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Description

The present invention relates to a masking member which protects a part of a surface of an article from a surface treatment such as coating, plating, vacuum evaporation, phosphatizing, and the like. More particularly, the present invention relates to a masking member consisting of a sheet having bellows part(s) in selected position(s) of said sheet. When a surface treatment is effected on the surface of an article, and if said surface of said article has (a) part(s) on which said surface treatment should not be effected for the reason that another surface treatment is effected on said part(s) after said surface treatment of said surface treatment spoils the appearance of said article and so on, said part(s) of said surface of said article may be covered and protected with said masking member.

Hitherto, adhesive tape has been used as a masking member to protect a part of a surface of an article such as a bumper of an automobile and the like. Namely, the adhesive tape is attached to said part of said surface to protect said surface from said surface treatment and after said surface treatment, said adhesive tape is removed from said surface. Said surface may not be affected by said surface treatment since said part of said surface was covered with said adhesive tape during said surface treatment. Nevertheless, adhesive tape as a masking member has faults in that attaching and removing of the adhesive tape to/from said part of said surface take time and have a high labor cost, and further, the adhesive tape attached to said part of said surface is buried in the layer of said surface treatment and it is very difficult to find the end of said buried adhesive tape to remove said adhesive tape. Said faults of adhesive tape may seriously obstruct a mass-production line such as a coating line for automobiles.

A reusable paint masking member, exhibiting both vertical and horizontal expensibility, is known from US-A-4,759,959.

Accordingly, an object of the present invention is to save trouble when the masking member is attached/removed to/from a part to be protected. According to the present invention, there is provided a masking member consisting of a sheet having bellows part(s) in selected position(s) of said sheet.

The invention also provides a method of surface treatment of an article wherein a part of the surface of the article is covered with such a masking, the surface treatment is performed and the masking member is removed.

The invention will be better understood from the following description given by way of example only with reference to the accompanying drawings in which:-

FIG. 1 to FIG. 6 relate to a first embodiment of the present invention.

FIG. 1 is a perspective view of the masking member of the first embodiment.

FIG. 2 is a front view showing a use mode of the masking member of the first embodiment.

FIG. 3 is a front view after coating in said use mode.

FIG. 4 is a perspective view showing another use mode of the masking member of the first embodiment.

FIG. 5 is a perspective view showing still another use mode of the masking member of the first embodiment.

FIG. 6 is a perspective view after coating and removing the masking member in said use mode.

FIG. 7 to FIG. 9 relate to a second embodiment of the present invention.

FIG. 7 is a perspective view of the masking member of the second embodiment.

FIG. 8 is a perspective view of a front part of an automobile.

FIG. 9 is a perspective view of said front part of said automobile protected by the masking member of the second embodiment.

FIG. 10 to FIG. 13 relate to a third embodiment of the present invention.

FIG. 10 is a perspective view of the masking member of the third embodiment.

FIG. 11 is a perspective view of a bumper of an automobile.

FIG. 12 is a perspective view of a front part of an automobile protected by the masking member of the third embodiment.

FIG. 13 is a cross sectional view of the bumper protected by the masking member of the third embodiment.

FIG. 14 to FIG. 18 relate to a fourth embodiment of the present invention.

FIG. 14 is a perspective view of the masking member of the fourth embodiment.

FIG. 15 is a cross sectional view of a clip part of the masking member of the fourth embodiment.

FIG. 16 is a perspective view of a front part of an automobile.

FIG. 17 is a perspective view of said front part of said automobile protected by the masking member of the fourth embodiment.

FIG. 18 is a cross sectional view of said clip part of said masking member of the fourth embodiment clipping a piller of a bumper.

FIG. 19 to FIG. 21 relate to a fifth embodiment of the present invention.

FIG. 19 is a perspective view of a bumper.

FIG. 20 is a perspective view of the masking member of the fifth embodiment.

FIG. 21 is a cross sectional view of said bumper protected by said masking member of the fifth embodiment.

FIG. 22 to FIG. 25 relate to a sixth embodiment of the present embodiment.

FIG. 22 is a cross sectional view of the masking member of the sixth embodiment.

FIG. 23 is a partial perspective view of both end parts of the masking member of the sixth embodiment.

FIG. 24 is a cross sectional view of a pillar protected by the masking member of the sixth embodiment.

FIG. 25 A is a partial front view of said pillar after coating, and FIG. 25 B is a partial front view of said pillar after removing the masking member.

The masking member of the present invention is made of a sheet such as from plastics or rubber such as polystyrene, polyethylene, polypropylene, ethylene-proplylene copolymer, polyvinylchloride, polyvinylidene chloride, polymethacrylate, styrene-butadiene copolymer, acrylonitrile-butadiene copolymer, polybutadine polyisoprene, polyisobutylene, polychloroprene, isoprene-isobutylene copolymer, natural rubber, polyurethane, melamine resin, urea resin, phenolresin, epoxyresin and the like; foams of said plastics; or said rubber; fiber sheet such as fabricrubber, knitting, non-woven fabric, paper, corrugated carboard and the like; thermoplastic resin - impregnated fiber sheet; thermosetting resin -impregnated fiber sheet; wooden sheet such as wood board, hardboard, plywood and the like; metal sheet and the like; laminated sheet consisting of a plural number of sheets selected from the group of said sheets. In cases where said masking member is made of a sheet from plastics or rubber, it is desirable to mix inorganic filler such as calcium carbonate, silica, talc, clay, bentonite, stone powder, blast furnace slag, flyash, and the like into said plastics or rubber since heat resistance, mechanical properties and the like of said masking member are improved by said inorganic filler and further, when a used masking member is burnt in a combustion furnace, a smaller combustion energy is produced so that said combustion furnace will stand long use. Usually, 10 to 500 weight parts, desirably 20 to 400 weight parts of said inorganic filler are mixed into said plastics. Further organic filler such as wood powder, organic, fiber powder, walnut powder, coconut powder, flour, chaff powder and the like may be mixed into said plastics or rubber. Still further, dyestuff, pigment, antioxidant, ultraviolet absorber plasticizer and the like may be mixed into said plastics or rubber. Polyolefin such as polyethylene, polypropylene and the like are desirable plastics for the material of the sheet of the masking member of the present invention since said polyolefin has high solvent resistance and is inexpensive, and of course, polyolefin in which said inorganic filler is mixed is a desirable material for said masking member. Polystyrene foam is also a desirable material for said masking member since said polystyrene foam is light and inexpensive, nevertheless, since said polystyrene foam has a low solvent resistance and a low heat resistance, it is desirable to laminate a suitable plastic or rubber onto said polystyrene foam.

Vacuum forming, press molding, casting, extrusion, injection, molding, paper making and the like may be used to produce the masking member of the present invention. The masking member of the present invention does not deform to maintain the shape corresponding with the part of the surface of the article to be protected from surface treatment during the storage, the transportation, handling, and the like, since the masking member is reinforced by said reinforcing rib(s). Therefore the masking member of the present invention can protect completely the part to be protected.

Said masking member consisting of a sheet having bellows part(s) in selected position(s) of said sheet, and said bellows part(s) of said masking member of the present invention can be bent both horizontally and perpendicularly, and further said bellows part(s) can be lengthened. Thus said masking member of the present invention can be applied to various curved surfaces and surfaces having various length.

Fig. 1 to Fig. 6 relate to a first embodiment of the present invention. Referring now to Fig. 1 to Fig. 6, a masking member (110) consists of a sheet (111) having a pair of bellows parts (112), (112) in the both end parts of said sheet (111). Further adhesive layers (113), (113) are formed on the upper edge and the lower edge of the back-side of said sheet.

