

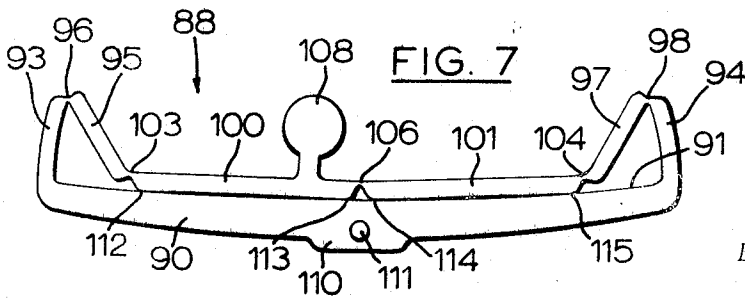
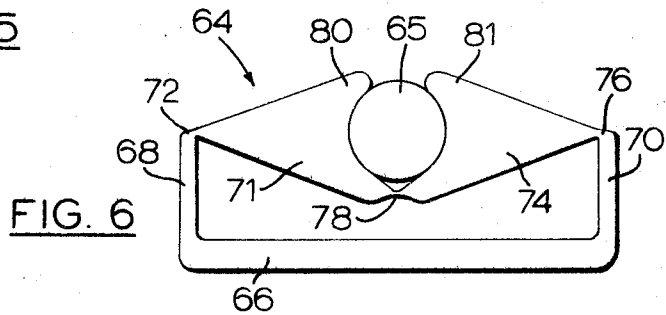
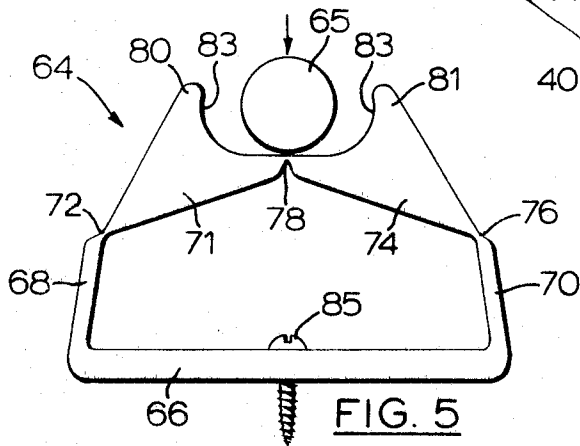
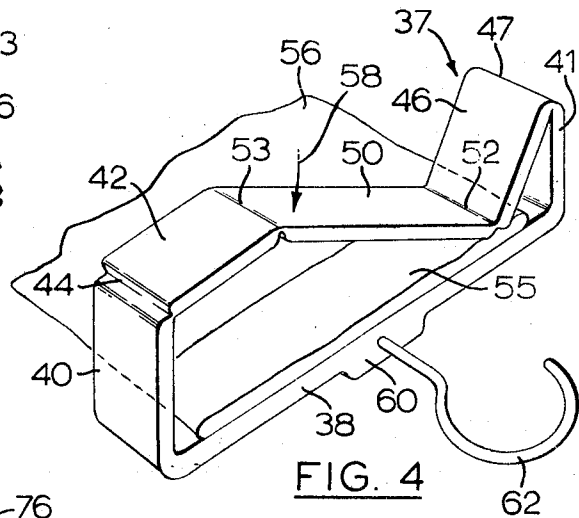
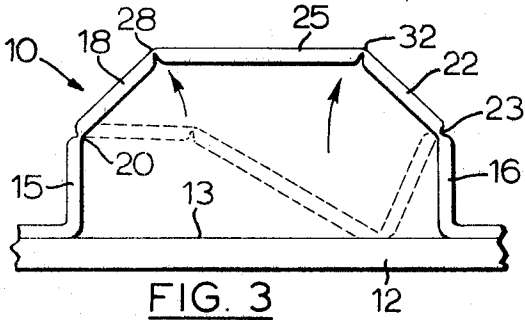
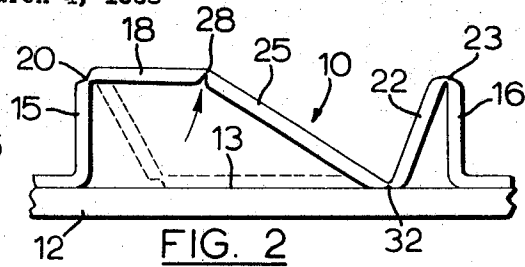
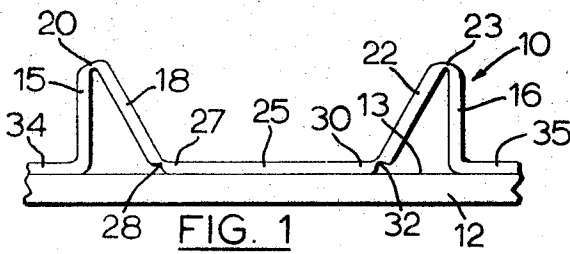
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3,512,227

