CLAMPING UNITS FOR USE IN PACKAGING

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ABSTRACT

A clamping unit comprising a member (A) having a cylindrical portion adapted to be inserted into a through-hole formed in a wall of a packaging box, a flange portion adapted to be closely fitted over the peripheral edge of said through-hole, an axial through-hole and grooves circumferentially formed in the end surface of said cylindrical portion or the front surface of said flange portion along the peripheral edge of said through-hole; and a member (B) having a cylindrical portion adapted to be inserted into a through-hole formed in the confronting wall of another packaging box, a flange portion adapted to be fitted over the peripheral edge of said through-hole, engaging projections adapted to be inserted into the axial through-hole of said member (A) and locking means adapted to elastically engage the end surface of the cylindrical portion or the inner peripheral surface of the axial through-hole of said member (A), said member (B) being inserted into said member (A), whereby the locking means of said member (B) are strongly elastically forced into the grooves of said member (A) and said member (A) is disengageably positively secured to said member (B).

2 Claims, 29 Drawing Figures
CLAMPING UNITS FOR USE IN PACKAGING

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to the field of clamping units for use in packaging which enable upper and lower component boxes of a large packaging box or two or more unitary packaging boxes to be disengageably coupled together when such coupling is necessary.

2. Description of the Prior Art

When it is necessary to couple unitary packaging boxes together, such coupling has been achieved, not by means of clamping units as proposed by the present invention but by means of bands 87 clamping an upper box 86 and a lower box 85 together as shown in FIG. 16a or hooks 90, 91 respectively provided on the upper and lower boxes 88, 89 and meshing with each other as shown in FIG. 16b. The use of the bands 87 has been disadvantageous in that the bands tend to become loosened or broken during transportation and, once they have been broken, reuse of the bands is impossible, which is uneconomical.

On the other hand, the provision of the hooks 90, 91 on the upper and lower boxes 88, 89 has had the disadvantages that sufficient consideration must be given to the mechanical strengths of the boxes and that the formation of the hooks 90, 91 is laborious. An additional disadvantage has been that the hooks make the separation of the upper and lower boxes 88, 89 difficult and require much labor for re-coupling, thus degrading the working efficiency.

SUMMARY OF THE INVENTION

The present invention consists in a clamping unit for use in packaging, which comprises a member having a cylindrical portion adapted to be inserted into a through-hole formed in a wall of one of two packaging boxes or upper and lower component boxes of a unitary packaging box to be coupled together, a flange portion adapted to be closely fitted over the peripheral edge of said through-hole on one side of the wall and grooves formed in said cylindrical portion for facilitating coupling; and a member having a cylindrical portion adapted to be inserted into a through-hole formed in the confronting wall of the other box, a flange portion adapted to be closely fitted over the peripheral edge of said through-hole on the side remote from said first member and locking means adapted to secured in said grooves, said members being coupled together by inserting one into another or rotating one relative to another, clamping the walls of the respective boxes therebetween, whereby said boxes are coupled together.

The first object of the invention is to provide a clamping unit comprising a member A having a cylindrical portion adapted to be inserted into a through-hole formed in a wall of one of packaging boxes or upper and lower component boxes of a packaging box to be coupled together, a flange portion adapted to be closely fitted over the peripheral edge of said through-hole and circumferential grooves formed in said cylindrical portion; and a member B having a cylindrical portion adapted to be inserted into a through-hole formed in the confronting wall of the other box, a flange portion adapted to be closely fitted over the peripheral edge of said through-hole, engaging projections adapted to be inserted into the cylindrical portion of said member A and locking means provided on the end extremities of said engaging projections and adapted to be elastically received in said grooves, said members A, B being coupled with or disengaged from each other, whereby said boxes are coupled with or disengaged from each other.