Said bellows parts (112), (112) of said masking member (110) can be bent both in YZ-directions and lengthened to X-direction as shown in fig. 1. Accordingly, said masking member (110) is lengthened to X-direction and bent in Y-direction at said bellows parts(112), (112) corresponding with a shape of a part (211) of a surface (210) and then said masking member (110) is easily attached to said part (211) by adhesive layers (113), (113) of said masking member (110). After said masking member (110) is attached said part (211), a surface treatment such as a spray-coating of a paint (400A) is effected on said surface (210) as shown in Fig. 2. After said spray-coating, said masking member (110) is removed from said part (211) and said paint (400A) is not coated on said part (211) since said part (211) has been protected during said coating.

Said masking member (110) is also lengthened to X-direction and bent in Y-direction at said bellows parts (112), (112) and then said masking member (110) is attached a part (211A) of a surface (210A) of an article (300A) as shown in Fig. 4.

Further, Fig. 5 shows that said masking member (110) is attached the lower half (211B) of a bumper (210B) of an automobile (300B). In this case, said bellows parts (112), (112) of said masking member (110) are lengthened to X-direction and bent both in Y and Z-directions corresponding with the shape of said lower half (211B) of said bumper (210B). After a spray-coating of a paint (400B) is effected on said

bumper (210B), said masking member (110) is removed from said lower half (211B) of said bumper (210B) and as shown in Fig.6, said paint (400B) is not effected on said lower half (211B) of said bumper (210B) but on the upper half (212B) of said bumper (210B).

Fig. 7 to Fig. 9 relate to a second embodiment of the present invention. Referring now to Fig. 7 to Fig. 9, a masking member (121) is produced by the molding of a sheet (121) having a pair of bellows parts (122) in the both end parts of said sheet (121) and has a shape corresponding with the surface of the lower half (221) of a bumper (220) of an automobile (310) and indentions (124), (125) are formed in both ends of said masking member (120) wherein projections (224), (225) in both ends of said lower half (221) of said bumper (220) are inserted into said indentions (124), (125) of said masking member (120). Further, an adhesive layer (123) is formed on the upper edge of the inside of said masking member (120), and a reinforcing rib (126) is formed in said masking member (120).

Said masking member (120) is correctly, easily, and securely attached on said lower half (221) of said bumper (220) by inserting said projections (224), (225) of said bumper (220) into said indentions (124), (125) of said masking member (120) and adhering said adhesive layer (122) to the upper edge of said lower half (221) of said bumper (220). When said masking member (120) is attached on said lower half (221) of said bumper (220), said bellows parts (122), (122) may be bent both in Y and Z-directions and a little lengthened to X-direction corresponding with the shape of said lower half (221) of said bumper (220). And then a paint (410) is coated on said bumper (220) as shown in Fig. 9. After said coating, said masking member (120) is easily removed from said bumper (220) and said paint (410) is not coated on said lower half (221) of said bumper (220) while said paint (410) is coated on the upper half (222) of said bumper (220).

The masking member of the second embodiment is easily attached to a part of a surface of an article to be protected by inserting (a) projection(s) of said part into (an) indention(s) of the masking member and said masking member is easily removed from said part by extracting said projection(s) of said part from said indention(s) of said masking member. Accordingly, said masking member of the present invention can be correctly, easily, and securely attached to a part of a surface by the guide of said projection(s) of said part and said indention(s) of said masking member.

Fig. 10 to Fig. 13 relate to a third embodiment of the present invention. Referring now to Fig. 10 to Fig. 13, a masking member (130) is produced by the molding of a sheet (131) having a pair of bellows parts (132), (132) in the both end parts of said sheet (131) and has a shape corresponding with the surface of the lower half (231) of a bumper (230) of an automobile (320) and a bending part (135) is elongated from the lower edge of said masking member (130) and projections (134) are formed on the surface of said Dending part (135). Further, an adhesive layer (133) is formed on the upper edge of the inside of said masking member (130) and a reinforcing rib (136) is formed in said masking member (130).

Said masking member (130) is correctly, easily, and securely attached on a lower half (231) of said bumper (230) by inserting said projections (134) of said masking member (130) into holes (234) of an inwardly bent part (235) which is elongated from the lower half (231) of said bumper (230) and adhering said adhesive layer (132) to the upper edge of said lower half (231) of said bumper (230). When said masking member (130) is attached on said lower half (231) of said bumper (230), said bellows parts (132), (132) may be bent both i Y and Z-directions and a little lengthened to X-direction corresponding with the shape of said lower half (231) of said bumper (230). And then a paint (420) is coated on said bumper (230) as shown in Fig. 12. After said coating, said masking member (120) is easily removed from said bumper (220) and said paint (420) is not coated on said lower half (221) of said bumper (220) while said paint (420) is coated on the upper half (222) of said bumper (220).

The masking member of the third embodiment is easily attached to a part of a surface of an article to be protected by inserting (a) projection(s) of said part into (an) indention(s) of the masking member and said masking member is easily removed from said part by extracting said projection(s) of said part from said indention(s) of said masking member.

Accordingly, said masking member of the present invention can be correctly, easily, and securely attached to a part of a surface by the guide of said projection(s) of said part and said indention(s) of said masking member.

Fig. 14 to Fig. 18 relate to a fourth embodiment of the present invention. Referring now to Fig. 14 to Fig. 18, a masking member (140) is produced by the molding of a sheet (141) having a pair of bellows parts (142),(142) in the both end parts of said sheet (141) and has a shape corresponding with the surface of the lower half (241) of a bumper (240) of an automobile (340) and pinching parts (144) are formed on the inside of said masking member (140) wherein pillars (244) of air inlets (243) of said lower half (241) of said bumper (240) are inserted into said pinching parts (144) of said masking member (140). As shown in Fig. 15, said pinching parts (144) are formed between a pair of walls (144A), (144A). Further, an adhesive layer (143) is formed on the upper edge of the inside of said masking member (130) and a reinforcing rib (145) is formed in said masking member (140).

Said masking member (140) is correctly, easily, and securely attached on said lower half (241) of said bumper (240) by inserting said pillars (243) of said

bumper (240) into said pinching parts (144) of said masking member (140) and adhering said adhesive layer (143) to the upper edge of said lower half (241) of said bumper (240). Said pinching parts (144) of said masking member (140) respectively pinch said pillars (243) of air inlets (244) by the elasticity thereof so that said masking member (140) is securely attached to said lower half (241) of said bumper (240). When said masking member (140) is attached on said lower half (241) of said bumper (240), said bellows parts (142), (142) may be bent both in Y and Z-directions and a little lengthened to X-direction corresponding with the shape of said lower half (241) of said bumper (240). After said masking member (140) is attached to said lower half (241) of said bumper (240), a paint (440) is coated on said bumper (240) as shown in Fig. 17. After said coating, said masking member (140) is easily removed from said bumper (240) and said paint (430) is not coated on said lower half (241) of said bumper (240) while said paint (430) is coated on the upper half (242) of said bumper (240).

Fig. 19 to Fig. 21 relate to a fifth embodiment of the present invention. Referring now to Fig. 19 to Fig. 21, a masking member (150) is produced by the molding of a sheet (141) having a pair of bellows parts (152), (152) in the both end parts of said sheet (151) and has a shape corresponding with a lower half (251) of a bumper (250) of an automobile and pinching parts (155) are elongated from the lower edge of said masking member (150) wherein a bending part (255) elongated from the lower edge of said bumper (250) is inserted into said pinching parts (155) of said masking member (150). Further, an adhesive layer (152) is formed on the upper edge of the inside of said masking member (140) and a reinforcing rib (156) is formed in said masking member (150).

