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SWIVEL SNAP HOOK OF SYNTHETIC RESIN
AND METHOD OF MANUFACTURING THE SAME

The present invention relates to a swivel snap hook made of syhthetic resin for use on a carrying strap of a bag, for example.

There are now on the market various swivel snap
5 hooks of synthetic resin for use on a carrying strap of a bag such as a shoulder bag. The prior hooks generally comprise an eye member adapted to be attached to one end of the strap, and a hook member rotatably or rockably connected to the eye member with a separate
10 retaining member or members. Thus the known hook is composed of three or more parts and hence needs to be assembled in an increased member of steps, causing only a limited rate of production and resluting in expensive products.

15 To this end, a two-piece swivel hook of synthetic resin has been proposed by Japanese Patent Laid-Open Publication (Kokai) 53-128826 in which an eye part and a hook part are pivotally movably connected to each other with no additional part. This connection is

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such that an axle portion of the eye part extends through a downwardly facing recess in a joint portion of the hook part from which portion a hook body and a resiliently deformable closure tongue extend
5 divergently. However, the known hook is disadvantageous in that the eye and hook parts need to be coupled together after these two parts have been molded independently of each other.

According to a first aspect of the present
10 invention, there is provided a swivel snap hook of synthetic resin, comprising: an eye member molded of synthetic resin; a hook member molded of synthetic resin having a base, a hook body extending from one side of said base, and a closure tongue extending from
15 said one side of said base so as to normally close said hook body, said closure tongue being resiliently deformable to open said hook body; and means connecting said eye and hook members for pivotal movements relative to each other, said connecting means including
20 a bearing portion molded of synthetic resin extending from one of said eye and hook members, said bearing portion being divided into a pair of opposed bearing halves by a space, said bearing halves having a pair of aligned through-holes of circular cross section
25 communicating with said space, and an arm portion molded of synthetic resin extending from the other member into said space and terminating in an enlarged

end which is loosely received in said through-holes in said bearing halves across said space for rocking movements.

According to a second aspect of the present invention, there is provided a method of manufacturing a swivel snap hook of synthetic resin, the hook including an eye member, a hook member, and means connecting the eye and hook member for pivotal movements relative to each other, the hook member having a base, a hook body extending from one side of the base, and a closure tongue extending from the one side of the base, the connecting means including a bearing portion extending from one of the eye and hook members and being divided into a pair of opposed bearing halves by a space, the bearing halves having a pair of aligned through-holes of circular cross section communicating with the space, the connecting means also including an arm portion extending from the other member into the space and terminating in an enlarged end loosely received in the through-holes in the bearing halves across the space, said method comprising the steps of: providing a mold defining a mold cavity of a contour corresponding to the shape of the eye and hook members in coupled state, said mold including a pair of identical molding die halves, and a pair of identical associated cylindrical rods, and said molding die halves having a pair of symmetrical first recesses

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for forming the eye member, a pair of symmetrical second recesses for forming the bearing portion, a pair of symmetrical third recesses for forming the base of the hook member, a pair of symmetrical fourth recesses for forming the hook body, a pair of symmetrical fifth recesses for forming the closure tongue, a pair of symmetrical sixth recesses for forming the arm portion, and a pair of symmetrical seventh recesses for forming a central part of the enlarged end, each of said cylindrical rods having in its one end an eighth recess for forming a respective one of a pair of opposite remaining parts of the enlarged end, said molding die halves further having two pairs of ninth recesses each having a semi-cylindrical contour, two of said semicylindrical ninth recesses in one molding die half being longitudinally aligned with each other and being disposed in mirror image relation to the other two semi-cylindrical ninth recesses, respectively, in the other molding die half, each symmetrical pair of said semi-cylindrical ninth recesses lying perpendicularly to said second recesses and jointly defining a cylindrical contour for receiving a respective one of said cylindrical rods; closing said mold in such a manner that each of said first, second, third, fourth, sixth, seventh, eighth and ninth recesses in said one molding die half is in registry with a respective one of the corresponding recesses in said other molding die

half, said closing including inserting each said
cylindrical rod inserted through each said symmetrical
pair of said semi-cylindrical ninth recesses
perpendicularly to said second recesses until said one
5 end of each said cylindrical rod reaches said seventh
recesses; injecting an amount of heat-softened
thermoplastic synthetic resin into said closed mold to
fill the mold cavity; and after said heat-softened
synthetic resin in the mold cavity is cooled to become
10 hard, removing from said mold the eye and hook members
molded in coupled state.

