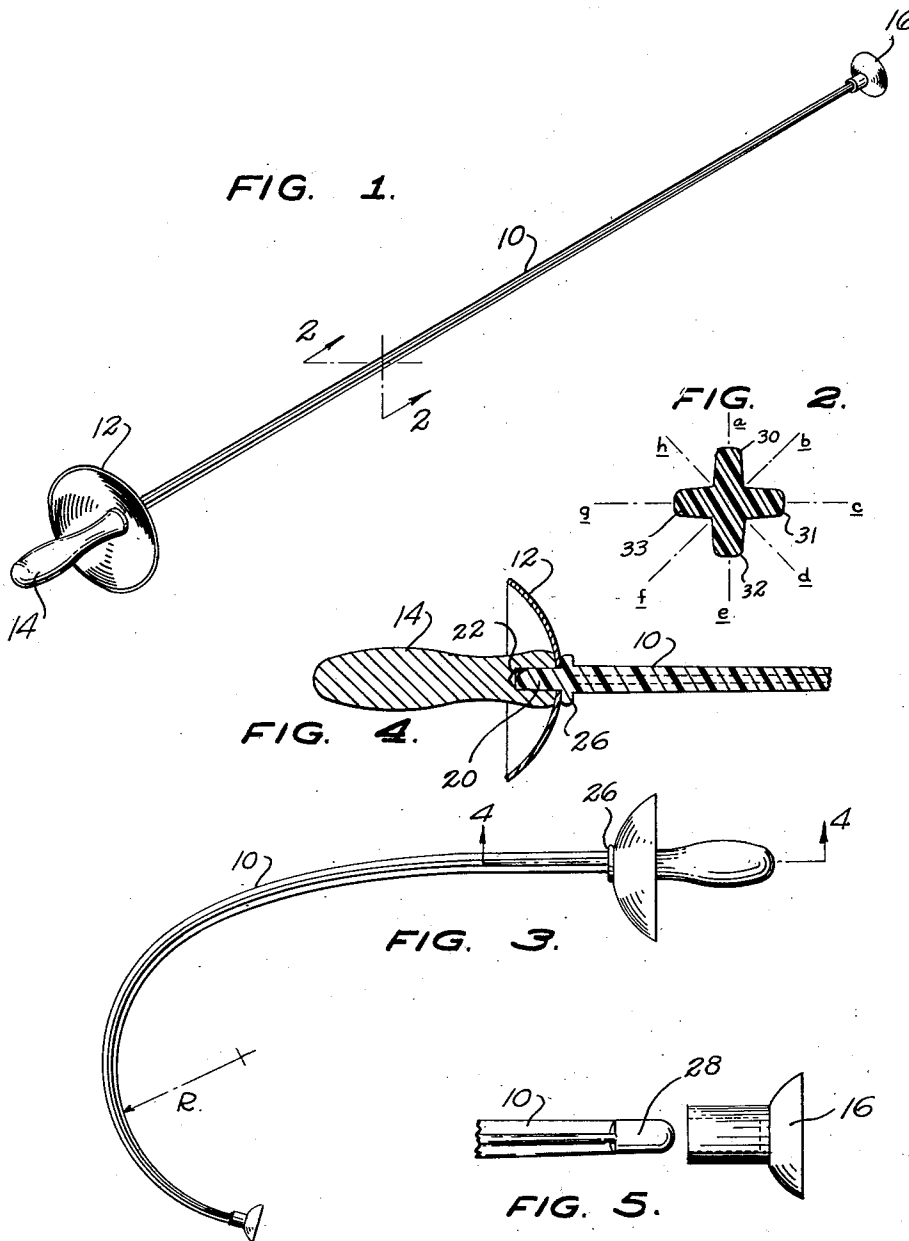


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TOY FENCING FOIL
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TOY FENCING FOIL

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3 Claims. (Cl. 46—1)

This invention relates to toys and more particularly to a toy fencing foil.

It is an object of my invention to provide a fencing foil which will be safe in the hands of a small child so that he may play-act at fencing with another child equipped with a similar foil, without any danger of cutting, scraping, or puncturing.

It is a further object of my invention to provide a fencing foil which will be simple and cheap to manufacture, primarily by a plastic injection molding process.

It is another object of my invention to provide a foil which will have a realistic appearance resembling a steel blade and at the same time be soft and readily bendable so that it will buckle during the course of a thrust under very light pressure.

It is a still further object of my invention to provide a child's toy fencing foil which will have a suitable natural resilience to maintain a close approximation to a genuine foil in the manner in which it reacts to whipping, parrying, and thrust.

It is a very important object of my invention to provide a fencing foil which will readily bend in any plane relative the neutral axis, under column stress, but which will not bend too readily as a cantilever beam.