Said masking member (150) is correctly, easily, and securely attached on said lower half (251) of said bumper (250) by inserting said bending part (255) of said bumper (250) and adhering said adhesive layer (152) to the upper edge of said lower half (251) of said bumper (250). Said pinching parts (155) of said masking member (150) respectively pinch said bending part (255) of said bumper (250) by the elasticity thereof so that said masking member (150) is securely attached to said lower half (251) of said bumper (250). When said masking member (150) is attached on said lower half (251) of said bumper (250), said bellows parts (152), (152) may be bent both in Y and Z-directions and a little lengthened to X-direction corresponding with the shape of said lower half (251) of said bumper (250). After said masking member (150) is attached to said lower half (251) of said bumper (250), a paint is coated said bumper (250) after said coating, said masking member (150) is easily removed from said lower half (251) of said bumper (250).

Fig. 22 to Fig. 25 relate to a sixth embodiment of the present invention. Referring now to Fig. 22 to Fig. 25, a masking member (160) consists of sheet (161) having four bellows parts (162) at regular intervals. A flange part (163) is extended from one end of one side of said sheet (161) and further, a flange part (165) is extended from the other end of the other side of said sheet (161). Two holes (164) are formed in said flange part (163) while two projections (166) are formed on said flange part (165).

Said masking member (161) is attached on a part (261) of a pillar (260) of a door of an automobile by bending said masking member (160) along said bellows parts (162) to surround said part (261) of said pillar (260) and said two projections (166) of said flange part (165) are respectively engaged in said holes (164) of said flange part (163) to secure said masking member (160) on the circumference of said part (261) of said pillar (260) as shown in Fig. 24.

After said masking member (160) has been attached on said part (261) of said pillar (260) as above described, said pillar (260) is coated by spraying a paint (440) as shown in Fig. 25A and said part (261) of said pillar (260) which is covered with said masking member (160) is not coated with said paint (440). After coating, said masking member (160) is removed from said part (261) of said pillar (260) by hand, hook, and the like and said pillar (260) has said part (261) which is not coated with said paint (440) as shown in Fig. 25B.

Claims

1. A masking member consisting of a sheet having bellows part(s) in selected position(s) of said sheet.

2. A masking member according to claim 1 wherein said sheet is of plastics or rubber.

3. A masking member in accordance with claim 1 or 2, wherein said sheet is a polyolefin sheet.

4. A masking member in accordance with claim 2 or 3 wherein said sheet contains an inorganic filler.

5. A masking member in accordance with claim 4, wherein said sheet is a polyolefin sheet and 10 to 500 weight parts of said inorganic filler is mixed in said polyolefin sheet.

6. A masking member in accordance with claim 1, wherein said sheet is a fiber sheet.

7. A masking member in accordance with claim 1, wherein said sheet is laminated sheet consisting of a soft elastic sheet and a rigid sheet.

8. A masking member according to any preceding claim produced by molding or vacuum forming of a sheet.

9. A masking member according to any preceding claim, wherein said bellows part(s) are located in both end parts of the masking member.

10. A masking member according to any preceding claim including an adhesive layer by which the masking member can be located on a surface to be protected.

11. A masking member according to any preceding claim including indentations at both ends of the masking member to receive projections from a surface to be protected.

12. A masking member according to any one of claims 1 to 10 including a bending part (135) of said masking member to engage a bent part of a body to be protected and projections (134) on said bending part to engage holes of said bent part

13. A masking member according to any one of claims 1 to 10 including pinching parts (144, 155) to engage a body to be protected.

14. A masking member according to claim 11, 12 or 13 including a reinforcing rib (126, 136, 145, 156).

15. A masking member according to any one of claims 1 to 8, having four bellows parts (162) at regular intervals whereby masking members can surround and protect a pillar.

16. A method of surface treatment of an article wherein a part of the surface of the article is covered with a masking member according to any preceding claim, the surface treatment is performed and the masking member is removed.

17. A method according to claim 16, wherein said masking member is used to protect the lower half of a bumper of an automobile, or a part of a surface of the underside of an automobile, or a pillar of a door.

Patentansprüche

1. Abdeckelement, bestehend aus einer Bahn mit einem oder mehreren Faltenbalgabschnitten an einer bzw. mehreren ausgewählten Stellen der Bahn.

2. Abdeckelement nach Anspruch 1, wobei die Bahn aus Kunststoff oder Kautschuk besteht.

3. Abdeckelement nach Anspruch 1 oder 2, wobei die Bahn eine Polyolefinbahn ist.

4. Abdeckelement nach Anspruch 2 oder 3, wobei die Bahn einen anorganischen Füllstoff enthält.

5. Abdeckelement nach Anspruch 4, wobei die Bahn eine Polyolefinbahn ist und 10 bis 500 Gew.-Teile des anorganischen Füllstoffs der Polyolefinbahn beigemischt sind.

6. Abdeckelement nach Anspruch 1, wobei die Bahn eine faserige Bahn ist.

7. Abdeckelement nach Anspruch 1, wobei die Bahn eine laminierte Bahn aus einer weichelastischen Bahn und einer steifen Bahn ist.

8. Abdeckelement nach einem der vorstehenden Ansprüche, hergestellt durch Formen oder Vakuumverformen einer Bahn.

9. Abdeckelement nach einem der vorstehenden Ansprüche, wobei der (die) Faltenbalgabschnitt(e) in beiden Endabschnitten des Abdeckelements angeordnet ist (sind).

10. Abdeckelement nach einem der vorstehenden Ansprüche, mit einer Klebstoffschicht, mit der das Abdeckelement auf einer zu schützenden Fläche befestigbar ist.

11. Abdeckelement nach einem der vorstehenden Ansprüche, mit Vertiefungen an beiden Enden des Abdeckelements zur Aufnahme von Vorsprüngen von einer zu schützenden Fläche.

12. Abdeckelement nach einem der Ansprüche 1 bis 10, mit einem Biegeabschnitt (135) des Abdeckelements zum Eingriff mit einem gebogenen Abschnitt eines zu schützenden Körpers und Vorsprüngen (134) an dem Biegeabschnitt zum Eingriff mit Aussparungen des gebogenen Abschnitts.

13. Abdeckelement nach einem der Ansprüche 1 bis 10, mit Klemmteilen (144, 155) zum Eingriff mit einem zu schützenden Körper.

14. Abdeckelement nach Anspruch 11, 12 oder 13 mit einer Verstärkungsrippe (126, 136, 145, 156).

15. Abdeckelement nach einem der Ansprüche 1 bis 8, mit vier Faltenbalgabschnitten (162) in regelmäßigen Abständen, so daß die Abdeckelemente einen Pfosten umgeben und schützen können.

16. Verfahren zur Oberflächenbehandlung eines Gegenstandes, wobei ein Teil der Oberfläche des Gegenstandes mit einem Abdeckelement nach einem der vorstehenden Ansprüche abgedeckt, die Oberflächenbehandlung ausgeführt und das Abdeckelement abgenommen wird.

17. Verfahren nach Anspruch 16, wobei das Abdeckelement zum Schutz der unteren Hälfte einer Stoßstange eines Kraftfahrzeugs, eines Teils einer Fläche des Unterbodens eines Kraftfahrzeugs oder eines Türpfostens verwendet wird.

