ferromagnetic objects (preferably cylindrical permanent magnets), having the same magnetic orientation.
 4. Closure system, according to claim 1, which consists of at least one Magnetic strip on one end of which is fixed (preferably stitched) Label made of flexible material (preferably polymer-bonded fabric) which has triple function:
 - as a final fastener or clasp which blocks insertion of said Magnetic Strip into said Pocket and stops it at necessary position;
 - as a flap for removal of said Magnetic Strip from said Pocket;
 - label which could have brand, name etc..
 5. Closure system, according to claim 1, which consists of Magnetic Slider, which consists of at least one ferromagnetic object (preferably permanent cylindrical magnet) having stronger magnetic attraction force than magnets inserted in said magnetic strip, and accelerates sliding (insertion) of said Magnetic Strip into said Pocket, said Magnetic slider has a handle and is covered by slippery material (preferably fabric) on the side which will slide onto the article;
 6. Closure system, according to preceding claims, which is being removed from any article of clothing, underclothing, leather goods, shoes, bags, any accessories and for any other field of application, in order to facilitate laundry, drying, ironing and is being inserted again (after cleaning processes) by means of the components of the closure system.
 7. Closure system according to claims 1, 3, 4, 6, wherein the Magnetic Strip is suitable to be produced in standard length sizes :
 - from 1 cm till 15 cm of closure for wristbands, cuffs, pockets, polo, ties, trousers, underclothing, bags, shoes, etc. (each magnetic strip has from 1 till 7 magnets);
 - from 15cm till 40 cm of closure for jackets, vests, new designed sleeves, bags, skirts, shirts Fig. 4 etc. (each magnetic strip has from 2 till 13 magnets);
 - from 40 cm till 150cm of closure for coats, overcoats, dresses, suits, pants, gowns etc. (each magnetic strip has from 3 till 29 magnets);
 8. Articles of clothing underclothing, leather goods, shoes, bags, any accessories and of any other field of application which have said Pocket according to claim 1 incorporated into the article during manufacturing process aimed to insert said Magnetic Strip according to claim 1 by means of said Magnetic Slider according to claim 1.

Patentansprüche

1. Der abnehmbare Magnetverschluss eignet sich um die verschiedene Bekleidungsstücke (Wäsche, Lederwaren, Schuhe, Taschen und sonstige Accessoires) zusammenzuhalten. Der flexible und leichte Verschluss (das Gewicht bewegt sich zwischen 0,8 g und 200 g, je nach dem, wie groß die Anziehungskraft sein soll) besteht aus drei verschiedenen, jedoch essentiellen Teilen:

Das feste Teil besteht aus einer Tasche aus einem flexiblen Material (meistens Gewebe) und wird auf die Kante des Kleidungsstücks, das man schließen/öffnen will angebracht oder wird sie während des Herstellungsphase innerhalb der Kante platziert. Das bewegliche Teil besteht aus einem entfernbaren Magnetstreifen und befindet sich innerhalb eines flexiblen Materials (meistens Gewebe), in dem die Magnete (vorwiegend zylindrische Dauermagnete) unterge-