It is believed possible by means of the present invention
to provide a swivel snap hook of synthetic resin which is
composed of only two pieces and which can be manufactured easily
15 with minimum cost.

It is also believed possible by means of the present
invention to provide a method of manufacturing a swivel snap hook
of synthetic resin in which all two pieces of the hook can be
molded simultaneously in only one molding step in an coupled or
20 assembled state.

The invention will be described by way of example with
reference to the accompanying drawings, wherein:-

Figure 1 is a front elevational view of a swivel snap hook of synthetic resin embodying the present invention;

Figure 2 is a side elevational view of Figure 1;

5 Figure 3 is a cross-sectional view taken along line III - III of Figure 1, partly not in cross section;

Figure 4 is a front elevational view similar to Figure 1, with parts broken away;

10 Figure 5 is an exploded front elevational view, with parts broken away, of a mold for molding the hook of Figures 1 - 4;

Figure 5A is a front elevational view of a half of a modified molding die;

15 Figure 6 is a cross-sectional view taken along line VI-VI of Figure 5;

Figure 7 is a front elevational view similar to Figure 4, showing a modified swivel snap hook according to a second embodiment;

20 Figure 8 is a side elevational view of Figure 7;

Figure 9 is a front elevational view, with parts broken away, of a swivel snap hook according to a third embodiment;

25 Figure 10 is a side elevational view of Figure 9;

Figure 11 is a front elevational view similar to

Figure 9, showing a modified swivel snap hook according to a fourth embodiment;

Figure 12 is a side elevational view of Figure 11;

5 Figure 13 is a front elevational view, with parts broken away, of a swivel snap hook according to a fifth embodiment;

Figure 14 is a side elevational view of Figure 13;

10 Figure 15 is a front elevational view similar to Figure 13, showing a modified swivel snap hook according to a sixth embodiment; and

Figure 16 is a side elevational view of Figure 15.

15 Figures 1 through 4 shows a swivel snap hook which generally comprises an eye member 1 adapted to be attached to one end of a carrying strap (not shown) of a bag such as a shoulder bag, and a hook member 2 rotatably and rockably connected to the eye member 1.
20 The eye and hook members 1, 2 are molded of synthetic resin in a manner described below.

The eye member 1 has an integral bearing portion which extends outwardly and downwardly therefrom and which is divided into a pair of opposed bearing halves
25 10, 10 by a space 11. The pair of opposed bearing halves 10, 10 have a pair of aligned through-holes 12, 12 of circular cross section communicating with the

space 11.

The hook member 2 has a base 3, a hook body 4 extending downwardly from a lower side of the base 3, and a closure tongue 5 extending downwardly from the lower side of the base 3 so as to normally close the hook body 4. The closure tongue 5 is resiliently deformable to open the hook body 4. The hook member 2 also has an integral arm portion 13 extending upwardly from the base 3 remotely from the hook body 4 and the closure tongue 5 into the space 11 and terminating in an enlarged end 14 loosely received in the through-holes 12, 12 in the bearing halves 10, 10 across the space 11.

The arm portion 13 has a circular cross section of a diameter slightly smaller than the width of the space 11 (Figures 1 and 4), while the enlarged end 14 of the arm portion 13 is in the shape of a sphere having a diameter larger than the width of the space 11 and substantially equal to the diameter of the through-holes 12, 12. Thus the hook member 2 is rotatable and rockable on the eye member 1 and vice versa. Specifically, the hook member 2 is rotatable on the eye member 1 about the axis of the arm portion 13 and is pivotally movable on the eye member 1 about the enlarged end 14 in a plane which includes the axis 6 of the bearing portion and which is parallel to the bearing halves 10, 10.

In production, the eye member 1 and the hook member 2 are molded on a mold simultaneously in a single molding step in coupled or assembled state. As shown in Figures 5 and 6, the mold includes a pair of identical molding die halves 20, 20, and a pair of identical associated cylindrical rods 21, 21. The two molding die halves 20, 20 and the two cylindrical rods 21, 21, when the mold is closed, jointly define a mold cavity having a contour corresponding to the shape of the eye and hook members 1, 2 in coupled state.