The second object of the invention is to provide a clamping unit comprising a member A having a cylindrical portion adapted to be inserted into a through-hole formed in a wall of one of packaging boxes, a flange portion adapted to be closely fitted over the peripheral edge of said through-hole, grooves formed in the inner peripheral surface of said cylindrical portion, circumferential steps extending from said grooves respectively and circumferential grooves formed in said steps respectively; and a member B having a cylindrical portion adapted to be inserted into a through-hole formed in the confronting wall of the other box, a flange adapted to be closely fitted over the peripheral edge of said through-hole, engaging projections projecting from said cylindrical portion and adapted to be inserted into the cylindrical portion of said member A, and locking means adapted to be elastically secured in the circumferential grooves of said member A, said members A, B being fastly coupled together with the locking means of the latter being elastically strongly secured in the grooves of the former, clamping said walls therebetween, whereby said boxes are coupled together such that they will not be disengaged even when subjected to vibrations during transportation and will be disengaged easily as desired.

The third object of the invention is to provide a clamping unit comprising a member A having a cylindrical portion adapted to be inserted into a through-hole formed in a wall of one of boxes, a flange portion adapted to be closely fitted over the peripheral edge of said through-hole, circumferential grooves formed in the outer surface of said flange portion and the end surface of said cylindrical portion; and a member B having a cylindrical portion adapted to be inserted into a through-hole formed in the confronting wall of the other box, a flange portion adapted to be closely fitted over the peripheral edge of said through-hole, engaging projections axially extending from said cylindrical portion and locking means respectively provided at the end extremities of said engaging projections and the end surface of said cylindrical portion and adapted to elastically engage the grooves of said member A; said members A, B being fastly positively coupled together with the locking means of the latter being elastically secured in the grooves of the former, clamping the walls of said boxes therebetween thereby said boxes are coupled together and said members A, B will not be disengaged from each other even when subjected to vibrations in the axial or circumferential direction.

The fourth object of the invention is to provide a clamping unit comprising a member C having a cylindrical portion adapted to be inserted into a through-hole formed in one of packaging boxes, a flange portion adapted to be closely fitted over the peripheral edge of said through-hole and axial through-hole; a member D having a cylindrical portion adapted to be inserted into a through-hole formed in the confronting wall of the other packaging box, a flange portion adapted to be closely fitted over the peripheral edge of said through-hole and an axial through-hole; and a key, said key being inserted into
the axial through-holes of said members C, D and elastically secured to the outer member to couple said members C, D together clamping the confronting walls of said boxes therebetween, or removed therefrom, whereby said boxes are very easily coupled with or disengaged from each other, and the packaging work is facilitated.

The fifth object of the invention is to provide a clamping unit comprising a member E having a cylindrical portion adapted to be inserted into a through-hole formed in a wall of one of packaging boxes, a flange portion adapted to be closely fitted over the peripheral edge of said through-hole, engaging projections axially projecting from said cylindrical portion and locking means provided at the end extremities of said engaging projections respectively; and a member F having a cylindrical portion adapted to be inserted into a through-hole formed in the confronting wall of the other packaging box, a flange portion adapted to be closely fitted over the peripheral edge of said through-hole and an axial through-hole, said members E, F being mounted in the through-holes of the respective boxes and said boxes being urged against each other with said walls facing each other, whereby the engaging projections of said member E are inserted into the axial through-hole of said member F and the locking means of the former are elastically locked in said member F, so that the members E, F are coupled together clamping the confronting walls of said boxes therebetween.

The sixth object of the invention is to provide a clamping unit comprising a member G having a cylindrical portion adapted to be inserted into a through-hole formed in a wall of one of packaging boxes, a flange portion adapted to be closely fitted over the peripheral edge of said through-hole and an axial through-hole; a member H having a cylindrical portion adapted to be inserted into a through-hole formed in the confronting wall of the other box, a flange portion adapted to be closely fitted over the peripheral edge of said through-hole, an outwardly expansible projection axially projecting from said cylindrical portion and adapted to be tightly inserted into the axial through-hole of said member G, and an axial through-hole; and a key adapted to expand said engaging projection outwardly; said members G, H being mounted in the through-holes of the respective boxes and coupled together with the outwardly expansible projection of the latter inserted into the axial through-hole of the former and said key being inserted into the axial through-holes of said respective members to outwardly expand the outwardly expansible projection into tight engagement with the inner peripheral wall of the axial through-hole of said member G, whereby said members are fast coupled together such that they will not be disengaged even when subjected to vibrations, and said boxes are coupled together with the confronting walls thereof being clamped by said members G, H, said boxes being readily disengaged from each other by pulling said key off the axial through-holes of said members.

