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PATENT SPECIFICATION

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(54) FASTENING DEVICES

(71) We, HONDA GIKEN KOGYO KABUSHIKI KAISHA, a Japanese Company, of 27-8 Jingumae 6 chome, Shibuya-ku, Tokyo, Japan; and NIFCO INC., a Japanese Company, of World Trade Center Building 23F, 4-1 Hamamatsucho 2 chome, Minato-ku, Tokyo, Japan, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to fastening devices integrally formed of thermoplastic synthetic resin, which can be fitted onto an anchor provided on an object to be fastened and, in that state, inserted into hooking engagement with a hole bored in a plate, and can be released from the hooking engagement when desired. Particularly, the fastening devices of this invention are of value in fastening seats to automobile bodies.

Among the methods heretofore developed for fastening seats to automobile bodies, there is included a method which comprises boring holes in seat bases of steel plate immovably formed inside an automobile body, attaching to the lower sides of seats engaging claws having the leading ends bent in the shape of the letter L, having the seats placed in their erect position above the seat bases, causing the leading ends of the engaging claws to be inserted into the holes, and subsequently tilting the seats on the seat bases to make the engaging claws completely plunge into the holes and thereby immobilizing the seats onto their bases. This method of fastening has an advantage that the seats can be firmly fastened by a relatively simple work, because the engaging claws are never released unless the seats are raised in a reverse direction. Unfortunately, this method requires the seats to be raised up and turned down while the engaging claws are brought into their hooked engagement or released out of the engagement and, during such movements of the seats, the backs thereof tend to interfere with the movements of the worker. Moreover, such movements of the seats must be made within a rather limited space of the automobile interior, compelling the worker to assume a highly restrained posture during the work and consequently rendering the work itself highly inconvenient.

An object of the present invention is to provide a fastening device which has a detent so adapted that an article such as a seat which is to be fastened can be fastened securely by simply forcing the device into a matching hole without requiring said article to be moved further, and the article, when desired to be removed, can easily be released from the engagement and removed by releasing the detent.

A fastening device according to the present invention is integrally formed of a thermoplastic synthetic resin, and comprises a pair of plate-like leg members which are connected by a flexible hinge so that they can be brought into face-to-face relation, fastening means at extremities of the leg members remote from the hinge, capable of retaining the leg members in the face-to-face relation, there being an opening in one leg member in which lies a latch member lying substantially in the plane of the one leg member and joined to that leg member at the boundary of the opening nearest the hinge, the latch member carrying a detent which, when the leg members are face-to-face, extends away from the leg member which does not carry the latch member, and an operating member extending from the end of the latch member remote from the hinge.

The accompanying drawings show, by way of example, one particular fastening device embodying the present invention. In these drawings:—

Figure 1 is a perspective view of the device in its extended state;

Figure 2 is a perspective view of the device of Figure 1 in its folded state;

Figure 3 is an enlarged front view of the fastening device in its working state;

Figure 4 is a cross-section on the line IV—IV in Figure 3;

Figure 5 is a cross-section on the line V—V in Figure 3;

Figure 6 is an enlarged partially cutaway perspective view of the fastening device in a state of use; and

Figure 7 is an explanatory diagram illustrating the context in which the fastening device can be used.

The device will be described as applied to the fastening of a seat 2 to a seat base 1 provided on the body of an automobile (see Figure 7).

As illustrated in Figure 1, the fastening device has a pair of plate-like leg members 3*a*, 3*b* integrally connected through a flexible web 4 constituting a hinge. The one leg member 3*a* has at the extremity thereof a pair of oppositely protruding fastening projections 5, and the other leg member 3*b* at the extremity thereof has a pair of fastening arms 6 extending parallel to each other in a direction perpendicular to said leg member 3*b*, and having claws 6′ at the leading ends thereof. When the claws 6′ and the fastening projections 5 are brought into mutual engagement, thw two leg members are retained in face-to-face condition (Figure 2).

At the centre of the leg member 3*b*, a latch member 7 is defined by a pair of parallel slots extending longitudinally in the leg member, inwards from the end thereof remote from the hinge 4. The free end of this latch member 7 is connected through a thin-walled hinge 9 to a strip-like operating member 8.