The two molding die halves 20, 20 have a pair of symmetrical first recesses 1a, 1a for forming the eye member 1 of a prospective swivel snap hook, a pair of symmetrical second recesses 10a, 10a for forming the bearing portion, a pair of symmetrical third recesses 3a, 3a for forming the base 3 of the hook member 2, a pair of symmetrical fourth recesses 4a, 4a for forming the hook body 4, a pair of symmetrical fifth recesses 5a, 5a for forming the closure tongue 5, and a pair of symmetrical sixth recesses 13a, 13a for forming the arm portion 13. The pair of first recesses 1a, 1a is connected with the pair of fourth recesses 4a, 4a by a runner 22b. As shown in Figure 6, in each molding die half 20, the fifth recess 5a for the closure tongue 5 extends from the third recess 3a for the base portion 3 at an angle (to the fourth recess 4a for the hook body 4) larger than the angle between the closure tongue 5

and the hook body 4 in coupled or assembled state
(Figures 1 and 4) in such a manner that a free end of
the fifth recess 5a is disposed outwardly of a free end
of the fourth recess 4a with a relatively small gap
5 therebetween, for a purpose described below.

The molding die halves 20, 20 also have a pair
of symmetrical seventh recesses 14a, 14a for forming a
central part of the spherical enlarged end 14 which
part is in the shape of a remainder of a sphere in
10 which a pair of diametrically opposed segmental parts
has been cut off by a pair of parallel planes. For
forming each of the remaining (segmental) parts of the
spherical enlarged end 14, each cylindrical rod 21 has
in its one end an eighth recess 14b.

15 Additionally, the two molding die halves 20, 20
have two pairs of ninth recesses 16a, 16a; 16a, 16a,
each having a semi-cylindrical contour. Two of the
semi-cylindrical ninth recesses 16a, 16a in one molding
die half 20 are longitudinally aligned with each other
20 and are disposed in mirror image relation to the other
two semi-cylindrical ninth recesses 16a, 16a,
respectively, in the other molding die half 20 when the
mold is closed for molding. Each symmetrical pair of
the semi-cylindrical ninth recesses 16a, 16a extends
25 perpendicularly to the second recesses 10a, 10a and
jointly serves to receive a respective one of the
cylindrical rods 21.

In molding, the mold is closed, that is, the two molding die halves 20, 20 are put together in such a manner that each of the first, second, third, fourth, fifth, sixth, seventh and ninth recesses 1a, 3a, 4a, 5a, 10a, 13a, 14a, 16a in one molding die half 20 is in registry with a corresponding one of the recesses in the other molding die 20. Each cylindrical rod 21 is inserted through a corresponding one pair of the opposed semi-cylindrical recesses 16a, 16a perpendicularly to the second recesses 10a, 10a for a bearing portion until the recessed or inner end of the cylindrical rod 21 reaches the seventh recesses 14a, 14a, at which time there is a gap between a peripheral surface of the cylindrical rod 21 and bottom surfaces of the second recesses 10a, 10a. An amount of heat-softened thermoplastic synthetic resin is then injected through a sprue 22a into the closed mold to fill the mold cavity thereof. After the thermoplastic material filled in the mold cavity is cooled to become hard, the molded article (a prospective swivel snap hook) is removed from the mold by parting the molding die halves 20, 20 and the associated cylindrical rods 21, 21 as is well known in the art. The sprue and runner of the molded article are removed. As a result, the eye member 1 and the hook member 2 have been simultaneously molded in coupled or assembled state. At that time, a free end of the closure tongue 5 is

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disposed outwardly of a free end of the hook body 4 with a relatively small gap therebetween. Finally, the closure tongue 5 is depressed inwardly of the hook body 4 against the resilience of the closure tongue 5 to
5 bring its free end into engagement with the free end of the hook body 4 on an inner side thereof, as shown in Figures 1, 2 and 4, thus normally closing the hook body 4.

Also, the hook member 2 is rotatable on the eye
10 member 1 about the axis of the arm portion 13 and is pivotably movable on the eye member 1 about the spherical enlarged end 14 in a plane which includes the axis 6 of the bearing portion and which is parallel to the bearing halves 10, 10. In use, as the closure
15 tongue 5 is depressed inwardly against its resilience by an article (not shown) to be hooked, the free end of the tongue 5 is spaced apart from the free end of the hook body 4 to open the latter so that the article is allowed to be threaded onto the hook body 4. Upon the
20 depressing force is released, the closure tongue 5 restores the shape of Figures 1 and 4 under its resilience to close the hook body 4, thus preventing the article from being removed from the hook body 4.

Accordingly, it is possible to mold the eye and
25 hook members 1, 2 concurrently in only one molding step in coupled or assembled state, requiring no separate step or steps of assembling the (separately molded) eye

and hook members together. The overall process for manufacturing this swival snap hook is quite simplified and hence much less costly.

