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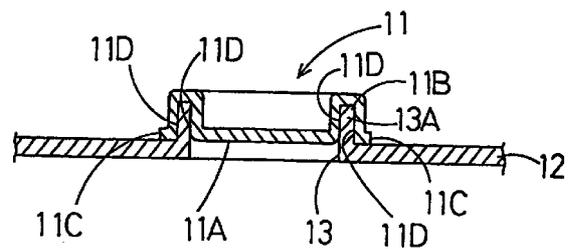
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(54) **MASKING MATERIAL**

(57) The object of the present invention is to give the masking member an improved heat resistance without damage of the moldability.

To attain this object, the present invention provides a masking member made of a polymer alloy including one or more engineering plastics selected from a group consisting of methylpentenecopolymer (TPX), polysulfone (PSF), polyethersulfone (PES), polyphenylene sulfide (PPS), polyphenylene ether (PPE) or modifications thereof, polyamide-imide (PAI), polyetherimide (PEI), polyetheretherketone (PEEK), and syndiotactic polystyrene (SPS) obtained through polymerization using a metallocene compound as a catalyst; and one or more thermoplastic resin(s) excepting said engineering plastics wherein the mixing weight ratio of said engineering plastics and said thermoplastic resin(s) is in the range between 7 : 3 to 4 : 6.

Fig. 1



EP 1 095 708 A1

Description**FIELD OF THE INVENTION**

5 [0001] The present invention relates to a masking member to protect part(s) of an article from the coating with paint.

BACKGROUND OF THE INVENTION

10 [0002] In the coating process with paint, usually masking member(s) is(are) attached to part(s) of an article where the coating with paint should not be effected and then said article is coated with paint. After coating, said masking member(s) is(are) removed from said part(s).

[0003] Hitherto, a masking member made of a thermoplastic resin such as a polypropyrene and the like has been provided.

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DISCLOSURE OF THE INVENTION

[0004] Nevertheless, said masking member made of a polypropyrene and the like has a poor heat resistance and said masking member will deform during heat treatment at a temperature higher than 150°C in such a case as a curing process of the coating film. Accordingly, said masking member should be removed before heat treatment but since the coating film is not cured yet before heat treatment, said masking member(s) often injure(s) the coating film around said part(s) when said masking member(s) is(are) removed from said part(s).

[0005] To provide a masking member having a good heat resistance, the use of an engineering plastic having a high melting point may be thought as a material of the masking member, but said engineering plastic has a poor moldability and it is difficult to mold the masking member having a desired shape, especially a complex shape.

[0006] Accordingly, the object of the present invention is to provides a masking member having a good moldability and a good heat resistance.

[0007] To attain said object, the present invention provides a masking member made of a polymer alloy including one or more engineering plastics selected from a group consisting of methylpentenecopolymer (TPX), polysulfone (PSF), polyethersufone (PES), polyphenylene sulfide (PPS), polyphenylene ether (PPE) or modifications thereof, polyamide-imide (PAI), polyetherimide (PEI), polyetheretherketone (PEEK), and syndiotactic polystyrene (SPS) obtained through polymerization using a metallocene compound as a catalyst; and one or more thermoplastic resin(s), excepting said engineering plastics, wherein the mixing weight ratio of said engineering plastics and said thermoplastic resin(s) is in the range between 7 : 3 to 4 : 6.

[0008] Said masking member has an excellent heat resistance by said engineering plastics and would not deform in a high temperature treatment at a temperature higher than 150 °C. Accordingly, said masking member is not necessary to be removed before said high temperature treatment such that the article can be effected on said high temperature treatment with said masking member(s) attached to part(s) to be protected. Accordingly, said masking member(s) does(do) not injure the coating film around said part(s) when said masking member(s) is(are) removed. Further, said masking member acquires a high mechanical strength, a high dimensional stability and the like, besides the heat resistance by said engineering plastics. Still further, said polymer alloy acquires a good moldability by said thermoplastic resin excepting said engineering plastics, and a masking member can be easily molded in a complex shape such as a deep drawing shape, an under-cut shape, and the like.

[0009] When said polymer alloy including said engineering plastics and said thermoplastic resin excepting said engineering plastics at a weight ratio of the range between 7 : 3 to 4 : 6 is formed on a sheet having a thickness in the range between 0.05 to 1.5mm, said sheet has an excellent moldability especially for the vacuum forming.

[0010] It is desirable to add a thermoplastic elastomer, especially a thermoplastic elastomer including a polystyrene unit in an amount in the range between 5 to 15% by weight to said polymer alloy. The moldability, the toughness, and the affinity for the paint of said polymer alloy can be improved by said elastomer.

50 [0011] Further, it is desirable to mix an inorganic filler into said polymer alloy. By mixing said inorganic filler, said masking member is reinforced and its heat resistance is improved since a high thermal conductivity is given to said masking member by said inorganic filler.

[0012] Preferably, said thermoplastic resin may be a thermoplastic resin selected from a group consisting of a polyamide, polystyrene, and a high impact polystyrene. By using said thermoplastic resins, the affinity of said masking member with paint may be increased.

55 [0013] Now the present invention will be described in detail. The material used for the masking member of the present invention is a polymer alloy including one or more engineering plastics selected from a group consisting of methylpentenecopolymer (TPX), polysulfone (PSF), polyethersufone (PES), polyphenylene sulfide (PPS), polyphe-

nylene ether (PPE) or modifications thereof, polyamide-imide (PAI), polyetherimide (PEI), polyetheretherketone (PEEK), and syndiotactic polystyrene (SPS) obtained through polymerization using a metallocene compound as a catalyst; and a thermoplastic resin other than said engineering plastic in a weight ratio of 70:30 to 40:60. One exemplary modified PPE that may be used for said engineering plastics is poly 2,6-dimethylphenylene ether.

5 **[0014]** In said engineering plastics, TPX, PSF, PES, PPS, PPE, PEI, PEEK and SPS are preferable for the present invention because said engineering plastics have relatively good moldability and PSF, PES, PPS, PPE, PAI, PEI, PEEK and SPS are preferable for the present invention because said engineering plastics have relatively good affinity with paint.

10 **[0015]** Said masking member of the present invention acquires an excellent heat resistance by said engineering plastics and an excellent moldability by said thermoplastic resin. Said masking member would not deform in the high temperature treatment at a temperature higher than 150°C such that the article can be effected by said high temperature treatment with said masking member and further the masking member having a complex shape such as a deep drawing shape, an under-cut shape and the like can be easily molded by using said polymer alloy.

15 **[0016]** When the weight ratio of said engineering plastics in said polymer alloy is less than 40%, the heat resistance of said masking member may not be enough and when the weight ratio of said thermoplastic resin is less than 30%, the excellent moldability can not be guaranteed.

20 **[0017]** As said thermoplastic resin, for example, polyolefin type resin such as polyethylene, polyethylene chloride, polypropylene, ethylene-propylene copolymer, ethylene-vinylacetate copolymer, ethylene-vinylchloride copolymer and the like, polyvinyl type resin such as polyvinyl chloride and the like, polyvinylidene type resin such as polyvinylidene chloride, polyvinylidene fluoride and the like, polycarbonate, polyamide type resin such as nylon 6, nylon 66 and the like, polystyrene type resin such as polystyrene, high impact resistant polystyrene, styrene-maleic anhydride copolymer, styrene-butadiene copolymer, styrene-acrylonitrile copolymer, acrylonitrile-butadiene-styrene copolymer and the like, acrylate and methacrylate type resin such as acrylonitrile-styrene-acrylate copolymer, methylmethacrylate-butadiene-styrene copolymer and the like, polyester type resin such as poly(ethylene terephthalate), poly(butylene terephthalate) and the like, fluoro resin, polytetrafluoroethylene, thermoplastic polyurethane, liquid crystal polyester and the like, may be used singly or in the form of mixture of two or more kinds thereof. Preferably, a thermoplastic resin having a good moldability is used as said thermoplastic resin.

30 **[0018]** Especially polyamide, polystyrene, high impact polystyrene, or a mixture of said thermoplastic resins is preferable as said thermoplastic resin and nylon 6 and/or nylon 66 are preferable as said polyamide. Said thermoplastic resin has an excellent moldability and an excellent affinity with paint.

[0019] Especially, a polymer alloy consisting of a modified PPE and a polyamide, a modified PPE and a polyamide and a polystyrene or a high impact polystyrene is preferable as a polymer alloy of the present invention.

[0020] It is preferable to mix a thermoplastic elastomer in said polymer alloy in an amount between 5 to 15% by weight and said thermoplastic elastomer may be a component to form a polymer alloy.

