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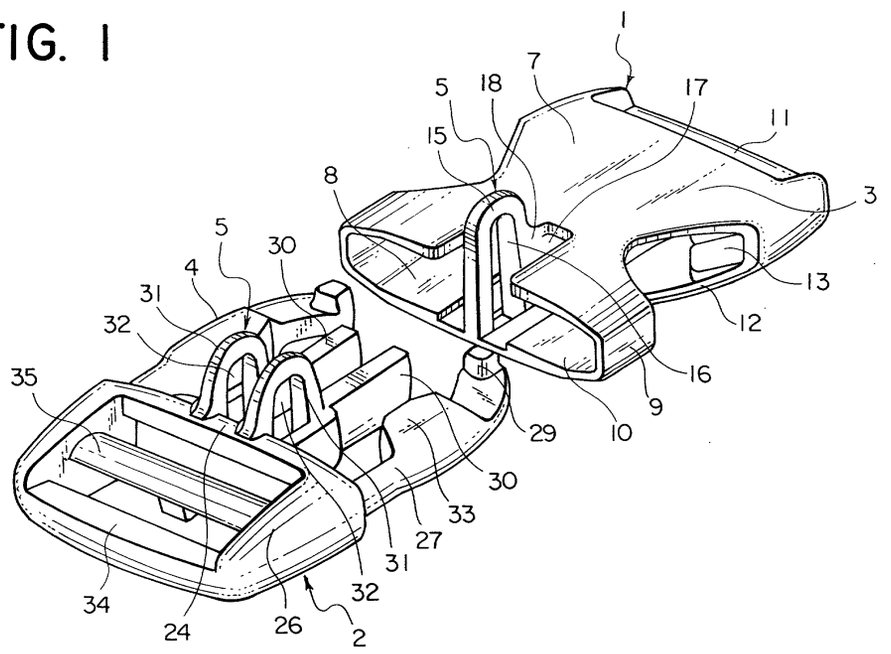
(54) Separable buckle

(57) A buckle which consists of a female member (1) having an insertion port (10) at an end of a housing (3) and a male member (2) having an insertion portion capable of being inserted into the housing (3), and is formed of a mounting portion (5) at least on one of the female member (1) and the male member (2). The mounting portion (5) can mount a locking device (50) or a sealing device (52) for locking or sealing engagement between the female member (1) and the male member (2) and comprises, for example, a mounting column (15, 31) or the like having a through hole (16, 32). When the insertion portion (4) is inserted into the housing (3), the through holes (16, 32) are overlapped and a lock bar is inserted into the through hole (16, 32) so as to lock, the engagement between the female member (1) and the male member (2) is locked accurately and easily.

FIG. 1



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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to an insertion type buckle comprised of a female member and a male member, wherein the female member and the male member can be locked or sealed with a locking device or the like when the female member and the male member are engaged with each other by insertion.

2. Description of the Related Art

[0002] A conventional insertion type buckle in which a male member is inserted into a female member has been widely used as a joint device for opening/closing an opening of a bag such as a nap sack or a binding device of a fastening belt for fastening commodities or traveler's bags. Although this buckle allows users to engage/disengage the female member and male member easily, anyone can release the engagement so that there is a fear that if a bag having this buckle is left without owner's attention, somebody may release the engagement and steal its content or commodities from the bag. To solve this problem, a buckle, which is structured to be locked so that the male member inserted into the female member may not be removed, has been well known.

[0003] For example, a buckle is known which is disclosed in Japanese Utility Model Publication No. HEI7-46166 and shown in Fig. 34. In this buckle, a locking cover 110 to guide engaging/disengaging operation is disposed slidably in a pressing plate 121 which is provided on a housing 103 of the female member 101 and can be pressed in order to release the engagement with a male member 102. This locking cover 110 accommodates a rotor 112 which revolves eccentrically and slides the locking cover 110 back and forth when a key 111 is inserted and revolved into the rotor 112. When the locking cover 110 is forwarded, the pressing plate 121 cannot be pressed, and when the locking cover 110 is retreated, the pressing plate 121 can be pressed. By this pressing, the engaging piece of the male member 102 releases engagement with an elastic engaging piece 101a of the female member 101 so that the male member 102 can be removed from the housing 103 of the female member 101.

[0004] However, said buckle 100 is a buckle in which, the locking cover 110 is mounted slidably through the rotor 112 on the pressing plate 121 of the housing of the female member 101. Therefore, the structure of the buckle 100 is very complicated and a large number of parts are required. Moreover, the special key 111 is necessary, thus an existing locking device such as a padlock or a cylinder lock cannot be used as the locking device of this buckle. Therefore, there is a problem that the cost of the buckle may be high.

[0005] Further, UK patent publication No.2266337 discloses a buckle as shown in Fig. 35. This buckle 120 engages when right and left inserting leg portions 122a of a male member 112 are inserted into a housing 121a of a female member 121. In this buckle 120, a tongue-like piece 123 is formed by bending an end of a narrow lock plate 123 perpendicularly in the shape of letter L and a protruded piece 123b is provided in the center portion near the other end such that it is protruded in the same direction as the tongue-like piece 123a. This protruded piece 123b is formed with insertion hole 123c of a U-shaped lock bar which is a locking device. Upon locking, after the right and left insertion porting leg portion 112a of the male member 122 is inserted into the housing 121a of the female device 121, the tongue-like piece 123a at an end of the lock plate 123 is pressed by pressing the surface of the belt 124 fixed on the housing 121a, while the protruded piece 123b is introduced into between a belt folding-back lever 135 of the male member 122 and the housing 121a from the back. Consequently, the protruded piece 123a appears on the rear face and then, the lock bar of the locking device is inserted into this protruded piece 123a to lock.

[0006] Although this buckle shown in Fig. 35 allows existing locking devices such as a padlock to be employed easily, this buckle 120 is comprised of three parts, the female member 121, the male member 122 and the lock plate 123, so that the number of the buckle's parts is large and cost of the buckle is increased. In addition, each member has a peculiar structure based on the combining structure, therefore, when a part of the members are lost, it is hard to collect alternative parts. Further, it is troublesome to store the lock plate 123 and its locking operation is difficult due to complicated operation.

SUMMARY OF THE INVENTION

[0007] The present invention has been achieved in view of the above described problems. Its basic feature is an insertion type buckle consisting of a female member and a male member, which allows itself to be locked easily with an existing locking device such as a padlock and a cylinder lock, or a buckle with a mounting portion of a locking device, a binding band or the like, which can be sealed easily with a binding band. The buckle has a very simple structure and can be provided at a low cost.

[0008] In addition, for the configuration of the mounting portion, for example, the mounting portion disposed in the female member and the male member can be constituted of simple through holes, cutout through holes a part of which coincide with openings, or through holes in which one is a through hole and the other coincides with the opening. Moreover, the mounting portion can be formed only on an insertion portion of the male member or only on a housing of the female member.

[0009] In addition, the mounting portion can be

formed of mounting columns erected both on the female member and the male member to allow easy locking or sealing operations. In this case, the mounting portion can be constituted only by the through hole formed on the mounting column or by the through hole a part of which coincides with the opening.

[0010] The basic feature of this invention is characterized by a buckle comprised of a female member in which a flat cylindrical housing having an insertion port at an end thereof is provided and a male member having an insertion portion which can be inserted into the housing, wherein a mounting portion, to which a locking device or a sealing device to lock or seal the engagement can be mounted to maintain the engagement between the female member and the male member when the insertion portion is inserted into and engaged with the housing, is disposed in both the female member and the male member or in any one thereof. This feature is effective in enabling existing locking or sealing structures such as locking devices and binding bands to be disposed to buckles of various configurations.

[0011] If the mounting portion is formed on each of the housing of the female member and the insertion portion of the male member, the mounting portion is provided with an opening which is open to a direction other than an insertion direction of a corresponding one of the female member and the male member such that the opening coincides with the through hole, or, the mounting portion is provided with the through hole formed on any one of the housing and the insertion portion and the opening, which is open to a direction other than the insertion direction of a corresponding one of the female member and the male member, formed on the other one of the housing and the insertion portion, such that the opening and the through hole communicate with each other; so that communicating portions or the communicating portion and the through hole may overlap each other when the insertion portion is inserted into and engaged with the housing. Further, it is preferable that the communicating portion, which make the opening and the through hole communicate, communicates with the opening in the same diameter as that of overlapping through hole. Moreover, for the diameters of the overlapping through holes, it is preferable that the diameter of the through hole disposed at the inner side, for example, the through hole of the insertion portion, is formed larger than the diameter of the through hole disposed at the outer side, for example, the through hole of the housing, so that insertion operation may be facilitated when a lock bar of a locking device is inserted.

[0012] Further, said mounting portion can be provided with the through hole on an operating portion which is exposed from the housing when the female member and the male member are engaged, or with the through hole or the through hole with the opening which is provided on a part of the housing which is near the inner part of an inserting leg of the insertion portion upon engagement. In this case, the mounting portion is provided only on the insertion portion or the housing, thereby a locking device or a binding band can be easily attached to, and moreover, the manufacture of the buckle is easy.

[0013] Furthermore, said mounting portions comprise mounting columns formed on an edge portion of the insertion portion side of the housing and a proximal portion of the insertion portion. The mounting columns can be formed so that they may approach each other upon engagement and in this case, the locking device or the sealing device can be mounted throughout the female member and the male member, thereby disengagement of the female member and the male member is surely prevented.

[0014] Further, on the mounting columns provided on the housing and the insertion portion, through holes which can overlap each other upon engagement can be provided, or openings which are open to opposite directions of insertion directions of corresponding ones of the female member and the male member can be provided on the through holes such that the through hole and the opening communicate with each other, or the mounting portion can be provided on any one of the housing or the insertion portion such that the mounting portion is capable of being inserted in between the mounting columns provided in parallel on the other one. The mounting portions wherein the locking device cannot slip out can be formed in a simple form and moreover, a locking operation can be done easily.

[0015] Furthermore, a bent portion which bends can be formed on each edge of the mounting portion. In this case, the sealing device such as a binding band can be mounted accurately and easily. There are various effects such as preventing the binding band from being removed from the mounting columns.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016]

Fig. 1 is a perspective view of a female member and a male member when they are removed from each other in a buckle of a first embodiment of the present invention;

Fig. 2 is a front view of the female member of the same buckle;

Fig. 3 is a sectional view taken along the line II-II in Fig. 2;

Fig. 4 is a front view of the male member of the same buckle;

Fig. 5 is a sectional view taken along the line IV-IV in Fig. 4;

Fig. 6 is a front view showing an engagement state between the female member and the male member of the same buckle;

Fig. 7 is a side view showing an engagement state between the female member and the male member of the same buckle;

Fig. 8 is a perspective view showing a state in which

the female member and the male member are removed from each other in the buckle of the first embodiment with a modification of the mounting portion;

Fig. 9 is a perspective view showing a state in which a female member and a male member are removed from each other in a buckle of a second embodiment of the present invention;

Fig. 10 is a longitudinal sectional view of the female member of the same buckle;

Fig. 11 is a perspective view showing a state in which a female member and a male member are removed from each other in a buckle of a third embodiment of the present invention;

Fig. 12 is a front view of the female member of the same buckle;

Fig. 13 is a sectional view taken along the line XII-XII in Fig. 12 of the same buckle;

Fig. 14 is a front view of the male member in the same buckle;

Fig. 15 is a sectional view taken along the line XIV-XIV in Fig. 14 of the same buckle;

Fig. 16 is a front view showing a state in which the female member and the male member of the same buckle are engaged with each other;

Fig. 17 is a front view of the male member having a mounting portion according to a modification in the buckle of the third embodiment;

Fig. 18 is a front view showing a state in which a female member and a male member are removed from each other in a buckle of a fourth embodiment of the present invention;

Fig. 19 is a partially broken front view showing a state in which the female member and the male member of the same buckle are engaged with each other;

Fig. 20 is a partially broken front view showing a state in which the female member and the male member are engaged with each other in the buckle of the fourth embodiment with a modification of the mounting portion of a locking device;

Fig. 21 is a front view showing a state in which a female member and a male member are engaged with each other in a buckle of a fifth embodiment of the present invention;

Fig. 22 is a sectional view taken along the line XXI-XXI in Fig. 21;

Fig. 23 is a front view of the female member of the same buckle;

Fig. 24 is a sectional view taken along the line XXIII-XXIII in Fig. 23 of the same buckle;

Fig. 25 is a front view of the male member of the same buckle;

Fig. 26 is a sectional view taken along the line XXV-XXV in Fig. 25 of the same buckle;

Fig. 27 is a front view of the male member indicating a modification of the mounting portion of the male member shown in Fig. 25;

Fig. 28 is a front view showing a state in which a female member and a male member are engaged with each other in a buckle of a sixth embodiment of the present invention;

Fig. 29 is a partially broken front view showing a state in which the female member and the male member are engaged with each other in the same buckle;

Fig. 30 is a sectional view taken along the line XXVIII-XXVIII in Fig. 28 showing a state in which the female member and male member are engaged with each other in the same buckle;

Fig. 31 is a perspective view showing a state in which a female member and a male member are removed from each other in a buckle of a seventh embodiment of the present invention;

Fig. 32 is a side view showing a state in which a locking device is mounted at the time of engagement in the same buckle;

Fig. 33 is a perspective view of the female member and the male member showing a modification of the mounting portion in the buckle of the seventh embodiment;

Fig. 34 is a longitudinal sectional view showing a state in which a female member and a male member are engaged with each other in a well known buckle; and

Fig. 35 is a perspective view showing a state in which the female member and the male member are engaged with each other in another well known buckle.

DESCRIPTION OF THE EMBODIMENTS

[0017] Hereinafter, the embodiments of the present invention will be described in detail with reference to the accompanying drawings.

[0018] The buckle of the present invention comprises a female member 1 and a male member 2 as shown in Fig. 1 and formed so that an insertion portion 4 provided on an end of the male member 2 can be inserted or removed through an insertion hole 10 in a flat cylindrical housing 3 of the female member 1. The female member 1 and the male member 2 are formed integrally by injection molding using thermoplastic resin such as polyacetal, polyamide, polyprophylene, and polybutylene terphthalate.