Revendications

1. Un élément de cache consistant en une feuille qui comporte une ou des partie(s) à soufflet en des emplacements choisis de ladite feuille.

2. Un élément de cache suivant la revendication 1, dans lequel ladite feuille est en plastique ou en caoutchouc.

3. Un élément de cache suivant la revendication 1 ou 2, dans lequel ladite feuille est une feuille de polyoléfine.

4. Un élément de cache suivant la revendication 2 ou 3, dans lequel ladite feuille contient une charge minérale.

5. Un élément de cache suivant la revendication 4, dans lequel ladite feuille est une feuille de polyoléfine et 10 à 500 parties en poids de ladite charge minérale est mélangée à ladite feuille de polyoléfine.

6. Un élément de cache suivant la revendication 1, dans lequel ladite feuille est une feuille en fibres.

7. Un élément de cache suivant la revendication 1, dans lequel ladite feuille est une feuille stratifiée composée d'une feuille élastique souple et d'une feuille rigide.

8. Un élément de cache suivant l'une quelconque des précédentes revendications obtenu par moulage ou formage sous vide de la feuille.

9. Un élément de cache suivant l'une quelconque des précédentes revendications, dans lequel lesdites parties en soufflet sont situées au niveau des deux parties d'extrémité de l'élément de cache.

10. Un élément de cache suivant l'une quelconque des précédentes revendications, comportant une couche adhésive grâce à laquelle l'élément de cache peut être placé sur la surface à protéger.

11. Un élément de cache suivant l'une quelconque des précédentes revendications, comportant des échancrures au niveau de ses deux extrémités pour recevoir des saillies de la surface à protéger.

12. Un élément de cache suivant l'une quelconque des revendications 1 à 10, comportant une partie (135) pouvant plier pour venir au contact d'une partie courbée d'un corps à protéger, et des parties saillantes (134) sur ladite partie pouvant plier pour venir s'engager dans des ouvertures de ladite partie courbée.

13. Un élément de cache suivant l'une quelconque des revendications 1 à 10, comportant des parties pinçantes (144, 155) pour se mettre en prise avec le corps à protéger.

14. Un élément de cache suivant la revendication 11, 12 ou 13, comportant une nervure de renfort (126, 136, 145, 156).

15. Un élément de cache suivant l'une quelconque des revendications 1 à 8, comportant quatre parties en soufflet (162) en des intervalles réguliers grâce auxquelles les éléments de cache peuvent entourer et protéger un montant.

16. Un procédé de traitement de surface d'un article, dans lequel une partie de la surface de l'article est couverte avec un élément de cache suivant l'une quelconque des précédentes revendications, le traitement de surface est réalisé et l'élément de cache est retiré.

17. Un procédé suivant la revendication 16, dans lequel ledit élément de cache est utilisé pour protéger la moitié inférieure d'un pare-chocs d'automobile, ou une partie de la surface du dessous de caisse d'une automobile, ou un montant de porte.