The leg members 3*a*, 3*b* are formed in symmetrically conforming shapes so that, when they are folded face-to-face along the hinge 4, they will be accurately opposed to each other, with their extremities brought into perfect union.

These two leg members 3*a*, 3*b* have raised portions 10 which, when the members 3*a*, 3*b* are folded face-to-face, abut each other and give rise to a cylindrical cavity 11 on the inside of the hinge 4, and to cavities 12 one at each opposite side of the leg members, extending in the direction of the length. The upper ends of the longitudinal cavities 12 open into windows 13 which are formed by the fastening arms 6 in conjunction with the raised portions 10. These cavities 11 and 12 and the windows 13 together give rise to a continuous space substantially in the shape of a letter U.

The latch member 7 defined by the two parallel slots in the leg member 3*b* is, when in its normal state (i.e. when unstressed), in the same plane as the leg member 3*b*. A detent 7*a* is formed on the outer surface of the latch member 7, and protrudes from the outer surface of the leg member 3*b*, i.e. away from the leg member 3*a*. The operating member 8 can be bent along the hinge 9 through a right angle in the direction of the other leg member 3*a* and then enter a gap between the projections 5. Thereupon it is retained by claws 14 on the fastening projections 5.

These claws 14, serving to restrain the operating member, extend obliquely inwards from the opposed edges of the two projections 5. These claws 14 are of such length that the leading ends thereof and the extremity of the leg member 3*a* allow for a clearance greater than the wall thickness of the operating member. For secure engagement with these claws, the operating member is forcibly driven into the gap between the two fastening projections 5 and then snapped into engagement after having forced its way past the two claws 14. After this engagement, the operating member is retained in the gap formed between the leading ends of the claws 14 and the extremity of the leg member 3*a*. Within this gap, the operating member enjoys freedom of motion in the longitudinal direction. In the illustrated preferred embodiment, the operating member 8 has, at a suitable point along its length, two spring arms 15 extending obliquely outwards from the opposite edges. When the operating member 8 is pulled longitudinally (to the right in Figures 4 and 6), these spring arms 15 are forced into the gap between the projections 5 and impart force to the operating member in the direction of restoration. When the operating member 8 is pulled in this way, the latch member 7 is deflected (to the right in Figures 4 and 6) so that the detent 7*a* ceases to project from the leg member 3*a*. When the operating member 8 is released, the spring arms 15 restore the operating member, latch member and detent to their normal positions, with the detent 7*a* projecting from the leg member 3*a*. The operating member 8 is so designed that, while it is retained in its normal state, the latch member 7 prevents the spring arms 15 coming into engagement with the fastening projections 5.

The raised portions 10 formed on the leg members are provided on their opposed surfaces respectively with protrusions 17 and matching recesses 18 so that, when the two leg members 3*a*, 3*b* are folded into face-to-face contact, these protrusions 17 and matching recesses 18 will cooperate closely, and prevent the two leg members from being moved relatively to each other. Further, the two leg members have outwardly extending flanges 19, 20 at their

ends remote from the hinge 4, which serve the purpose of ensuring the stability of the fastening device when inserted in a hole in the seat base 1.

The fastening device is made by being integrally moulded of a thermoplastic synthetic resin in the extended shape as shown in Figure 1.

This fastening device is assembled in to its operating state by folding the two leg members and causing the fastening arms 6 to be snapped into engagement with the fastening projections 5, and subsequently bringing the operating member 8 into engagement with the claws 14 of the projections 5, as described above.

Now, the actual use of the fastening device will be be described with reference to the fastening of a seat 2 to a seat base 1. During the manufacture of the seat proper, a metal anchor 2*a*, formed by bending a steel wire in the shape of an inverted top-hat, is attached in advance to the lower surface near the front of the seat. In the seat base 1, a hole 1*a* is formed in advance in the upper side. Before the seat 2 is mounted in position on the seat base 1, the fastening device embodying the present invention is attached to anchor 2*a*.

