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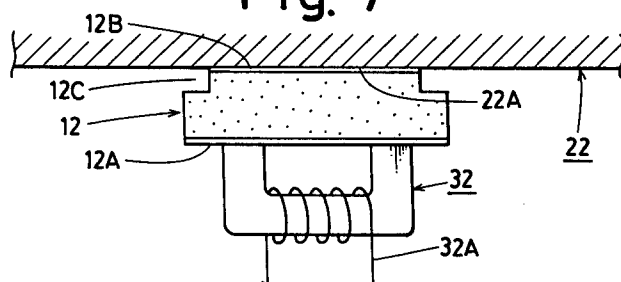
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**J.A. KEMP & CO., 14 South Square Gray's Inn**  
**London WC1R 5LX(GB)**(54) **MASKING MATERIAL.**

(57) A masking material easy to fix or remove. A layer of magnetic substance is formed on the masking material so that the magnet attracts said masking

material with magnetism thereof for fixing or removing the masking material to or from the part to be or has been masked.

**Fig. 7****EP 0 484 560 A1**

## FIELD OF THE INVENTION

The present invention relates to a masking member used to protect a part of the surface of an article from a surface treatment.

For instance, in a case where a two-color coating is effected on such as a car-body, bumper, and the like, a method wherein a paint having a color is coated on said car-body, bumper and the like which is partially covered with a masking member and then another paint having a different color is coated on said place which has been covered with said masking member, has arisen.

Hitherto, adhesive tape or paper has been used as said masking member used in said two-color coating. Nevertheless, in the case of said adhesive tape, said adhesive tape should be repeatedly attached to cover a masking place having a large area and in the case of said paper, other adhesive tape should be used to attach said paper, and further, said adhesive tape and paper should be cut to fit the size and shape of the masking place and said adhesive tape and paper are apt to easily wrinkle and as a result, the workability to attach said adhesive tape and paper is very inferior. Further, since said adhesive tape and paper are thin and are buried in the coating film after coating, a problem occurs where said adhesive tape or paper is very difficult to remove from the masking place.

Further, for instance, in a case where a paint such as polyvinyl-chloride sol, tar-urethane and the like is coated on the underside of a car-body for vibration-sound-corrosion-proofing, said masking members may be attached to places where said coating should not be effected, for instance, holes such as bolt holes, cable holes, drainage holes, shaft holes and the like, places to which parts are attached such as brackets and the like on said underside of said car-body.

Hitherto, said adhesive tape or paper has also been used as the masking member in said coating process of the underside of a car-body, and the same problems as above mentioned have arisen.

## DESCRIPTION OF THE PRIOR ART

To solve said prior problems, a masking member consisting of a plastic sheet molded to correspond with the size and shape of the masking place and an adhesive layer has been provided for the coating of a car-body, bumper and the like (For instance, Jikkai Hei 2-12479).

Since said masking member is already molded to correspond with the size and shape of the masking place, said masking member can be attached to said place by said adhesive layer without cutting and since said masking member is rigid, said masking member may not wrinkle when said mask-

ing member is attached and as a result, the workability to attach said masking member may be much improved. Further, since said masking member is thick enough, said masking member may not be buried in the coating film and can be easily removed from the masking place.

Further, to solve said prior problems, a molded plastic foam and a vacuum formed plastic foam sheet has been provided as masking members for the coating of the underside of a car-body (For instance, Jikkai Sho 62-5852).

Said masking members may be molded in a panel shape, plug shape, clip shape, cap shape, and the like and said panel type masking member is attached to a flat masking place by an adhesive layer, said plug type masking member is attached in a hole, said clip type masking member is attached to a panel masking place by pinching, and said cap type masking member is attached on a projecting masking place.

Said masking members are also easily attached to and removed from said masking places. Nevertheless, since said masking member consisting of a vacuum formed sheet and said panel type masking member are attached to said masking places by said adhesive layer, when said masking members are once attached to said masking member, it is difficult to move them to adjust the attaching position and to increase the attaching strength to prevent the moving or disconnecting of said masking members during the surface treatment, the bonding strength of said adhesive layer should be increased. Nevertheless, when the bonding strength of said adhesive layer is increased, and a large disconnecting force may be necessary when said masking members are removed and a problem that said adhesive layer transfers to the masking place may arise. Especially, in a surface treatment applying high temperature heating, a serious problem that said adhesive layer of said masking members is annealed so as to transfer to said masking place may arise.

Further, it is desirable to attach and remove the masking member automatically by using a robot and the like in a continuous mass-production process such as the coating process for a car. Hitherto, a method wherein the masking member is removed by a hook equipped to the robot has been provided but in said prior method, it is feared that the surface of the article around said masking member will be damaged by said hook and if the position of said hook is not located clearly, it is feared that said hook will miss said masking member.