[0019] In the buckle of the first embodiment shown in Figs. 1 to 7, the female member 1 consists of a flat cylindrical housing 3 comprising an upper plate 7, a bottom plate 8 and a side wall 9 as shown in Figs. 2 and 3. The insertion port 10 is provided at an end while a belt holding portion 11 is provided at the other end. A curved cutout concave portion 12 is provided in each of both side walls 9 by cutting the side wall in an arc inward such that an operating portion 33 of a flexible inserting leg portion 27 of the male member 2 engages with the cutout concave portion 12 and is exposed outward upon insertion

engagement of the buckle. Further, engaged portions 13, which can engage engaging portions 29 of inserting leg portions 27, are provided on an inner face on the front end side from the cutout concave portions 12 of the housing 3 such that they oppose each other.

[0020] A tongue-like mounting column 15 is provided in the insertion port 10 of the housing 3, such that it is protruded out of the surface from the center portion of the bottom plate 8 of the housing 3 through the upper plate 7 in order to form a mounting portion 5 for a locking device 50, which allows a U-shaped lock bar 51 of the locking device 50 such as a padlock and a cylinder lock to be inserted into and installed on, when the insertion portion 4 of the male member 2 is inserted into and engaged with that female member 1. Insertion portions 17 are provided in both sides of the mounting column 15 so that the mounting columns 31 of the male member 2 can be inserted therein. A through hole 16 which penetrates the mounting column 15 from side to side is formed in the mounting column 15 so that the lock bar 51 of the locking device 50 can be passed through. Between the upper plate 7 and the bottom plate 8 of the housing 3 as shown in Fig. 3, a partition plate 18 which is extended inward in the longitudinal direction from the mounting column 15 is provided such that it reinforces the housing 3 and guides guide pieces 30 of the male member 2. A belt attachment portion 11 is formed at an outside end of the housing 3 by providing an attachment lever 19, on which a belt is to be attached, between the side walls 9.

[0021] In the male member 2, as shown in Figs. 4 and 5, a belt holding portion 26 capable of holding an end of the belt is provided in a rear half from a proximal portion 24 existing substantially in the center in the longitudinal direction thereof and an insertion portion 4, which can be inserted into the housing 3 of the female member 1, is formed in a front half from the proximal portion 24. In the insertion portion 4, flexible inserting leg portions 27, whose front ends which can be inserted into the housing 3 are curved inward, are provided protrudedly on both sides of the proximal portion 24, and the engaging portions 29, which can engage the engaged portions 13 disposed inside the housing 3, are provided at front ends of the inserting leg portions 27 such that they are protruded out of both the front and rear faces.

[0022] A pair of guide pieces 30, which can sandwich the mounting column 15 and the partition plate 18 from both sides, are provided protrudedly in the center of the proximal portion 24 of the insertion portion 4 in order to cope with the mounting column 15, which is the mounting portion 5 disposed on the housing 3 of the female member 1. A space is provided between the guide pieces 30 such it is extended from the proximal portion 24 to its front end, so that the guide pieces 30 can be inserted while being guided by the partition plate 18. Further, the mounting columns 31 are formed protrudedly out of the surface on the proximal portion 24 of the guide pieces 30, so as to oppose and sandwich the mounting column 15 provided at an end portion of the partition plate 18 of the housing 3 and a through hole 32 is formed in this mounting column 31 which corresponds to the through holes 16 in the mounting columns 15, so that the lock bar 51 of the locking device 50 can be inserted therein.

[0023] A portion opposing the cutout concave portion 12 of the housing 3 at the center of the inserting leg portion 27 is formed in a larger width so that it can press and operate the insertion portion 27 from both sides and constitutes the operating portions 33. In the belt holding portion 26 provided in a rear half of the male member 2, as shown in Fig. 5, a holding lever 34 is provided horizontally such that its inside is inclined downward in order to hold a belt and then, a folding-back lever 35 is provided horizontally between the holding lever 34 and the proximal portion 24 so that the belt can be wound around and hooked on it.

[0024] As for use state of the female member 1 and the male member 2, as shown in Fig.6, the inserting leg portions 27 of the insertion portion 4 of the male member 2 are inserted from the insertion port 10 of the housing 3, so that the engaging portions 29 of the inserting leg portions 27 engage the engaged portions 13 inside the housing 3. At the same time, the mounting column 15 of the housing 3 and the mounting columns 31 of the insertion portion 4 are made to overlap so that the through holes 16, 32 coincide with each other. Then, the female member 1 and the male member 2 are locked by inserting the lock bar 51 of the locking device 50 as shown in Fig. 7. Consequently, even if it is intended to move any one in a direction that the female member 1 and the male member 2 are removed from each other, the female member 1 and the male member 2 cannot move in the direction that they leave each other because the lock bar 51 comes into contact with peripheral walls of the through holes 16, 32, thereby preventing them from being removed.

[0025] Fig. 8 shows a modification of the mounting portion 5 of the buckle of the first embodiment. The mounting column 15 as the mounting portion 5 erected in the center of the insertion port 10 of the housing 3 of the female member 1 is provided in a reverse J shape by separating a leg portion 15b of the mounting column 15 placed opposite to the insertion direction of the female member 1 from the upper plate 7 of the housing 3 by a predetermined distance, forming an opening 14 between the upper plate 7 such that the opening 14 communicates with the through hole 16.

[0026] A pair of the mounting columns 31 as the mounting portion 5 erected on the proximal portion 24 of the insertion portion 4 of the male member 2 are provided in reverse J shapes by separating leg portions 31b of the mounting columns 31 placed opposite to the insertion direction of the male member 2 from the proximal portion 24 of the insertion portion 4 by a predetermined distance, forming openings 36 between the tip of the leg portions 31b and the upper plate 7 of the housing 3.

Each opening 36 is formed such that it communicates with each through hole 32. When the insertion portion 4 of the male member 2 is inserted into the housing 3 of the female member 1, a leg portion 15a of the mounting column 15 is sandwiched by leg portions 31a of the mounting column 31 such that the through hole 16 and the through holes 32 overlap. When the lock bar 51 of the locking device 50 is inserted into the through holes in this state, even if it is intended to move the male member 2 in a direction to remove it from the female member 1, the male member 2 cannot move further because the lock bar 51 comes into contact with the leg portions 31a of the mounting column 31. On the contrary, even if it is intended to move the female member 1 in a direction to slip out of the male member 2, the male member 1 cannot move further because the lock bar 51 comes into contact with the leg portion 15a of the mounting column 15.

[0027] A buckle of a second embodiment of the present invention shown in Figs. 9 and 10 has substantially the same structure as the buckle of the first embodiment, except that a pair of the mounting columns 15 are provided on the housing 3 of the female member 1 while a single mounting column 31 is provided on the insertion portion 4 of the male member 2. As shown in Fig. 9, a pair of the mounting columns 15 are provided in the center of the upper plate 7 of the insertion port 10 of the flat housing 3,such that they are projected out of the surface with an interval to fit a tongue-like mounting column 31 provided on the insertion portion 4. The upper plate 7 between the pair of the mounting portions 15 is cut off to provide an insertion portion 17 where the mounting column 31 can be inserted. Further, as shown in Fig. 10, a partition plate 18 is disposed between the upper plate 7 and the bottom plate 8 such that it is stretched from the insertion portion 17 up to a front end in order to guide the guide pieces 30 of the insertion portion 4.

[0028] On the other hand, in the male member 2, as shown in Fig. 9, a pair of the guide pieces 30 are provided in the center of the proximal portion 24 and then, the tongue-like mounting column 31 is provided on the proximal portion 24 side of these guide pieces 30 such that it is projected out of the surface. A gap is provided from this mounting column 31 to front ends of the guide pieces 30 so as to be capable of holding the partition plate 18 in the housing 3. The mounting column 15 of the housing 3 is provided with the through holes 16 while the mounting column 31 on the insertion portion 4 is provided with the through hole 32. When the insertion portion 4 is inserted into the housing 3, both the through holes 16, 32 overlap each other, so that the lock bar of the locking device can be inserted into the through holes 16, 32.

[0029] In a buckle of a third embodiment of the present invention shown in Figs. 11 to 16, the female member 1 is comprised of a flat cylindrical housing 3 as shown in Figs. 12 and 13 and has an insertion port 10 at an end thereof and a belt holding portion 11 at the other end. A cutout concave portion 12 is provided in each of both side walls 9 by cutting in the shape of arc, so that an operating portion 33 of an inserting leg portion 27, which is deformable plastically, of the male member 2 appears outward at this cutout concave portion 12. Further, the engaged portions 13, which can engage the engaging portions 29 of the inserting leg portions 27, are provided in areas from the cutout concave portions 12 to an inner face of the front end side of the housing 3 such that they oppose each other, and the partition plate 18 is provided in the longitudinal direction at the center portion in the width direction of the housing 3 and between the upper plate 7 and the bottom plate 8 in order to guide the guide piece 30 of the male member 2.

[0030] On the other hand, in the male member 2, as shown in Figs. 14 and 15, the belt holding portion 26 is provided from the proximal portion 24, which is substantially in the center thereof, up to a rear half in order to hold an end of the belt. The insertion portion 4, which can be inserted into the housing 3 of the female member 1, is formed from the proximal portion 24 over a front half thereof. In the insertion portion 4, the inserting leg portions 27, which can be inserted into the housing 3 and are deformable plastically so that front ends thereof curve inward, are provided protrudedly on both sides of the proximal portion 24. The engaging portions 29 capable of engaging the engaged portions 13 disposed inside the housing 3 are provided at both surfaces of the front ends of the inserting leg portions 27.

[0031] A guiding piece 30 is provided protrudedly in the center of the proximal portion 24 of the insertion portion 4, the guiding piece 30 having a H-shaped lateral section allowing itself to slide guided by the partition plate 18 in the housing 3. Further, the wide operating portion 33 is provided in the center of each inserting leg portion 27 such that it is projected outward from the cutout concave portion 12 of the housing 3. A through hole 32, into which a U-shaped lock bar 51 of the locking device 50 or the like can be inserted, is formed on the operating portion 33 such that it goes through between the front and rear faces, and this through hole 32 structures a mounting portion 5 of the present invention.

[0032] The through hole 32 is provided so as to adjoin an edge portion of the cutout concave portion 12 of the housing 3 when the inserting leg portions 27 are inserted into the housing 3. In the male member 2, a belt holding portion 26 is formed on an opposite side of the insertion portion 4, being provided with a folding-back lever 35 which the belt can be wound around and hooked on and a holding lever 34 capable of holding the folded-back belt.

[0033] As for use state of the female member 1 and the male member 2, as shown in Fig. 16, the insertion portion 4 of the male member 2 is inserted from the insertion port 10 of the housing 3 of the female member 1, so that the engaging portion 29 of the inserting leg portion 27 engages the engaged portion 13 of the hous-

ing 3. When the buckle is locked by inserting a U-shaped lock bar 51 of a locking device 50 into the through hole 32 provided in the operating portion 33 exposed from the cutout concave portion 12 of the housing 3, even if the operating portion 33 is pressed inward of the housing 3, the lock bar 51 comes into contact with an edge portion of the cutout concave portion 12 of the housing 3, thereby restricting the inserting leg portions 27 from swinging. Therefore, engagement between the engaging portion 29 and the engaged portion 13 is maintained thereby disabling the female member 1 and the female member 2 from being removed from each other.

[0034] Fig. 17 shows a modification of the mounting portion 5 in the buckle of the third embodiment. The through hole 32 on which the lock bar of the locking device 50 is to be mounted, formed in the inserting leg portion 27 of the insertion portion 4 of the male member 2, is provided with an opening 36 in an inside face of the inserting leg portion 27, that is, in a direction perpendicular to the inserting direction, while employing the through hole 32 as it is, so that this opening 36 communicates with the through hole 32.

[0035] Figs. 18 and 19 show the buckle of a fourth embodiment. In this buckle, the male member 1 is a flat cylindrical housing 3 comprised of an upper plate 7, a bottom plate 8 and side walls 9. An insertion port 10 is provided at an end thereof while a belt holding portion 11 is provided at the other end. An arc-shaped cutout concave portion 12 is provided in each of both the side walls 9 so that an operating portion 33 of a flexible inserting leg portion 27 of the male member 2 appears outward at this cutout concave portion 12. The engaged portions 13 capable of engaging the engaging portions 29 provided on the inserting leg portions 27 are provided on inner faces of the upper plate 7 and bottom plate 8 on the front end side of the housing 3 from the cutout concave portions 12 such that they oppose each other. The partition plate 18 is provided in the center of the housing 3 in the longitudinal direction from the vicinity of the insertion port 10 up to the belt holding portion 11 to join the upper plate 7 with the bottom plate 8, in order to reinforce the housing 3. Further, a through hole 16 is provided piercing through the upper plate 7 and the bottom plate 8 in an eccentric edge portion on the insertion port 10 side of the housing 3 such that the U-shaped lock bar of the locking device is inserted into the through hole 16.

[0036] On the other hand, in the male member 2, an insertion portion 4 which can be inserted into the housing 3 is formed in a front half from the proximal portion 24 existing in the center of the longitudinal direction of the male member 2. The insertion portion 4 is provided with inserting leg portions 27 on both sides of the proximal portion 24 such that the insertion leg portions 27 can be inserted into the housing 3 and front ends thereof have flexibility to curve inward. An operating portion 33 is provided on a side face in the center of each inserting leg portion 27 so that it can be pressed inward. An engaging portion 29 capable of engaging an engaged portion 13 of the housing 3 is provided protrudedly out of the front and rear faces at a front end of each inserting leg portion 27. A mounting portion 5 of a locking device is formed by providing a through hole 32 in the proximal portion of any one inserting leg portion such that a U-shaped lock bar of the locking device can be inserted. Further, a pair of guide pieces 30 are provided protrudedly in the center of the proximal portion 24 so that they go along the partition plate 18 of the housing 3 and are guided thereby.