The seventh object of the invention is to provide a clamping unit comprising a member I having a cylindrical portion adapted to be inserted into a through-hole formed in a wall of one of packaging boxes, a flange member adapted to be closely fitted over the peripheral edge of said through-hole and an internally threaded axial through-hole; and a member J having a cylindrical portion adapted to be inserted into a through-hole formed in the confronting wall of the other box, a flange portion adapted to be closely fitted over the peripheral edge of said through-hole; and an externally threaded projection axially projecting from said cylindrical portion and adapted to be screwed into the internally threaded through-hole of said member I; said members I, J being mounted in the through-holes of the respective boxes and fastly coupled together by screwing the externally threaded projection of the latter into the internally threaded through-hole of the former, with the confronting walls of the respective boxes being clamped therewith, whereby said boxes are coupled together and said members I, J will not be separated even when subjected to vibrations, said boxes being easily disengaged from each other by releasing the engagement of said members upon unscrewing the member I.

BRIEF DESCRIPTION OF THE DRAWING

FIGS. 1a, 1b and 1c are respectively a front view, a sectional side view and a back view of a member A in the first embodiment of the package clamping unit according to the present invention;

FIG. 2 is a perspective view of a member B of the first embodiment of the clamping unit;

FIGS. 3a, 3b and 3c are respectively a front view, a sectional side view and a fragmentary back view of the member (B);

FIGS. 4a and 4b are respectively a front view and a side view of a spacer;

FIG. 5 is a sectional side view illustrating the manner of coupling the members A and B;

FIG. 6 is a perspective view of members C, (D) and a key in the second embodiment of the clamping unit according to the invention;

FIG. 7 is a sectional side view of the second embodiment of the clamping unit in a clamping position;

FIG. 8 is a sectional side view illustrating the manner of coupling the members C, D and the key;

FIGS. 9a and 9b are respectively a front view and a sectional side view of a member E in the third embodiment of the clamping unit according to the invention;

FIGS. 10a and 10b are respectively a front view and a sectional side view of a member F of the third embodiment of the clamping unit;

FIGS. 11a and 11b are respectively sectional side views of the members E and F in opposed positions;

FIGS. 12a, 12b and 12c are respectively sectional side views of members G, H and a key in the fourth embodiment of the clamping unit according to the invention;

FIG. 13 is a perspective view of the members G, H and the key;

FIGS. 14a and 14b are respective sectional side views of members I and J in the fifth embodiment of the clamping unit according to the invention;