## DISCLOSURE OF THE INVENTION

The present invention provides a masking member having (a) magnetic layer (s) to solve said prior problems.

To attach said masking member of the present invention to a masking place, the magnet (s) is (are) arranged on the back of said masking place and then said masking member is attached to the surface of said masking place to fix said masking member by the magnetic force intermediating said magnetic layer. As above mentioned, said masking member is attached to said masking place without an adhesive layer.

Further, said masking member may be attached/removed to/from said masking place by a magnet (s) equipped to a robot intermediating said magnetic layer.

Accordingly, in the present invention, said masking member is very easily attached/removed to/from said masking place, and automatic attaching and removing can be easily attained, the attaching position of said masking member is easily adjusted and further, said problem of transfer of the adhesive layer is solved.

## BRIEF DESCRIPTION OF THE DRAWINGS

Figs. 1 to 4 each show a first embodiment of the present invention and,

Fig. 1 is a perspective view for illustration.

Fig. 2 is a perspective view of a masking member.

Fig. 3 is a side sectional view for illustration when said masking member is attached.

Fig. 4 is a perspective view of a bumper after coating.

Figs. 5 to 11 each show a second embodiment of the present invention and,

Fig. 5 is a perspective view of a masking member.

Fig. 6 is a side view when said masking member is attached to an electromagnet.

Fig. 7 is a side view of a masking place.

Fig. 8 is a side view after coating.

Fig. 9 is a side view when said masking member is attached to an electromagnet after coating.

Fig. 10 is a side view when said masking member is removed.

Fig. 11 is a side view when said masking member is released from said electromagnet.

Figs. 12 and 13 each show a third embodiment of the present invention and,

Fig. 12 is a perspective view of a masking member.

Fig. 13 is a side sectional view when said masking member is attached.

Figs. 14 and 15 each show a fourth embodiment of the present invention and,

Fig. 14 is a perspective view of a masking member.

Fig. 15 is a side sectional view when said masking member is attached.

Figs. 16 and 17 each show a fifth embodiment of the present invention and,

Fig. 16 is a perspective view of a masking member.

Fig. 17 is a side sectional view when said masking member is attached.

Figs. 18 and 19 each show a sixth embodiment of the present invention and,

Fig. 18 is a perspective view of a masking member.

Fig. 19 is a side sectional view when said masking member is attached.

Figs. 20 and 21 each show a seventh embodiment of the present invention and,

Fig. 20 is a perspective view of a masking member.

Fig. 21 is a side sectional view when said masking member is attached.

Figs. 22 and 23 each show an eighth embodiment of the present invention and,

Fig. 22 is a perspective view of a masking member.

Fig. 23 is a side sectional view when said masking member is attached.

In the Figures:

(11), (12), (13), (14), (15), (16), (17), (18)

..... Masking member

(11)A, (12)A, (13)A, (14)A, (15)A, (16)A, (17)A, (18)A

..... Magnetic layer

## DESCRIPTION OF THE INVENTION

Figs. 1 to 4 each show a first embodiment of the present invention. In the Figures, (11) is a masking member and said masking member is used to protect the air-inlet (21)A of a bumper (21) of a car and has a shape corresponding to the front shape of said air-inlet (21)A and inserting grooves (11)B, (11)C in which crosspieces (21)B and a side piece (21)C of said air-inlet (21)A are respectively inserted are formed in said masking member (11). As shown in Fig. 2, magnetic layers (11)A, (11)A are formed on the upper edge and the lower edge of the back of said masking member by coating a magnetic paint in which a magnetic material such as iron powder and the like is mixed.

A masking member of the present invention is made of a plastic such as polystyrene, polyethylene, polypropylene, polyvinyl-chloride, polyurethane, melamine resin, urea resin, phenol resin and the like, a reinforced plastic wherein an inorganic filler such as calcium carbonate, talc, bentonite and

the like is mixed in said plastic, a foamed plastic of said plastic, a synthetic rubber such as styrene-butadiene rubber, a crylonitrile-butadiene rubber and the like, a natural rubber, a molded fiber material wherein wood fiber, synthetic fiber, natural fiber, inorganic fiber etc. is bound by a binder to mold wood, paper, reclaimed paper, corrugated card-board, metal, and a complex or a laminate of two or more of said materials.