- bracht sind. Dieser Streifen ist an einem Ende mit einer magnetisierbaren, selbstsperrenden Etikett geschlossen, die aus einem flexiblen Material (vorwiegend einer beschichteten magnetischen Polymergewebe) hergestellt ist. Sie verhindert das Abrutschen des Streifens in die Tasche (Eintreten), hält ihm an einem gewünschten Punkt an und erleichtert das Entfernen des Streifens bei Waschen, Trocknen und Bügeln des Kleidungsstücks.
- Ein magnetischer Einfädler, der das Einführen des Streifens in die Tasche beschleunigt, besteht aus einem Magneten (vorwiegend zylindrischen Dauermagneten) mit einer höheren Anziehungskraft als die des Magnets in dem genannten Streifen. Er ist mit einem Griff ausgestattet und an der Seite, wo er in das Kleidungsstück geschoben werden soll, mit einem gleitenden Material (vorwiegend Gewebe) bedeckt.
2. Das Verschlusssystem, wie im Abschnitt 1 beschrieben, wird in der Kante des Kleidungsstücks untergebracht mit folgender Vorgehensweise:
 - am Rand der gefalteten und im inneren des Kleidungsstücks befestigten Gewebe befindet sich eine Öffnung, ein Knopfloch, um eine Kante zu schaffen, die zum Einführen des Magnetstreifens vorgesehen ist.
 3. Das Verschlusssystem, wie im Abschnitt 1 beschrieben, besteht aus einem Magnetstreifen, die aus zwei Schichten eines flexiblen Materials (vorwiegend Gewebe) hergestellt ist, die miteinander, meistens durch einen Naht, verbunden sind. Innendrin sind die ferromagnetischen Objekte (vorzugsweise zylindrische Dauermagnete), mit gleicher magnetischen Orientierung, positioniert und befestigt.
 4. Das Verschlusssystem, wie im Abschnitt 1 beschrieben, besteht des Weiteren aus einem magnetischen Streifen, die an einer Seite mit einer Etikette aus flexiblem Material (vorwiegend beschichteten magnetischen Polymergewebe) befestigt (meist genäht) ist. Diese hat eine dreifache Funktion:
 - Begrenzungsstopper, der das Abrutschen des Streifens in die Tasche verhindert und ihm auf der gewünschten Höhe blockiert.
 - Lasche, um das Band in die Tasche einzuführen
 - Namensetikette mit verschiedenen Hinweisen
 5. Das Verschlusssystem, wie im Abschnitt 1 beschrieben besteht des Weiteren aus einem magnetischen Einfädler, der ein ferromagnetisches Objekt ist (vorwiegend Dauermagnet). Er erzeugt die Anziehungskraft in dem Streifenmagneten, so dass er in die Tasche abrutschen kann. Der Einfädler ist mit einem beliebigen Material (meist Polymeren) überzogen um das Anfassen zu ermöglichen und an dem unteren Ende (Kontakt Tasche, Band, Kleidungsstück) mit gleitfähigem Stoff beschichtet.
 6. Das Verschlusssystem, wie in vorhergehenden Abschnitten beschrieben, kann von dem Kleidungsstück (Wäsche, Lederwaren, Schuhe, Tasche oder sonstige Accessoires) immer wieder entfernt werden um das Waschen, Trocknen und Bügeln zu erleichtern. Anschließend (nach der Reinigungsphase) wird es wieder eingesetzt durch die Verwendung des magnetischen Einfädler.
 7. Das Verschlusssystem, wie in den Abschnitten 1, 3, 4, 6 beschrieben, hat folgende Standards für den Magnetstreifen:
 - von 1 cm bis 15cm für die Verschlüsse von Manschetten, Taschen, Polohemden, Krawatten, Hosen usw. (Jedes Band ist mit 1 bis 7 Magneten versehen);
 - von 15 cm bis 40 cm für die Verschlüsse von Jacken, Westen, Ärmeln, Röcken, Hemden usw. (Jedes Band ist mit 2 bis 13 Magneten versehen)
 - von 40cm bis 150cm für die Verschlüsse von den Hemden, Jacken, Mänteln, Anzügen, Kleider, Hosen mit geöffneten Beinen, Hemden usw. (Jedes Band ist mit 3 bis 29 Magneten versehen).
 8. Alle Kleidungsstücke (inklusive Wäsche, Lederwaren, Schuhen, Taschen, Accessoires im Allgemeinen sowie beliebige, andere Anwendung) bekommen in der Fertigungsphase eine spezielle Tasche, wie in den Abschnitten 1 beschrieben, um den Magnetstreifen dort einzusetzen.