FIGS. 15a and 15b are respectively perspective views of the members I and J; and

FIGS. 16a and 16b are respectively a perspective view of an illustrative view illustrating a conventional manner of clamping packages or upper and lower boxes.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Embodiments of the present invention will be de-
scribed in detail with reference to the accompanying drawings. In the first embodiment of the invention, the clamping unit comprises a member A and a member B. The member A which is generally indicated by numeral 1 is composed integrally of a flange portion 2 and a cylindrical portion 3, and has an axial through-hole 5. Two grooves 4 are formed substantially axially in the inner surface of the through-hole 5 at diametrically opposite locations. These grooves 4 may be formed linearly or helically. The peripheral edge portion of the front end of the through-hole 5 is partially recessed to form steps 6 respectively extending circumferentially in a counterclockwise direction from the grooves 4, and an arcuate groove 7 is formed in each step 6. At the terminal end of each arcuate groove 7 is formed an engaging depression 8. On the other hand, grooves 9 are formed in the end surface of the cylindrical portion 3, which are respectively extending circumferentially in the same direction as the grooves 7 from the rear ends of the grooves 4, and an engaging depression 10 is formed at the terminal end of each groove 9. The member B which is generally indicated by numeral 11 in FIGS. 2 and 3, is composed integrally of a flange portion 12, a tapered cylindrical portion 13 and an engaging projection 14. Substantially semicircular recesses 16 are formed in the surface of the flange portion 12 extending into the tapered cylindrical portion 13, so as to define a handle 15 therebetween. At the front edge of the engaging projection 14 is provided engaging arms 17 which will be inserted into the grooves 4 and slidably moved on the steps 6 respectively. Each engaging arm 17 is provided with an engaging projection 18 adapted to slide in the groove 7 and received in the engaging depression 8 of the member A. On the front end surface of the tapered cylindrical portion 13 are formed engaging projections 19 at locations opposite the engaging projections 18, which are adapted to slide in the grooves 9 and received in engaging depressions 10 formed at the terminal ends of said grooves 9, respectively. The members A and B are respectively integrally molded of a synthetic resin material. Numeral 20 (FIG. 5) designates a through-hole formed, for example, in a lower box 21, and 22 designates staples by which the flange portion 2 of the member A is fixed to the lower box 21 to secure the member A in the through-hole 20 in said lower box. Since the member A is fastened to the lower box 21 by means of the staples 22, there is no necessity of interposing an adhesive or the like between the member A and the lower box 21. Further, the member A is provided with elongate stoppers 23 which axially extend on the outer surface of the cylindrical portion 3 up to the flange portion 2 and by which the member A is held against rotation after it has been forced into the through-hole 20 in the lower box 21. Numeral 24 designates an upper box formed with a through-hole 25, and 26 designates a spacer to provide a space for receiving the projecting rear end of the cylindrical portion 3 of the member A. This spacer 26 is formed with an opening 27 and placed on the outer surface of the upper box 24 with said opening 27 in registration with the through-hole 25 in said upper box. When the member B is inserted into the through-hole 25 in the upper box 24, the engaging projection 14 is received in the through-hole 5 of the cylindrical portion 3 of the member A previously secured to the lower box 21. The tapered surface of the cylindrical portion 13 of the member B facilitates the insertion of said member B into the through-hole 25. The members A and B are coupled together in the following manner: The member B is inserted with force such that the engaging arms 17 at the front end of the engaging projection 14 are slidably received in the grooves 4 formed in the inner surface of the through-hole 5 of the member A respectively. Upon completion of the insertion, the member B is turned in a counterclockwise direction by the handle 15, whereby the engaging projections 18 on the engaging arms 17 and the engaging projections 19 on the tapered cylindrical portion 13 are received in the grooves 7 and 9 of the member A respectively and slidingly move therein. The member B is rotatable through a limited angle as determined by the length of the grooves 7 and 9. Finally, the engaging projections 18 and 19 of the member B are respectively received in and elastically engage the engaging depressions 8 and 10 of the member A, and thus the member B is fastly coupled with the member A. When it is desired to separate the upper and lower boxes from each other, this can be readily achieved by disengaging the member B from the member A by turning the former in a counterclockwise direction by the handle 15. As described above, when it is desired to couple the upper box 24 and the lower box 21 or more than one boxes with each other, the through-holes 20, 25 are formed in the confronting walls of said boxes and the spacer 26 is attached to the outer surface, for example, of the upper box 24. The spacer 26 is attached such that its opening 27 registers with the through-hole 25 of the upper box 24. It will be understood that the length of the tapered cylindrical portion 13 of the member B must be equal to the wall thickness of the upper box 24 and the length of the engaging projection 14 must be substantially equal to the wall thickness of the member A. In the first embodiment, as described above, the members A and B are elastically coupled together by the engagement of the projections 18 on the engaging arms 17 and the projections 19 on the front surface of the tapered cylindrical portion 13 of the member B with the engaging depressions 8 and 10 at the terminal ends of the grooves 7 and 9 of the member A respectively. With the clamping unit constructed and used as described above, the upper box 24 and the lower box 21 can be positively coupled together by one step of operation and the coupling is fast because the member A is securely fastened to the upper box 24 by means of the staples 22. Further, the upper and lower boxes can be separated from each other only by turning the member B in a counterclockwise direction by the handle 15. Therefore, the clamping unit described above has such remarkable advantages that the working efficiency can be enhanced, that the printing or indication of a company name, the name of the article, etc., on the surfaces of the boxes is possible and the appearance of the package is not spoiled, because the clamping unit does not expose, and that the clamping unit does not take extra space.