[0037] A folding-back lever 35 which a belt can be wound around and hooked on and a holding lever 34 capable of holding the folded back belt are provided horizontally between side frames in a rear half from the proximal portion 24 of the male member 2, so that a belt holding portion 26 is formed.

[0038] As for use state of the female member 1 and the male member 2, as shown in Fig. 19, the insertion portion 4 of the male member 2 is inserted from the insertion port 10 of the housing 3 of the female member 1, so that the engaging portions 29 of the inserting leg portions engage the engaged portions 13 of the housing 3. Consequently, the through hole 16 in the housing 3 overlaps the through hole 32 in the inserting leg portion 27 and if locking is done by inserting a lock bar of a locking device through these through holes 16, 32, the female member 1 and the male member 2 are locked with that lock bar so that the inserting leg portions 27 cannot be moved in the housing 3. Therefore, engagement between the engaging portions 29 and the engaged portions 13 is maintained thereby disabling the female member 1 and the male member 1 from being removed from each other.

[0039] Fig. 20 shows a modification of the mounting portion on which the locking device is to be mounted in the buckle of the fourth embodiment. A mounting portion 5 is formed by communicating a through hole 16 made through the upper plate 7 and the bottom plate 8 of the housing 3 of the female member 1 with an opening 14 made in a side wall 9 of the housing 3. Additionally, it is permissible to form the mounting portion 5 for the locking device by communicating a through hole 32 made in the proximal portion 24 of the inserting leg portion 27 of the male member 2 with an opening 36 which is open to the side of the belt holding portion 26. If the opening is formed in the same direction as the inserting direction, even if the lock bar 51 is inserted, the male member 2 slips out of the female member 1. The opening direction needs to be opposite to the inserting direction.

[0040] Figs. 21-26 show the buckle of a fifth embodiment. As shown in Figs. 23 and 24, the female member 1 has an insertion port 10, into which the insertion plate 28 of the male member 2 can be inserted, at an end of its housing 3. A tongue-like flexible pressing plate 21 is formed by cutting three sides of the upper plate 7 while leaving its insertion port 10 side. The insertion port 10 is formed between an upper side of a base lever 22 pro-

vided on side walls 9 on both sides of the housing 3 and the upper plate 7. A flexible tongue-like engaging plate 23 is provided protrudedly such that it is extended in the insertion direction from the base lever 22. A front end of the engaging plate 23 is formed such that it slopes upward toward the front end and is projected, so that it engages an engaging pawl 37 provided on the insertion plate 28 of the male member 2.

[0041] A hook portion 41 is formed above a rear wall 40 provided on the side walls 9 on the belt holding portion 11 side of the housing 3 and a tongue-like piece 42 provided at a front end of the pressing plate 21 such that it opposes a bottom face of the hook portion 41 restricts upward motion of the pressing plate 21. Further, a press-down protrusion 43, which can press down the engaging plate 23, is provided on a bottom face at a front end of the pressing plate 21. If the engaging plate 23 is pressed down, the engaging pawl 37 of the insertion plate 28 is released from engagement so that the insertion plate 28 can be removed. Further, a through hole 16, which allows the lock bar of the locking device to be passed through, is formed on a side of the base portion of the pressing plate 21 of the housing 3 so that this through hole may extended up to the engaging plate 23.

[0042] On the other hand, in the male member 2, as shown in Figs. 25 and 26, an insertion portion 4 is formed by providing a flat insertion plate 28 in front of its proximal portion 24. A flexible elastic tongue-like piece 38 is provided at the center of the insertion plate 28 by cutting out three sides thereof except its proximal portion 24 side. This elastic tongue-like piece 38 is formed so as to be capable of making an elastic contact with a slope 44 formed on the pressing plate 21 of the housing 3. A cutout portion 25 is formed by dividing the center of the insertion plate 28 in front of the elastic tongue-like piece 38 to right and left sections. When the insertion plate is inserted into the housing 3, the cutout portion 25 escapes the interference with pressing protrusion 43 on the pressing plate 21. A hook-like engaging pawl 37 is provided on a bottom face at a front end of this insertion plate 28 so as to engage the engaging plate 23 of the housing 3. Further, a through hole 32 for inserting the lock bar of the locking device can be passed through is provided in the insertion plate 28 corresponding to the through hole 16 provided in the pressing plate 21 of the housing 3 so that it overlaps the through hole 16. Further, a belt holding portion 26 is formed on an opposite side to the insertion potion 4 of the proximal portion 24 and comprised of a folding-back lever 35 which a belt can be wound around and hooked on and a holding lever 34 capable of holding the folded-back belt.

[0043] As for use state of the female member 1 and the male member 2, as shown in Fig. 22, the insertion portion 4 of the male member 2 is inserted from the insertion port 10 of the housing 3 of the female member 1 so as to engage the engaging pawl 37 of the insertion plate 28 with the engaging plate 23 of the housing 3. Consequently, the through hole 16 provided in the engaging plate 23 and pressing plate 21 overlaps the through hole 32 provided in the insertion plate 28. If the lock bar of the locking device is inserted into the through holes 16, 32 and locked, the female member 1 and the male member 2 are prevented from being separated by the lock bar so that the insertion plate 28 cannot be moved within the housing 3, thereby restricting the movement of the insertion plate 28.

[0044] Fig. 27 shows a modification of the mounting portion 5 which allows the locking device to be attached in the buckle of the fifth embodiment. In this buckle, a part of the mounting portion 5 is structured by providing the through hole 32 provided in the insertion plate 28 of the insertion portion 4 of the male member 2 with an opening 36 which is open in a direction other than the insertion direction or toward the center line of the male member 2 so that the opening 36 communicates with the through hole 32.

[0045] The insertion portion 4 of this male member 2 is inserted into the housing 3 of the female member 1 shown in Fig. 23. If the insertion portion 4 is inserted into the housing 3, the through hole 16 provided in the housing 3 overlaps the through hole 32 provided in the insertion portion 4. The lock bar of the locking device inserted into these through holes restricts the movement of the female member 1 and the male member 2. This type of the mounting portion 5 allows the locking device to be inserted easily even if the through holes 16, 32 deflect from each other to some extent.

[0046] Figs. 28 to 30 shows the buckle of the sixth embodiment. The female member 1 is a flat cylindrical housing 3 comprised of an upper plate 7, a bottom plate 8 and side walls 9. An insertion port 10 is provided at an end thereof and a belt holding portion 11 is provided at the other end. Arc-shaped cutout concave portions 12 are provided in both the side walls 9, so that the operating portions 33 of the inserting leg portions 27 of the male member 2 are exposed outward from the cutout concave portions. Engaged portions 13 are formed on side walls 9 on the insertion port 10 side of the cutout concave portions 12, so as to engage hook-shaped engaging portions 29 provided on the proximal portion of the operating portion 33 of the inserting leg portions 27.

[0047] Partition pieces 20 are provided in the center of each of the upper plate 7 and bottom plate 8 of the housing 3 in the longitudinal direction thereof such that they oppose each other in order to guide a pair of guide pieces 30 provided on the insertion portion 4 of the male member 2. Further, as shown in Fig. 29, a through hole 16 is provided through the upper plate 7 and the bottom plate 8 at a position which is eccentric to a side of each of the upper plate 7 and bottom plate 8 of the housing 3 and avoids the interference with the inserting leg portion 27 when the inserting leg portions 27 are inserted so that the engaged portion 13 engages the engaging portion 29. The lock bar of the locking device can be inserted into this through hole 16. Moreover, a protruded

portion 45 is provided on an edge portion on the insertion port 10 side of the upper plate 7 such that it is protruded toward a folding-back lever 35 in the belt holding portion 26 of the male member 2 when the inserting leg portion 27 of the male member 2 is inserted. When a belt hooked on the folding-back lever 35 is floated, this comes into contact with the belt thereby blocking it from loosening.

[0048] The male member 2 is provided with a belt holding portion 26 capable of holding an end of a belt, which is extended in a rear half from the proximal portion 24. The belt holding portion 26 is comprised of a folding-back lever 35 which a belt is hooked and folded back by, the folding-back lever 35 being provided on the proximal portion 24 side, and a holding lever 34 capable of holding the belt, provided outside the folding-back lever 35, such that they are stretched between side frames. An insertion portion 4 is formed in a front half from the proximal portion 24 and flexible inserting leg portions 27 are provided protrudedly on both sides of the proximal portion 24 of the insertion portion 4. An operating portion 33 is formed such that a front end thereof is expanded and a hook-shaped engaging portion 29 capable of engaging the engaged portion 13 formed in the cutout concave portion 12 of the housing 3 is provided in the base portion of the operating portion 33. A pair of the guide pieces 30 are provided protrudedly in the center of the proximal portion 24 so as to be capable of sliding along the partition pieces 20 provided on the upper plate 7 and the bottom plate 8 of the housing 3 such that they oppose each other.

[0049] As for use state of the female member 1 and the male member 2, as shown in Fig. 28, the inserting leg portion 27 of the insertion portion 4 of the male member 2 is inserted into the insertion port 10 of the housing 3 so that the engaging portions 29 of the inserting leg portion 27 engages the engaged portions 13 formed in the cutout concave portions 12 of the housing 3. After that, the lock bar of the locking device is inserted into the through hole 16 in the housing 3 to lock.

[0050] Consequently, even if it is intended to press the operating portions 33 of the inserting leg portion 27 inserted into the housing 3, the operating portions 33 cannot be moved because the lock bar of the locking device exists in the through hole 16. Thus, the engagement between the engaged portion 13 of the housing 3 and the engaging portion 29 of the inserting leg portion 27 cannot be released. Meanwhile, it is permissible to provide the through hole 16 provided through the upper plate 7 and the bottom plate 8 of the housing 3 with an opening 14 on the housing 3 which is open in a direction other than the insertion direction of the housing 3 to communicate this opening 14 with the through hole 16.

[0051] Finally, the buckle of the seventh embodiment shown in Fig. 31 has the same structure as the buckle of the first embodiment except that the configuration of the mounting portion on which the locking device is to be mounted is different. If speaking of the mounting portion 5 on which the locking device is to be mounted, a plate-like mounting column 15 having a specified width is erected at an end portion on the insertion port 10 side of the upper plate 7 of the flat housing 3 of the female member 1 and then, a bent portion 20 is formed by bending a front end of the mounting column 15. On the other hand, in the male member 2, a plate-like mounting column 31 having a specified width is erected at the proximal portion 24 of the male member 2 corresponding to the mounting column 15 of the female member 1. Then, a bent portion 39 is formed by bending a front end of the mounting column 31 in an opposite direction to the bent portion 20.

[0052] As for use state of the female member 1 and the male member 2 of this buckle, the a belt is connected to the female member 1 and the male member 2 and the engaged portion 13 and the engaging portion 29 are engaged by inserting the insertion portion 4 of the male member 2 from the insertion portion 4 of the housing 3 of the female member 1. Consequently, as shown in Fig. 32, both the mounting columns 15, 36 contact each other face to face. With this state, a sealing device 52 such as a binding band is wound around these mounting columns 15, 36. The sealing device 52 never slips out because it is hooked by the bent portions 20, 39 of the mounting columns 15, 36.

[0053] Fig. 33 shows a modification of the mounting columns 15, 36 in the buckle shown in Fig. 31. Through holes 16, 32 are made in opposing faces of the mounting columns 15, 36 of the female member 1 and the male member 2 respectively, so that the lock bar of the locking device can be inserted therein. This buckle allows the locking device or the sealing device to be employed depending on the case.

[0054] The buckle of the present invention has the above-described structure and achieves following effects.

[0055] There is provided a buckle comprised of a female member which is a flat cylindrical housing having an insertion port at an end thereof and a male member having an insertion port which can be inserted into the housing, wherein a mounting portion, to which a locking device or a sealing device for locking or sealing the engagement when the female member and the male member engage each other is to be mounted, is disposed in both the female member and the male member or in any one thereof. Consequently, existing locking or sealing structures such as locking devices and binding bands can be disposed to buckles of various configurations.

[0056] When said mounting portions are provided on both the housing and the insertion portion, if through holes which overlap respective mounting portions, openings which overlap respective through holes, or the openings which communicate with one of the through holes are structured so that they may overlap each other, the mounting portion can be provided on both the housing and the insertion portion in diversified styles easily according to the use. In such a case, too, disen-

gagement of the female member and the male member can be surely prevented.

[0057] Moreover, when mounting columns as mounting portions are formed on an end portion of the insertion port side of the housing and a proximal portion of the insertion portion, so that the mounting columns approach each other when the insertion portion is inserted for engagement, the locking device or the sealing device can be attached to both the female member and thereby, disengagement of the female member and the male member can be surely prevented. Further, if through holes which can overlap each other under engagement are provided on the mounting columns provided on the housing and the insertion portion, or an opening is provided to this through hole in an opposite direction to the insertion direction of a corresponding one of the female member and the male member such that they communicate with each other, the locking device does not slip out and moreover, the locking procedure can be facilitated.

Reference Numerals

[0058]

1	female member
2	male member
3	housing
4	insertion portion
5	mounting portion
10	insertion port
12	cutout concave portion
14	opening (female member)
15	mounting column (female member)
16	through hole (female member)
20	bent portion (female member)
31	mounting column (male member)
32	through hole (male member)
36	opening (male member)
39	bent portion (male member)
50	locking device
51	lock bar
52	sealing device

Claims

1. A buckle comprised of a female member (1) which is provided with an insertion port (10) at an end of a flat cylindrical housing (3) thereof and a male member (2) having an insertion portion (4) which can be inserted into the housing (3), being **characterized in that**

a mounting portion (5), to which a locking device (50) or a sealing device (52) for locking or sealing engagement between the female member (1) and the male member (2) is adapted to be mounted, is formed at least one of the female member (1) and the male member (2).

2. The buckle according to claim 1, being **characterized in that** the mounting portion (5) is formed on each of the housing (3) and the insertion portion (4), and the mounting portions (5) are formed with through holes (16, 32) respectively, which overlap each other, when the female member (1) and the male member (2) engage each other.