Fig. 1

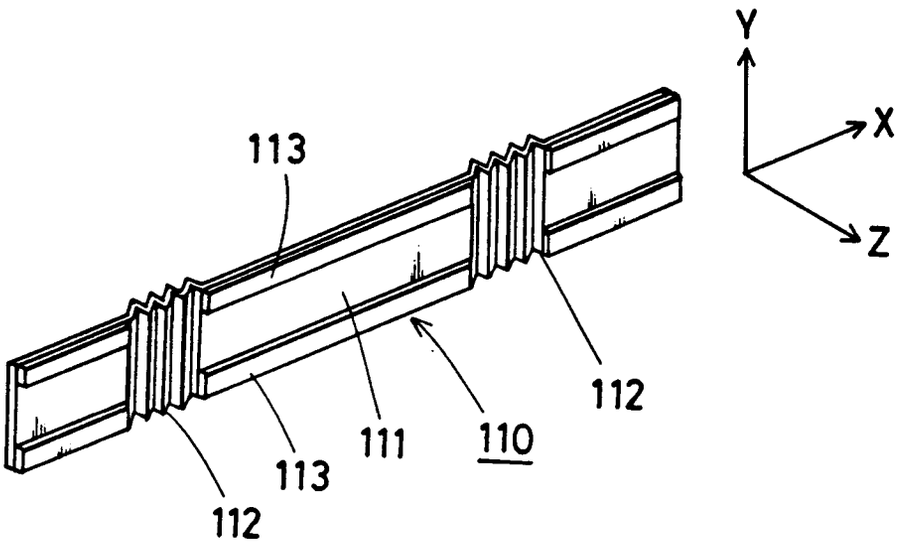


Fig. 2

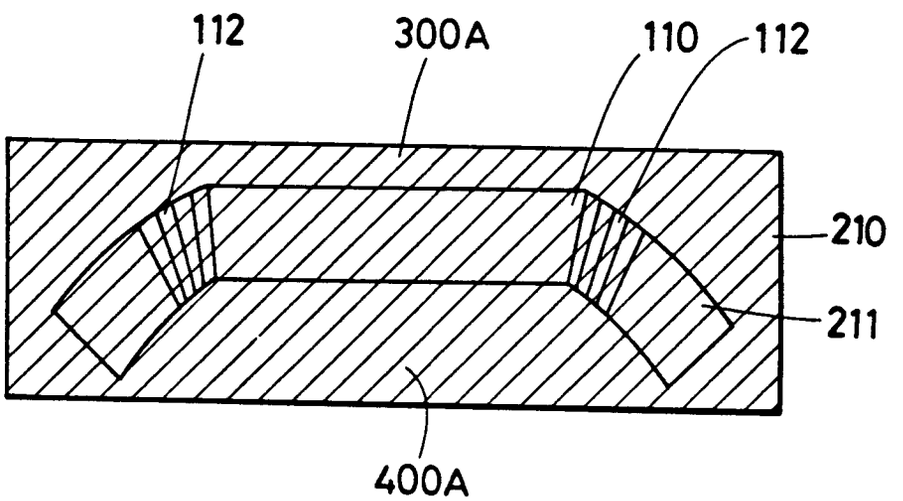


Fig. 3

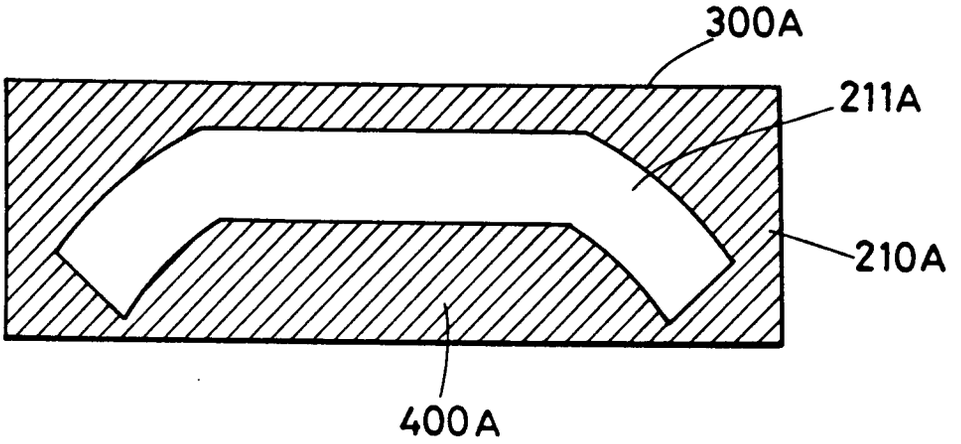


Fig. 4

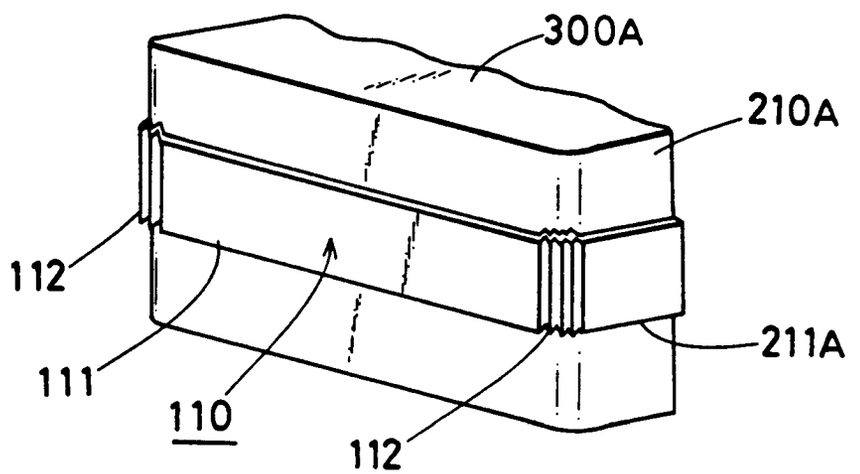
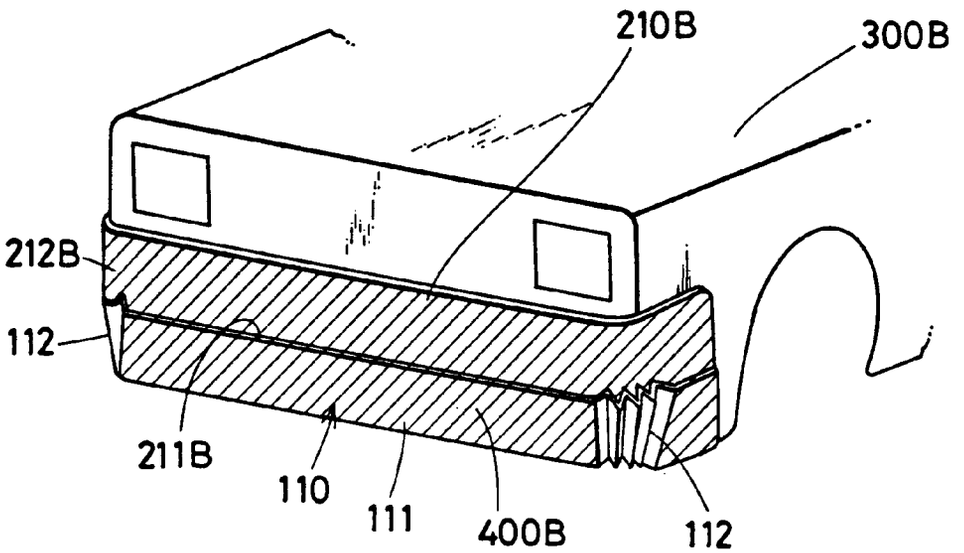


Fig. 5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211B
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400B
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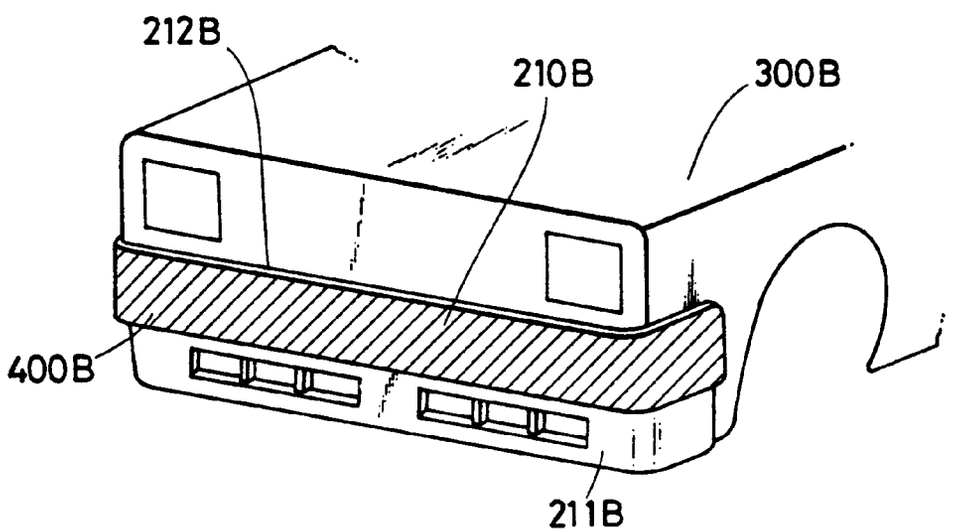
Fig. 6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211B