Figure 5A shows a modified form of the mold, in which there are an upper sprue 22a leading to the first recesses 1a, and a lower sprue 22a leading to the fourth recesses 4a. In molding, heat-softened synthetic resin is injected into the mold through the upper and lower sprues 22a, 22a concurrently and separately to fill the mold cavity (the recesses 1a, 13a) for the eye member 1 and to fill the mold cavity (the recesses 4a, 3a, 5a, 13a, 14a, 14b) for the hook member 2. Accordingly the runner 22b (Figures 5 and 6) extending between the first recess 1a and the seventh recess 14a may be omitted. In an alternative form, the mold may have only a single central sprue leading to the runner 22b which extends between the first recess 1a and the seventh recess 14a.

Figures 7 and 8 illustrate a swivel snap hook according to a second embodiment, in which the bearing halves 10, 10 are an integral part of the hook member 2 and projects from the upper side of the base 3 remotely from the hook body 4 and the closure tongue 5, while the arm portion 13 and thus the spherical enlarged end 14 are an integral part of the eye member 1. In this embodiment, the hook member 2 is rotatable on the spherical enlarged end 14 about the axis of the arm

portion 13 and is pivotably movable about the spherical enlarged end 14, thus providing a universal joint between the eye and hook members 1, 2, like the embodiment of Figures 1 through 4.

5 According to a third embodiment shown in Figures 9 and 10, the enlarged end 14' of the arm portion 13 is in the shape of a remainder of a sphere in which a pair of diametrically opposed segmental parts has been cut off by a pair of parallel planes perpendicular to the
10 axis of the arm portion 13. Thus the enlarged end 14' has upper and lower flat surfaces 15, 15. The eye and hook members 1, 2 are rockable with respect to each other, like the embodiment of Figures 1 through 4.

 Figures 11 and 12 illustrate a fourth embodiment
15 which is similar to the third embodiment of Figures 9 and 10, except that the bearing halves 10, 10 are an integral part of the hook member 2 and projects from the upper side of the base 3 remotely from the hook boby 4 and the closure tongue 5, while the arm portion
20 13 and thus the enlarged end 14' are an integral part of the eye member 1. With this arrangement, a universal joint between the eye and hook members 1, 2 can also be achieved, like the first embodiment of Figures 1 through 4 and the second embodiment of
25 Figures 7 and 8.

 According to a fifth embodiment shown in Figures 13 and 14, in which the enlarged end 14" of the arm

portion 13 is in the shape of a cylinder extending through the pair of aligned through-holes 12, 12 in the bearing halves 10, 10 across the space 11. As the cylindrical enlarged end 14" is rotatably received in
5 the through-holes 12, 12, the hook member 2 is pivotally movable on the eye member 1 about the cylindrical enlarged end 14" in a plane which includes the axis 6 of the arm portion 13 and which is parallel to the bearing halves 10, 10.

10 Figures 15 and 16 illustrate a sixth embodiment which is similar to the fifth embodiment of Figures 13 and 14, except that the cylindrical enlarged end 14" of the arm portion 13 is an integral part of the hook member 2 and extends from the upper side of the base 3
15 remotely from the hook body 2 and the closure tongue 5, while the bearing halves 10, 10 are an integral part of the eye member 1. The hook body 2 is pivotally movable on the eye member 1 about the cylindrical enlarged end 14" in a plane which includes the axis 6 of
20 portion and which is parallel to the bearing halves 10, 10.

Reference is directed to our co-pending patent application No. 85 07772 (Serial No. 2 157 358) of even date herewith entitled 'SWIVEL SNAP HOOK OF SYNTHETIC RESIN' reference 230P49857.



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CLAIMS:-

1. A swivel snap hook of synthetic resin,
comprising:

(a) an eye member molded of synthetic resin;

5 (b) a hook member molded of synthetic resin
having a base, a hook body extending from one side of
said base, and a closure tongue extending from said one
side of said base so as to normally close said hook
body, said closure tongue being resiliently deformable
10 to open said hook body; and

(c) means connecting said eye and hook
members for pivotal movements relative to each other,
said connecting means including

15 (1) a bearing portion molded of synthetic
resin extending from one of said eye and
hook members, said bearing portion being
divided into a pair of opposed bearing
halves by a space, said bearing halves
having a pair of aligned through-holes of
20 circular cross section communicating with
said space, and

(2) an arm portion molded of synthetic resin
extending from the other member into said
space and terminating in an enlarged end
25 which is loosely received in said
through-holes in said bearing halves across
said space for rocking movements.

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2. A swivel snap hook according to claim 1,
said bearing portion being an integral part of said eye
member, and said arm portion being an integral part of
said hook member and projecting from an opposite side
of said base remotely from said hook body and said
5 closure tongue.

