MAGNETIC FASTENING MEANS

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Fig. 1

Fig. 2
MAGNETIC FASTENING MEANS

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ABSTRACT OF THE DISCLOSURE

Improvements are provided in magnetic fasteners of the type used in the place of buttons on garments. The stud pin has a reduced diameter end which fits into a recess in the pin of the socket element, thus providing metal to metal lead-in surfaces and avoiding the inside beveled corner on the ceramic ferrite magnet. The socket pin extends through its magnet resulting in greater resistance to lateral stress and a more nearly continuous metal core for increased magnetic attraction of the fastener parts. The holder shells engage loosely around the magnets to eliminate breakage during assembly.

This invention relates to magnetic fastening means especially useful for garments to be worn by handicapped people. It is an improvement over the fastener disclosed in the pending application of John H. Humiston, S.N. 333,430, filed Mar. 18, 1966, now Patent No. 3,324,521. A still earlier form of magnetic button fasteners is shown in the patent to Brett, 3,141,216.

While the fasteners shown and described in the Humiston application have many desirable features, certain problems have been encountered in their manufacture and use. The annular magnets are made from powdered or granular ceramic ferrite material by a process of compression molding and sintering and it is difficult to obtain a good beveled inner corner around the hole in the magnet, which provided the lead-in surface for the stud pin into the socket. Any burr around such lead-in surface would tend to catch against the stud pin and interfere with putting the fastener elements together. Another problem encountered was breakage of the magnets when the holder shell was being clamped around the magnet and armature assembly.

In the fastener of the present invention the magnets have square inner corners, the pin of the socket element is extended to provide a metal lead-in surface around a central recess in the socket pin, and the stud pin has a projecting end portion of reduced diameter to fit into such recess. Also the holder shells are made to engage loosely around their magnets to prevent breakage while permitting adequate manufacture tolerances.

Other improved results will be hereinafter referred to, or will be apparent from the description of a specific embodiment of the invention shown in the accompanying drawings.

In these drawings:

FIG. 1 is a central vertical section, with parts shown in full, of the male and female fastener elements when separated; and

FIG. 2 is a central vertical section of the same elements fastened together.

The male and female fastener elements generally indicated by the numerals 5 and 6 respectively, are adapted for attachment to overlapping flaps of a garment or the like, by pronged rings (not shown) of the kind commonly used for attaching metal snap fasteners. Each female element has an annular magnet 7 of generally cylindrical shape with an axial hole 8. Against the outer end face 9 of the magnet is mounted an armature 10 of magnetic material such as soft iron or steel. Projecting axially from the disc-shaped base 11 of the armature into the hole 8 of the magnet, is a socket pin 12. This pin preferably extends substantially through the hole 8 to the inner face 13 of the armature base 11 and an inner section 20 of the wall 17 is bent over the beveled outer corner 21 of the magnet. Preferably the inner curved section 20 of the wall 17 is not made to bear against the magnet tightly so that there is a certain amount of looseness to take care of reasonable tolerances without breakage of the magnet.

The construction involving the male fastener elements is generally the same as that which has already been described, and corresponding numerals are used where they apply. The stud pin 22 of the male element, however, is much longer than the pin 12 and projects through and beyond its armature 7. It has a reduced diameter free end portion 23 to co-operate with the inclined lead-in surface 16 of the socket pin, so that when the parts are brought together with the opposed end surfaces 13 and 24 of the magnets of the female and male elements, respectively, somewhat close together, the stud pin will snap into place even though the elements are not in exact alignment. It will be understood that the magnets are so arranged that the ends which come into juxtaposition are of opposite polarities, as indicated by the letters N and S.

It will also be seen in FIG. 2 that the length of the pin 22 combined with the length of pin 12 to the bottom of recess 14 is greater than the combined axial dimension or length of the two magnets so that the end of pin 22 will abut the pin 12. There is left a clearance between the magnets in the closed position so as to insure the coming together of the pins 12 and 22. This is in the area of greatest magnetic flux and produces the greatest holding power when the male fastener elements are engaged. Also the cylindrical wall extending through the magnet of the female element and surrounding the end 23 of the stud pin provides a more nearly continuous core of magnetic material to allow better concentration of the magnetic flux. The pin 22 projecting into the recess provides metal to metal contact to resist transverse stresses.

Joined to the inner wall 17 of the holder shell by the U-bend at the outer edge 18, is the outer wall 25 which flares outwardly and curls over around its outer edge to form the prong-retaining channel 26. The extent in the axial direction of both the inner and outer walls is substantially the same.

To attach each of the fastener elements to a garment flap a prong ring as commonly used in snap fasteners pierces through the garment material and has its prongs clinched in the channel 26.

What I claim is:

1. Magnetic fastening means with male and female fastener elements each of which has (a) a permanent magnet of generally cylindrical shape with an axial hole therethrough each having end surfaces of opposite polarity;
(b) an armature of magnetic material with a disc-shaped base bearing against an end face of the magnet;
(c) a holder shell engaging around the peripheries of said magnet and said base to hold them together;
(d) a stud pin on the armature of said male element projecting axially from the armature base through and a substantial distance beyond its magnet, said
3. Magnetic fastening means as defined in claim 1 wherein said open ended recess has an outward flare at the free end of said socket pin to provide a lead-in surface for said stud pin.

3,372,443

4. Magnetic fastening means as defined in claim 1 wherein each of said magnets consist of ceramic ferrite material and the inside corners around the hole are substantially square.

5. Magnetic fastening means as defined in claim 1 further characterized by a loose fitting of each holder shell against the magnet.

References Cited

UNITED STATES PATENTS

3,141,216 7/1964 Brett.
3,324,521 6/1968 Humiston.

FOREIGN PATENTS

1,111,697 3/1956 France.

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