(31) is a plastic magnet and said plastic magnet (31) has a shape corresponding to the back shape of said air-inlet (21)A of said bumper (21) and inserting grooves (31)B, (31)C in which said crosspieces (21)B and a side piece (21)C of said air-inlet (21)A are respectively inserted are formed in said plastic magnet (31). Said plastic magnet (31) consists of a plastic such as polyethylene, polypropylene, polyvinyl-chloride, acrylonitrile-butadiene-styrene copolymer and the like in which a magnet powder such as Sm-Co magnet powder, Nd-Fe magnet powder, ferrite magnet powder, and the like is mixed, and for instance, said plastic mixed with said magnet powder is formed into a sheet and said sheet is molded by a press, vacuum forming and the like to produce said plastic magnet (31) or the pellets of said plastic are mixed with said magnet powder and injection-molded to produce said plastic magnet (31).

Prior to coating, said plastic magnet (31) is attached in said air-inlet (21)A of said bumper (21) from the back and said masking member (11) is attached in said air-inlet (21)A from the front. Thus, said magnetic layer (11)A, (11)A are magnetically attracted to said plastic magnet (31) and said masking member (11) is firmly fixed in said air-inlet (21)A. This case is shown in Fig. 3. After said air-inlet (21)A is protected by said masking member (11) as above described, a coating is performed to form a coating film (41) on said bumper (21) excepting said air-inlet (21)A as shown in Fig. 4. After said coating, said plastic magnet (31) is removed from the back of said air-inlet (21)A and said masking member (11) is removed from the front of said air-inlet (21)A.

Figs. 5 to 11 each show a second embodiment of the present invention. A masking member (12) of this embodiment has a panel shape and a magnetic layer (12)A is formed on the upper side of said masking member (12) by attaching a foil of a magnetic material such as iron to said upper surface by an adhesive, and an adhesive layer (12)B is formed on the lower side of said masking member (12) and a lacking part (12)C is formed around the circumference of said lower side.

Said masking member (12) is magnetically attracted to an electro magnet (32) equipped to a robot by said magnetic layer (12)A wherein electricity is transmitted to the coil (32)A of said electro

magnet (32) as shown in Fig. 6, and said masking member (12) is transported to a flat masking place (22)A of an article (22) and said masking member (12) is attached to said masking place (22)A by said adhesive layer (12)B as shown in Fig. 7. And then, the electricity to said coil (32)A of said electro magnet (32) is cut off to release said masking member (12) from said electro magnet (32) and after then, a coating is performed on the surface of said article (22) to form a coating film (42) as shown in Fig. 8 and in this embodiment, said coating film (42) around the circumference of said masking member (12) is cut by said lacking part (12)C of said masking member (12), said masking member (12) is easily removed without any obstruction of said coating film (42). To cut completely said coating film (42) around said masking member (12), it is desirable that the width W of said lacking part (12)C is more than 1 mm and the height h of said lacking part (12)C is between 0.2 to 10 mm, more preferably 0.5 to 5 mm as shown in Fig. 8. After said coating, said masking member (12) is magnetically attracted by said electro magnet (32) intermedating said magnetic layer (12)A wherein electricity is transmitted to said coil (32)A again as shown in Fig. 9 to remove said masking member (12) from said masking place (22)A of said article (22) as shown in Fig. 10. In this case, said masking member (12) is magnetically attracted by said electro magnet (32) without any obstruction of said coating film (42) covering said magnetic layer (12)A. Said masking member (12) is transported to the scrapping position and then the electricity to said coil (32)A of said electro magnet (32) is cut off to release said masking member (12) from said electro magnet (32) as shown in Fig. 11.

Figs. 12 and 13 each show a third embodiment of the present invention. A masking member (13) of the present invention has a plug shape consisting of a flange part (13)B and a tapering inserting part (13)C, and a magnetic layer (13)A is formed on the upper side of said flange part (13)B by scattering a magnetic powder such as iron powder and the like after an adhesive is coated on said upper side of said flange part (13)B.

Said masking member (13) is magnetically attracted by an electro magnet (33) intermedating said magnetic layer (13)A wherein electricity is transmitted to the coil (33)A of said electro magnet (33), the same as in the prior embodiment to insert said masking member (13) into a hole (23)A as a masking place of an article (23) as shown in Fig. 13, and after the surface treatment, said masking member (13) is removed from said hole (23)A by the magnetic attraction of said electro magnet (32), the same as in the prior embodiment.

Figs. 14 and 15 each show a fourth embodiment of the present invention. A masking member (14) of this embodiment has a clip shape having an inserting groove (14)B, and a magnetic layer (14)A is formed on the outside of said masking member (14) by attaching a foil of a magnetic material to said outside.