Revendications

1. Système de fermeture magnétique amovible des pièces de fixation appropriées amovibles des vêtements (y compris les linge, produits en cuir, chaussures, sacs, accessoires en général ainsi que d'autres applications), **caractérisées par** sa souplesse et sa légèreté (le poids varie de 0,8 g à 200 g) et se compose de trois parties distinctes:
 - une partie fixe, composée d'au moins un compartiment, par le biais d'une soudure ou d'un point dans le tissu; les bords de la tête doivent être ouverts / fermés - ou composés d'au moins un de ces «compartiments modifiés» - au cours

- de la production d'un vêtement, le long des bords de ce vêtement;
- une partie mobile composée d'au moins une bande magnétique amovible réalisée avec un matériau flexible (idéalement de tissu) à l'intérieur duquel sont logés les aimants permanents dans une bande cylindrique; Cette bande a une extrémité fermée par un mécanisme magnétique autobloquant, composé d'un matériau flexible (idéalement recouvert d'un tissu de polymère magnétique), qui empêche la bande de glisser à l'intérieur du compartiment modifié et hors du vêtement, ce qui facilite le lavage, le séchage et le repassage du vêtement;
 - Un Curseur Magnétique est utilisé pour accélérer l'insertion de la bande dans le compartiment modifié (qui est composé d'un aimant permanent et de préférence cylindrique) par une force supérieure n'attirant que les aimants utilisés dans lesdites bandes, et est équipé d'une poignée et recouvert d'un matériau souple (idéalement du tissu) du côté où il sera glissé sur la pièce de vêtement;
2. Un système de fermeture, tel que défini ci-dessus, composé d'un compartiment modifié à l'intérieur du bord de la partie supérieure de la pièce de vêtement, par le biais d'un processus de production différente à partir du bord: un trou est obtenu à l'extrémité du tissu, qui est pliée et fixée à l'intérieur de la pièce de vêtement, de façon à créer un bord creux, mais avec une petite ouverture adaptée pour l'insertion d'une bande magnétique;
 3. Un système de fermeture, tel que défini au point 1, comprenant une bande magnétique formée de deux couches de matériau flexible (idéalement du tissu), reliés entre eux par soudage de matériaux ensemble ou par couture, à l'intérieur duquel sont positionnés un ensemble d'objets ferromagnétiques (de préférence des aimants permanents cylindrique) tous avec la même orientation magnétique ;
 4. Un système de fermeture, tel que défini au point 1, composé d'une bande magnétique où une extrémité est maintenue en place (de préférence par coutures) à un label de matériau souple (de préférence en tissu enduit, matériau polymère aimanté) qui a trois fonctions :
 - un «interrupteur fin de course» qui empêcherait l'insertion de la bande dans le compartiment modifié, le bloquant dans la position désirée;
 - un onglet sur le glissement de la bande du compartiment modifié;
 - Indicatif sur lequel apposer une marque, un nom, un spécifique, etc.;
 5. Un système de fermeture, tel que défini au point 1, composé d'un objet fileté ferromagnétique (de préférence un aimant permanent cylindrique) qui générerait une force d'attraction sur les aimants dans la bande, ce qui permet au curseur d'être dans le compartiment. L'enfileur est équipé d'un support de tout matériau (de préférence polymère) qui permettrait d'avoir une poignée et est couvert dans l'extrémité inférieure (extrémité en contact avec la bande du compartiment) de matériau lisse (de préférence en tissu)
 6. Un système de fermeture / ouverture, tel que défini dans les points précédents, serait apte à être retiré de toute pièce de vêtement (y compris le linge, produits en cuir, chaussures, sacs, accessoires en général et toute autre application), pour faciliter le lavage, le séchage et le repassage, et pouvant être réintroduite (après nettoyage) par l'utilisation des mêmes composants du système (aimant fileté)
 7. Un système de fermeture, comme décrit dans les demandes 1, 3, 4 et 6, où la bande magnétique est apte à être produite dans les mesures de longueur standard:
 - de 1 cm à 15cm, adapté pour fixer ensemble les poignets, poches, polos, cravates, pantalons, etc. (Chacun avec 1 à 7 pour simples aimants de bande);
 - de 15cm à 40cm pour la fermeture de vestes, gilets, manchons nouvellement conçus, jupes, chemises, etc. (chacune avec 2 à 13 pour simples aimants de bande);
 - 40cm à 150cm pour les fermetures de manteaux, vestes, manteaux, robes, costumes, pantalons, robes, etc. (chacun avec de 3 à 29 pour simples aimants de bande)
 8. Vêtements (y compris le linge, produits en cuir, chaussures, sacs, accessoires en général et toute autre application), **caractérisés par** un compartiment modifié monté pendant la production des vêtements, comme décrit aux points 1 et 2, qui serait spécifique pour l'insertion de la bande