Fig. 7

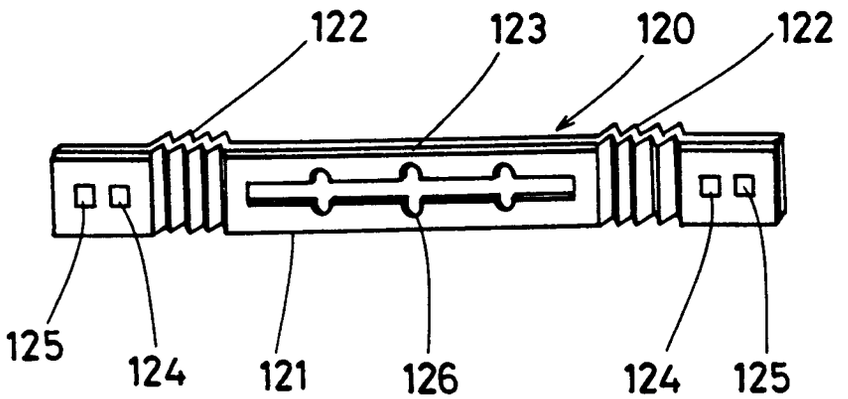

Fig. 8

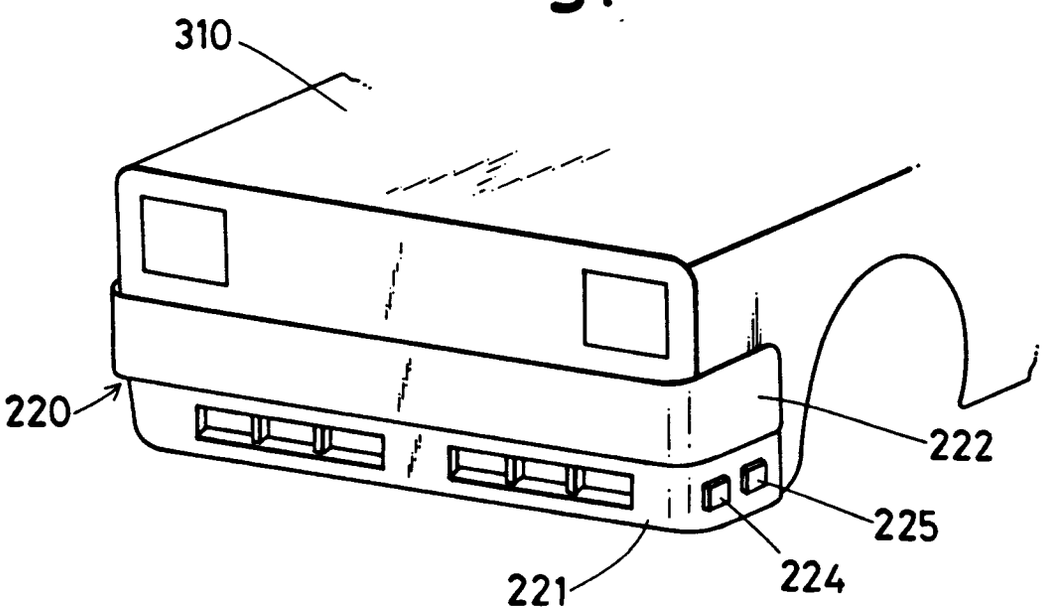

Fig. 9

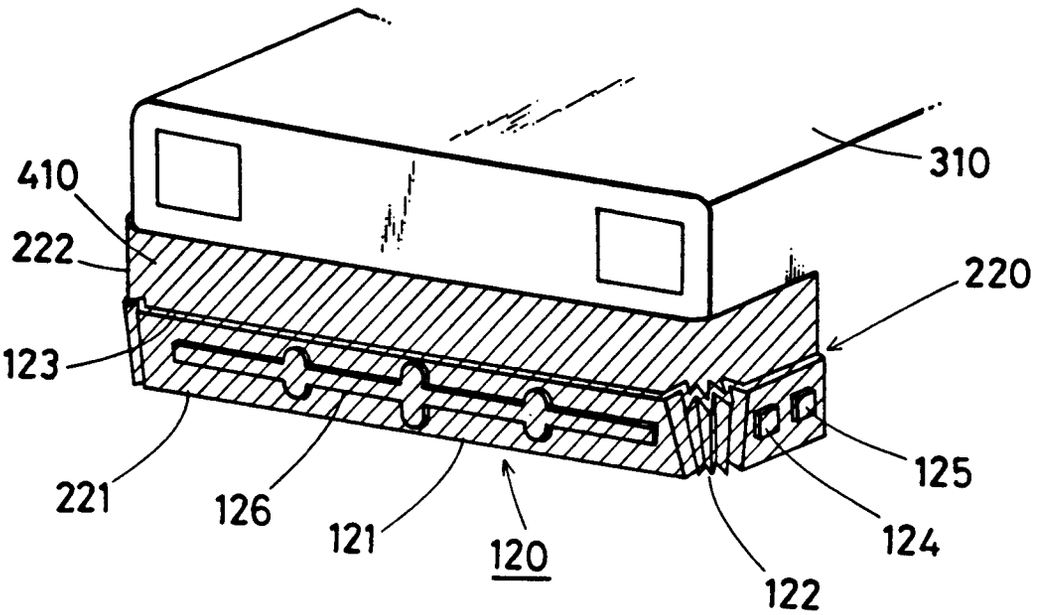
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Fig. 10

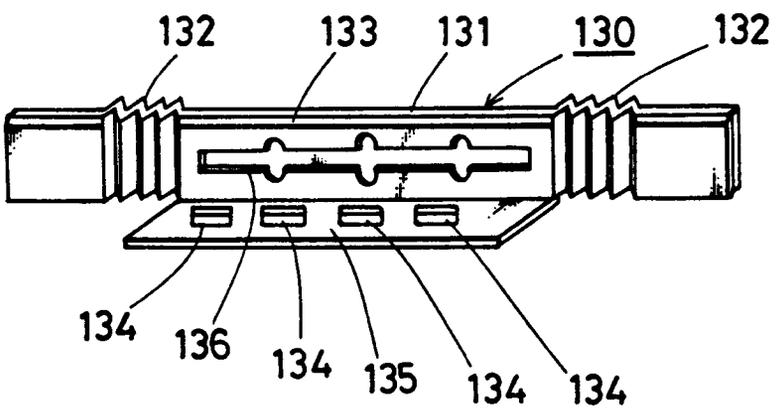
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Fig.11

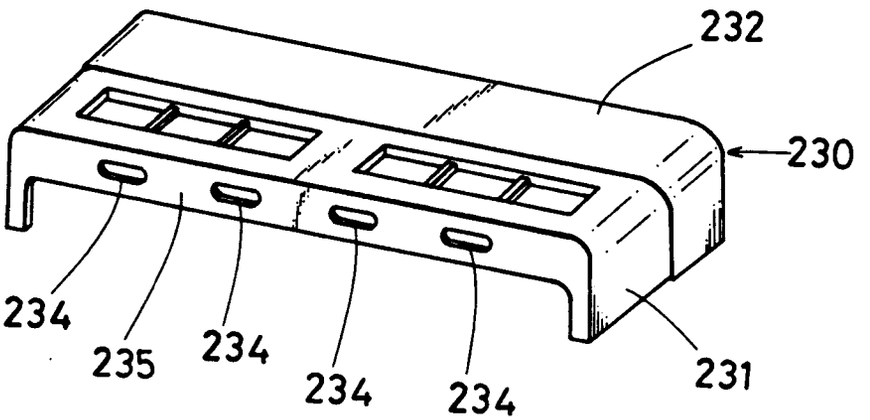
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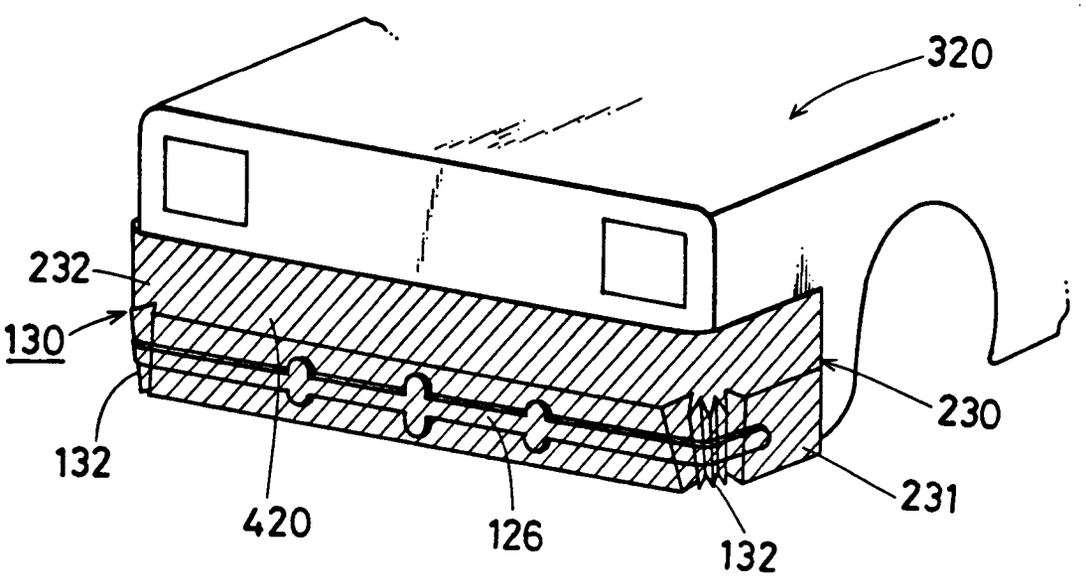
Fig.12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231

Fig.13

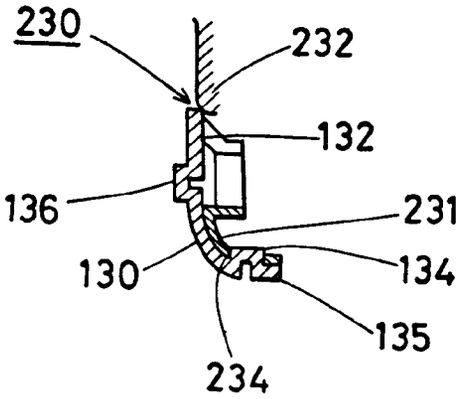
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Fig.14