Said masking member (14) is magnetically attracted by a permanent magnet (34) intermedating said magnetic layer (14)A wherein electricity is transmitted to attach said masking member (14) to a masking place (24)A having a panel shape of an article (24) by inserting said masking place (24)A into said inserting groove (14)B as shown in Fig. 15, and after the surfacetreatment, said masking member (14) is removed from said masking place (24)A by the magnetic attraction of said permanent magnet (34), the same as in the prior embodiments.

Figs. 16 and 17 each show a fifth embodiment of the present invention. A masking member (15) of this embodiment has a cylindrical shape and an inserting hole (15)B is formed in said masking member (15) and a magnetic layer (15)A is formed on the upper side of said masking member (15) by attaching a foil of a magnetic material such as iron and the like on said upper side.

Said masking member (15) is magnetically attracted by an electro magnet (35) intermedating said magnetic layer (15)A wherein electricity is transmitted to the coil (35)A of said electro magnet (35), the same as in the second and third embodiments to attach said masking member (15) on a projecting masking place (25)A of an article (25) by inserting said masking place (25)A into said inserting hole (15)B as shown in Fig. 17, and said masking member (15) is removed from said masking place (25)A by the magnetic attraction of said electro magnet (35), the same as in the second and third embodiments.

Figs. 18 and 19 each show a sixth embodiment of the present invention. A masking member (16) of this embodiment has a vessel shape and a magnetic layer (16)A is formed on the inside of the bottom of said masking member (16) by coating a magnetic paint, the same as in the first embodiment, and an adhesive layer (16)B is formed on the outside of said bottom and a flange part (16)C is formed outwardly from the upper edge of said masking member (16).

Said masking member (16) is magnetically attracted by an electro magnet (36) intermedating said magnetic layer (16)A wherein electricity is transmitted to the coil (36)A of said electro magnet (36), the same as in the prior embodiments to attach said masking member (16) to a flat masking place (26)A of an article (26) by said adhesive layer (16)B as shown in Fig. 19, and after the surface

treatment, said masking member (16) is removed from said masking place (26)A by the magnetic attraction of said electro magnet (36), the same as in the prior embodiments.

Figs. 20 and 21 each show a seventh embodiment of the present invention. A masking member (17) of this embodiment has a vessel shape forming an inserting hole (17)B on the inside of said masking member (17) and a magnetic layer (17)A is formed on the outside of the bottom of said masking member (17) by attaching a foil of a magnetic material, the same as in the second embodiment to said outside of said bottom by an adhesive, and a flange part (17)C is formed outwardly from the upper edge of said masking member (17).

Said masking member (17) is magnetically attracted by an electro magnet (37) intermedating said magnetic layer (17)A wherein electricity is transmitted to the coil (37)A of said electro magnet (37), the same as in the prior embodiments to attach said masking member (17) to a projecting masking place (27)A of an article (27) by inserting said masking place (27)A into said inserting hole (17)B as shown in Fig. 21, and after the surface treatment, said masking member (17) is removed from said masking place (27)A by the magnetic attraction of said electro magnet (37) the same as the prior embodiment.

Figs. 22 and 23 each show a eighth embodiment of the present invention. A masking member (18) of this embodiment consists of an inserting part (18)B having a vessel shape and a flange part (18)C formed from the upper edge of said inserting part (18)B having a vessel shape and a magnetic layer (18)A is formed on the upper side of said flange part (18)C, the same as in the prior embodiments.

Said masking member (18) is magnetically attracted by an electro magnet (38) intermedating said magnetic layer (18)A wherein electricity is transmitted to the coil (38)A of said electro magnet (38), the same as in the prior embodiments to attach said masking member (18) in a hole (28)A of an article (28) as shown in Fig. 23, and after the surface treatment, said masking member (18) is removed from said masking place (28)A by the magnetic attraction of said electro magnet (38), the same as in the prior embodiments.