Fig.1

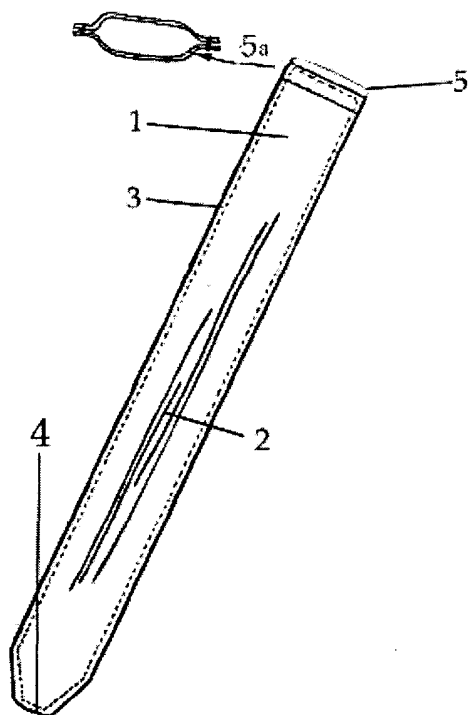


Fig.1(a)

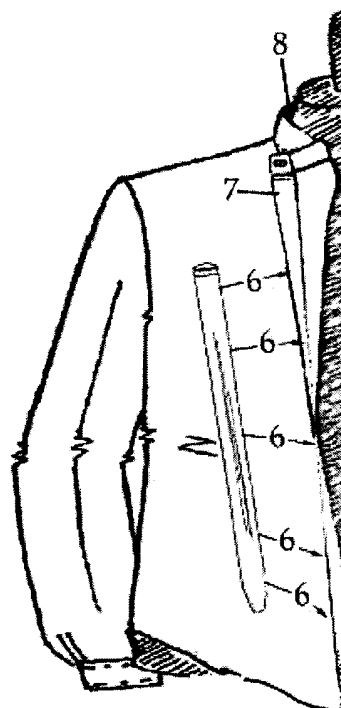


Fig.1(b)