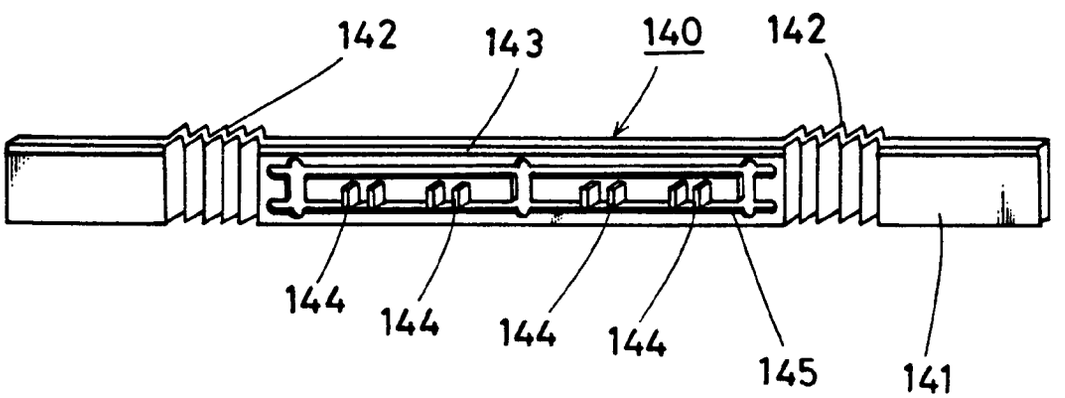
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Fig.15

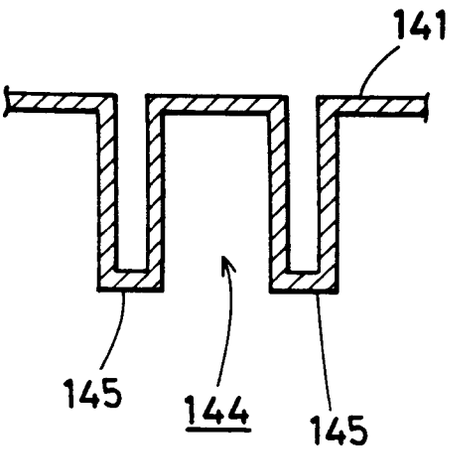

Fig.16

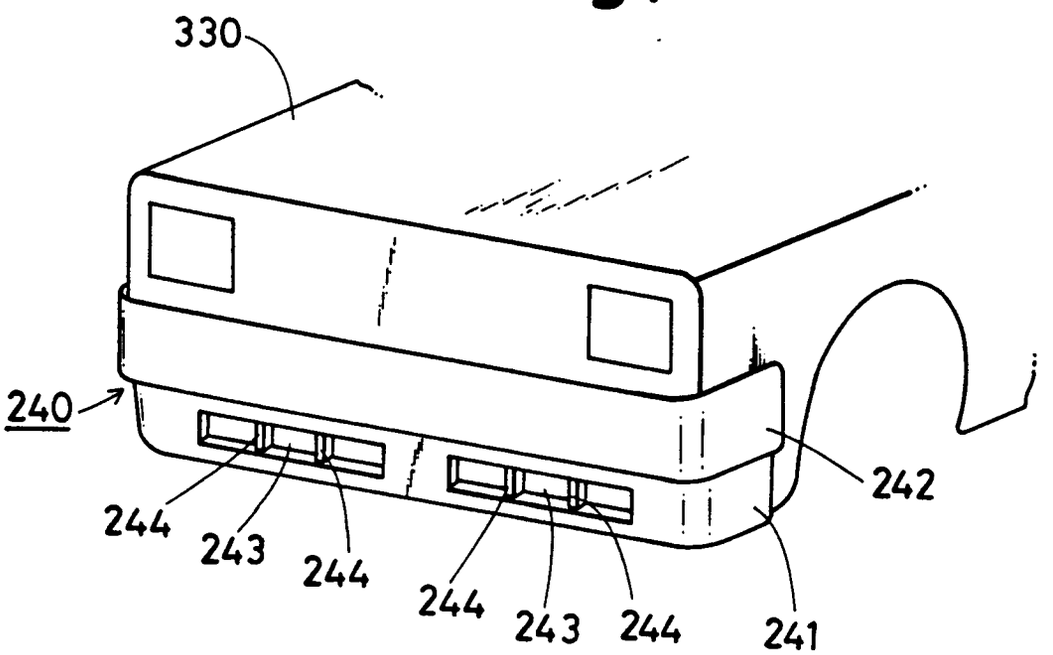

Fig.17

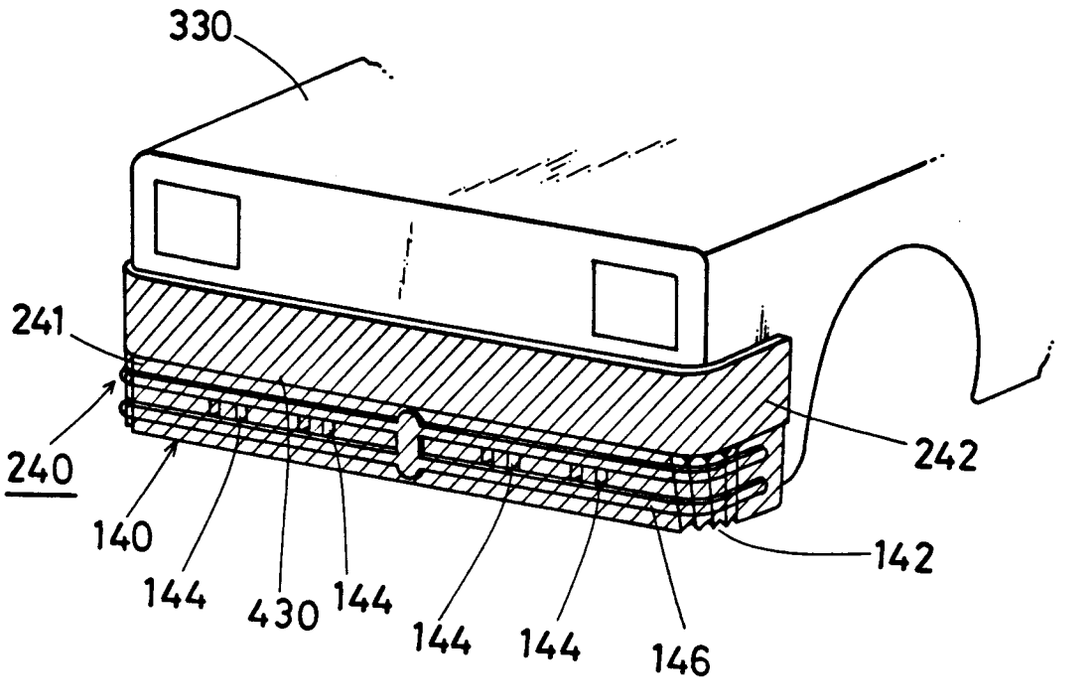
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Fig.18