## Claims

1. A masking member having (a) magnetic layer (s).

Fig. 1

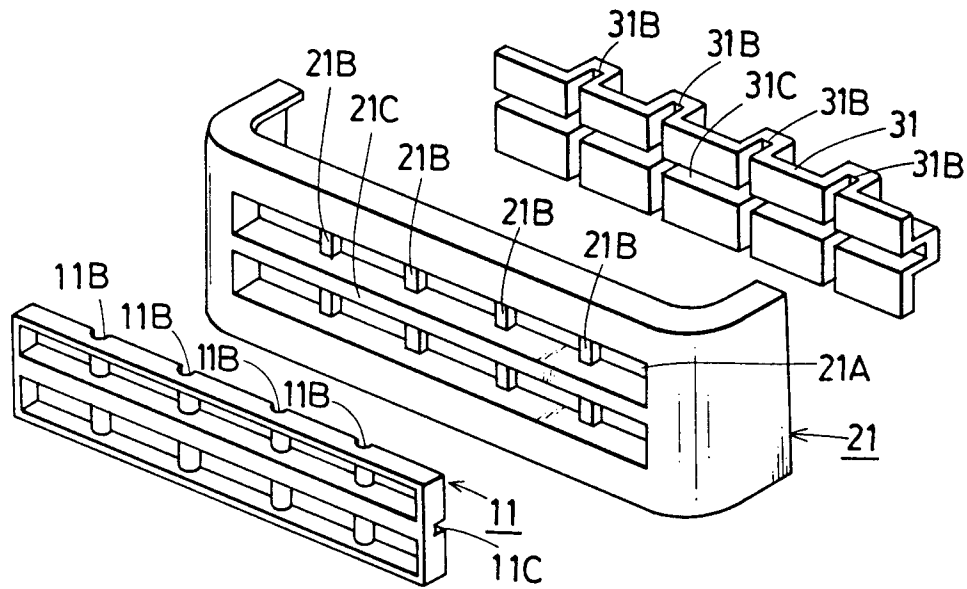


Fig. 2

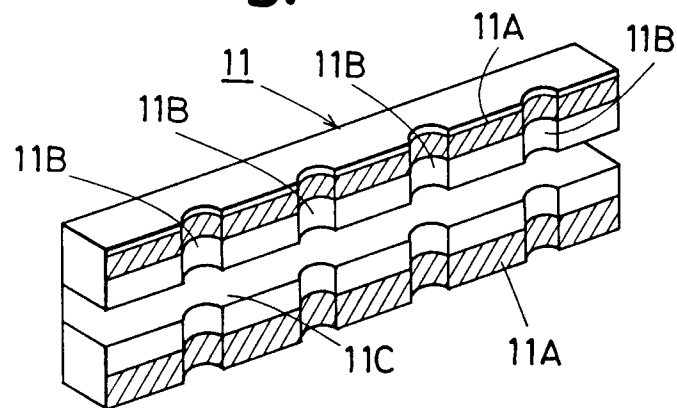


Fig. 3

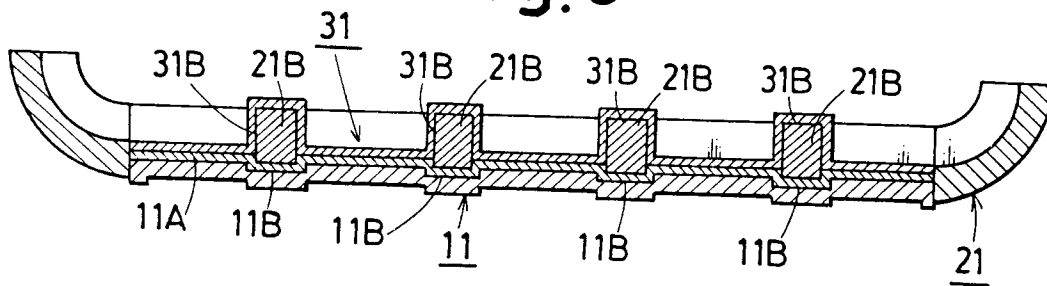


Fig. 4

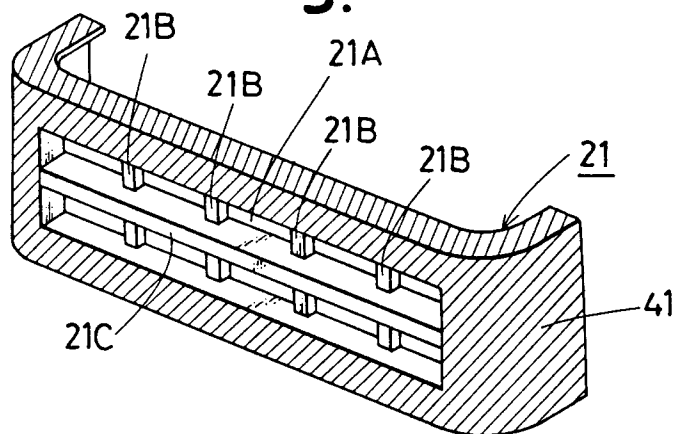