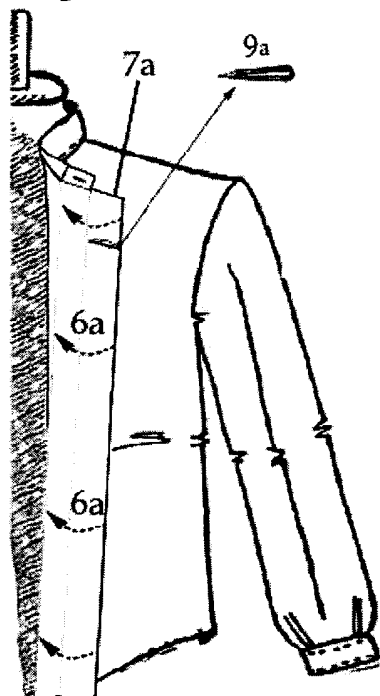
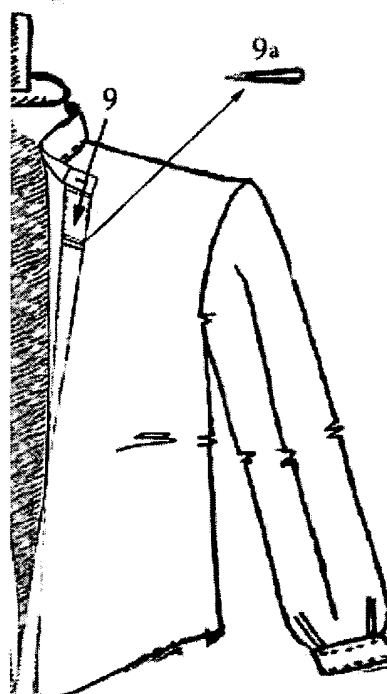
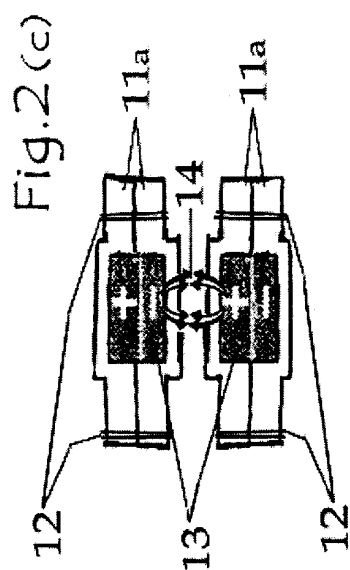