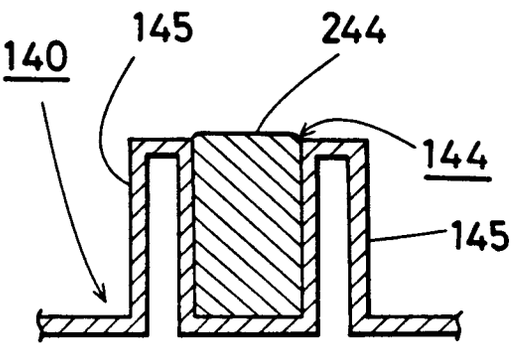
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Fig.19

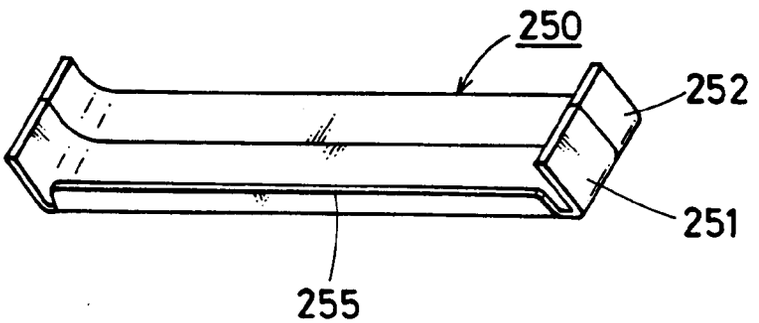

Fig.20

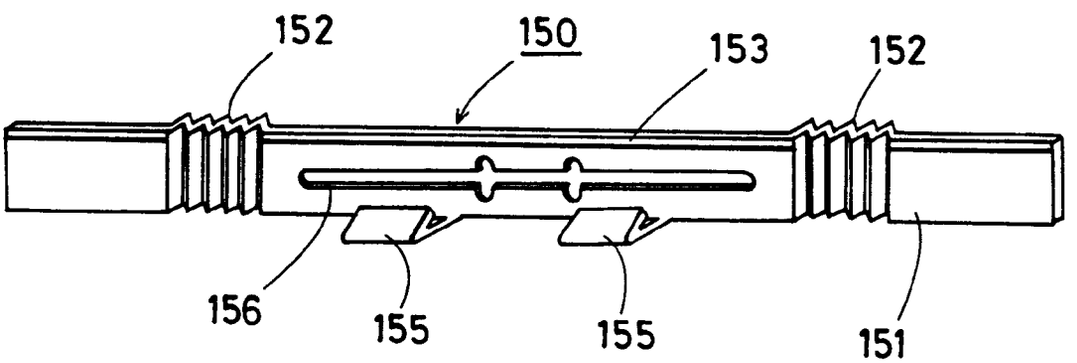

Fig.21

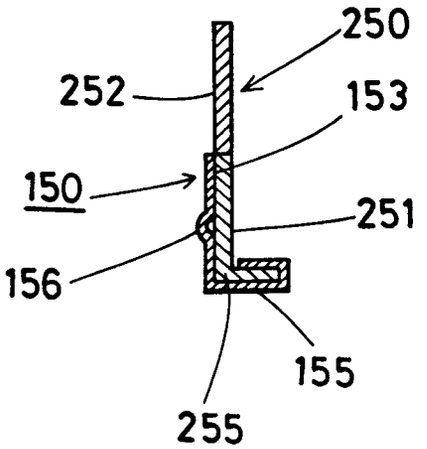
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Fig.22

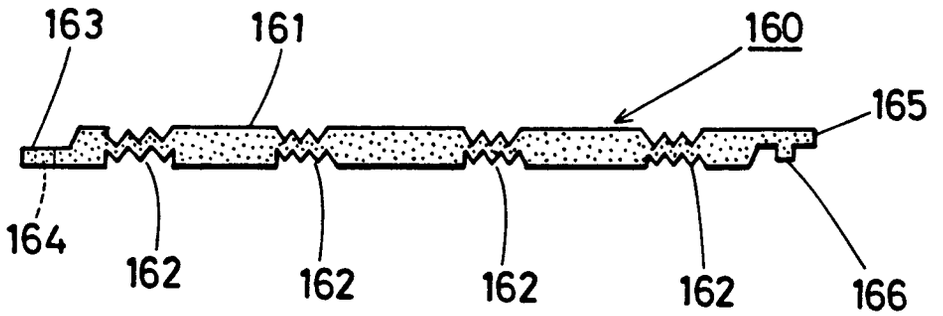
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Fig. 23

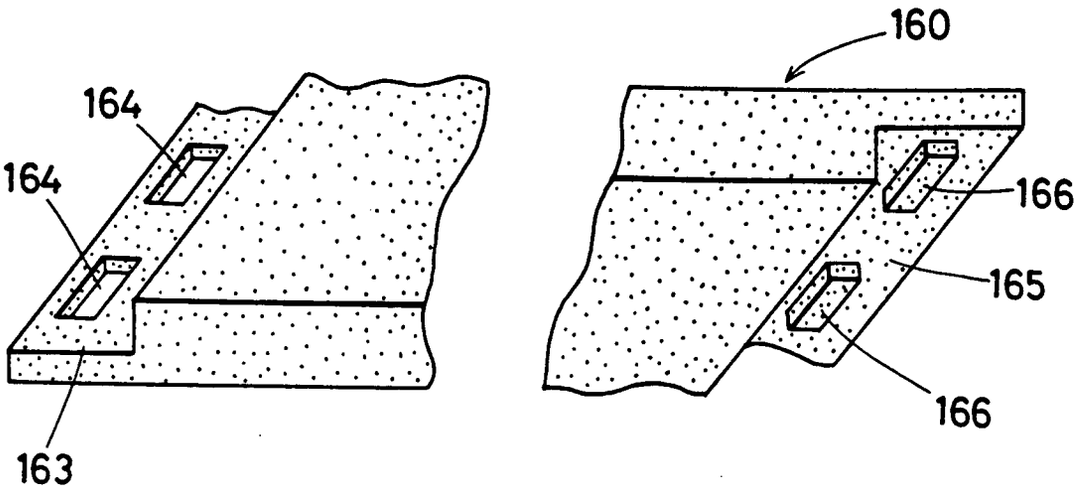
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Fig. 24

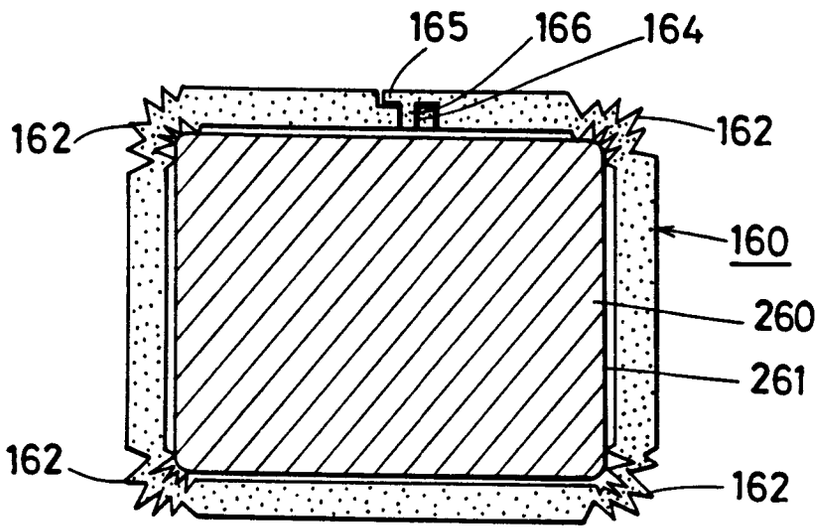
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Fig.25