Fig. 5

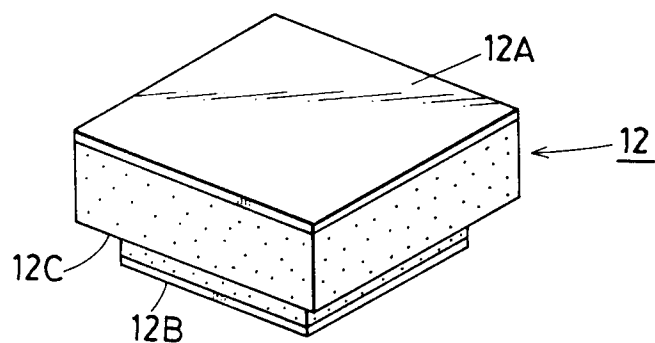


Fig. 6

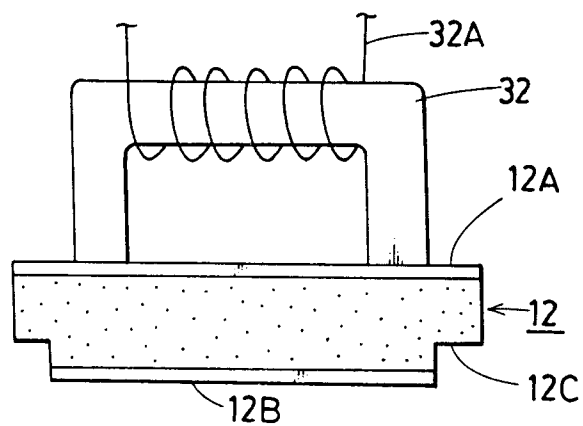


Fig. 7

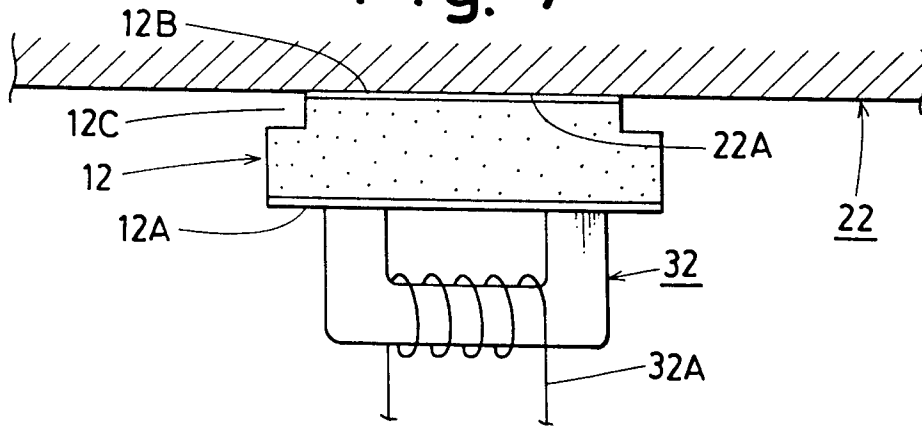


Fig. 8

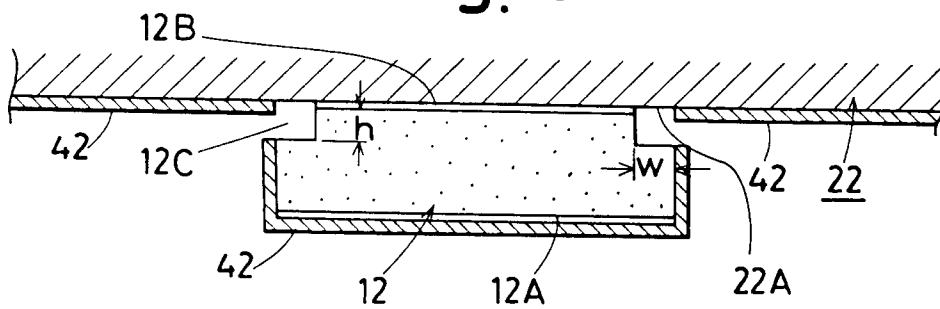


Fig. 9