3. A swivel snap hook according to claim 1,
said bearing portion being an integral part of said
hook member and projecting from an opposite side of
10 said base remotely from said hook body and said closure
tongue, and said arm portion being an integral part of
said eye member.

4. A swivel snap hook according to claim 1,
said enlarged end of said arm portion being in the
15 shape of a sphere having a diameter larger than the
width of said space and substantially equal to the
diameter of said through-holes.

5. A swivel snap hook according to claim 1,
said enlarged end of said arm portion being in the
20 shape of a remainder of a sphere in which a pair of
diametrically opposed segmental parts has been cut off
by a pair of parallel planes perpendicular to the axis
of said arm portion, said sphere having a diameter
larger than the width of said space and substantially
25 equal to the diameter of said through-holes.

6. A swivel snap hook according to claim 1,
said enlarged end of said arm portion being in the



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shape of a cylinder having a length larger than the width of said space and having a diameter smaller than the diameter of said through-holes.

7. A method of manufacturing a swivel snap hook of synthetic resin, the hook including an eye member, a hook member, and means connecting the eye and hook member for pivotal movements relative to each other, the hook member having a base, a hook body extending from one side of the base, and a closure tongue extending from the one side of the base, the connecting means including a bearing portion extending from one of the eye and hook members and being divided into a pair of opposed bearing halves by a space, the bearing halves having a pair of aligned through-holes of circular cross section communicating with the space, the connecting means also including an arm portion extending from the other member into the space and terminating in an enlarged end loosely received in the through-holes in the bearing halves across the space, said method comprising the steps of:

(a) providing a mold defining a mold cavity of a contour corresponding to the shape of the eye and hook members in coupled state, said mold including a pair of identical molding die halves, and a pair of identical associated cylindrical rods, and said molding die halves having a pair of symmetrical first recesses for forming the eye member, a pair of symmetrical

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second recesses for forming the bearing portion, a pair of symmetrical third recesses for forming the base of the hook member, a pair of symmetrical fourth recesses for forming the hook body, a pair of symmetrical fifth
5 recesses for forming the closure tongue, a pair of symmetrical sixth recesses for forming the arm portion, and a pair of symmetrical seventh recesses for forming a central part of the enlarged end, each of said cylindrical rods having in its one end an eighth recess
10 for forming a respective one of a pair of opposite remaining parts of the enlarged end, said molding die halves further having two pairs of ninth recesses each having a semi-cylindrical contour, two of said semicylindrical ninth recesses in one molding die half
15 being longitudinally aligned with each other and being disposed in mirror image relation to the other two semi-cylindrical ninth recesses, respectively, in the other molding die half, each symmetrical pair of said semi-cylindrical ninth recesses lying perpendicularly
20 to said second recesses and jointly defining a cylindrical contour for receiving a respective one of said cylindrical rods;

(b) closing said mold in such a manner that each of said first, second, third, fourth, sixth,
25 seventh, eighth and ninth recesses in said one molding die half is in registry with a respective one of the corresponding recesses in said other molding die half,



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said closing including inserting each said cylindrical rod inserted through each said symmetrical pair of said semi-cylindrical ninth recesses perpendicularly to said second recesses until said one end of each said
5 cylindrical rod reaches said seventh recesses;

(c) injecting an amount of heat-softened thermoplastic synthetic resin into said closed mold to fill the mold cavity; and

(d) after said heat-softened synthetic resin
10 in the mold cavity is cooled to become hard, removing from said mold the eye and hook members molded in coupled state.

8. A swivel snap hook substantially as described with reference to and as illustrated in Figures 1 to 4 of the
15 accompanying drawings.

9. A swivel snap hook substantially as described with reference to and as illustrated in Figures 7 and 8 of the accompanying drawings.

10. A swivel snap hook substantially as described with
20 reference to and as illustrated in Figures 9 and 10 of the accompanying drawings.

11. A swivel snap hook substantially as described with reference to and as illustrated in Figures 11 and 12 of the accompanying drawings.

25 12. A swivel snap hook substantially as described with reference to and as illustrated in Figures 13 and 14 of the accompanying drawings.

13. A swivel snap hook as described with reference to

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and as illustrated in Figures 15 and 16 of the accompanying drawings.

14. A method of manufacturing a swivel snap hook of synthetic resin substantially as described with reference to
5 and as illustrated in Figure 5 of the accompanying drawings.

15. A method of manufacturing a swivel snap hook of synthetic resin substantially as described with reference to and as illustrated in Figure 5 modified as in Figure 5A of the accompanying drawings.