35 **[0021]** Said thermoplastic elastomer is such as a polystyrene elastomer, a polyolefine elastomer, a polyvinylchloride elastomer, a polyester elastomer, a polyamide elastomer and the like and a preferable elastomer is a polystyrene elastomer such as a styrene-butadiene-styrene block copolymer (SBS) having a polystyrene unit as a hard segment and a polybutadiene unit as a soft segment, a styrene-isoprene-styrene block copolymer (SIS) having a polystyrene unit as a hard segment and a polyisoprene unit as a soft segment, a styrene-ethylene/butylene-styrene block copolymer (SEBS) having a polystyrene unit as a hard segment and a hydrogenated polybutadiene unit as a soft segment, and a styrene-ethylene/propylene-styrene block copolymer (SEPS) having a polystyrene unit as a hard segment and a hydrogenated polyisoprene unit as a soft segment. The mixture of two or more said polystyrene elastomers may also be preferably used in the present invention. It is preferable to combine said polystyrene elastomer(s) with the polymer alloy consisting of the modified PPE and the polyamide.

45 **[0022]** By adding said thermoplastic elastomer to said polymer alloy, the moldability, the toughness and the affinity with paint can be improved.

[0023] When a masking member having a poor affinity with paint is reused, the paint film formed on said masking member may peel off from the surface of said masking member and said peeled paint film may become small pieces to be scattered and said scattered small pieces may adhere to, or contaminate the paint film newly formed on the article to form unevenness resulting in an inferior paint film.

50 **[0024]** When the affinity of said masking member is improved, said problem may be solved and said masking member can be reused repeatedly.

[0025] In the present invention, one or more kinds of filler such as an inorganic filler such as calcium carbonate, magnesium carbonate, barium sulfate, calcium sulfate, calcium sulfite, calcium phosphate, calcium hydroxide, magnesium hydroxide, aluminium hydroxide, magnesium oxide, titanium oxide, iron oxide, zinc oxide, alumina, silica, diatomaceous earth, dolomite, gypsum, talc, clay, wollastonite, asbestos, mica, glass fiber, carbon fiber, calcium silicate, bentonite, white carbon, carbon black, iron powder, aluminium powder, stone powder, blast furnace slag, fly ash, cement, zirconia powder and the like; natural fiber such as cotton, hemp, wool and the like; organic synthetic fiber such

as polyamide fiber, polyester fiber, acryl fiber, viscose fiber, acetate fiber, vinylchloride fiber, vinylidenechloride fiber and the like; inorganic fiber such as asbestos fiber, glass fiber, carbon fiber, ceramics fiber, metal fiber, whisker and the like; an organic filler such as linter, linen, wood powder, coconuts powder, walnut powder, starch, wheat flour and the like may be added to the materials of said masking member. When said inorganic filler is mixed in said polymer alloy, the dimensional stability, compressive and tensile strength and the like may be improved. Especially said inorganic filler gives said masking member a high thermal conductivity to improve the heat resistance.

[0026] Said inorganic filler is usually added to the materials of said masking member in an amount between 0.5 to 200% by weight.

[0027] Further, the pigment and the dyestuff may be added in the material of said masking member to distinguish masking parts by colour, and still further the third component such as a flame-reactant, a fire extinguisher, an insecticide, an antiseptics, an antioxidant, an ultraviolet absorber, a foaming agent such as a chemical foaming agent, a capsule type foaming agent and the like may be added to the material of said masking member. Two or more third components may be added in said material. When said blowing agent is added in said material, foamed masking member can be obtained.

[0028] As masking member of the present invention, a layered material, which is produced by laminating one or more kinds of resin or foam resin such as thermoplastic resin such as polyolefin such as polyethylene, polypropylene, ethylene-propylene copolymer, ethylene-vinylacetate copolymer and the like, polyvinylchloride, polystyrene, polymethacrylate, polyvinylidenechloride, styrene-butadiene copolymer, polyester, polyamide and the like, its foam resins, and polyurethane foam and the like on a material consisting mainly of said polymer alloy, may be used.

[0029] Further, the material of said masking member of the present invention may be effected by surface treatment such as the corona treatment, the primer treatment, and the like to improve the affinity with paint. The affinity with paint can be improved by adding said thermoplastic elastomer, selecting polyamide, polystyrene, and high impact polystyrene and the mixture thereof as above described and the affinity with paint is further improved by said surface treatment.

[0030] Said corona treatment can be effected on said masking member or a sheet as the material of said masking member and the surface of said masking member or said sheet is a little carbonized to improve the affinity with paint.

[0031] A primer used for said primer disposal, having the affinity with both said polymer alloy and paint, is such as, synthetic rubber or synthetic resin primer comprising modified polyolefin or olefin copolymer such as polypropylene chloride, ethylene-vinyl acetate copolymer and the like, synthetic rubber such as styrene-butadiene rubber, acrylonitrile-butadiene rubber, chloroprene rubber, polybutadiene and the like, acrylic synthetic resin, vinyl synthetic resin, acrylic synthetic resin having a functional group such as an amino group, an amido group and the like, synthetic resin having an amino group, epoxy resin and the like; and low molecular weight primer comprising of aluminum alcoholate or aluminum chelate complex such as aluminum isopropylate, trisacetylaetonatoaluminum and the like, alkyl metal such as 2-ethylhexyllead, hexadecyllithium and the like, an organotin compound such as dibutyltinacetate, di-n-butyltinoxide and the like, a silane compound such as methylvinylchlorosilane and the like, metal complex of 1,3-dicarbonyl compound such as lithium acetylacetonate, beryllium acetylacetonate and the like, an organotitanium compound such as tetrabutyltitanate and the like, borate such as tri-n-butyl borate, triphenyl borate and the like, phosphate such as trioleyl phosphate, tridecyl phosphate and the like, carboxylate such as magnesium stearate, cobalt naphthenate and the like, metal thioalcoholate such as potassium n-dodecylmercaptide and the like, dithiocarboxylate such as zinc 2-ethylhexaneditiocarboxylate and the like, dithiocarbamate such as nickel dimethyldithiocarbamate, copper dimethyldithiocarbamate and the like, sulfonate such as nickel benzene sulfonate and the like, organic phosphate such as vanadium dibutylphosphate and the like. Said primer may be used singly or mixtures thereof. Especially, said acrylic resin including the quaternary ammonium salt and said amino resin are preferable as a primer.

[0032] Said primer treatment using said primer or the mixture of two or more said primers is carried out by coating the solution or the emulsion of said primer or said mixture on the surface of said masking member or said sheet as the material of said masking member and drying.

[0033] Prior to said primer treatment, the surface of said masking member or said sheet can be treated by the affinity treatment. Said affinity treatment may include the flame treatment and the sulfuric acid treatment to carbonize a little the surface of said masking member or said sheet, the corona treatment to increase the roughness and carbonize a little the surface of said masking member or said sheet.

[0034] To manufacture said masking member, a sheet consisting of mainly said polymer alloy or a laminated sheet is preferably softened by heating and then vacuum-formed in a desirable shape. The masking member having a complex shape such as a deep drawing shape, an under-cut shape, and the like is easily manufactured by using said sheet having a good moldability and said vacuum forming. Further, said vacuum forming is suitable for the mass production.

[0035] The thickness of said sheet is preferably between 0.05 to 1.5mm and more preferably 0.1 to 1.0mm and further more preferably 0.2 to 0.6mm. Said sheet having said thickness has a good moldability especially for the vacuum forming and further the masking member made of said sheet can be easily attached to or removed from the part to be protected.

[0036] Nevertheless, said masking member of the present invention can be manufactured by the press molding, the blow molding, the injection molding and the like besides the vacuum molding. Further, said sheet may be the stretched sheet or the non-stretched sheet.

5 **BRIEF DESCRIPTION OF THE DRAWINGS**

[0037]

- 10 FIG. 1 is the partial sectional view of the first embodiment when the masking member is attached.
- FIG. 2 is the perspective view of the masking member of the first embodiment.
- FIG. 3 is the partial sectional view of the second embodiment when the masking member is attached.
- 15 FIG. 4 is the perspective view of the masking member of the second embodiment.
- FIG. 5 is the perspective view of the masking member of the third embodiment.
- FIG. 6 is the sectional view taken along the line A-A of FIG. 8 when the masking member is provisionally fixed.
- 20 FIG. 7 is the sectional view taken along the line A-A of FIG. 8 when the masking member is fixed.
- FIG. 8 is the perspective view of the third embodiment when the masking member is attached.
- 25 FIG. 9 is the perspective view of the masking member of the fourth embodiment.
- FIG. 10 is the perspective view of the masking member of the fifth embodiment.
- FIG. 11 is the partial sectional view of the fifth embodiment when the masking member is attached.
- 30 FIG. 12 is the sectional view of the fifth embodiment when an adhesive layer is applied.
- FIG. 13 is the perspective view of the masking member of the sixth embodiment.
- 35 FIG. 14 is the partial cross sectional view of the sixth embodiment when the masking member is attached.
- FIG. 15 is the partial longitudinal sectional view of the sixth embodiment when the masking member is attached.
- FIG. 16 is the perspective view of the masking member of the seventh embodiment.
- 40 FIG. 17 is the perspective view of the seventh embodiment when the masking member is attached.
- FIG. 18 is the sectional view taken along the line A-A of FIG. 17.
- 45 FIG. 19 is the sectional view taken along the line B-B of FIG. 17.
- FIG. 20 is the perspective view of the masking member of the eighth embodiment.
- FIG. 21 is the perspective view of the eighth embodiment when the masking member is attached.
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PREFERRED EMBODIMENT OF THE INVENTION

[0038] TESTS and EXAMPLES of the invention are concretely described below but said TEST and EXAMPLES do not limit the scope of the invention.