ARTICULABLE ARTICLE CLAMP

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3,512,227

**ARTICULABLE ARTICLE CLAMP**

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7 Claims

**ABSTRACT OF THE DISCLOSURE**

An integrally constructed, articuable article includes two spaced upstanding members at least one of which is resiliently bendable. First and second members are hingedly joined to the two upstanding members respectively by flexible webs constituting first and second hinge lines respectively. The latter two members are hingedly connected via a third flexible web at a location remote from the first and second hinge lines, one of these members being ungeniculate between its two hinge lines.

This invention relates to articuable articles which can be extruded or molded from resilient plastic material, such as polypropylene, and which exhibit a two-position, over-toggling effect. This over-toggling effect makes the articuable articles well adapted for use as clipping or gripping devices. The articuable articles according to this invention can also be employed in applications which make use of the fact that, due to the over-toggling effect, a portion of the articuable article can take up two positions: an "out" or "projecting" position, and an "in" or "recessed" position. Such an application might be as a recessible handle for briefcases, suitcases, etc.

It is an object of this invention to provide an integral articuable article, which can be either molded or extruded, of which a portion exhibits a two-position, over-toggling effect.

Accordingly, this invention provides an integral articuable article, comprising: two spaced upstanding members of which at least one is resiliently bendable, a first swingable member hingedly joined to one of said upstanding members through a first flexible web constituting a first hinge line, a second swingable member hingedly joined to the other of said upstanding members through a second flexible web constituting a second hinge line, said first and second swingable members being hingedly joined together at points remote from said first and second hinge lines through a third flexible web constituting a third hinge line, at least one swingable member being ungeniculate between its two hinge lines, all said hinge lines being substantially parallel.

Two embodiments of this invention are shown in the accompanying drawings, in which like numerals denote like parts throughout the several views, and in which:

FIG. 1 is a sectional view of a first embodiment of this invention in the "closed" position;

FIG. 2 is a sectional view of the first embodiment of this invention in an intermediate position;

FIG. 3 is a sectional view of the first embodiment of this invention in the "open" position;

FIG. 4 is a perspective view of a pants hanger utilizing the first embodiment of this invention;

FIG. 5 is a sectional view of a second embodiment of this invention in the "open" position;

FIG. 6 is a sectional view of the second embodiment of this invention in the "closed" position; and

FIG. 7 is a sectional view of a pants hanger incorporating the third embodiment of this invention.

Referring first FIG. 1, there is shown an integral articuable article 10, adapted to be secured to, and to cooperate with, a base 12 having a substantially flat surface 13. The

articuable article 10 consists of two upstanding members 15 and 16, a first swingable member 18 hingedly joined at one end to the upstanding member 15 through a flexible web 20, a second swingable member 22 hingedly joined at one end to the upstanding member 16 through a flexible web 23, and a third swingable member 25 hingedly joined at its one end 27 to the other end of the swingable member 18 through a flexible web 28, and hingedly joined at its other end 30 to the other end of the swingable member 22 through a flexible web 32. The flexible webs 20, 23, 28 and 32 constitute hinge lines in the article 10, and all of the hinge lines are substantially parallel.

The upstanding members 15 and 16 have lateral extensions 34 and 35, respectively, by which the upstanding members 15 and 16 can be secured to the base 12. The attachment can be by any appropriate known method, for example glue, mechanical attachment members, or welding.