It is a well known fact that small children are fascinated by the art of dueling and it is a very common sight to see children of very young years engaged in dueling play with sticks and other stiff and sharp implements such as umbrella spokes, canes, etc. There are, of course, various toys on the market in the form of rubber and plastic knives and daggers, cutlasses, etc. with which a child may amuse himself while play-acting at dueling; but none of these implements are particularly satisfactory because they are primarily of miniature size and so short in length that they do not lend themselves to the art of fencing even on the small dimensional scale as it would be practiced by a child. Likewise, there are on the market children's swords of metal and plastic, having a rectangular cross-section; they would be extremely dangerous in the hands of children playing at dueling because of the considerable stiffness of blade construction necessarily effected by such a cross-section.

In view of the fact that children frequently improvise dangerous sword weapons, usually of wood, for the purpose of dueling, and inasmuch as the science and activity of fencing is one which is entirely wholesome and a sport recognized in our colleges, schools and universities, it has occurred to me that a suitable development in the form of a toy foil with which small children could be taught the rudiments of fencing, and yet maintain the highest standards of safety, would be useful and desirable. It was with this thought in mind, and particularly with the objects of the invention as enumerated above as conditions to be met in the creation of a device with which children could actually be taught the rudiments of fencing without the dangers thereof, that this invention was conceived.

I have found that a foil meeting the objects of the

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invention for use by children should be of a somewhat smaller size than an actual foil used in school competition. Thus, a foil some 20" to 22" long is quite suitable for effecting the thrill of fencing, while at the same time maintaining the fencers a suitable distance apart so as to give them some feeling of the rudiments of this sport. I have further found that it is possible to construct a foil of a soft plastic material which can be injection molded.

The difficulty with the use of such a material is the fact that the cross-section must be so large to maintain proper rigidity that the weight and cost would make the device impractical. An added difficulty is that in order to produce the proper rigidity so that the blade will not buckle of its own weight, or while being whipped about in action, the cross-section must be so heavy as to make the blade entirely too stiff. Thus, in the course of a thrust the blade might not buckle except under heavy pressure and injury could result.

After some experimentation with various blade cross-sections I have discovered that a practical, safe, and cheaply manufactured toy foil blade can be made of such a plastic as copolymer polystyrene, having a cruciform cross-section, it being particularly noted that on the basis of my experiments such a cross-section appears to bend equally well in any plane as will hereinafter be more fully explained.

A detailed description of my invention will now be given in conjunction with the appended drawing, in which:

Fig. 1 is a perspective of a foil constructed in accordance with my concept.

Fig. 2 is a section through 2—2 of Fig. 1.

Fig. 3 shows the foil in bowed or buckled condition.

Fig. 4 is a section through 4—4 of Fig. 3.

Fig. 5 is a fragmentary portion of the foil at the tip thereof.

Referring now to the drawing, my invention will be seen to comprise a blade 10, having a guard cup 12 of metal or plastic, a handle 14, and a soft rubber suction cup or disc tip 16. By reference to Fig. 4, it will be apparent that the handle end of the blade 10 terminates in a cylindrical hub 20 which may be cemented in a socket 22 of the handle. At one end of the portion 20 a flange 26 is molded which bears against the cup 12. It will thus be apparent that the cup is securely held between the inner end of handle 14 and the flange 26.

The outer end of blade 10 terminates in a cylindrical portion 28 adapted to have a strong force-fit in the interior of the neck of the suction cup 16. Preferably the suction cup should be fairly large in diameter and of soft material to act as a cushion when a thrust is made against any part of the body. Also, the suction cup should fit tightly on the portion 28 so that there would be no danger of its coming off in the course of combat play.

The blade 10 is preferably tapered to a ratio of about 1½ to 1 from the hilt to the tip end of the length of some 20". Thus, the diameter of the blade at the hilt may be about ¾" while the tip diameter would be about ¼". I have found these dimensions, for a blade manufactured of the plastic material mentioned above, to be quite suitable and when provided with a silvery finish effects a rather realistic appearance despite the unusual cruciform shape which would not be suitable for conventional steel fencing foils, since it would render such a foil so stiff as to make it deadly. The blade for the toy fencing foil of a commercial embodiment may have a length from 18 to 22 times the average girth and taper from the hilt to the tip in a ratio of somewhat less than two to one. For commercial purposes, the blade may be comprised of suitable readily bendable plastic material having a modulus of elasticity in the range of 350,000 to 550,000 pounds per

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square inch and be of symmetrical cruciform section for substantially its entire length.