The second embodiment of the invention will be described hereunder with reference to FIGS. 6, 7 and 8. In this embodiment, the clamping unit comprises a member C generally indicated by numeral 28, a member D generally indicated by numeral 29 and a key generally indicated by numeral 30. The members C and D respectively have cylindrical portions 30, 31, flange portions 32, 33 and through-holes 34, 35. Numeral 36
designates steps of the member C formed by recessing the front surface of the flange portion 33 and 37 designates grooves formed in said steps 36 respectively. The key 38 is composed integrally of a handle 39, a stem 40 and engaging arms 41. Numerical 42 designates engaging projections formed at portions of the engaging arms 41; 43, 44 packaging boxes to which the members C and D are secured respectively; and 45, 46 through-holes formed in said boxes 43, 44 for receiving the cylindrical portions 30, 31 of the members C, D respectively. In securing the members C, D to the boxes 43, 44, the flange portions 32, 33 are usually fixed to said boxes by means of an adhesive or staples.

The second embodiment of the clamping unit described above is used in the following manner: The members C, D are mounted on the packaging boxes 43, 44 by inserting their cylindrical portions 30, 31 into the through-holes 45, 46 and secured thereto at the flange portions 32, 33 as shown in FIG. 8. The key 38 is inserted into the through-holes 34, 35 of the members C, D and turned in the direction of the arrow in FIG. 8, whereby the engaging arms 41 at one end of the key 38 slide on the steps 36 and the projections 42 are received in the grooves 37. Thus, the key 38 is elastically secured clamping the members C, D together. The members C, D are fastened together by the key 38 and hence the packaging boxes 43, 44 are integrally connected together. The key 38 can be removed from the through-holes 34, 35 of the members C, D by turning it in the opposite direction. FIG. 6 shows the sequence in which the key 38 is inserted into the through-holes 34, 35 of the members C, D. As described above, with the clamping unit according to this embodiment, the preparation for coupling the boxes 43, 44 together can be accomplished only by inserting the cylindrical portions 30, 31 of the members C, D into the through-holes 45, 46 formed in the confronting walls of said boxes and securing the flange portions 32, 33 to said walls. The coupling of the boxes 43, 44 can be achieved simply by inserting the key 38 into the through-holes 34, 35 of the members C, D and clamping said member together by turning said key.

The third embodiment of the invention will be described with reference to FIGS. 12 and 13. In this embodiment, the clamping unit comprises a member F, generally indicated by numeral 47 and a member F generally indicated by numeral 48. These members E, F respectively have cylindrical portions 49, 50 and flange portions 51, 52. Numerical 55 designates engaging arms projecting from the cylindrical portion 49 of the member E and each having a hook 54 at its end extremity. Numerical 55 designates a through-hole of the member F; 56 steps formed at the forward end of the through-hole 55; 57 recesses formed at portions of said steps 56; and 58 a handle provided on the member E. The members E, F are respectively integrally molded of a synthetic resin material and preferably elastic material. The engaging arms 53 restore their normal positions when the hooks 54 formed at the end extremities thereof are received in the recesses 57, whereby the members E, F are fastened together. Moreover, the members E, F are fastened in a very simple manner. Namely, the through-holes are formed in the confronting walls of two boxes and the cylindrical portions 49, 50 of the members E, F are inserted into said through-holes and fixed therein respectively in opposed relation to each other. In fixing the member F to the box, the flange portion 52 thereof may be secured directly to the inner surface of the box by means of an adhesive or staples. The other member E is inserted in the through-hole of the opposite box, with the engaging arms 53 extending into the through-hole 55 of the member F, and then turned in one direction, whereby the hooks 54 at the end extremities of said engaging arms are respectively received in the recesses 57 and the engaging arms 53 which have been elastically deflected inwardly by the inner surface of the through-hole 55 are opened to their normal positions, and thus the member E is fastened to the member F. For disengaging the member E from the member F, the member E is turned with force, whereby the hooks 54 are removed from the recesses 57 respectively. The member E can be disengaged from the member F simply by pulling the engaging arms 53 off the through-hole 55. According to this invention, therefore, two separate packaging boxes or upper and lower boxes can be coupled together or disengaged from each other simply by rotating the member E relative to the member F. Furthermore, the clamping unit of this embodiment can be produced easily.