FIG. 1 shows the articuable article 10 in its closed or recessed position, in which the third swingable member 25 is in surface contact with the surface 13 of the base 12. The first, second and third swingable members 18, 22 and 25 are, due to their thickness, relatively rigid by comparison with the thin flexible webs by which they are joined together. In order to permit the first, second and third swingable members 18, 22 and 25 to be moved to the open position, shown in FIG. 3, it is necessary that the upstanding members 15 and 16 be resiliently bendable, so that their upper extremities can move outwardly to accommodate the over-toggling stress. This necessity that the upstanding members 15 and 16 be resiliently bendable will be more clearly understood from an examination of FIG. 2, to which attention is now directed. FIG. 2 shows the first step in opening out the articuable article 10 from its closed position (FIG. 1) to its open position (FIG. 3). The first step is to pivot one of the outside swingable members 18 or 22 (in this case member 18) upwardly as shown. It will be appreciated that, in order to move from the FIG. 1 position to the FIG. 2 position, the members 18 and 25 must go through a "dead-centre" position in which they are parallel with one another. This "dead-centre" position represents a state of unstable equilibrium for the articuable article 10, and in order to reach this position, the upper extremity of the upstanding member 15 must be moved slightly to the left. This leftward movement is resisted by the upstanding member 15, which wants to remain in the position shown in FIGS. 1 and 2. This accounts for the over-toggling effect exhibited by the article 10. During the pivotal motion of the swingable member 18, the right hand upstanding member 16 will undergo little or no bending, because of the frictional engagement of the base 12 with the right hand end of the swingable member 25. However, since the articuable article 10 could also be opened out by first pivoting the swingable member 22, the upstanding member 16 should have the same kind of resilient bending characteristic as the upstanding member 15. If, however, it could be guaranteed that the swingable member 18 would always be the first to be pivoted outwardly, the upstanding member 16 would not have to be bendable.

FIG. 3 shows the second stage of the opening-out of the articuable article 10. During the opening-out of the article 10 from the FIG. 2 position to the FIG. 3 position (from the dotted lines to the solid lines in FIG. 3), the upstanding members 15 and 16 are not required to undergo any bending stress, due to the double articulation inherent in the swingable members 18, 22 and 25.

FIG. 4 shows a pants-hanger 37 incorporating the first embodiment of this invention. The pants-hanger 37 comprises a base member 38, two upstanding members 40 and 41 integral with the base member 38 at the ends thereof, a swingable member 42 hingedly joined to the

upper extremity of the upstanding member 40 through a flexible web 44, a swingable member 46 hingedly joined to the upper extremity of the upstanding member 41 through a flexible web 47, and a swingable member 50 hingedly joined to the swingable member 46 through a flexible web 52 and hingedly joined to the swingable member 42 through a flexible web 53. It will thus be seen that, in all important respects, the members 40, 42, 50, 46 and 41 correspond, respectively, to the members 15, 18, 25, 22 and 16 in FIG. 1. The two-stage opening-out procedure described with reference to FIGS. 1-3 is identical with the opening-out procedure for the pants-hanger 37 shown in FIG. 4.

It will be appreciated that, in order to return the members 18, 25 and 22 from the FIG. 3 position to the FIG. 1 position, the opening-out procedure is simply reversed, with the swingable member 22 being first pivoted down into the FIG. 2 position, following which the swingable member 18 is pivoted down to the FIG. 1 position, the latter pivotal movement causing the resiliently bendable upstanding member 15 to bend slightly leftwardly. The same opening and closing procedures apply to the pants-hanger 37 shown in FIG. 4, and the positions of the swingable members in FIG. 4 correspond to those in FIG. 2, i.e. the intermediate position.

The cuffs 55 and a portion of the legs 56 of a pair of pants are shown properly positioned against the base member 38 of the pants-hanger 37 in FIG. 4. If pressure is now applied where shown by the arrow 58 against the leftward end of the swingable member 50, the swingable member 50 can be brought down tightly against the base member 38, to hold the cuffs 55 of the pants in place.

The base member 38 has, midway of its ends, a slightly thicker portion 60 in which the hook 62 of the pants-hanger 37 is embedded.

It will be appreciated that, for the first embodiment shown in FIGS. 1-4, the amount of pressure, if any, exerted by the swingable member 25 (50) against the base 12 (base member 38) is governed by the lengths of the swingable members and the upstanding members, and by the spacing between the upstanding members. For example, in FIG. 1, if the upstanding members 15 and 16 were positioned closer together than the spacing shown, while the rest of the dimensions were maintained, the swingable member 25 would be urged more strongly against the base 12 in the closed position. Conversely, if the upstanding members 15 and 16 were spread further apart, a point would be reached where, in the closed position, the swingable member 25 would be spaced out of contact with the base 12. The same relationships apply to FIG. 4, and it is intended that the dimensions of all members be chosen so as to give the desired pressure between the swingable member 50 and the base member 38 in the closed position.