3. The buckle according to claim 1 or 2, being **characterized in that** the mounting portion (5) is formed on each of the housing (3) and the insertion portion (4), and each mounting portion (5) has an opening (14, 36) which is open in a direction other than an insertion direction of a corresponding one of the female member (1) and the male member (2) and communicates with a corresponding one of the through holes (16, 32), such that the openings (14, 36) can overlap each other when the female member (1) and the male member (2) are engaged.

4. The buckle according to claim 1 or 2, being **characterized in that** the through hole (16, 32) is formed in the mounting portion (5) of any one of the housing (3) and the insertion portion (4), and an opening (14, 36) is formed at least on the other mounting portion (5), wherein the opening (14, 36) is open in a direction other than an insertion direction of a corresponding one of the female member (1) and the male member (2) and communicates with the through hole (16, 32) when the insertion portion (4) is inserted for engagement.

5. The buckle according to claim 1 or 2, being **characterized in that** the mounting portion (5) is formed on each of the housing (3) and the insertion portion (4), and openings (14, 36), which are open in a direction other than an insertion direction of a corresponding one of the female member (1) and the male member (2) and communicate with at least one of the through holes (16, 32), are formed such that the communicating portions or the communicating portion and the through hole (16, 32) overlap each other when the insertion portion (4) is inserted for engagement.

6. The buckle according to claim 1 or 2, being **characterized in that** the mounting portion (5) comprises a through hole (32) going through a front face and a rear face of an operating portion (33) of the insertion portion (4) or a through hole (32) having an opening (36) inside of the operating portion (33), the operating portion (33) appearing through a cutout concave portion (12) formed on a side of the housing (3) when the insertion portion (4) is inserted for engagement.

7. The buckle according to claim 1 or 2, being **characterized in that** the mounting portion (5) comprises a through hole (16) formed near an inner side of an inserting leg portion (27) of the insertion portion (4) which is inserted into the housing (3) such that the through hole (16) goes through between a front face and a rear face of the housing (3).

8. The buckle according to claim 1 or 2, being **characterized in that** the mounting portion (5) comprises a through hole (16) having an opening (14) which is open to an outside face of the housing (3).

9. The buckle according to claim 1 or 2, being **characterized in that** the mounting portion (5) comprises mounting columns (15, 31) erected on an end portion of the insertion port (10) side of the housing (3) and a proximal portion (24) of the insertion portion (4), such that the mounting columns (15, 31) approach each other when the insertion portion (4) is inserted for engagement.

10. The buckle according to claim 9, being **characterized in that** the mounting columns (15, 31) have through holes (16, 32) which overlap each other when the insertion portion (4) is inserted for engagement.

11. The buckle according to claim 10, being **characterized in that** the mounting column (15, 31) has an opening (14, 36) which is open in an opposite direction to the insertion direction of a corresponding one of the female member (1) and the male member (2) and communicates with the through holes (16, 32).

12. The buckle according to claim 9, being **characterized in that** the mounting columns (31, 15) are provided in parallel on any one of the housing (3) and the insertion portion (4) and the mounting column (15, 31) is provided on the other one such that it is capable of being inserted in between the mounting columns (15, 31).

13. The buckle according to claim 9, being **characterized in that** a bent portion (20, 39) is formed at each end of the mounting columns (15, 31).

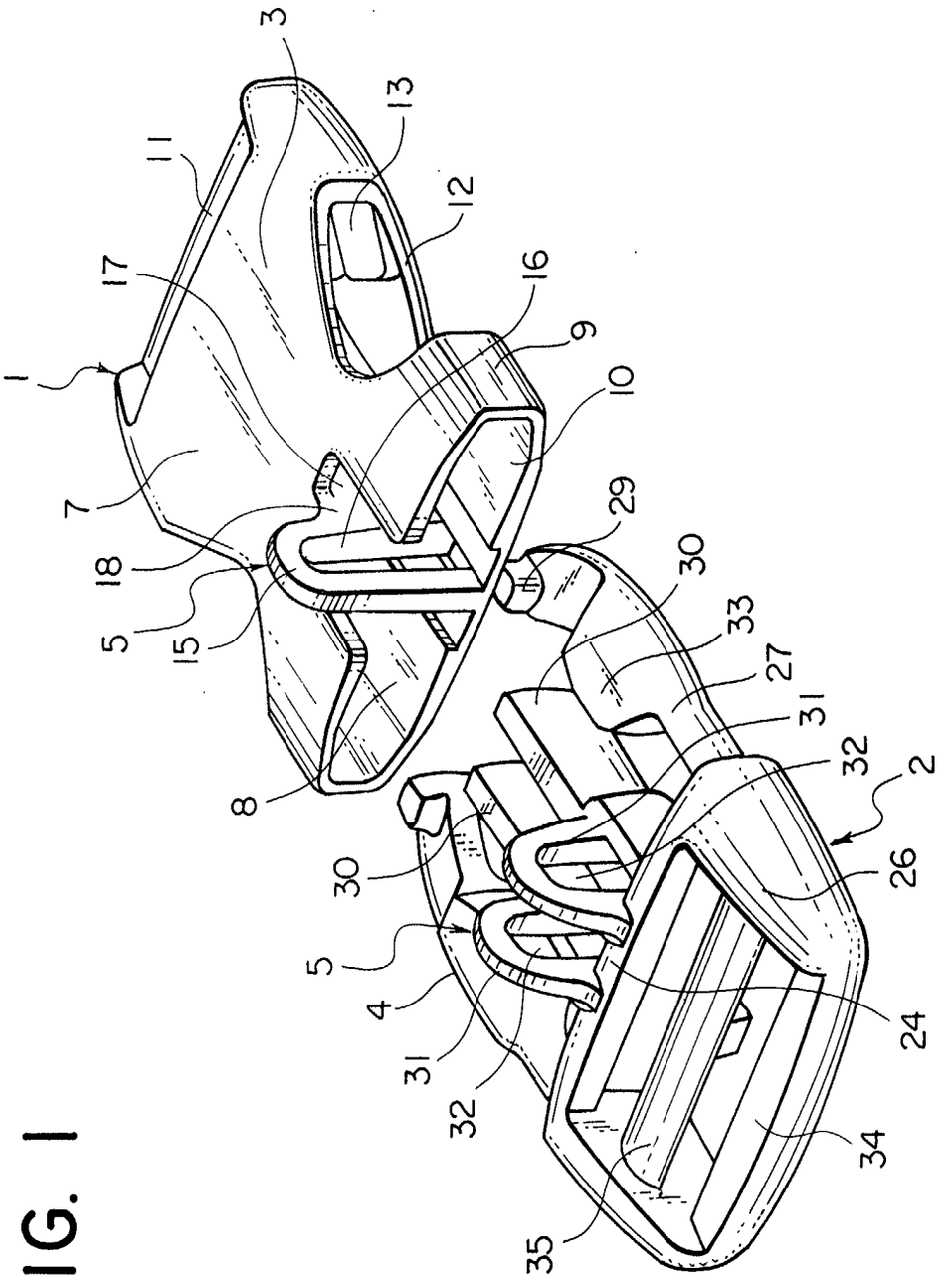
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FIG. 1

FIG. 2

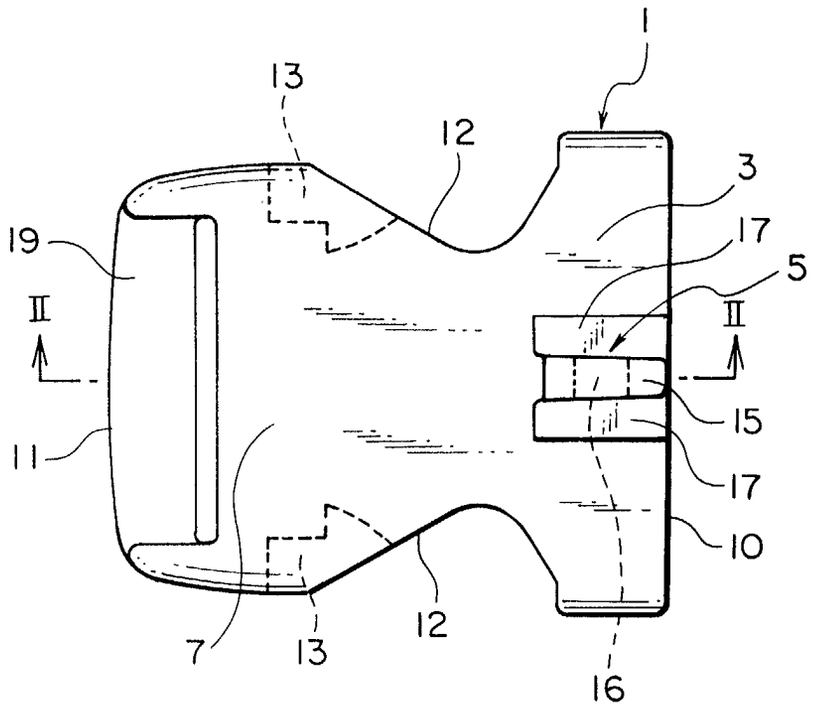


FIG. 3

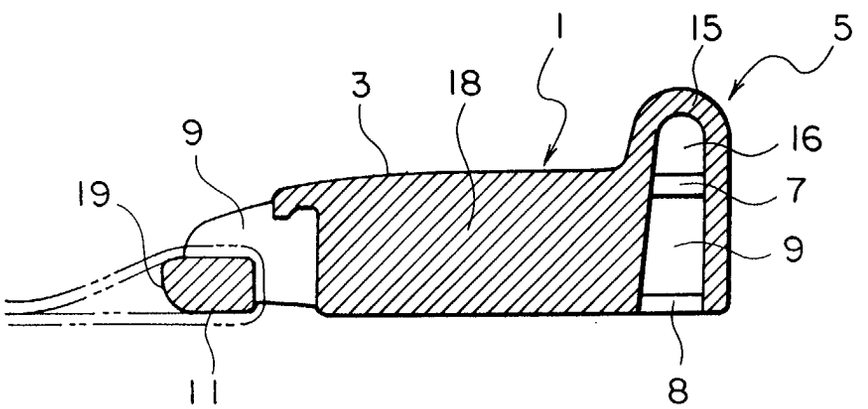
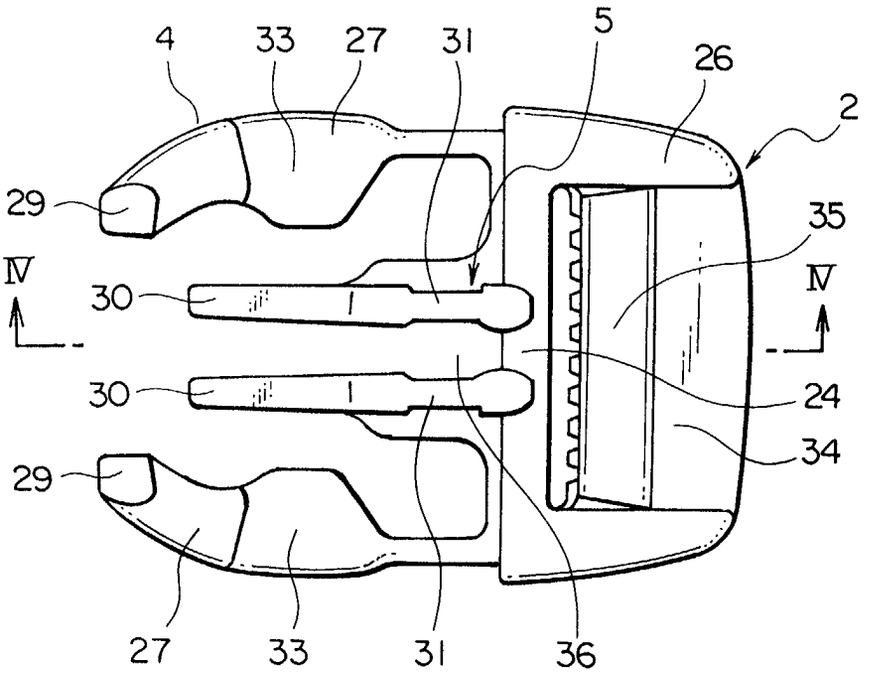


FIG. 4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33
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31
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IV
30
IV
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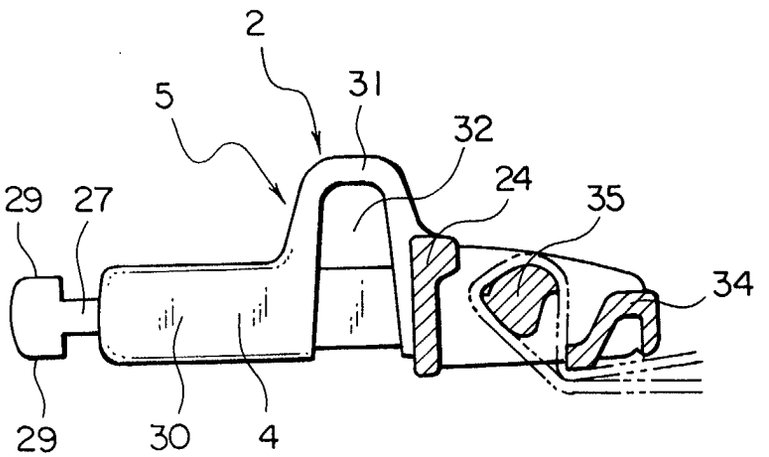
24
34
29
27
33
31
36