The fastening device is placed below the anchor 2*a* with the leg members 3*a*, 3*b* still in their unfolded state. The hinge 4 is then applied to the bottom section of the anchor 2*a*, and the two leg members are folded so as to nip the anchor therebetween, with the result that the bottom section will be held inside the cavity 11 formed in consequence of the folding, and the two vertical sections of the anchor will be embraced in the two cavities 12 formed on the opposite edges of the device. With the entirety of the U-shaped portion of the anchor trapped securely between the folded leg members, the fastening arms 6, 6′ extended from one leg member 3*b* are brought into secure engagement with the projections 5 formed on the other leg member 3*a*, completing the attachment of the fastening device to the anchor 2*a*. Prior to this final engagement, the operating member 8, formed as an outward extension of the free end of the latch member 7, is bent down onto the extremity of the other leg member 3*a* and then brought into secure engagement with the claws 14 as described above, so that the operating member 8 will assume a position parallel to the lower surface of the seat.

After the fastening device has been attached to the anchor as described above, it is placed over the hole 1*a* of the seat base. The anchor 2*a* is then pushed into the hole in conjunction with the fastening device. The detent 7*a* which protrudes from the outer surface of one leg member 3*b* is thrust out after riding through the hole, and is brought into secure engagement with the lower edge of the hole by virtue of the resiliency of the latch member 7, completing the fastening of the seat to its seat base.

Owing to the secure engagement of the detent 7*a* of the latch member 7 with the edge of the hole, the anchor 2*a* which has been inserted into the fitting aperture keeps the seat fast to the seat base. If, thereafter, the operating member is pulled longitudinally, it causes the latch member to bend towards the interior of the leg member 3*b* and enables the detent 7*a* to be retracted from the outer surface of the leg member. Therefore, the seat can readily be removed from the seat base by gripping a knob 16 provided at the extremity of the operating member, pulling the operating member and, at the same time, lifting the seat.

Figures 6 and 7 illustrate the foregoing condition under which the fastening device is put to use. As is evident from the illustrations, the hole to be bored in the seat base is desired to be located so that the end portion of the operating member will not be concealed between the seat base and the seat when the fastening device is put to use.

As described above, a fastening device of this invention is designed to intervene between the hole bored in the seat base and the anchor, and to provide secure union upon simply causing the anchor and device to be inserted into the hole. This secure union between the anchor and the hole by the medium of a fastening device of this invention can, when necessary, easily be released by externally actuating the operating member in the direction of releasing the detent from the hole. The work involved is easy to perform. The fastening of an article such as a seat to an underlying plate such as a seat base can be accomplished with a light work burden.

Further the fastening devices of this invention have an advantage that they can be integrally moulded of a plastics material and, therefore, can be supplied at a low price.

WHAT WE CLAIM IS:—

1. A fastening device integrally formed of a thermoplastic synthetic resin, comprising a pair of plate-like leg members which are connected by a flexible hinge so that they can be brought into face-to-face relation, fastening means at extremities of the leg members remote from the hinge, capable of retaining the leg members in the face-to-face relation, there being an opening in one leg member in which lies a latch member lying substantially in the plane of the one leg member and joined to that leg member at the boundary of the opening nearest the hinge, the latch member carrying a detent

which, when the leg members are face-to-face, extends away from the leg member which does not carry the latch member, and an operating member extending from the end of the latch member remote from the hinge.

2. A device according to claim 1, in which the faces of the leg members which are towards each other when in the face-to-face relation have raised portions which cooperate to define around them a U-shaped space.

3. A device according to claim 1 or claim 2, in which the operating member is strip-like and is hinged to the latch member, and the operating member can be swung into a gap between two projections on that leg member which does not carry the latch member.

4. A device according to claim 3, in which the projections have claws on the opposed edges thereof, extending obliquely inwards from the opposed edges so as to obstruct removal of the operating member.

5. A device according to claim 3 or claim 4, in which the operating member has spring arms extending obliquely outwards from the opposite edges thereof, these arms being able to impart a force to the operating member in the direction of restoration when the operating member is pulled lengthwise in the gap between the projections.