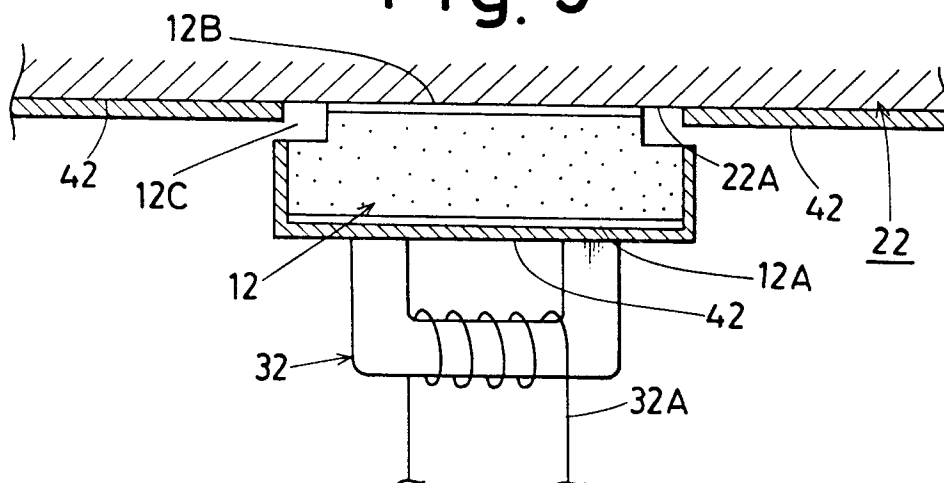




Fig.10

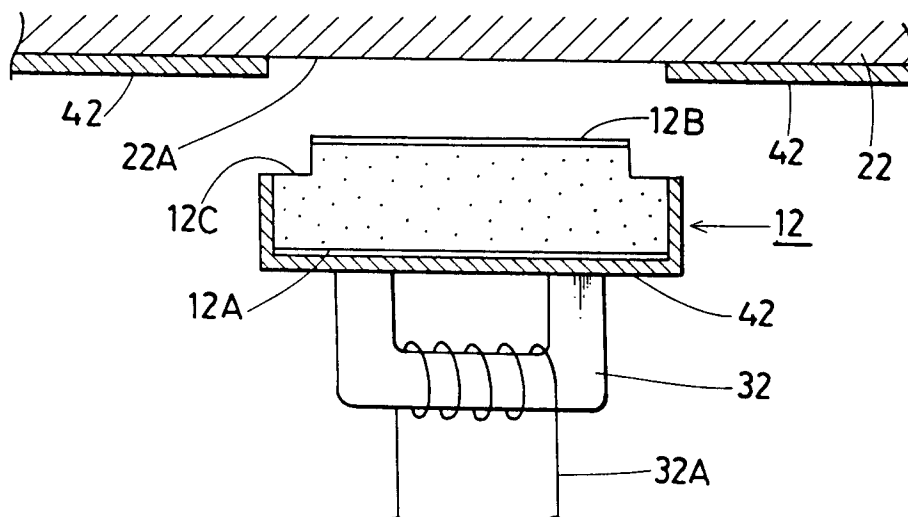


Fig.11

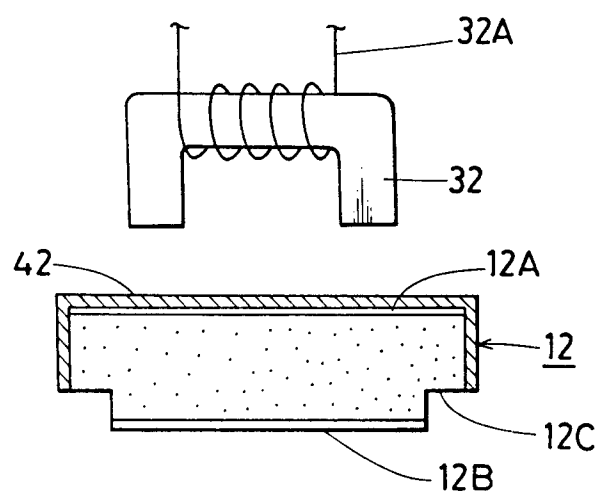


Fig. 12

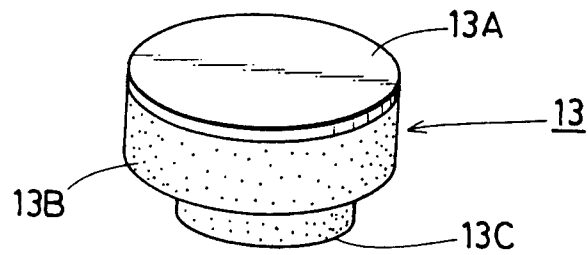


Fig. 13

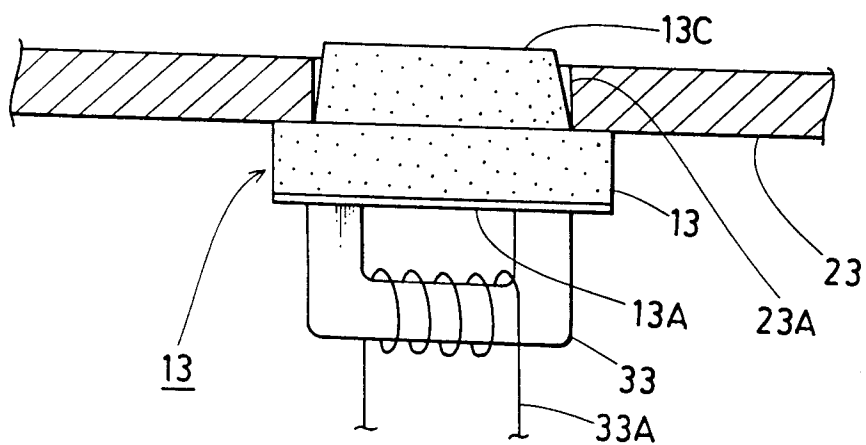


Fig. 14