Now, the fourth embodiment of the invention will be described with reference to FIGS. 12 and 13. In this embodiment, the clamping unit comprises a member G generally indicated by numeral 59, a member H generally indicated by numeral 60 and a key generally indicated by numeral 69. The members G, H respectively are composed integrally of flange portions 61, 62 and cylindrical portions 63, 64. Numerical 65 designates a through-hole formed in the cylindrical portion 63 of the member G, and 66 designates an outwardly expandable cylindrical projection projecting from the cylindrical portion 64 of the member H and having slits 67 axially formed therein and an annular groove 68 formed in the inner surface thereof adjacent the front end thereof. The key 69 is adapted to be inserted into the cylindrical projection 66 of the member H, and composed integrally of a tapered body 70, an annular projection 71 formed on said tapered body 70 adjacent the front end thereof and adapted to be received in the annular groove 68, and a handle 73 formed with a hole 74 for receiving a driver or the like by which said key is inserted or pulled off.

The members G and H are to be mounted in the walls of boxes, and particularly the member G is previously secured to the box by means of an adhesive or staples. The member H is to be inserted into a through-hole formed in the wall of the other box and its cylindrical projection 66 is to be received in the through-hole 65 of the member G. After the separate boxes are coupled together by the members G, H, the key 69 is inserted into the cylindrical projection 66 of the member H while expanding said cylindrical projection outwardly into tight contact with the inner surface of the through-hole 65 of the member G, and finally the annular projection 71 of said key is received in the annular groove 68 in the inner surface of the cylindrical projection 66 of the member H. Thus, the key 69 is fastened in the cylindrical projection 66 against outward movement. For removing the key from the member H, a driver or the like is inserted into the hole 72 in the handle 73 and the key is manually pulled outwardly through said driver or the like. Upon thus removing the key 69, the cylindrical projection 66 of the member H is released from tight contact with the inner surface of
the through-hole 65 of the member G and the member H can be easily disengaged from the member G.

On some occasions, the flange portion 62 of the member H is detachably secured to the inner surface of the box by means of an adhesive or staples by reason of strength. The clamping unit according to this embodiment is highly convenient to that two or more separate boxes can be coupled together as the occasion demands during transportation, simply by inserting the members G, H into the through-holes previously formed in the confronting walls of these boxes and coupling them together fastly by means of the key 69. Not only the packaging boxes but also the outer cabinets of apparatus can be simply and positively coupled together by using the members G, H and the key 69.

As described above, according to the fourth embodiment the cylindrical projection 66 of the member H is inserted into the through-hole of the cylindrical portion 63 of the member G, and said members G and H are disengageably coupled with each other by means of the key 69. Therefore, the engagement or disengagement of the members G and H can be achieved by a simple operation of the key. Such construction has the remarkable advantage that separate packaging boxes or cabinets of apparatus can be disengageably coupled with each other, viz.

Finally, the fifth embodiment of the invention will be described with reference to FIGS. 14 and 15. In this embodiment, the clamping unit comprises a member I generally indicated by numeral 74 and a member J generally indicated by numeral J. These members I and J respectively are composed integrally of cylindrical portions 76, 77 adapted to be inserted into through-holes formed in the confronting walls of separate packaging boxes or cabinets, and flange portions 78, 79 adapted to be fitted on the inner surfaces of said walls. The member I has an internally threaded through-hole 80 formed axially therein, while the member J has an externally threaded projection 81 projecting from the front surface of the cylindrical portion 77. Numeral 82 designates an arcuate groove formed in the rear end surface of the cylindrical portion 76 of the member I; 83 an engaging depression formed at a terminal end of said arcuate groove 82; and 84 a projection formed on the front end surface of the cylindrical portion 77 of the member J and adapted to be slidably received in the arcuate groove 82 and brought into elastic engagement with the engaging depression 82. Numeral 85 designates a handle formed on the cylindrical portion 77 of the member J.