6. A device according to any of claims 1 to 5, in which the operating member has a knob at the free end thereof.

7. A device according to any of claims 1 to 6, in which the leg members have outwardly extending flanges at their edges remote from the hinge.

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3 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 1

Fig.1

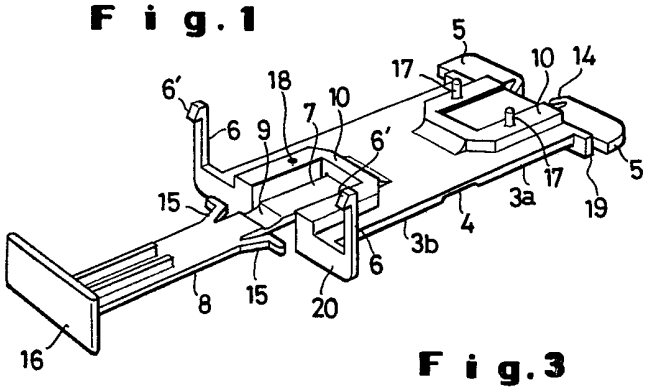

Fig.3

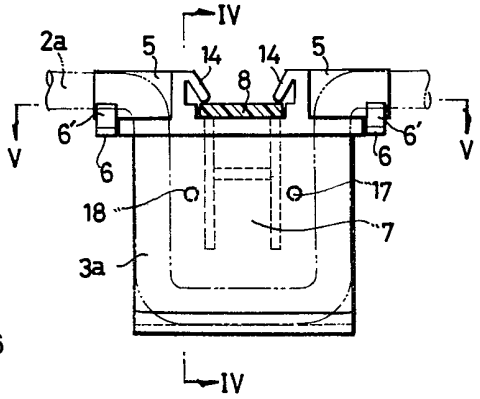

Fig.2

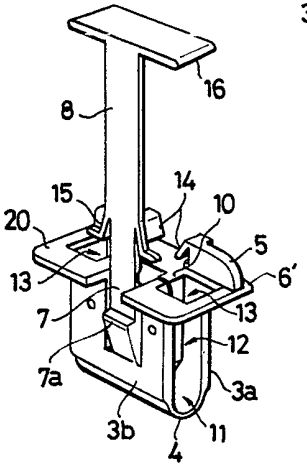

Fig.4

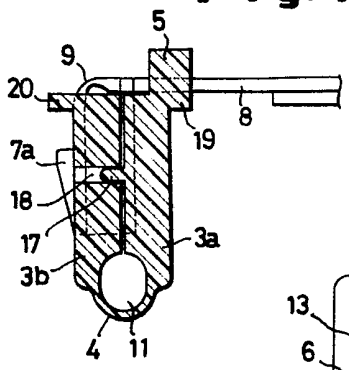

Fig.5

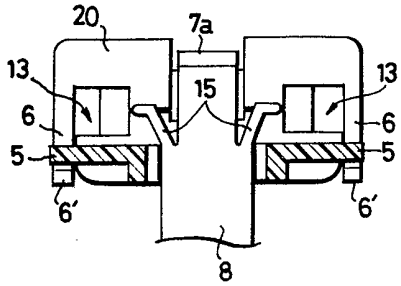

Fig.6

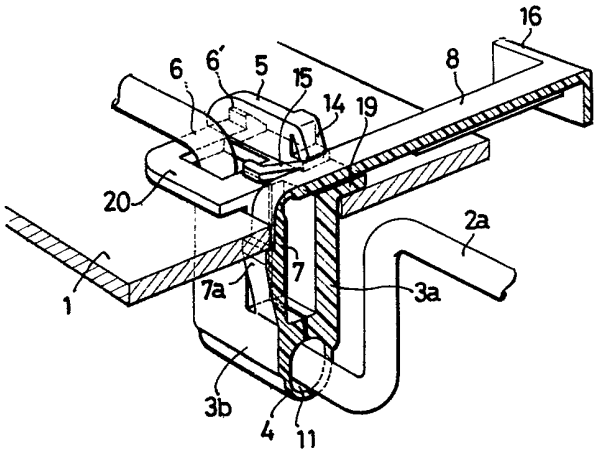

Fig.7