Attention is now directed to FIGS. 5 and 6, showing, in cross-section, the second embodiment of this invention in its open and in its closed position. In FIG. 5, the invention has been incorporated into a wall clip 64 for holding in an upright position a broom of which the handle 65 appears in cross-section. The wall clip 64 includes a base 66, two upstanding members 68 and 70 integral with the base 66, a swingable member 71 hingedly joined to the upper extremity of the upstanding member 68 through a flexible web 72, and a swingable member 74 hingedly joined to the upper extremity of the upstanding member 70 through a flexible web 76. The two swingable members 71 and 74 are hingedly joined together through a flexible web 78. Preferably, the wall clip 64 is molded or extruded in the configuration shown in FIG. 5, which represents the "open" position. As can be seen, the swingable member 71 has an integral jaw 80 projecting upwardly from it, and the swingable member 74 has a jaw 81. Preferably, the wall clip 64 is bilaterally symmetrical about a line passing through the flexible web 78 perpendicular to the base 66. Each of

the jaws 80 and 81 has a concavely curved portion 83 of which the radius of curvature is substantially the same as the radius of the broom handle 65. Fastening means, such as screws 85, can be provided in the base member 66 for securing the wall clip to a wall.

In order to lock the broom handle 65 between the jaws 80 and 81, the broom handle is pressed against the flexible web 78, thereby forcing the two swingable members 71 and 74 to pivot about their respective flexible webs 72 and 76 through a "dead-centre" or "over-toggling" position in which the three flexible webs 72, 76 and 78 are in alignment, to the closed position shown in FIG. 6. In the closed position, the jaws 80 and 81 tightly grip the broom handle 65 and hold it in position. The force exerted by the jaws 80 and 81 on the broom handle 65 is a function of the amount of residual bending stress in the upstanding members 68 and 70 when the jaws 80 and 81 are locked around the broom handle 65 in the closed position. Naturally, the resistance of the upstanding members 68 and 70 to bending is a function of the elasticity of the material employed, and the dimensions of the upstanding members themselves. To remove the broom handle 65 from the grip of the jaws 80 and 81, the broom handle is merely grasped and pulled outwardly.

Attention is now directed to FIG. 7, which shows, in cross-section, a pants-hanger 88 incorporating the third embodiment of this invention. The pants-hanger 88 has a base member 90 of which the inside surface 91 is slightly curved concavely. At the extremities of the base member 90 are located integral upstanding members 93 and 94. A swingable member 95 is hinged to the upper extremity of the upstanding member 93 through a flexible web 96, and a similar swingable member 97 is hinged to the upper extremity of the upstanding member 94 through a flexible web 98. Two intermediate swingable members 100 and 101 are hinged, respectively, to the swingable members 95 and 97 through flexible webs 103 and 104, and are hinged to each other through a flexible web 106. The swingable member 100 has an upward projection 108, integral with itself, near its rightward end. The base member 90 has a slightly thickened portion 110 midway of its ends, in which the hook of the pants-hanger 88 is embedded at 111. The pants-hanger 88 is shown, in FIG. 7, in the closed position, and because of the slight curve on the inside wall 91 of the base member 90, the intermediate swingable members 100 and 101 bear against the surface 91 at four spaced-apart points 112, 113, 114 and 115, thereby providing a more evenly distributed grip on the cuffs of a pair of pants than that afforded by the single swingable member 50 shown in FIG. 4. In order to open the pants-hanger 88 into the open position, one merely pulls upwardly on the projection 108 thereby lifting the flexible web 106 above the hypothetical line joining the flexible webs 103 and 104. By pulling further on the projection 108, all four swingable members 95, 97, 100 and 101 can be swung outwardly away from the base member 90, thereby permitting pants cuffs to be inserted or removed from the pants-hanger 88.

In the appended claims, the terms "geniculate" and "ungeniculate" are used. Looking at FIG. 1, the term "geniculate" could properly describe that portion of the article 10 extending between the flexible web 28 and the flexible web 23, i.e. the portion consisting of both swingable members 22 and 25. Together, the members 22 and 25 constitute a "geniculate" member, since the term "geniculate" means having one or more knee-like joints or bends. Thus, in FIG. 7, the portion of the pants-hanger 88 extending between the flexible web 103 and the flexible web 98 is also a geniculate member, with two knee-bends. The term "ungeniculate" would describe the swingable member 22 in FIG. 1, since member 22 by itself has no knee-bends in it.