In using the clamping unit of the type described above for coupling, for example, upper and lower boxes together, through-holes are bored in the confronting walls of said boxes, and the cylindrical portion 76 of the member I is inserted into one of said through-holes, while the cylindrical portion 77 of the member J is inserted into the other through-hole and turned in one direction to screw the externally threaded projection 81 into the internally threaded through-hole 80 of the member J. In this case, the projection 84 slidingly moves in the arcuate groove 82 as the externally threaded projection 81 is screwed into the internally threaded through-hole 80, and it is finally brought into elastic engagement with the engaging depression 83. Since the projection 84 is elastically secured in the engaging depression 83, the members I and J are coupled together fastly and not allowed to loosen even when subjected to vibrations or other external forces. According to the fifth embodiment described above, the members I and J are coupled together through the meshing engagement between the externally threaded projection 81 and the internally threaded through-hole 80 and also the elastic engagement between the projection 84 and the depression 83 at the end of the arcuate groove 82. Therefore, the clamping unit of this type has the remarkable advantages that the molding of the members I, J is easy, that the clamping operation is very easy and that the positive engagement or disengagement of separate packaging boxes can be achieved in a simple manner.

It will be understood from the description herein that the clamping units according to the present invention are highly advantageously used for coupling packaging boxes with each other.

We claim:

1. A clamping unit for use in packaging, comprising a member (A) having a cylindrical portion adapted to be fitted into a through-hole formed in the wall of one of boxes to be coupled together, a flange portion adapted to be fitted over the peripheral edge of said through-hole, grooves substantially axially formed in the surface of the axial bore of said cylindrical portion, steps formed at the end surface of said cylindrical portion closer to said flange portion and extending circumferentially from said grooves respectively, arcuate grooves formed in said steps respectively, said respective arcuate grooves being provided with an engaging depression at end portion thereof, and arcuate grooves formed at the other end surface of said cylindrical portion and extending circumferentially from said grooves respectively, said respective arcuate grooves being provided with an extending depression at end portion thereof; and a member (B) having a cylindrical portion adapted to be fitted into a through-hold formed in the confronting wall of the other box, a flange portion adapted to be fitted over the peripheral edge of said through-hole, an engaging projection adapted to be inserted into the axial bore of the cylindrical portion of said member (A), and engaging arms provided with engaging projections and engaging projections formed at the end surfaces of said engaging projection and said cylindrical portion respectively for elastic engagement with said member (A); said members (A), (B) being molded of a synthetic resin material and said member (B) being inserted into said member (A) and turned relative to said member (A), whereby said engaging projections of said engaging arms and said engaging projections are engaged with said engaging depressions of said arcuate grooves respectively and said members (A), (B) are coupled together.

2. A clamping unit for use in packaging, comprising a member (A) having a cylindrical portion adapted to be fitted into a through-hole formed in the wall of one of boxes to be coupled together, a flange portion adapted to be fitted over the peripheral edge of said through-hole, grooves substantially axially formed in the inner surface of said cylindrical portion, steps formed at one end surface of said cylindrical portion and extending circumferentially from said grooves respectively, arcuate grooves formed in said steps respectively, and engaging depressions formed at the terminal ends of said grooves respectively; and a member (B) having a cylindrical portion adapted to be fitted into a through-hole formed in the confronting wall of the
other box, a flange portion adapted to be fitted over the peripheral edge of said through-hole, an engaging projection adapted to be inserted into the axial bore of the cylindrical portion of said member (A), engaging arms adapted to elastically engage the arcuate grooves of said member (A), engaging projections formed on said engaging arms respectively, and a handle formed at the end surface of the cylindrical portion closer to said flange portion; said member (B) being inserted into said member (A) and turned in one direction to be disengageably coupled with said member (A).

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