Particular attention is invited to Fig. 2 showing a typical cross-section of the cruciform blade showing lobes 30—33. Four planes of reversible bending, $a-b$, $b-f$, $c-g$, $d-h$, have been designated by dot-dash lines. For example, the plane $a-e$, which bisects one of the webs comprising lobes 30 and 32 and the plane $b-f$ which bisects the angle between the two webs, the other web being in the $c-g$ plane. It is, of course, essential that a proper fencing foil be readily bendable in a large number of planes. I have found that the bending of the cruciform foil described herein not only takes place in the planes shown in Fig. 2 but in an infinite number of planes and that the resistance to bending is substantially the same in any one of these planes. In other words, for all practical purposes were the cross-section to be circular no advantage as to the number of planes of bending could be achieved thereby. On the other hand, were the cross-section to be circular, although bending could take place in an infinite number of planes, such bending would require greater thrust because of the added material and the blade would, of course, be substantially heavier, in fact, about twice as heavy as the cruciform section blade.

As illustrated in Fig. 3, the bending takes place primarily at the forward half of the blade, a 180° bend being produced on a radius R which may vary from one-third to possibly one-sixth of the blade length.

A particular advantage of the cruciform section resides not only in the apparent fact that the blade when subjected to column stress can readily bend in any plane whatsoever, but that owing to the perpendicular arrangement of the webs, a suitable resistance to unwanted transverse bending or flexing is achieved. Thus, in parrying, or in maneuvering, quick motions of the blade or slight beam stresses thereon do not produce any deflection not expected in a full-size steel blade. It further follows that by virtue of the use of a cruciform cross-section, the webs may be elongated in a direction normal to the neutral axis so as to provide considerable inherent stiffness to whatever extent may be desired and safe without, however, adding to the weight or mass of the blade. In other words, the symmetrical cruciform cross-section is peculiarly advantageous over other forms of cross-section, such as round or square which do not inherently lend themselves to effecting proper stiffness without adding considerable weight. Thus, the addition of weight would create a maneuvering disability while at the same time the blade might well be too stiff to be safe. For example, by the use of the cruciform section in the blade of the plastic material specified, some 20" long with the relative taper of $\frac{3}{8}$ " to $\frac{1}{4}$ ", I have been able to make a blade which upon a lunge or thrust will readily commence to buckle at substantially less than one pound of pressure at the tip. This is an extremely important aspect of the invention because the tip, even though tapered down to a smaller cross-section than exists at the hilt, must be kept large enough so that it will not be broken off.

In the course of experimentation it was actually found that the symmetrical cruciform section was superior to other types of cross-sections for the particular purpose of this toy as intended for manufacture from plastic material by injection molding.

To the best of my knowledge, my invention for the first time enables the manufacturing and marketing of a relatively safe fencing toy for small children and one

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which effects a realistic elastic motion of the blade as compared with an actual full-size steel foil.

A further advantage residing in the use of a plastic such as copolymer polystyrene or other plastic of the same general range of modulus of elasticity, is that after a touch has been made the column stress causes bowing and the blade retains a noticeable deflection. Thus, the many arguments which occur between children as to whether or not a "touch" has been made are immediately settled by noting whether or not the blade is deflected. The blade is very readily straightened out by a child merely by bending between the fingers.

In conclusion, it should be particularly noted that there is definite co-action between the symmetrical cruciform shape of the blade and the fact that it is comprised of a plastic material such as copolymer polystyrene or other plastic of equivalent modulus of elasticity capable of effecting a 180° bend in a short radius without breakage while at the same time effecting buckling under slight column stress. One such coaction resides in the fact that a safe blade having a realistic "whip" feel is achieved, assuming proper ratio of length, girth, and taper are utilized. Another co-action is the fact that the blade can bend 180° in any plane and is thus equally sensitive to a column stress at any angle of thrust. A further co-action resides in the degree of stiffness that may be maintained for a minimum of weight of material insofar as transverse, or beam stresses are concerned while at the same time being very readily yieldable to any column stress.

Accordingly, I believe that I am entitled to patent protection to the extent set forth in the appended claims.

I claim:

1. A toy fencing foil comprising a blade of plastic material having a flexibility such as to afford a 180° bend without breakage, said blade having a column rigidity such that bowing thereof will commence at less than one pound of thrust-force exerted axially at the tip thereof, said blade having a symmetrical cross-section relative to the neutral axis thereof, the cross-section of said blade being cruciform and having four lobes of equal cross sectional area, a handle and guard secured at one end of said blade, and a blunted safety tip at the other end of said blade.

2. In a toy as set forth in claim 1, said blade being 18" to 22" in length, and being substantially $\frac{3}{8}$ " in diameter at the handle end and $\frac{1}{4}$ " in diameter at the tip end.

3. In a toy fencing foil as set forth in claim 1, said blade having the length of from 18 to 22 times the girth and tapering from the handle end to the tip end in a ratio of less than 2 to 1.

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