FIG. 5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4

FIG. 6

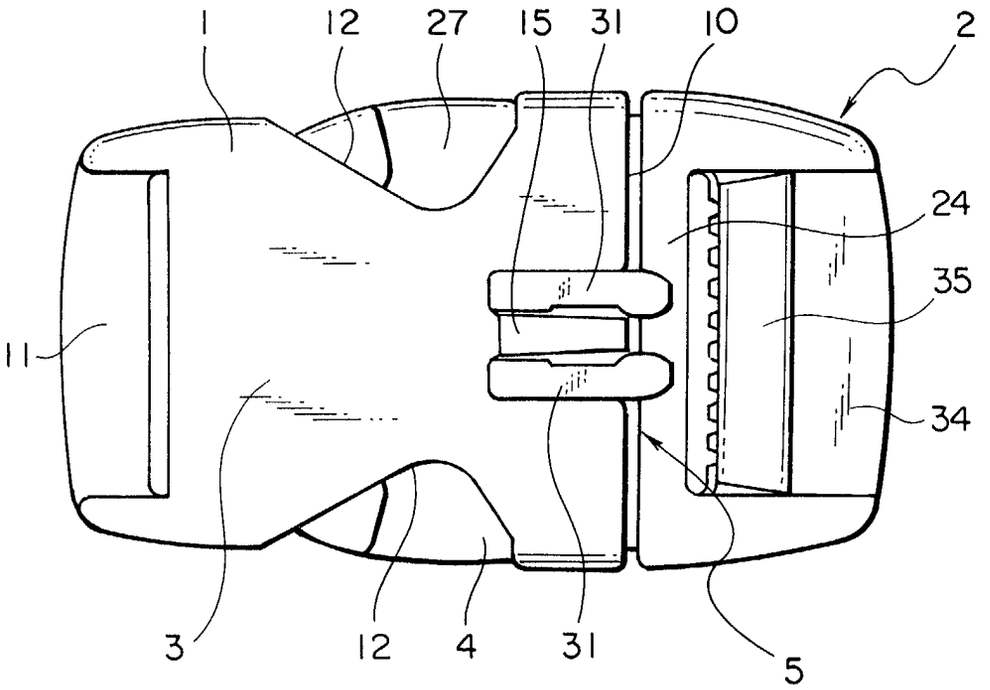
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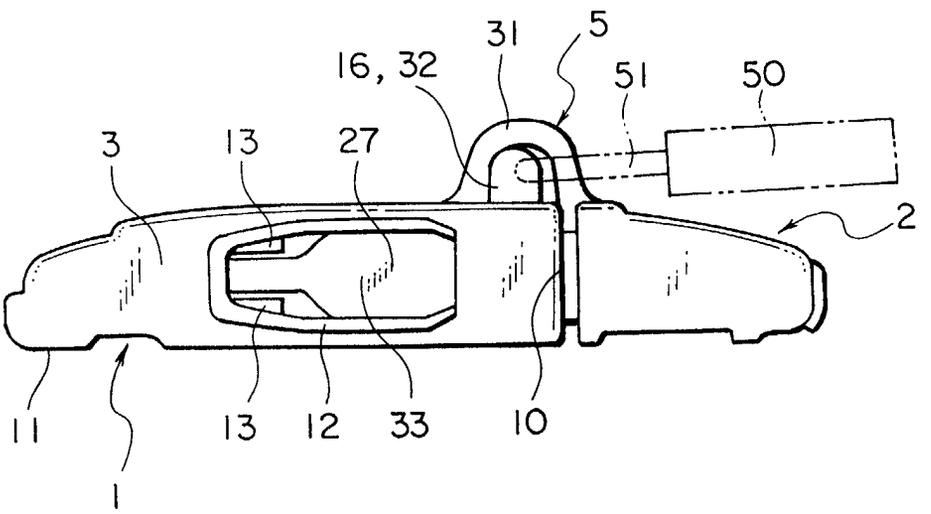
FIG. 7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16, 32
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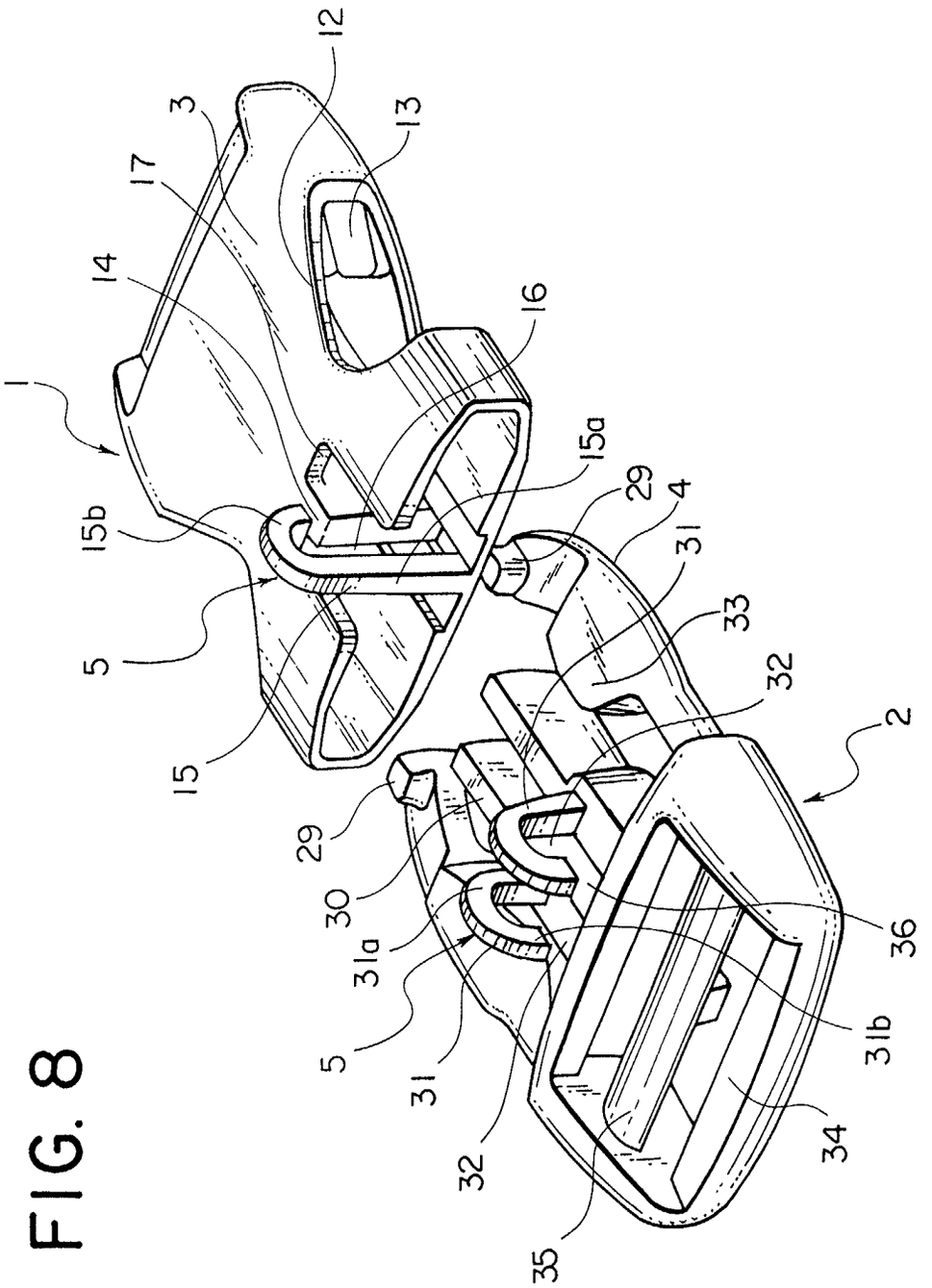
FIG. 8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15a
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31b
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FIG. 9

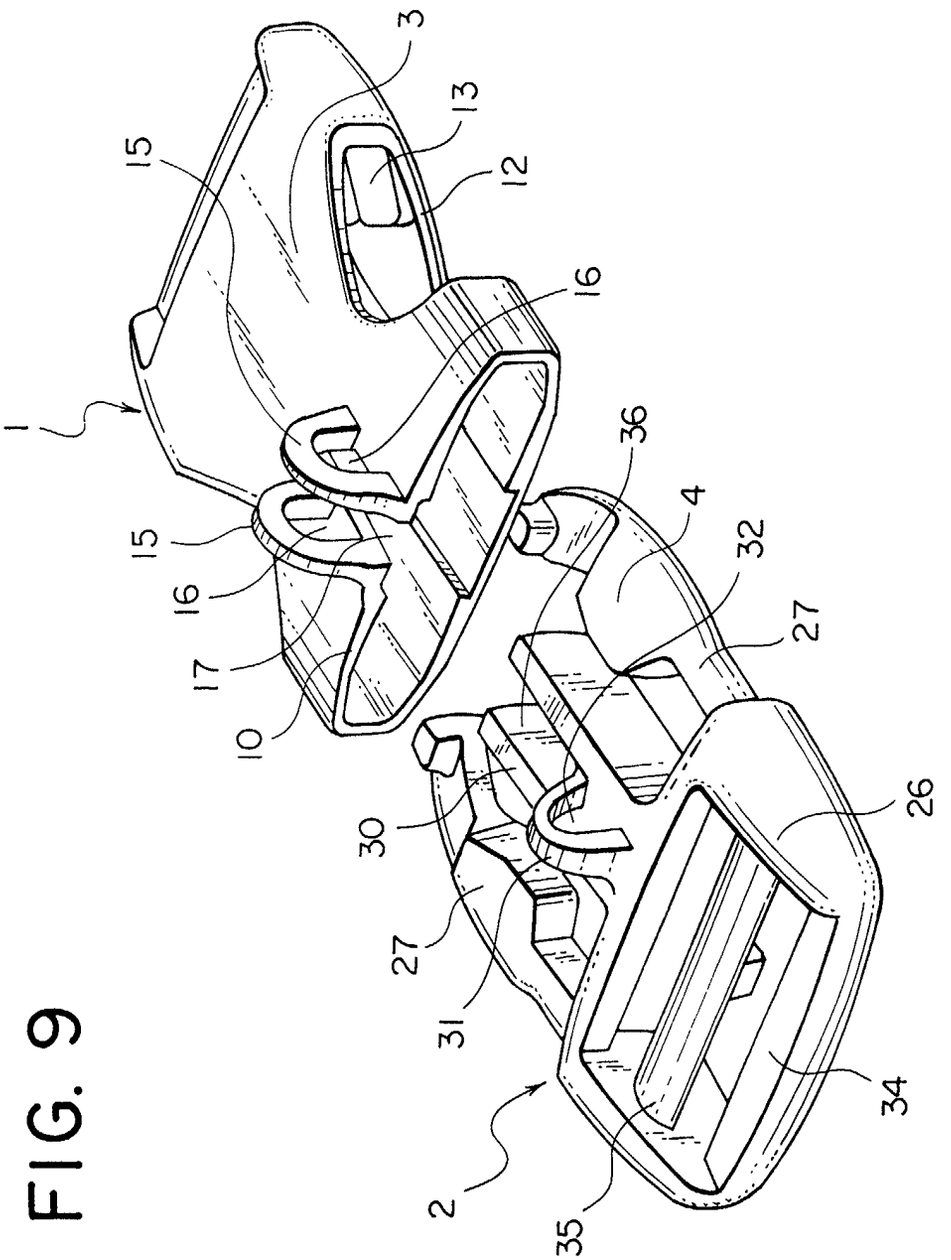

FIG. 10

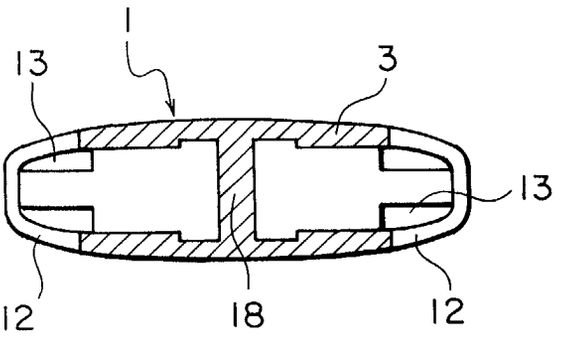
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FIG. 11

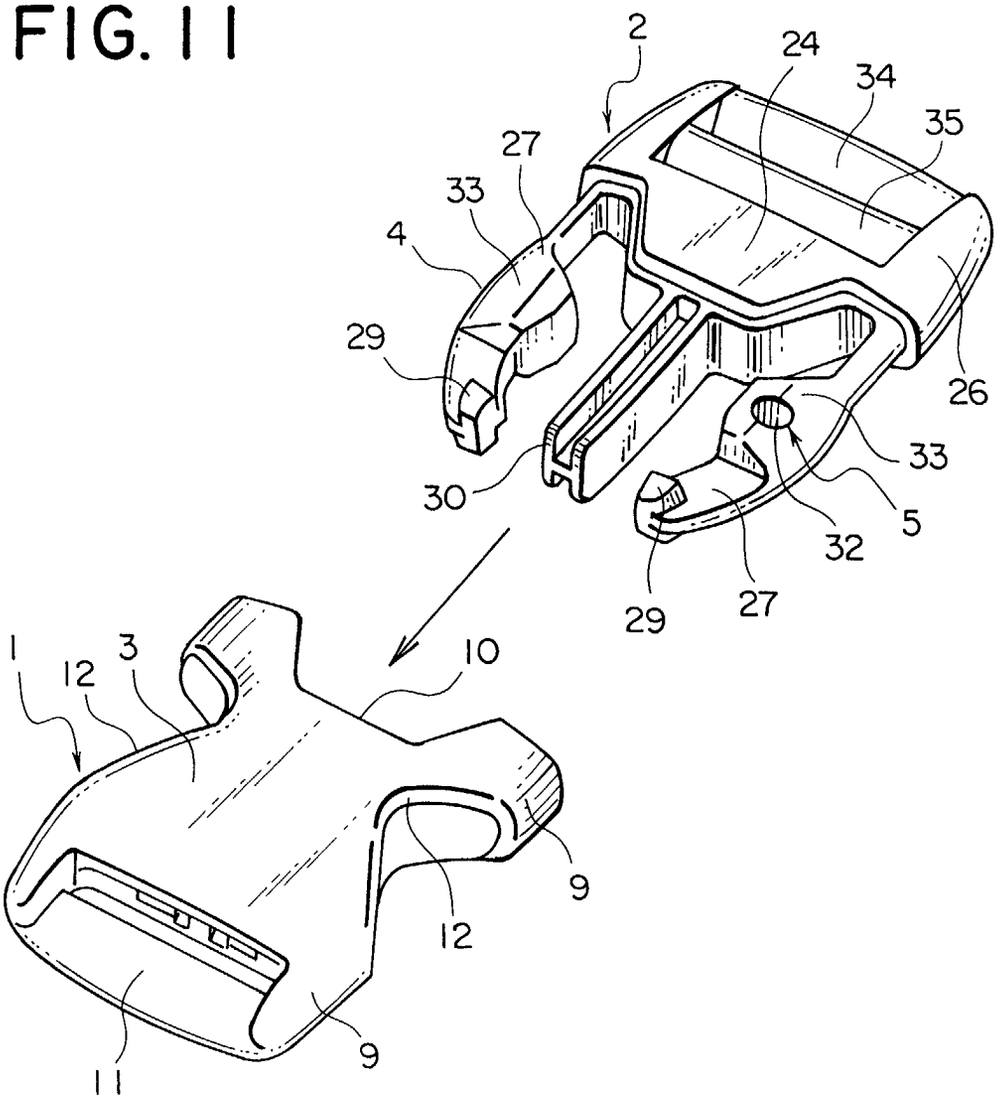
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FIG. 12