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[TEST]

[0039] Each plastic sheet having a thickness of 0.4mm is prepared using a polymer alloy consisting of an engineer-

EP 1 095 708 A1

ing plastics, a thermoplastic resin, and a thermoplastic elastomer or an engineering plastic whose mixing ratios are shown in Table 1 to 3. Each plastic sheet is vacuum formed to manufacture each masking member. Herein PS is polystyrene, PC is polycarbonate, PET is polyethyleneterephthalate, PEN is polyethylenenaphtalate, and PAR is polyarylate.

[0040] The heat resistance, the affinity with paint, and moldability of each plastic sheet is estimated. For the estimation of the heat resistance, said plastic sheet is heated at 200 °C for 30 minutes and then deformation of said plastic sheet is observed by the eye. For estimation of the affinity with paint, a thermosetting melamine resin paint is coated on the surface of said plastic sheet and then cured at 150 to 180 °C and after that said plastic sheet is warped to observe the state of the coating film. For estimation of the moldability, the states of said plastic sheet when said plastic sheet is vacuum formed and after the vacuum forming are observed by the eye. The results are shown in Table 1 to 3.

[Table 1]

Composition	Rate of Combination	Heat Resistance	Affinity	Moldability
TPX/PS/SEBS	35/65/10	X	○	○
TPX/PS/SEBS	40/60/10	○	△	○
TPX/PS/SEBS	50/50/10	○	△	○
TPX/PS/SEBS	70/30/10	○	X	○
TPX/PS/SEBS	75/25/10	⊙	X	X
PSF/PS/SEBS	35/65/10	X	○	○
PSF/PS/SEBS	40/60/10	○	○	○
PSF/PS/SEBS	50/50/10	⊙	○	○
PSF/PS/SEBS	70/30/10	⊙	△	○
PSF/PS/SEBS	75/25/10	⊙	X	X
PES/PS/SEBS	35/65/10	X	○	○
PES/PS/SEBS	40/60/10	○	○	○
PES/PS/SEBS	50/50/10	⊙	○	○
PES/PS/SEBS	70/30/10	⊙	△	○
PES/PS/SEBS	75/25/10	⊙	X	X
PPS/PS/SEBS	35/65/10	X	⊙	○
PPS/PS/SEBS	40/60/10	○	○	○
PPS/PS/SEBS	50/50/10	⊙	○	○
PPS/PS/SEBS	70/30/10	⊙	○	○
PPS/PS/SEBS	75/25/10	⊙	△	X
PPE/PS/SEBS	35/65/10	X	⊙	⊙
PPE/PS/SEBS	40/60/10	○	⊙	⊙
PPE/PS/SEBS	50/50/10	○	⊙	○
PPE/PS/SEBS	70/30/10	⊙	○	○
PPE/PS/SEBS	75/25/10	⊙	○	X

[Table 2]

Composition	Rate of Combination	Heat Resistance	Affinity	Moldability
PAI/PS/SEBS	35/65/10	X	⊙	○

EP 1 095 708 A1

[Table 2] (continued)

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Composition	Rate of Combination	Heat Resistance	Affinity	Moldability
PAI/PS/SEBS	40/60/10	○	⊙	○
PAI/PS/SEBS	50/50/10	⊙	○	○
PAI/PS/SEBS	70/30/10	⊙	○	△
PAI/PS/SEBS	75/25/10	⊙	△	X X
PEI/PS/SEBS	35/65/10	X	○	○
PEI/PS/SEBS	40/60/10	○	○	○
PEI/PS/SEBS	50/50/10	⊙	○	○
PEI/PS/SEBS	70/30/10	⊙	△	○
PEI/PS/SEBS	75/25/10	⊙	X	X
PEEK/PS/SEBS	35/65/10	X	⊙	○
PEEK/PS/SEBS	40/60/10	○	○	○
PEEK/PS/SEBS	50/50/10	⊙	○	○
PEEK/PS/SEBS	70/30/10	⊙	△	○
PEEK/PS/SEBS	75/25/10	⊙	X	X
SPS/PS/SEBS	35/65/10	X	⊙	⊙
SPS/PS/SEBS	40/60/10	○	○	⊙
SPS/PS/SEBS	50/50/10	○	○	○
SPS/PS/SEBS	70/30/10	⊙	△	○
SPS/PS/SEBS	75/25/10	⊙	△	X

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[Table 3]

Composition	Rate of Combination	Heat Resistance	Affinity	Moldability
TPX/-/-	100/-/-	⊙	X X	X
PSF/-/-	100/-/-	⊙	△	X
PES/-/-	100/-/-	⊙	△	X
PPS/-/-	100/-/-	⊙	△	X
PPE/-/-	100/-/-	⊙	△	X
PAI/-/-	100/-/-	⊙	X	X X
PEI/-/-	100/-/-	⊙	X	X
PEEK/-/-	100/-/-	⊙	△	X
SPS/-/-	100/-/-	⊙	△	X
PC/PS/SEBS	40/60/10	△	X	△
PC/PS/SEBS	50/50/10	○	X	X
PC/PS/SEBS	70/30/10	○	X X	X
PET/PS/SEBS	40/60/10	△	X	X
PET/PS/SEBS	50/50/10	○	X	X
PET/PS/SEBS	70/30/10	⊙	X X	X

[Table 3] (continued)

Composition	Rate of Combination	Heat Resistance	Affinity	Moldability
PEN/PS/SEBS	40/60/10	△	X	X
PEN/PS/SEBS	50/50/10	○	X	X
PEN/PS/SEBS	70/30/10	⊙	X	X
PAR/PS/SEBS	40/60/10	○	X	X
PAR/PS/SEBS	50/50/10	○	X	X
PAR/PS/SEBS	70/30/10	⊙	X	X

Heat resistance:

[0041]

- ⊙No peeling, no warping, no contraction
-Slight warping

Affinity with paint:

[0042]

- ⊙The coating film adheres tightly and no peeling of the coating film by repeated warping.
-Partial peeling of the coating film by repeated warping
- XPoor adhesiveness of the coating film, peeling by warping
- X XThe coating film does not adhere to the surface of said sheet. Peeling by slight warping

Moldability:

[0043]

- ⊙Can be molded easily, no crack or warping
-Can be molded but low mechanical strength in the part where the thickness of said plastic sheet is small.
- △Can be molded but warping
- XConsiderable warping and cracks after molding
- X XTremendous warping and cracks and cannot mold the masking member

[THE FIRST EMBODIMENT]

[0044] FIG. 1 and FIG. 2 relate to the first embodiment of the present invention. A flange (13A) is extended from the surroundings of the hole (13) of an article (12) to be masked. A masking member (11) consists of an inserting part (11A) having a vessel form consisting of a circular bottom and having a radius corresponding to the radius of said hole (13), an inserting groove (11B) having a C-shaped cross section which is formed on the circumference of said inserting part (11A), and a flange part (11C) which is extended from the circumference of said inserting groove (11B). Said flange part (11C) is not always necessary.

[0045] Said masking member (11) is manufactured by vacuum forming or press molding of a sheet (thickness: 0.3 mm) consisting of PSF-nylon6-SEBS (50:40:10 at a weight ratio) polymer alloy in which 30 % by weight of calcium carbonate is contained.

[0046] When said masking member (11) is used in order to coat said article (12), said masking member (11) protects the inside and surroundings of said hole (13) by inserting said inserting part (11A) of said masking member (11) into said hole (13) of said article (12), and by inserting said flange (13A) surrounding said hole (13) into said inserting groove (11B) of said masking member (11).

[0047] After said coating, when said masking member (11) is heated in the curing process, said masking member (11) may shrink by forming residual stress, however, because both interior walls (11D, 11D) may bind said flange (13A) of said hole (13), the attaching firmness of said masking member (11) to said hole (13) may increase, and the wholly shrinkage of said masking member (11) may be prevented at the point of said inserting groove (11B). Therefore said

masking member (11) never falls into said hole (13).