The preferred material for use in fabricating the articulating article of this invention is polypropylene, primarily

because of its performance at the flexible webs in the structure, where it has proved capable of withstanding repeated flexings without rupture or deterioration. Since, however, it is conceivable that other materials could be used with equivalent or superior performance characteristics, this invention is not to be considered limited to use with polypropylene.

It is also emphasized that the flexible webs through which a given swingable member is joined to two other members need not necessarily be located at the "ends" of that given swingable member. It is quite conceivable that a flexible web could be located at an intermediate point along the swingable member. For example, in FIG. 1, the swingable member 22 could extend rightwardly beyond the flexible web 23, such that the latter is located at an intermediate position along the member 22.

While preferred embodiments of this invention have been disclosed herein, those skilled in the art will appreciate that changes and modifications may be made therein.

What I claim as my invention is:

1. An integral, articulable article, comprising:

two spaced upstanding members of which at least one is resiliently bendable,

a first swingable member hingedly joined to one of said upstanding members through a first flexible web constituting a first hinge line,

a second swingable member hingedly joined to the other of said upstanding members through a second flexible web constituting a second hinge line,

said first and second swingable members being hingedly joined together at points remote from said first and second hinge lines through a third flexible web constituting a third hinge line, at least one swingable member being ungeniculate between its two hinge lines, all said hinge lines being substantially parallel, the other swingable member being geniculate at a location between its two hinge lines about a fourth flexible web, said fourth flexible web constituting a fourth hinge line substantially parallel with the other hinge lines.

2. An integral articulable article, comprising:

two spaced upstanding members of which at least one is resiliently bendable,

a first swingable member hingedly joined to one of said upstanding members through a first flexible web constituting a first hinge line,

a second swingable member hingedly joined to the other of said upstanding members through a second flexible web constituting a second hinge line,

a third swingable member hingedly joined to said first swingable member through a third flexible web constituting a third hinge line, and hingedly joined to said second swingable member through a fourth flexible web constituting a fourth hinge line, at least two of said swingable members being ungeniculate, all said hinge lines being substantially parallel.

3. An article as claimed in claim 2, in which each of said swingable members is ungeniculate between its two hinge lines, whereby each swingable member is adapted to maintain its two hinge lines a given distance apart.

4. An article as claimed in claim 3, further comprising a base member resiliently and integrally supporting said upstanding members at locations on the latter spaced from said first and second webs, the base member spacing the upstanding members apart a given distance, whereby the upstanding members tend to seek a position of minimum stress in which said first and second hinge lines are separated by a rectilinear distance which is less than the sum of the rectilinear distances between sequentially adjacent pairs of hinge lines.

5. An article as claimed in claim 2, in which one of said swingable members is geniculate at a location between its two hinge lines about a fifth flexible web, said fifth web constituting a fifth hinge line substantially parallel with the other hinge lines.

6. An article as claimed in claim 5, further comprising a base member resiliently and integrally supporting said upstanding members at locations on the latter spaced from said first and second webs, the base member having an upper surface extending between the upstanding members and facing in the direction in which the upstanding members project, said upper surface being concave in a plane parallel to said direction and containing both upstanding members, the base member spacing the upstanding members apart a given distance, whereby the upstanding members tend to seek a position of minimum stress in which said first and second hinge lines are separated by a rectilinear distance which is less than the sum of the rectilinear distances between sequentially adjacent pairs of hinge lines.

7. A method of producing an integral articulable article, said method including the steps:

extruding from resilient material an extrudate having a cross-section comprising: an elongated base portion having at its extremities two integral upstanding portions, and a plurality of intermediate portions extending between the upper extremities of said upstanding portions, the intermediate portions being linked together and to said upstanding portions by short relatively thin portions which constitute flexible webs in the extrudate, the flexible webs defining a plurality of parallel hinge lines, the rectilinear distance between the flexible webs attached to the upstanding portions being less than the sum of the rectilinear distances between sequentially adjacent pairs of flexible webs, and cutting said extrudate transversely to obtain a section thereof.

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