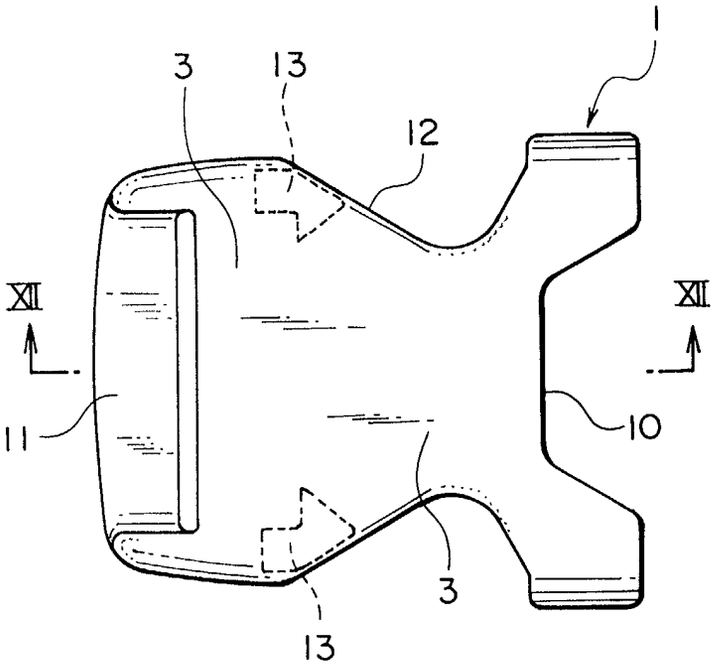

FIG. 13

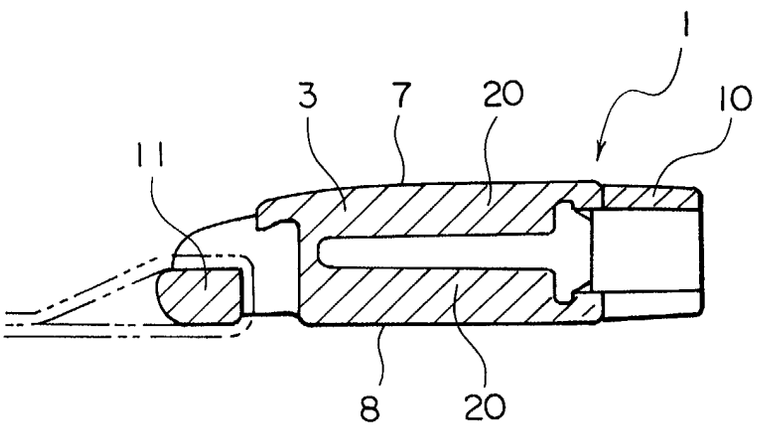

FIG. 14

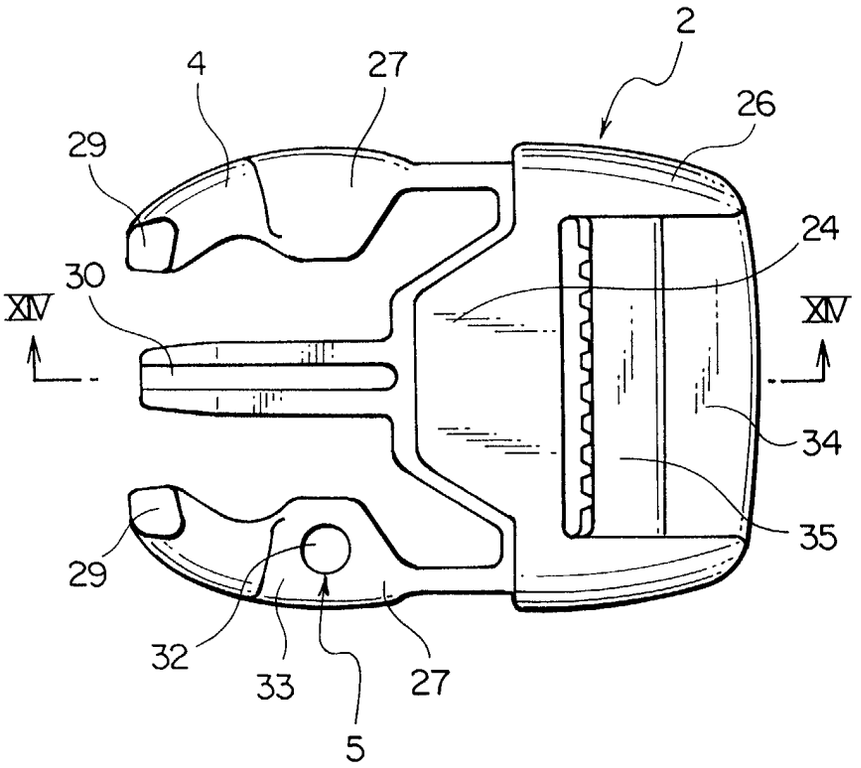

FIG. 15

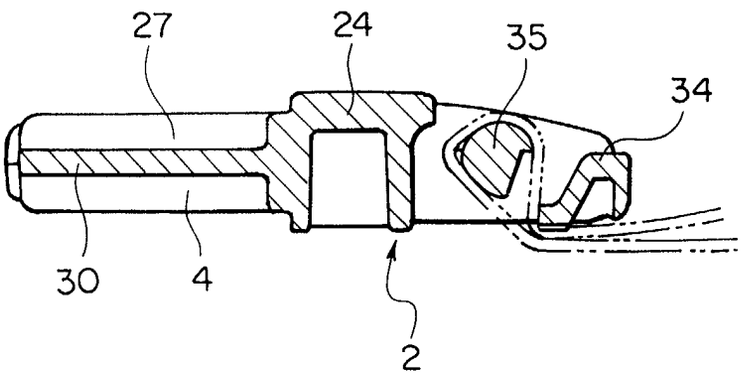

FIG. 16

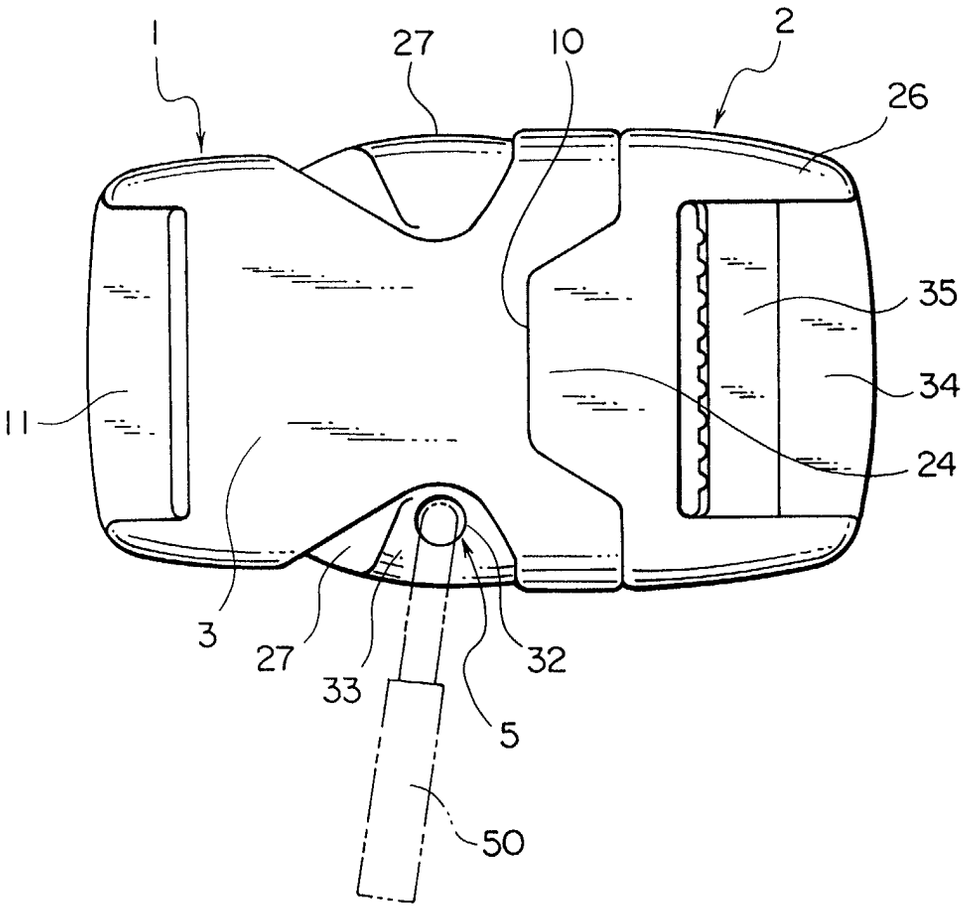

FIG. 17

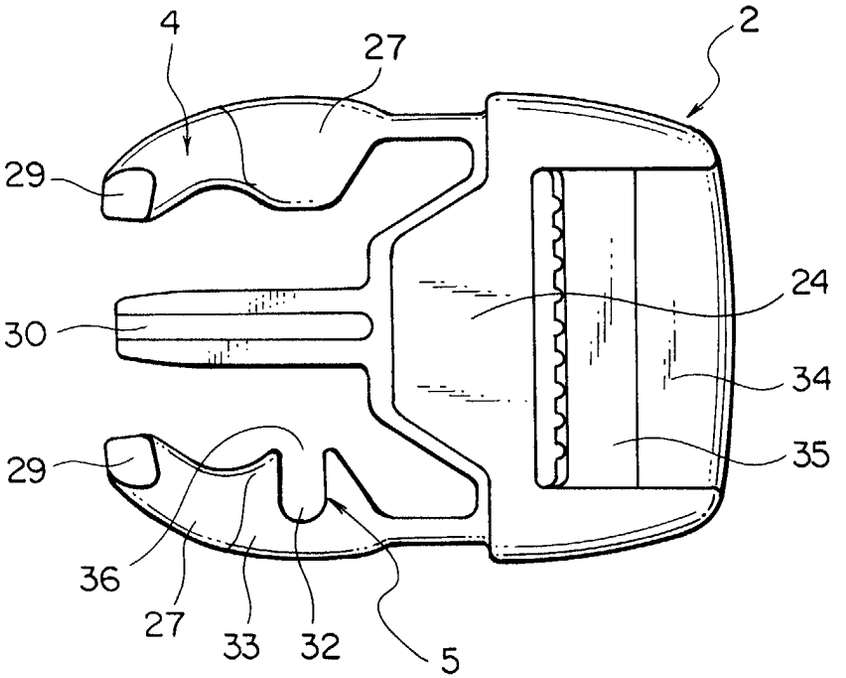
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FIG. 18

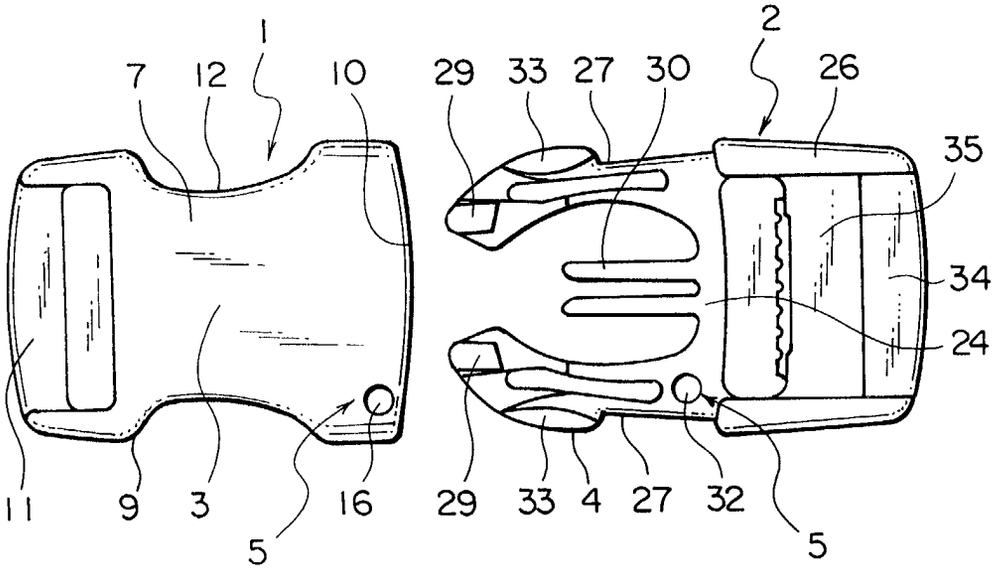
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FIG. 19