[THE SECOND EMBODIMENT]

5 **[0048]** FIG. 3 and FIG. 4 relate to the second embodiment of the present invention. A flange (23A) is extended from the surroundings of the hole (23) of an article (22) to be masked. A masking member (21) consists of an inserting part (21A) having a vessel form consisting of a half spherical bottom and having a radius corresponding to the radius of said hole (23), an inserting groove (21B) having a C-shaped cross section which is formed on the circumference of said inserting part (21A), and a flange part (21C) which is extended from the circumference of said inserting groove (21B),
10 ribs (21F) which are formed between the circumference outer walls (21E) of said inserting groove (21B) and said flange parts (21C).

[0049] Said masking member (21) is manufactured by vacuum forming or press molding of a sheet (thickness: 0.3 mm) consisting of PES-nylon6-SEBS (50:40:10 at a weight ratio) polymer alloy in which 30 % by weight of calcium carbonate is contained.

15 **[0050]** When said masking member (21) is used in order to coat said article (22), said masking member (21) protects the inside and surroundings of said hole (23) by inserting said inserting part (21A) of said masking member (21) into said hole (23) of said article (22), and by inserting said flange (23A) surrounding said hole (23) into said inserting groove (21B) of said masking member (21).

20 **[0051]** After said coating, when said masking member (21) is heated in the curing process, as described in the first embodiment, said masking member (21) may shrink by forming residual stress, however, because both interior walls (21D, 21D) may bind said flange (23A) of said hole (23) and further said circumference outer walls (21E) reinforced by said ribs (21F) may prevent opening of said inserting groove (21B), the attaching firmness of said masking member (21) to said hole (23) may increase, and the wholly shrinkage of said masking member (21) may be prevented at the point of said inserting groove (21B). Therefore said masking member (21) never falls into said hole (23).

25

[THE THIRD EMBODIMENT]

[0052] FIG. 5 to FIG. 8 relate to the third embodiment of the present invention. A masking member (31) in this embodiment is attached to a pillar body such as a center pillar (32) of the car. And said masking member (31) consists of a body (31A) having a C-shaped cross section, inside of which an inserting part (31B) for a body (32A) of said center pillar (32) is formed, a pair of flange inserting parts (31D, 31D) formed along the lower end of a pair of side walls (31C, 31C) of said body (31A), in which a pair of flanges (32B, 32B) of said center pillar (32) are respectively inserted, a pair of back sheets (31E, 31E) extending from said flange inserting parts (31D, 31D), an upper sheet (31F) extending from the upper end of said body (31A), and reinforcing vertical ribs (31G) are vertically formed on the circumference of said body (31A), and reinforcing horizontal ribs (31H) are horizontally formed on the circumference of said body (31A). Said masking member (31) is manufactured by vacuum forming of a sheet (thickness: 0.3 mm) consisting of PPS-nylon6-SEBS (50:40:10 at a weight ratio) polymer alloy in which 30 % by weight of calcium carbonate is contained.

30 **[0053]** As shown in FIG. 6, said masking member (31) is provisionally attached to said body (32A) of said center pillar (32) by inserting said body (32A) of said center pillar (32) into said inserting part (31B) of said masking member (31) and inserting said flanges (32B, 32B) on the side edge of said center pillar (32) into said flange inserting parts (31D, 31D) of said masking member (31)

[0054] After said masking member (31) is provisionally attached to said center pillar (32), as shown in FIG. 7, said back sheets (31E, 31E) are respectively turned over to be attached to a back sheet (32C) of said center pillar (32), and said back sheets (31E, 31E) are mutually fixed by such as an adhesive tape (34), a tacker, or the like.

45 **[0055]** As above described, said masking member (31) is attached to said center pillar (32) as shown in FIG. 8, thermosetting melamine-alkyd resin paint and the like is coated. After said coating, said masking member (31) attached to said center pillar (32) is treated by the curing process at the temperature of about 170 °C. After said coating layer is cured, said masking member (31) is removed from said center pillar (32).

50 [THE FOURTH EMBODIMENT]

[0056] FIG. 9 relates to the fourth embodiment of the present invention. A masking member (41) in this embodiment consists of a body (41A) having a C-shaped cross section, inside of which an inserting part (41B) for a body (42A) of said center pillar (42) is formed, a pair of flange inserting parts (41D, 41D) formed along the lower end of a pair of side walls (41C, 41C) of said body (41A), in which a pair of flanges (42B, 42B) of said center pillar (42) are respectively inserted, a pair of back sheets (41E, 41E) extending from said flange inserting parts (41D, 41D), an upper sheet (41F) extending from the upper end of said body (41A), and reinforcing ribs (41G) are vertically formed on the circumference of said body (41A) and ribs (41H) are horizontally formed on the circumference of said body (41A). Said masking mem-

ber (41) is manufactured by vacuum forming of a sheet (thickness: 0.3 mm) consisting of PPE-nylon6-SEBS (50:40:10 in a weight ratio) polymer alloy in which 30 % by weight of calcium carbonate is contained.

[0057] The same as said masking member (31) of the third embodiment, said masking member (41) is provisionally attached to said body (42A) of said center pillar (42) by inserting said body (42A) of said center pillar (42) into said inserting part (41B) of said masking member (41) and inserting said flanges (42B, 42B) on the side edge of said center pillar (42) into said flange inserting parts (41D, 41D) of said masking member (41), and said back sheets (41E, 41E) of said masking member (41E, 41E) are respectively turned over to be attached to a back sheet of said center pillar (42), and said back sheets (41E, 41E) are mutually fixed by such as an adhesive tape, a tacker, or the like.

[0058] Under this condition, after thermosetting melamine-alkyd resin paint and the like coating, said masking member (41) is attached to said center pillar (42), and the center pillar is treated by the curing process at the temperature of about 170°C. After said coating layer is cured, said masking member (41) is removed from said center pillar (42).

[0059] Furthermore, said masking member (31) of the third embodiment is easily bent along said reinforcing vertical ribs (31G) because said reinforcing vertical ribs (31G) are continuously formed, but, the bending rigidity of said masking member (41) of this embodiment improves because said reinforcing ribs (41G) are intermittently formed.

[THE FIFTH EMBODIMENT]

[0060] FIG. 10 to FIG. 12 relate to the fifth embodiment of the present invention. An inlet (56) of the fuel tank of the car consists of a hole part (57), an inner flange part (58) surrounding said hole part (57), and an outer flange part (59) formed on the outside of said inner flange part (58) intermedating a packing groove (60) and said inner flange part (58) is slightly higher than said outer flange part (59).

[0061] A masking member (51) consists of a central disk part (52), an outer ring part (53) surrounding said central disk part (52) intermedating a guide groove (54), a grip (52A) projecting from said central disk part (52) and an adhesive layer (55) formed on the backside of said outer ring part (53). And said masking member (51) is manufactured by vacuum forming of a sheet (thickness: 0.3 mm) consisting of PPE-nylon66-SEBS (50: 40:10 at a weight ratio) polymer alloy in which 40 % by weight of calcium carbonate is contained.

[0062] When said masking member (51) is attached to said inlet (56), the position of said masking member (51) is adjusted by inserting said inner flange part (58) of said inlet (56) into said guide groove (54) of said masking member (51) and then said adhesive layer (55) of said outer ring part (53) is pressed to the top of said outer flange part (59) as shown in FIG. 11, and paint is prevented from going into the fuel tank through said inlet (56) by said masking member (51).

[0063] As no projecting part rising from said outer ring part (53) on the backside of said masking member (51), the adhesive can be applied on the backside of said outer ring part (53) to form said adhesive layer (55) by a roll coater (61) as shown in FIG. 12.

[THE SIXTH EMBODIMENT]

[0064] FIG. 13 to FIG. 15 relate to the sixth embodiment of the present invention. As shown in FIG. 13, a masking member (71) of this embodiment is attached to an air-intake (76) of a lower skirt part (75) of a front bumper (74) of a car body (73) for the coating. Vertical reinforcing ribs (76A) and a horizontal reinforcing rib (76B) and a pair of prop (76C) are formed inside of said air-intake (76) of said skirt part (75). And on said masking member (71), vertical fitting grooves (72A) which are fitted in said vertical reinforce ribs (76A) are formed, a horizontal fitting groove (72B) which is fitted in said horizontal rib (76B) are formed, a pair of fitting groove (72C) which are fitted in said prop (76C) are formed, and a flange (72D) is formed on the front circumference. Said masking member (71) is manufactured by vacuum forming of a sheet (thickness: 0.4 mm) consisting of PPE-nylon6-SBS (50:40:10 at a weight ratio) polymer alloy in which 35 % by weight of calcium carbonate is contained.

[0065] Said masking member (71) is attached inside said air-intake (76), said reinforcing ribs (76A, 76B) of said air-intake (76) are fitted in said fitting groove (72A, 72B) of said masking member (71), said prop (76C) is fitted in said fitting groove (72C).

[0066] As above described, said masking member (71) is attached to said air-intake (76) of said skirt part (75) to be masked, and after said coating of said car body (73), said coating layer is cured by heat treatment.