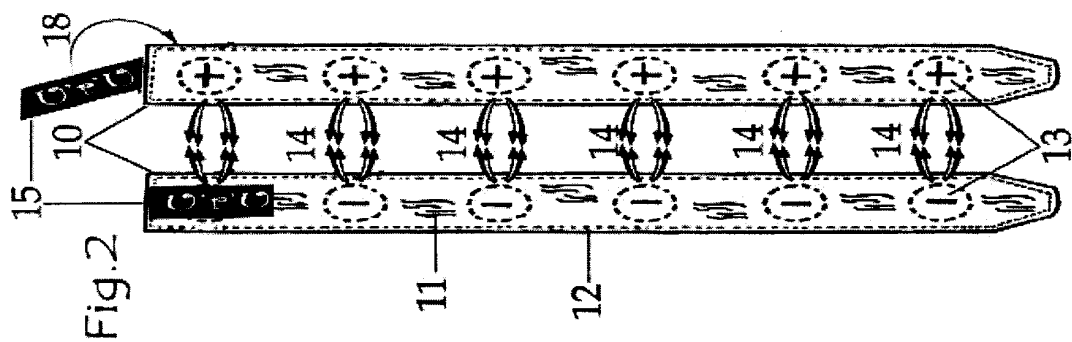
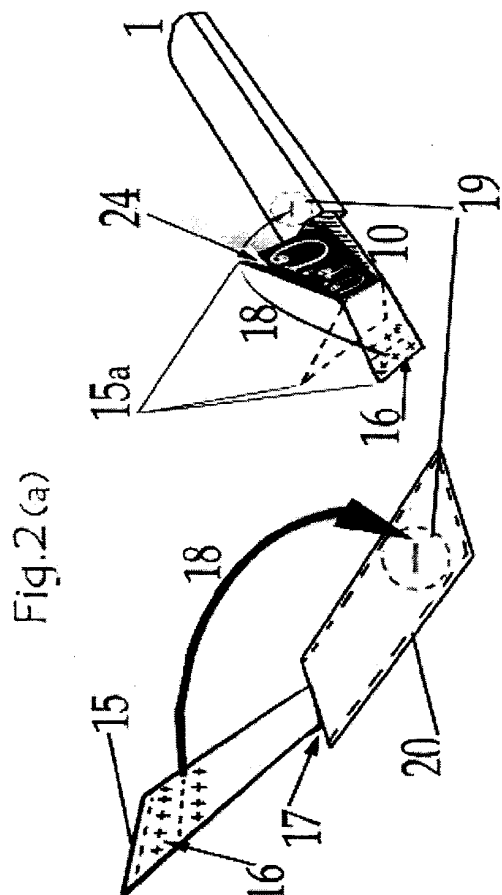
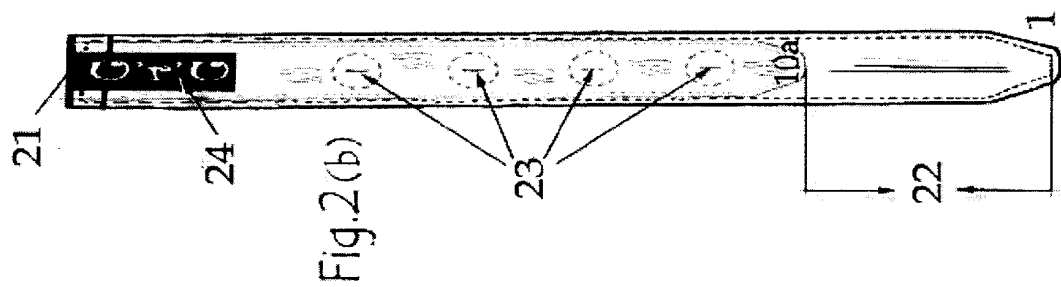