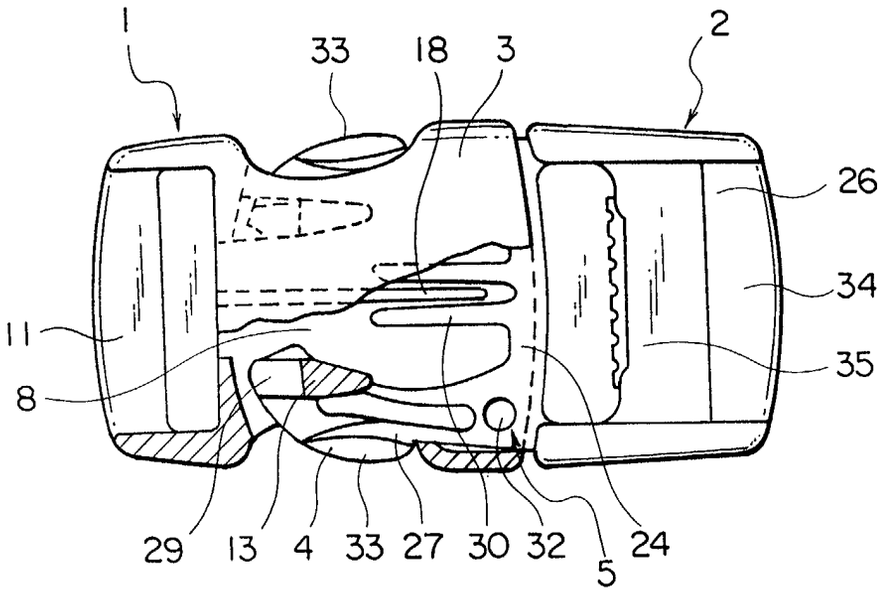
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FIG. 20

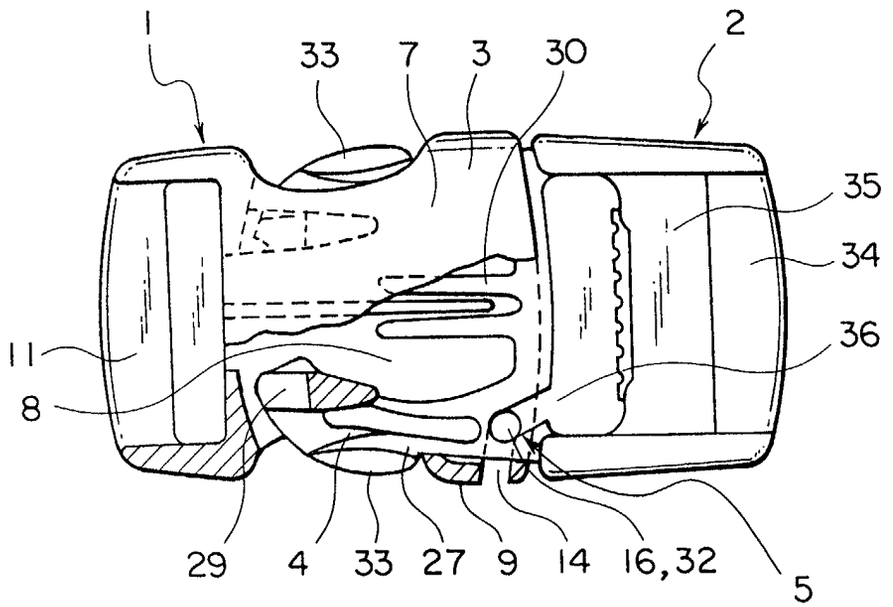
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FIG. 21

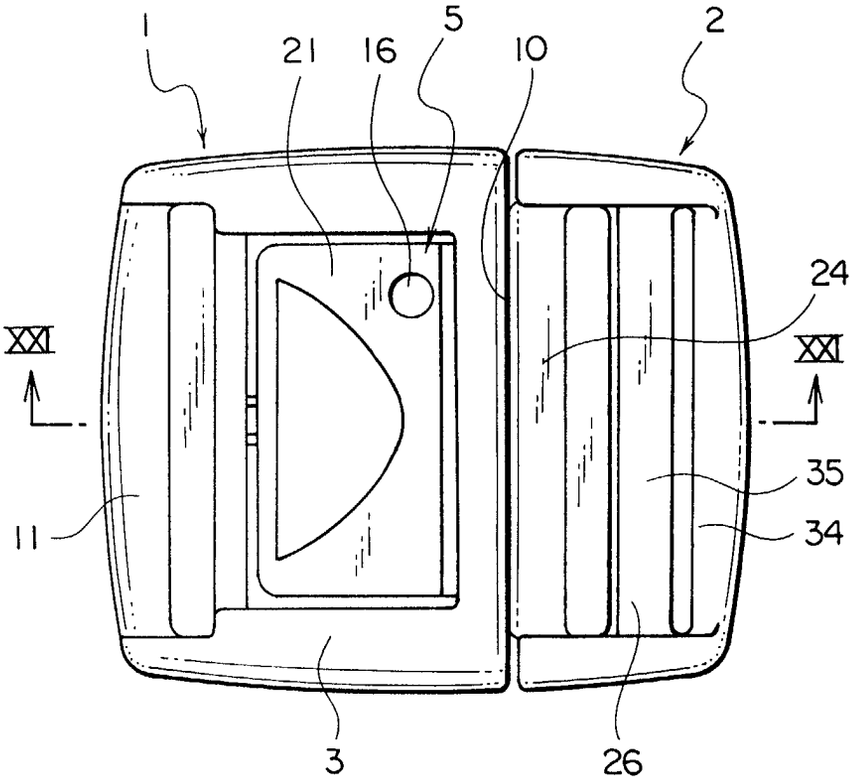
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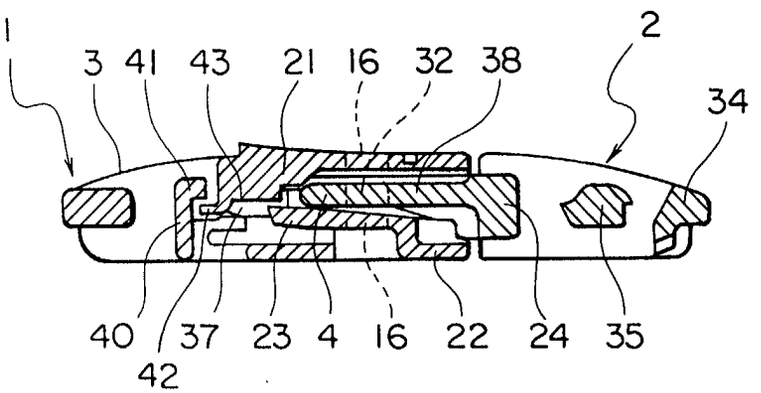
FIG. 22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4
16
22
24
35