[THE SEVENTH EMBODIMENT]

[0067] FIG. 16 to FIG. 19 relate to the seventh embodiment of the present invention. A masking member (81) in this embodiment is used for masking of a window frame (84A) of a door (84) of the car, consisting of three parts (81A, 81B, 81C) having a L-shaped cross section, a reinforcing longitudinal rib (81D) is longitudinally formed on said each part (81A, 81B, 81C) respectively, reinforcing lateral ribs (81E) are laterally formed on said each part (81A, 81B, 81C)

respectively. Said masking member (81) is manufactured by vacuum forming of a sheet (thickness: 0.3 mm) consisting of PEI-nylon6-SBES (50:40:10 at a weight ratio) polymer alloy in which 30 % by weight of calcium carbonate is contained.

5 **[0068]** As shown in FIG. 17, said masking member (81) is attached to said window frame (84A) of said door (84) by fitting said each part (81A, 81B, 81C) of said window frame (84A), and one connection part of said each part (81A, 81B, 81C) is put upon another connection part of said each part (81A, 81B, 81C), and said connection parts of said each part (81A, 81B, 81C) are mutually fixed by an adhesive tape (82) or the like.

10 **[0069]** In this case, one connection edge of said reinforcing lateral ribs (81E) is inserted into underside of another connection edge of said reinforcing lateral ribs (81E) at the mutual connection parts of said each part (81A, 81B, 81C) as shown in FIG. 18. And an upper flange part (81F) of said each part (81A, 81B, 81C) is hung on the upper edge of said window frame (84A) as shown in FIG. 19.

[0070] After said coating, said masking member (81) is removed from said window frame (84A) of said door (84). Because said window frame (84A) of said door (84) is protected by said masking member (81), the coating layer is not formed on said window frame (84A) of said door (84).

15 **[THE EIGHTH EMBODIMENT]**

20 **[0071]** FIG. 20 and FIG. 21 relate to the eighth embodiment of the present invention. A masking member (91) is attached to a sidesill (93) of a car body (92) and fixed by magnets (94). Said masking member (91) is manufactured by vacuum forming of a sheet (thickness: 0.3 mm) consisting of PEEK-nylon6-SBES (50:40:10 in a weight ratio) polymer alloy in which 30 % by weight of calcium carbonate is contained.

[0072] As above described, said masking member (91) is attached to said sidesill (93) which is to be masked, and said car body (92) is coated. After said coating, said masking member (91) is cured by heat treatment as shown in FIG. 21.

25 **INDUSTRIAL UTILITY**

30 **[0073]** The masking member of the present invention may be useful to protect many kinds of articles during the coating process, especially the coating process including a high temperature treatment at a temperature higher than 150°C and further the present invention is useful to manufacture a masking member having a complex shape and said masking member is preferably used for the coating line of the car or the car parts.

Claims

- 35 **1.** A masking member made of a polymer alloy including one or more engineering plastics selected from a group consisting of methylpentenecopolymer (TPX), polysulfone (PSF), polyethersulfone (PES), polyphenylene sulfide (PPS), polyphenylene ether (PPE) or modifications thereof, polyamide-imide (PAI), polyetherimide (PEI), polyetheretherketone (PEEK), and syndiotactic polystyrene (SPS) obtained through polymerization using a metallocene compound as a catalyst; and one or more thermoplastic resin(s) excepting said engineering plastics
- 40 wherein the mixing weight ratio of said engineering plastics and said thermoplastic resin(s) is in the range between 7 : 3 to 4 : 6.
- 2.** A masking member in accordance with claim 1, further 5 to 15% by weight of one or more thermoplastic elastomer(s) is(are) added to said polymer alloy.
- 45 **3.** A masking member in accordance with claim 1 or 2, further an inorganic filler is mixed to said polymer alloy.
- 4.** A masking member in accordance with claims 1 to 3, said thermoplastic resin is selected from a group consisting of a polyamide, a polystyrene, and a high impact polystyrene.
- 50 **5.** A masking member in accordance with claims 1 to 4, said thermoplastic elastomer includes a polystyrene unit.
- 6.** A masking member in accordance with claims 1 to 5, said masking member is made from a sheet of said polymer alloy having a thickness of 0.05 to 1.5mm.
- 55 **7.** A masking member in accordance with claim 6, said masking member is manufactured by the vacuum forming.