Fig.1(c)





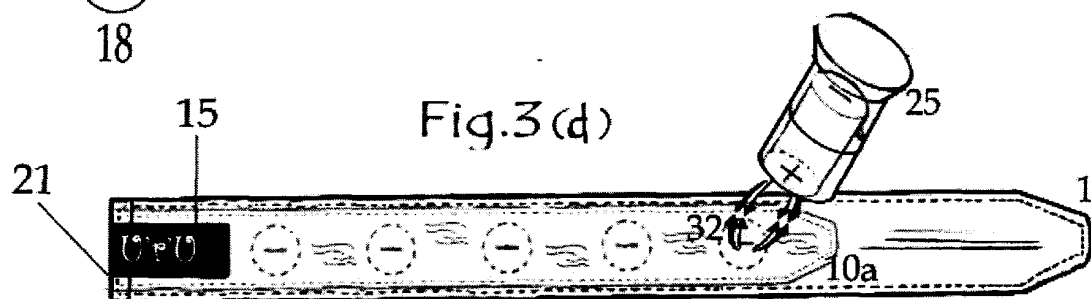
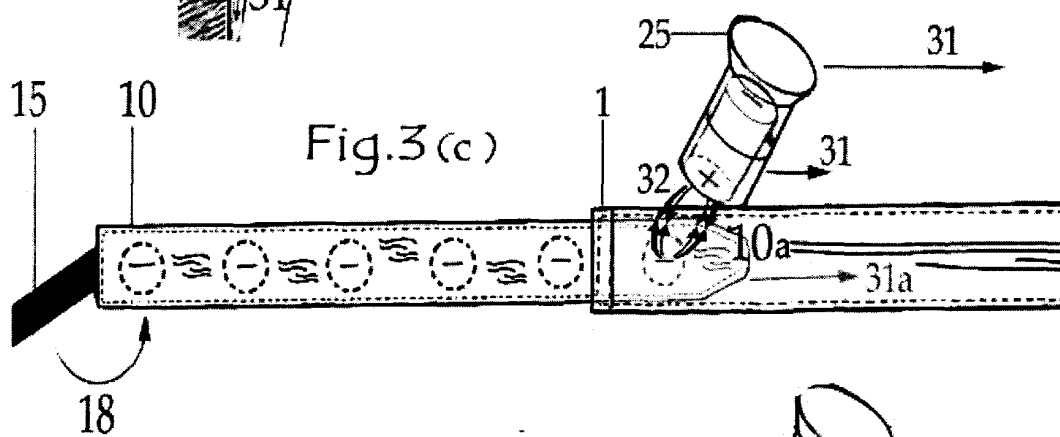
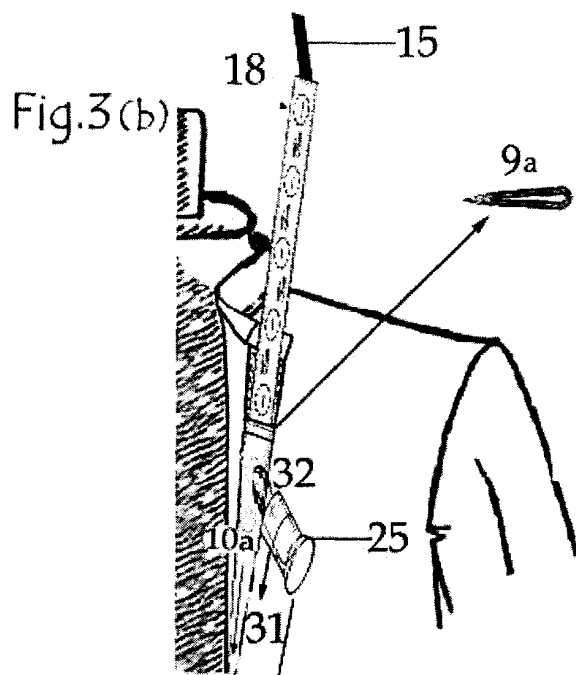
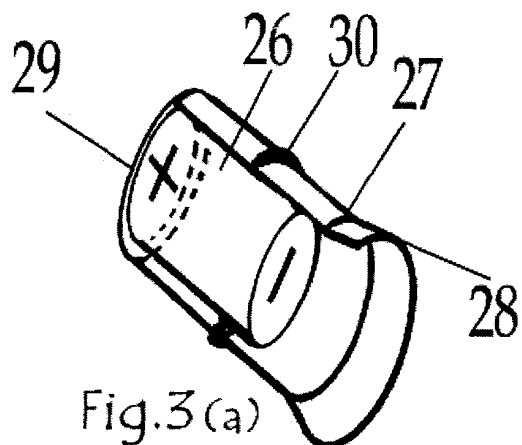
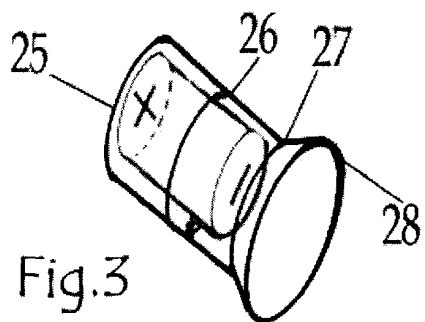