FIG. 23

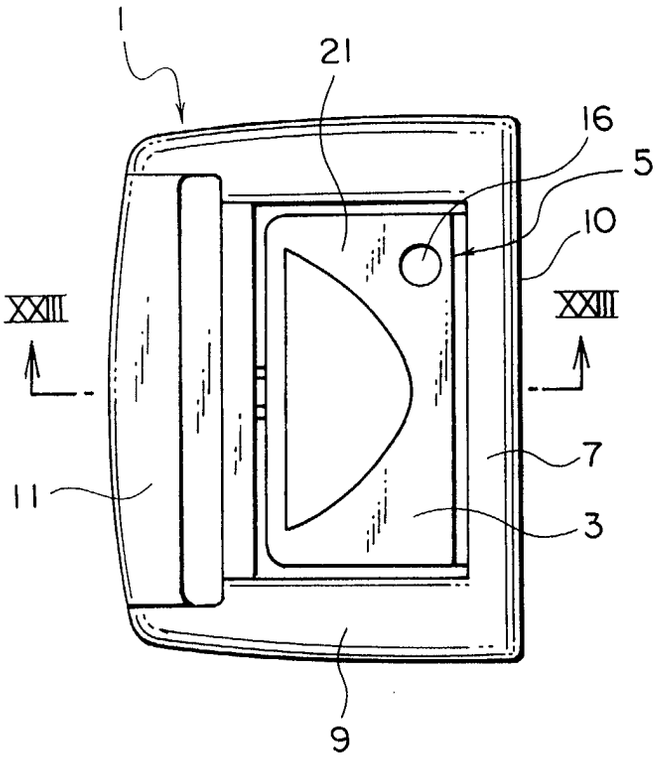

1
21
16
5
10
XXIII
XXIII
11
7
3
9

FIG. 24

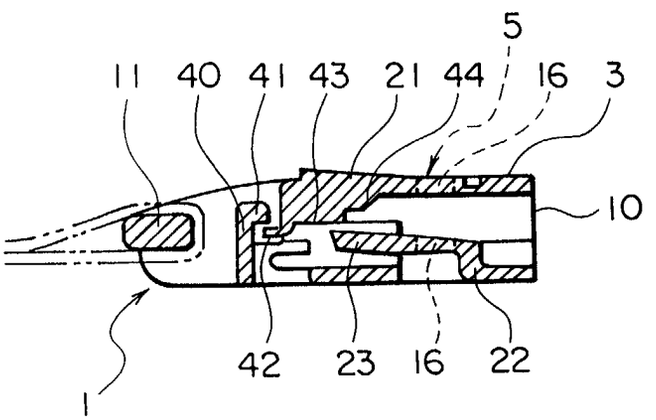

5
11
40
41
43
21
44
16
3
10
42
23
16
22
1

FIG. 25

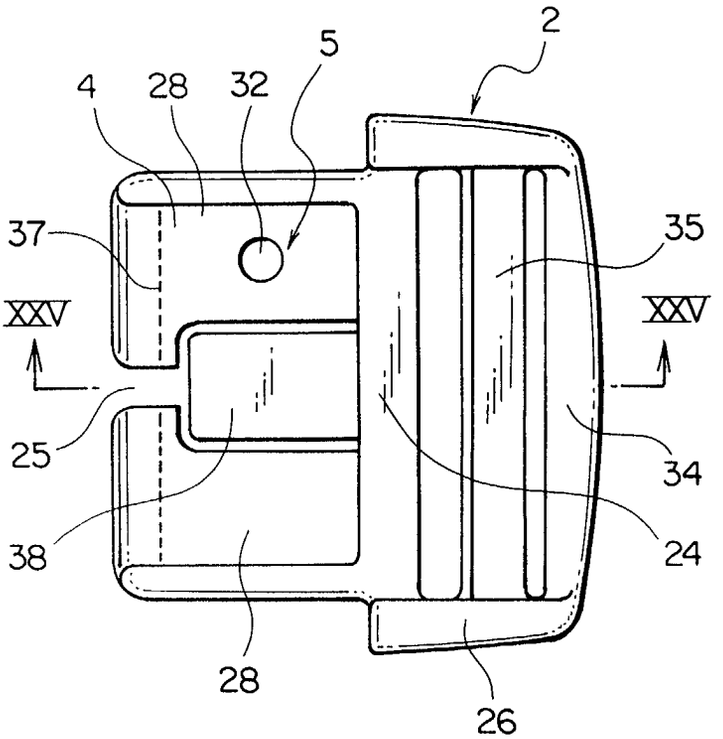


FIG. 26

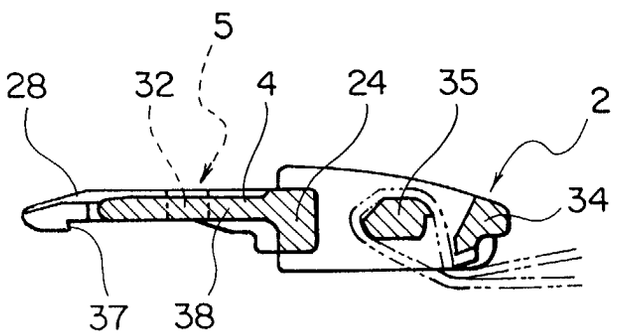


FIG. 27

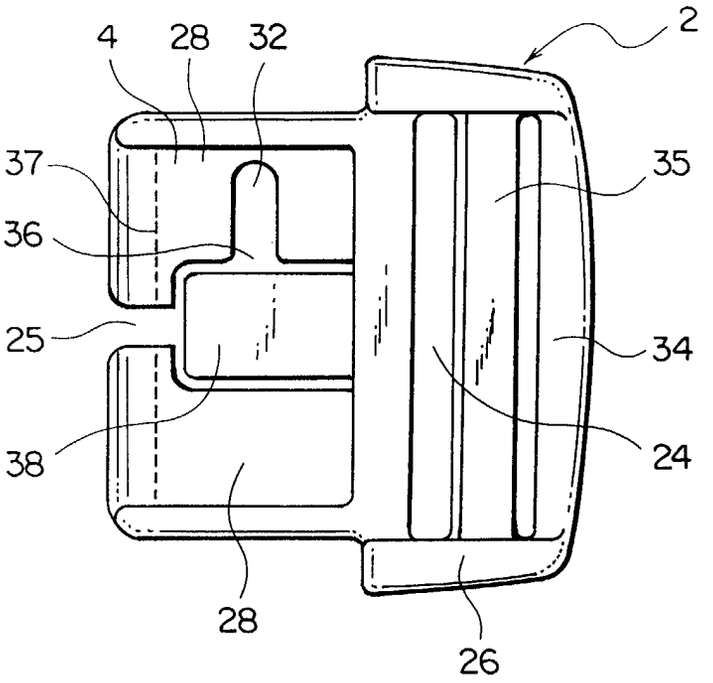

4
28
32
2
37
35
36
25
34
38
24
28
26

FIG. 28

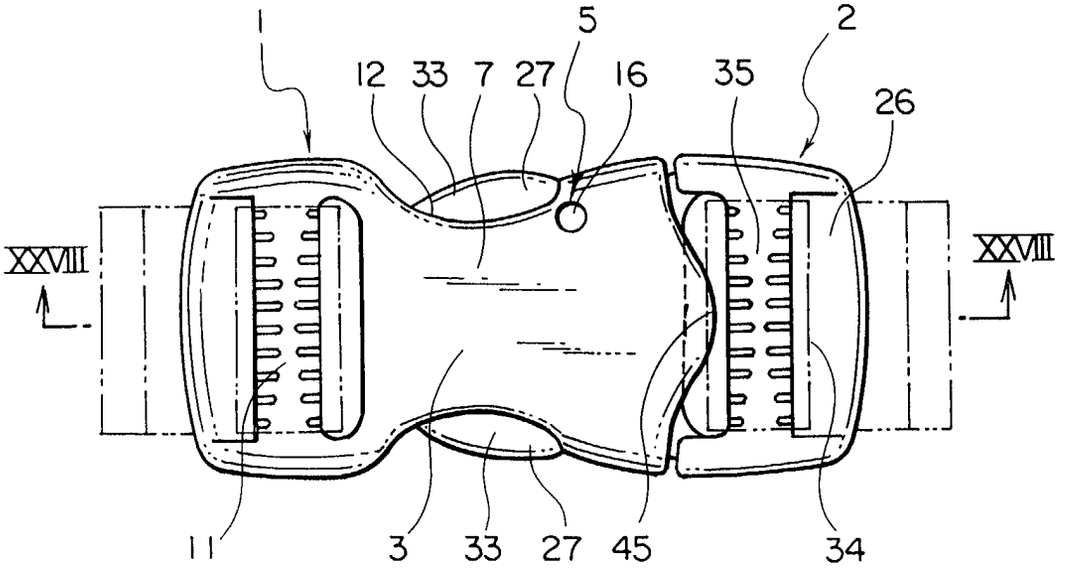

1
5
2
12
33
7
27
16
35
26
XXVIII
XXVIII
11
3
33
27
45
34

FIG. 29

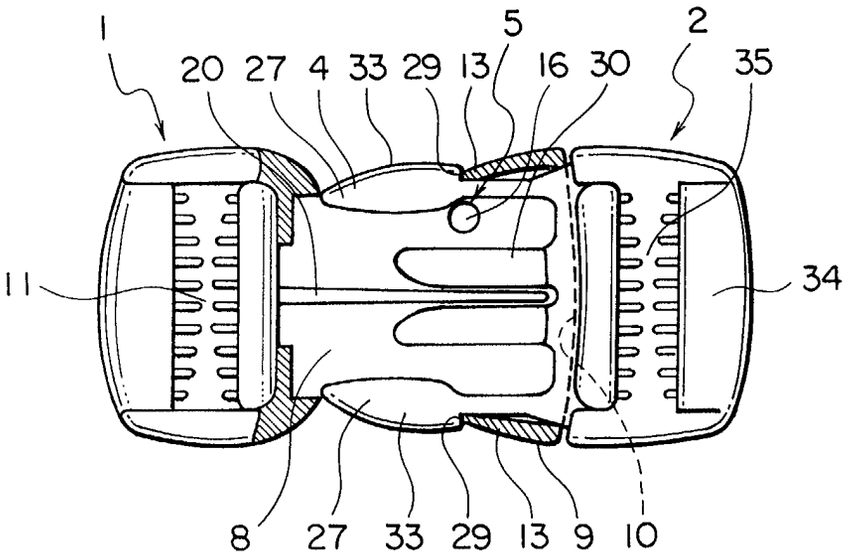
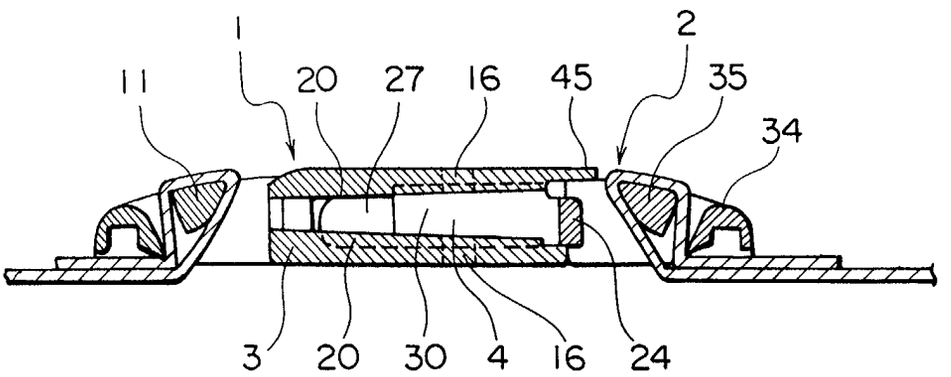

1
20
27
4
33
29
13
5
16
30
2
35
11
34
8
27
33
29
13
9
10

FIG. 30


1
2
11
20
27
16
45
35
34
3
20
30
4
16
24

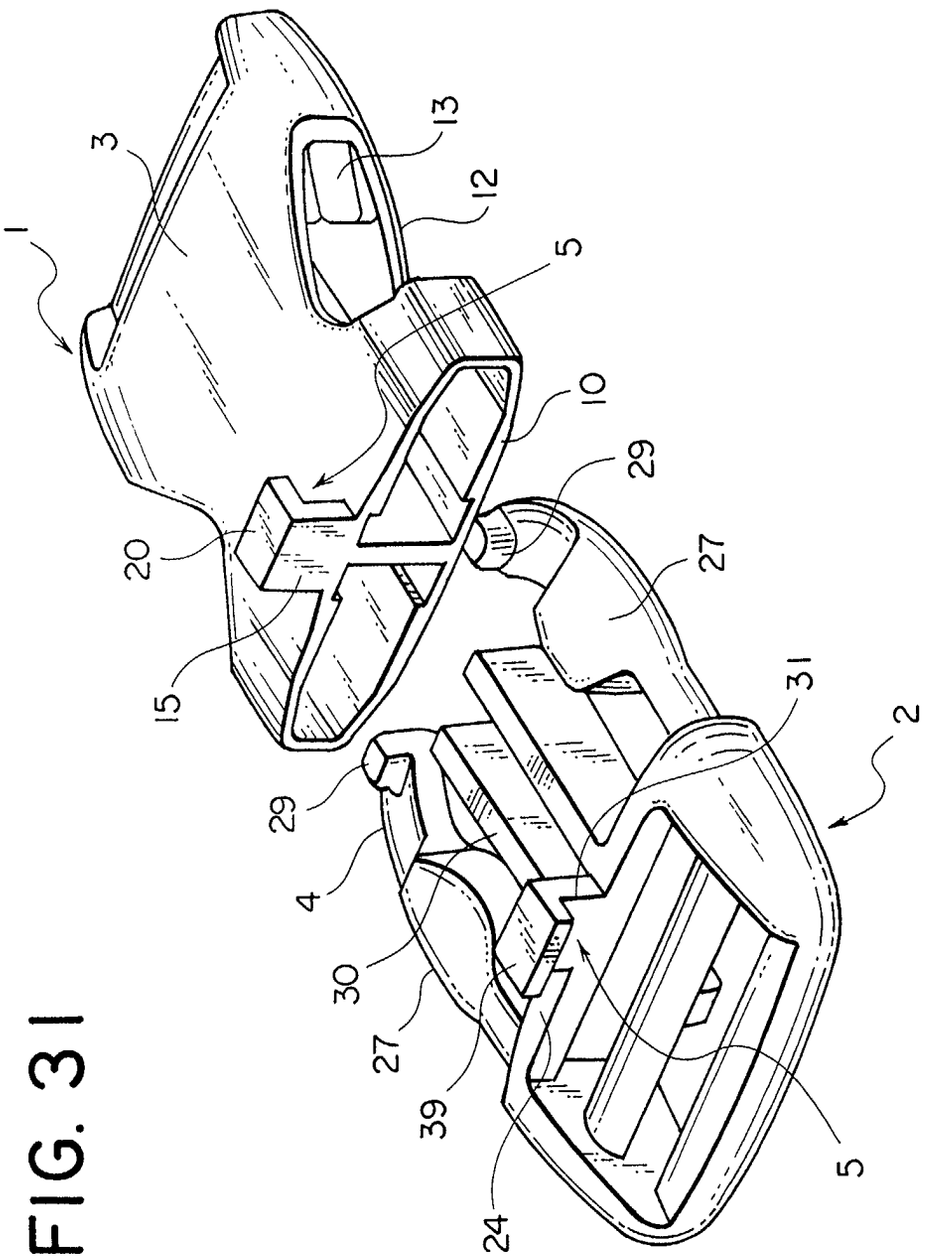
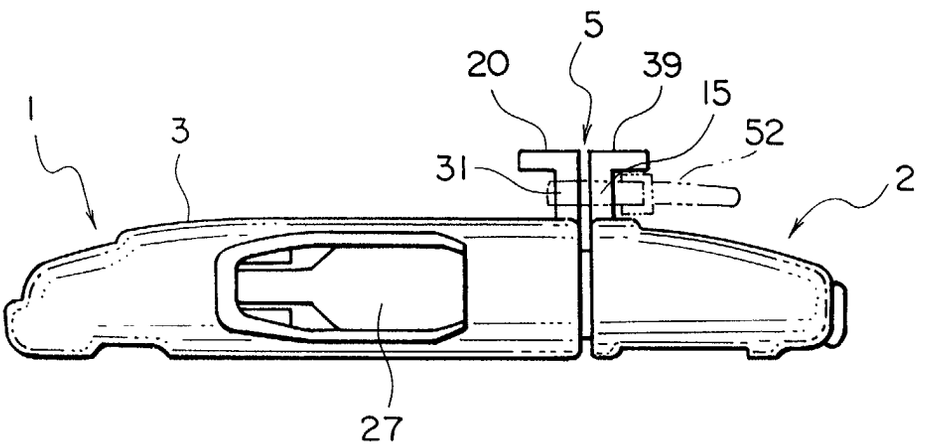


FIG. 31

FIG. 32



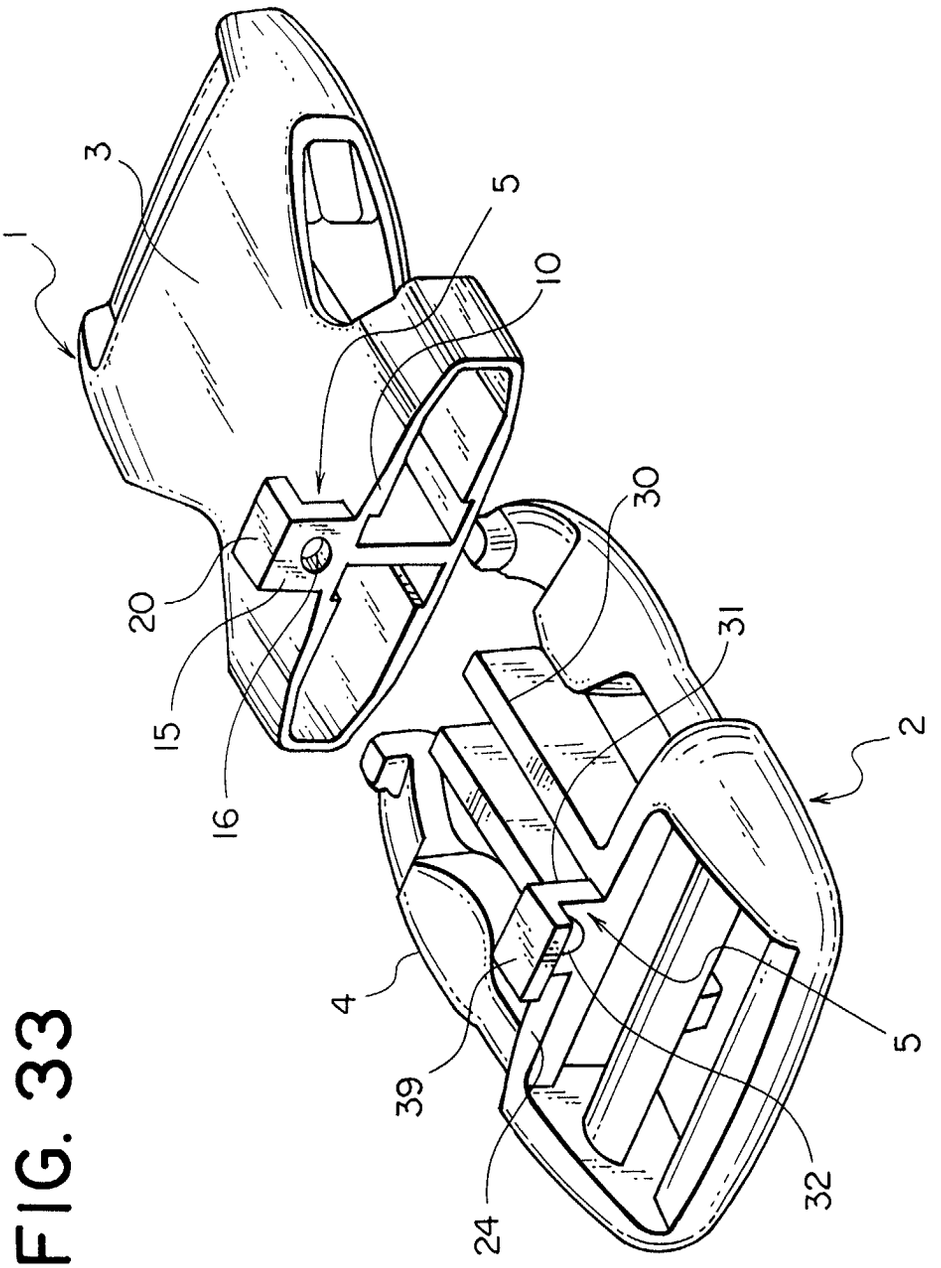


FIG. 33

FIG. 34
PRIOR ART

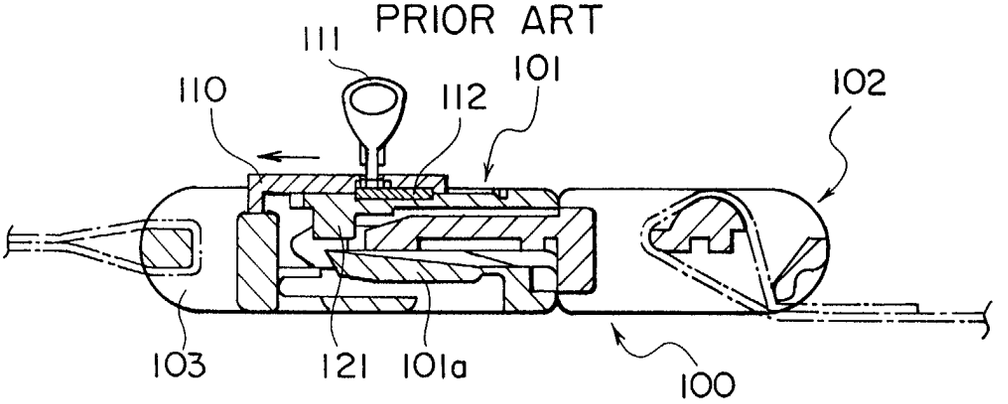


FIG. 35
PRIOR ART