Fig. 1

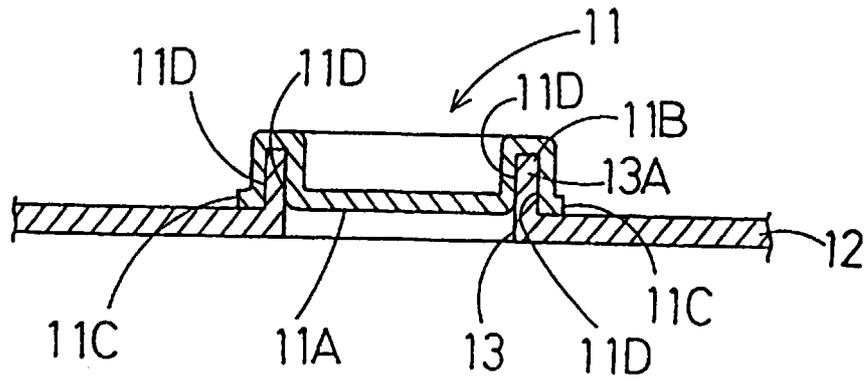


Fig. 2

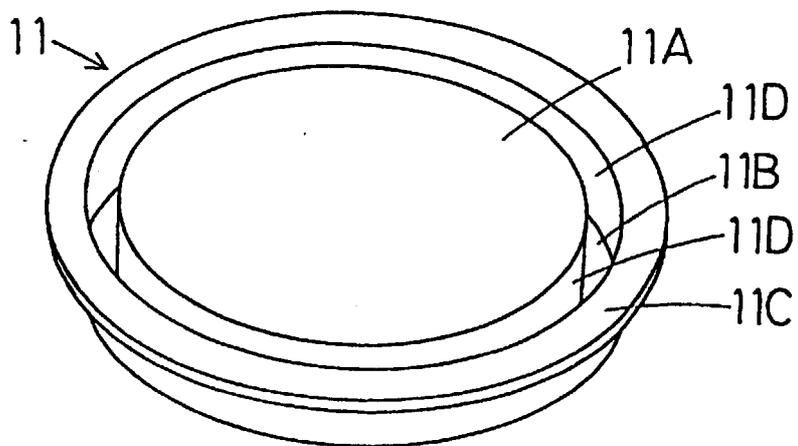


Fig. 3

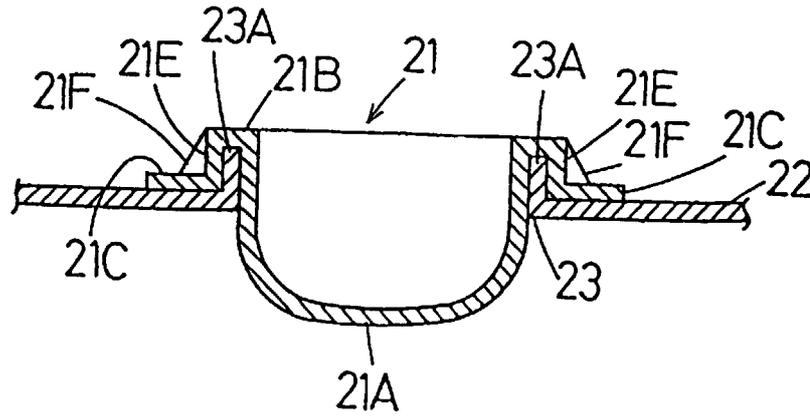


Fig. 4

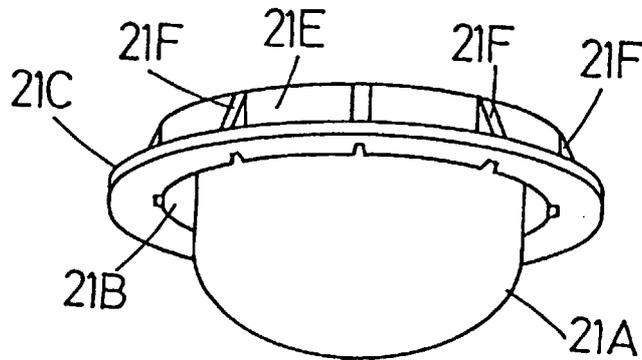


Fig. 5

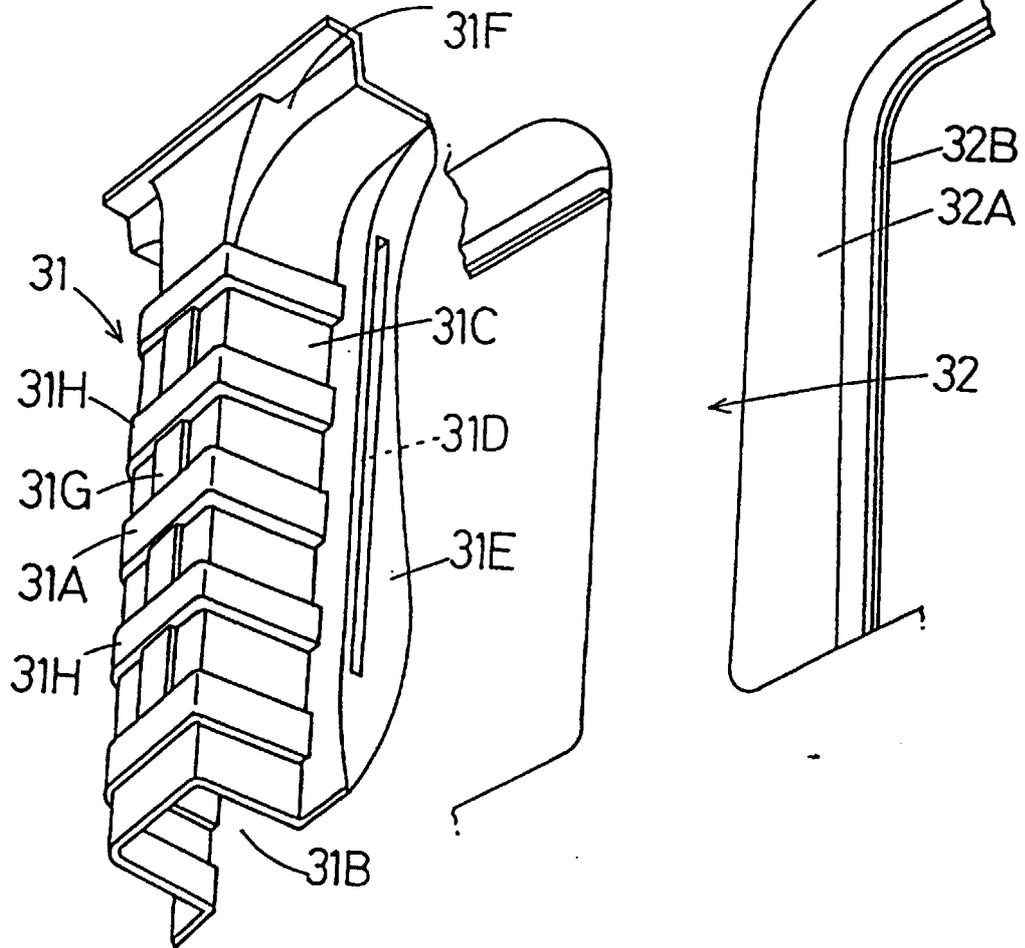


Fig. 6

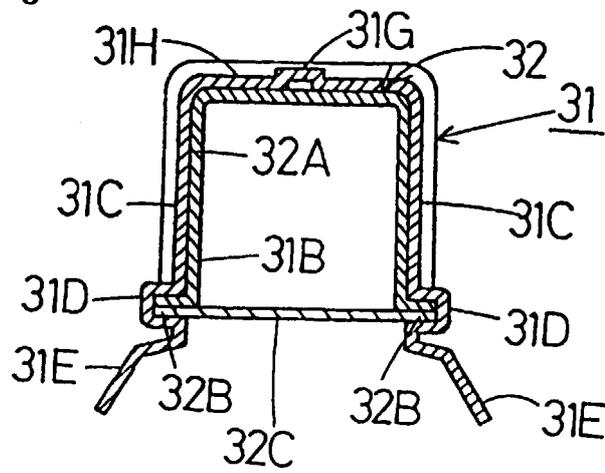


Fig. 7

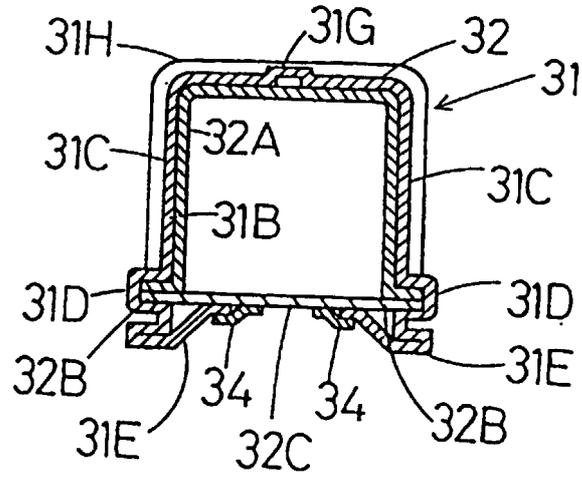


Fig. 8

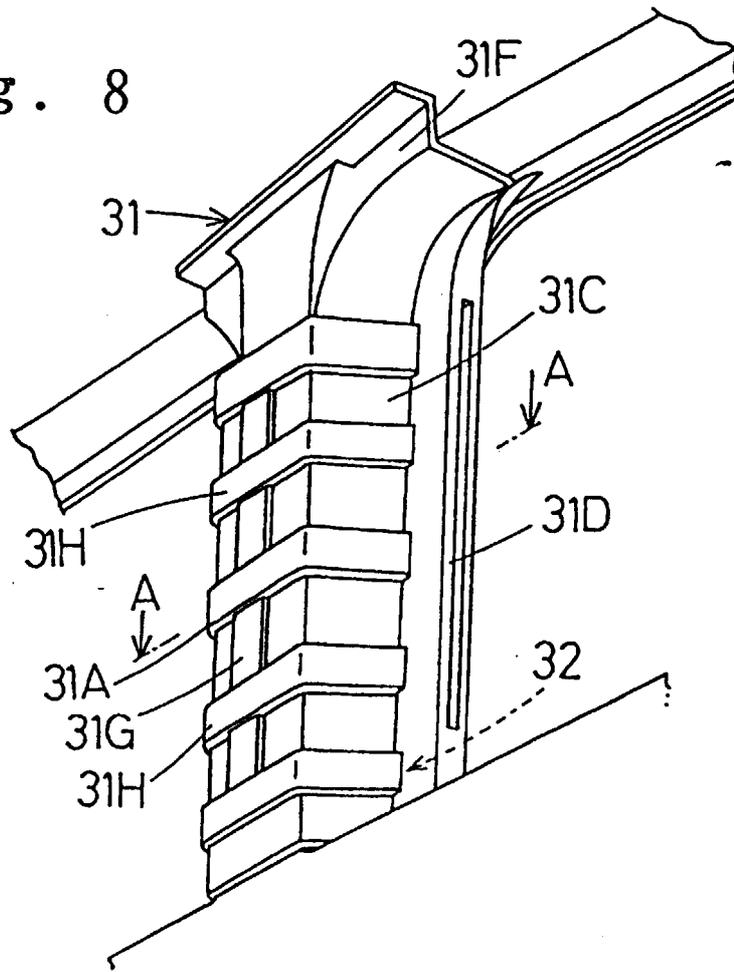


Fig. 9

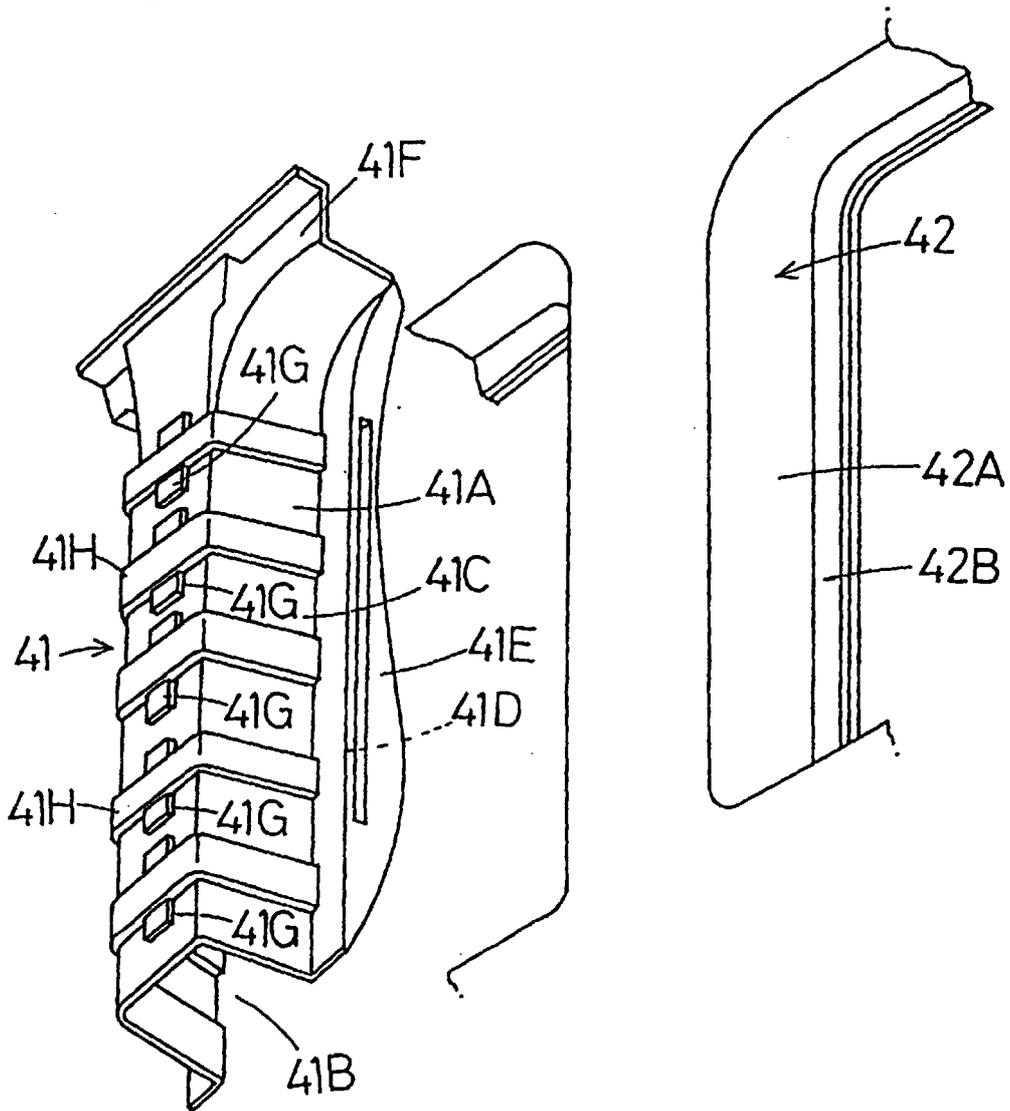


Fig. 10

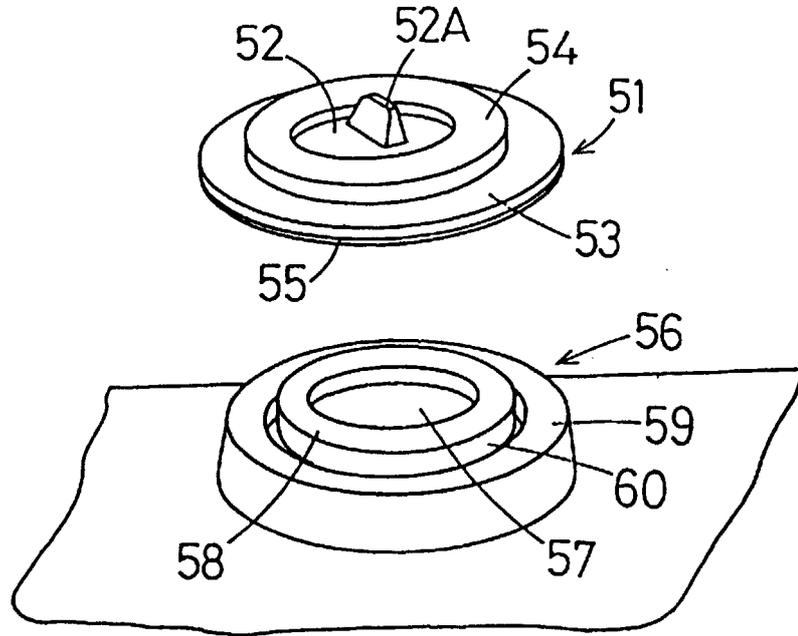


Fig. 11

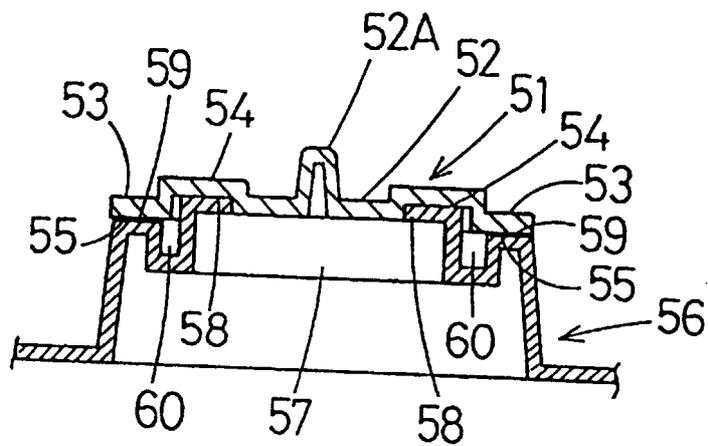


Fig. 14

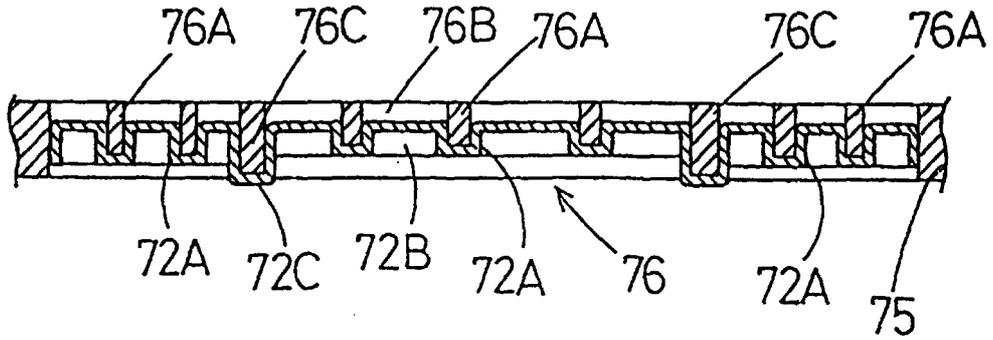


Fig. 15

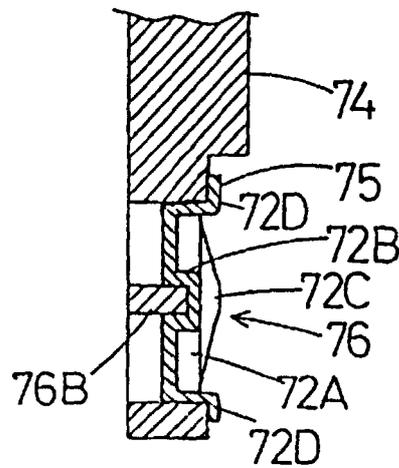


Fig. 16

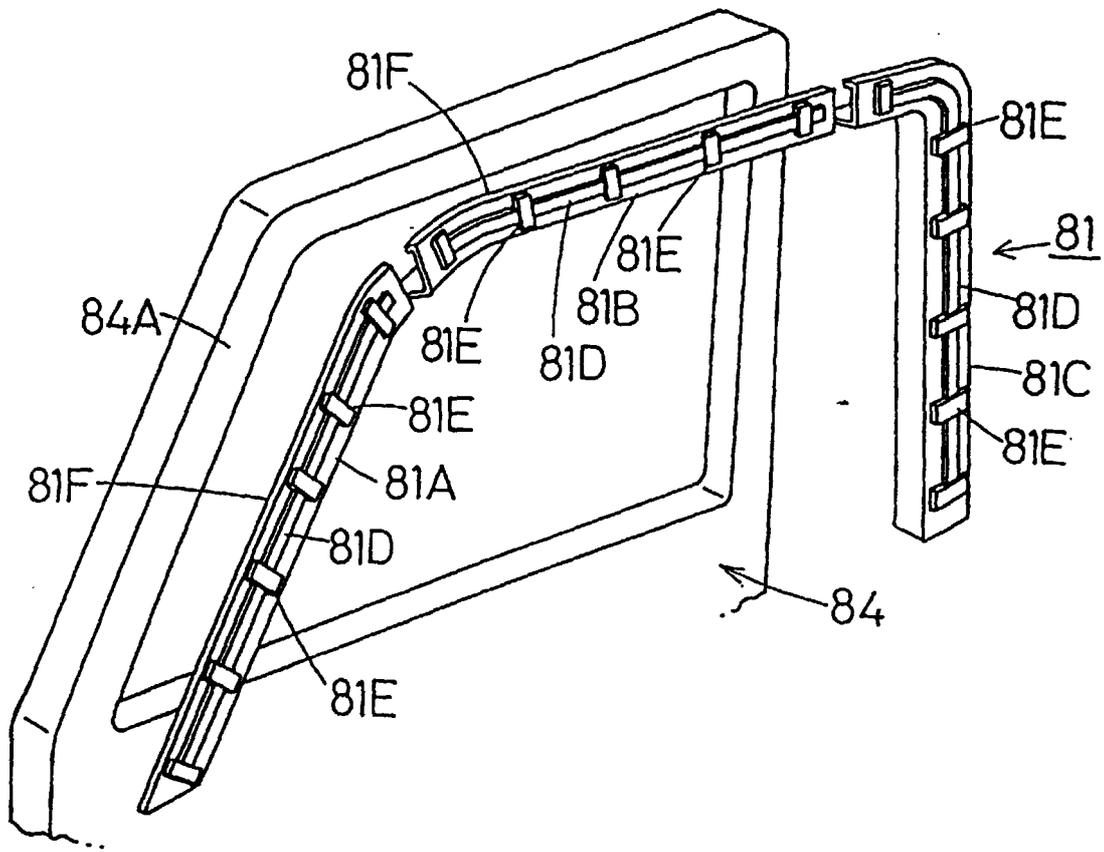


Fig. 17

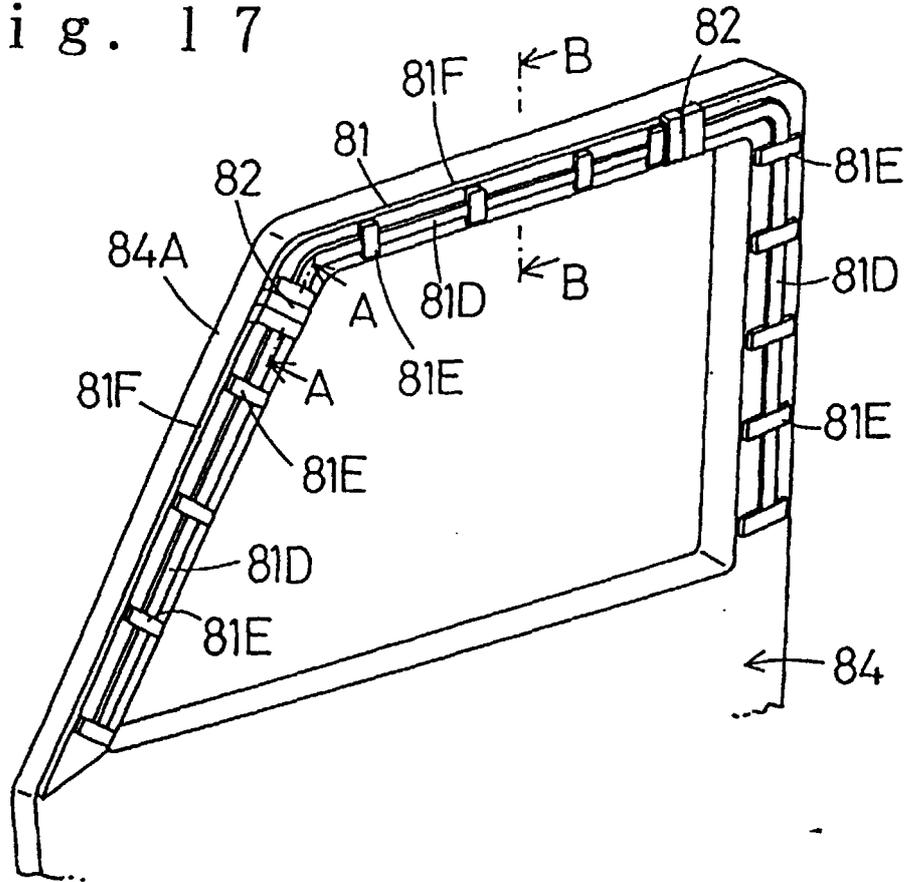