Fig.4

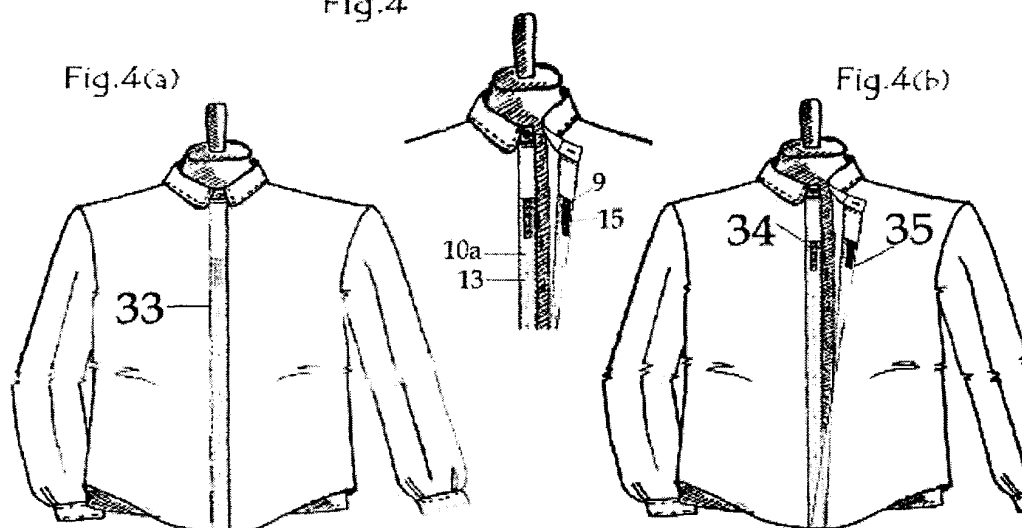
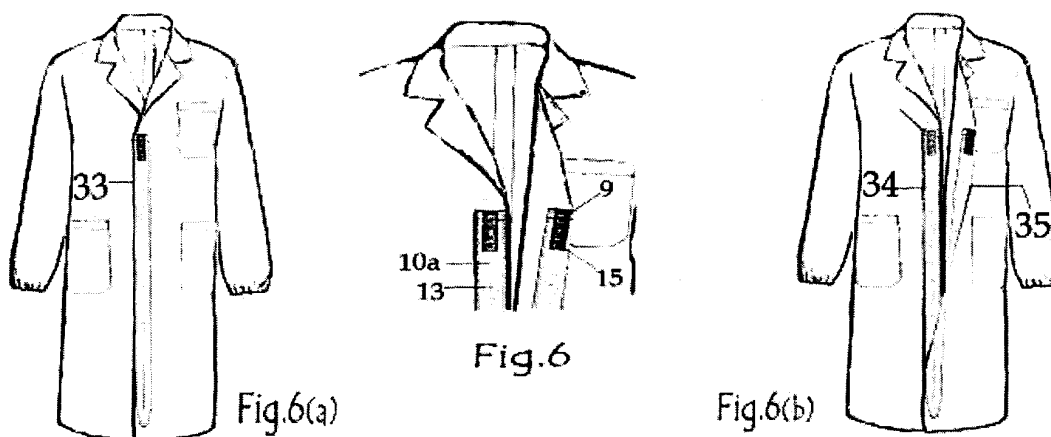
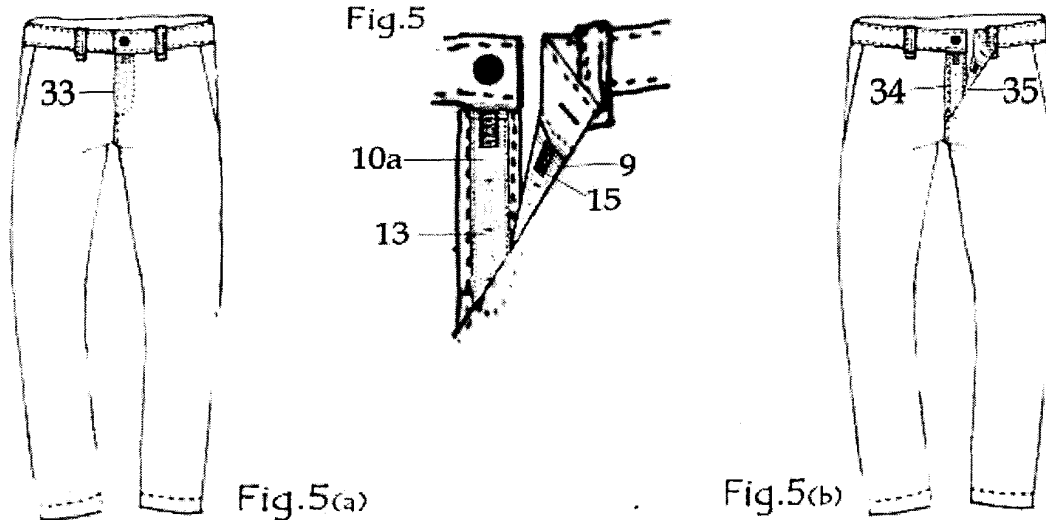


Fig.5



REFERENCES CITED IN THE DESCRIPTION

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