Fig. 18

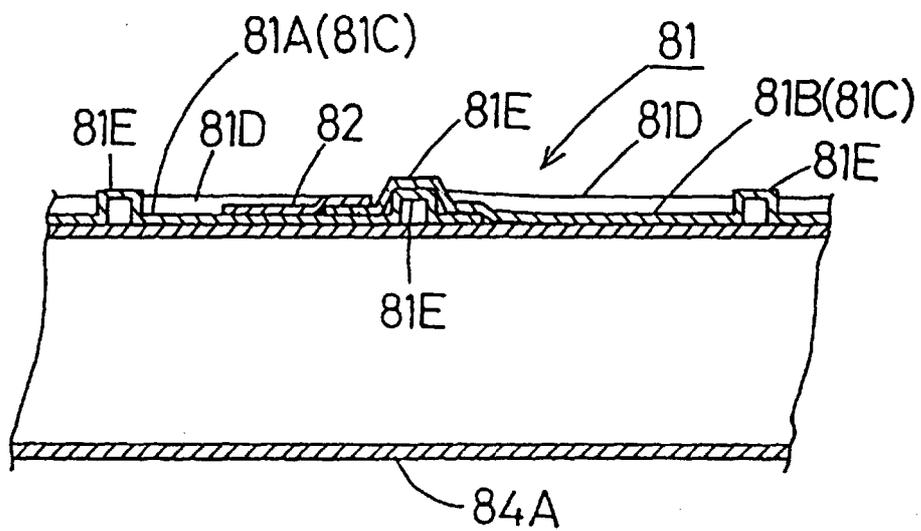


Fig. 19

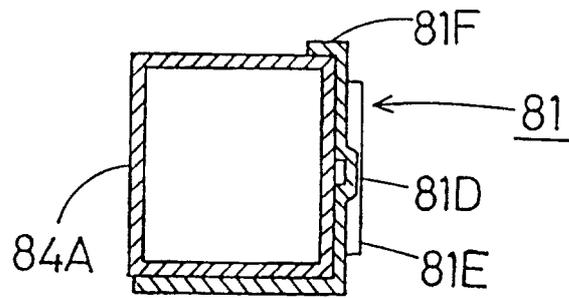


Fig. 20

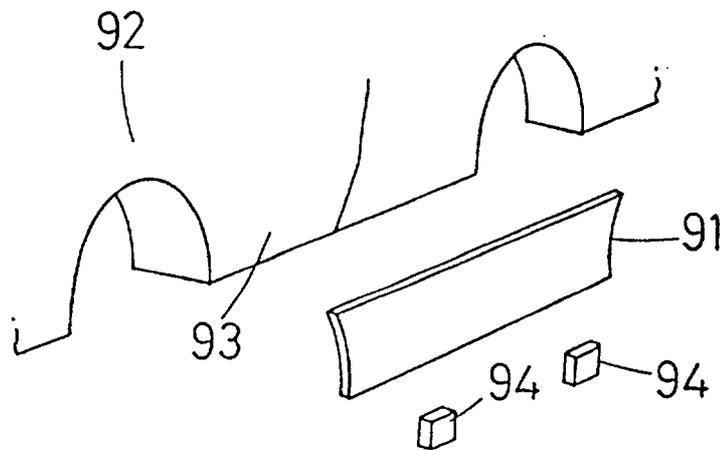
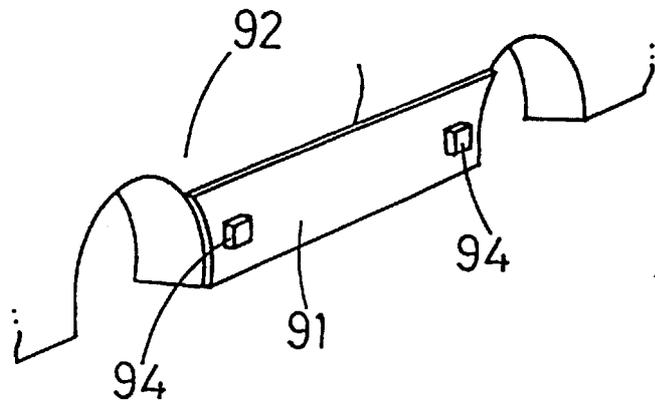


Fig. 21



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP99/02001

A. CLASSIFICATION OF SUBJECT MATTER Int.Cl. ⁶ B05B15/04		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) Int.Cl. ⁶ B05B15/04		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Jitsuyo Shinan Koho 1926-1996 Toroku Jitsuyo Shinan Koho 1994-1999 Kokai Jitsuyo Shinan Koho 1971-1999 Jitsuyo Shinan Toroku Koho 1996-1999		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP, 05-261323, A (Nagoya Oilchemical Co., Ltd.), 12 October, 1993 (12. 10. 93), Column 1, line 39 to column 2, line 22 (Family: none)	1-7
X	JP, 07-228845, A (Nagoya Oilchemical Co., Ltd.), 29 August, 1995 (29. 08. 95), Column 2, line 19 to column 3, line 6 (Family: none)	1-7
X	WO, 95/09055, A1 (Nagoya Oilchemical Co., Ltd.), 6 April, 1995 (06. 04. 95), Page 5, line 20 to page 6, line 22 & AU, 4834593, A1 & EP, 676246, A1	1-7
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed		"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family
Date of the actual completion of the international search 12 July, 1999 (12. 07. 99)		Date of mailing of the international search report 21 July, 1999 (21. 07. 99)
Name and mailing address of the ISA/ Japanese Patent Office		Authorized officer
Facsimile No.		Telephone No.

Form PCT/ISA/210 (second sheet) (July 1992)