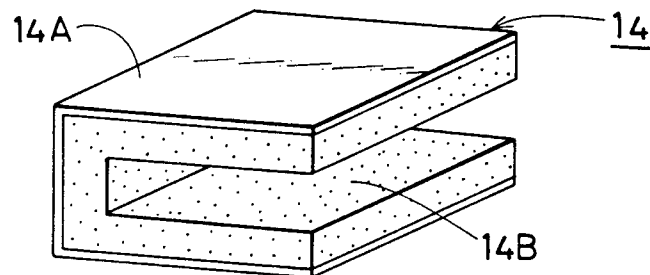


Fig. 15

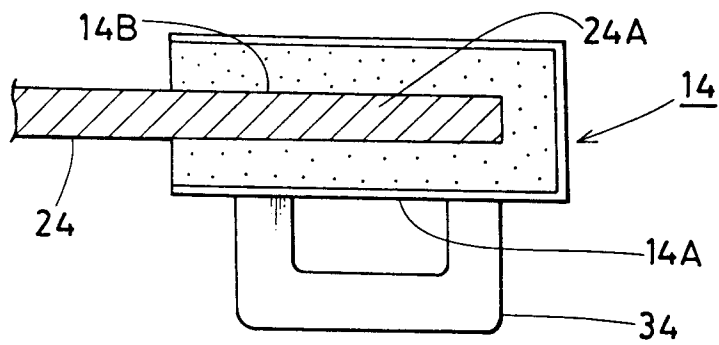


Fig. 16

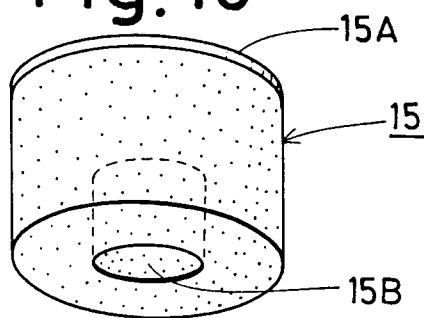


Fig. 17

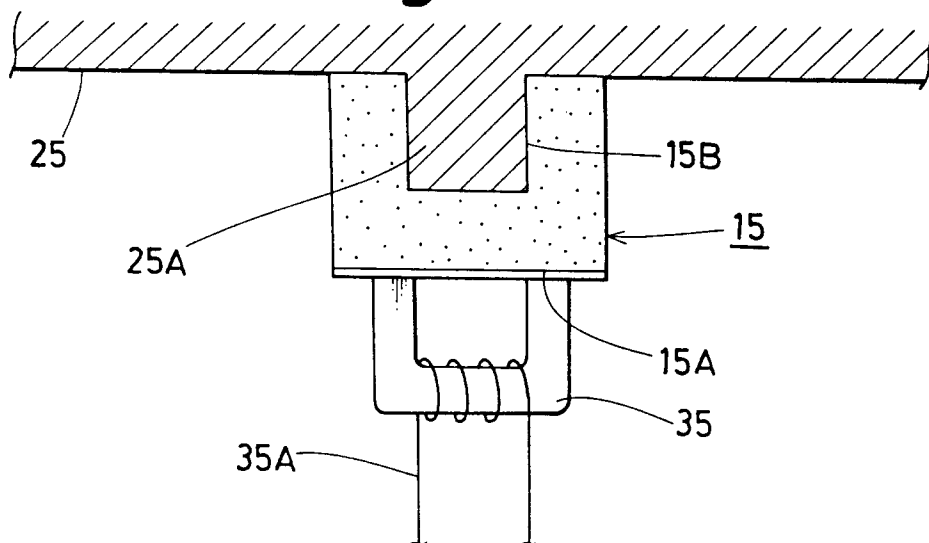


Fig. 18

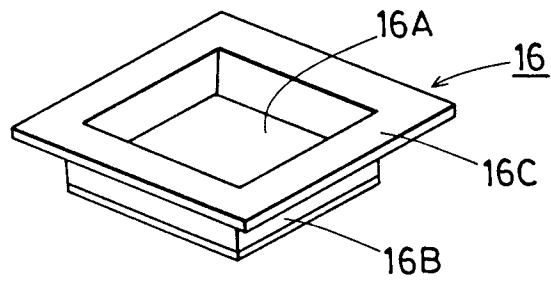


Fig. 19

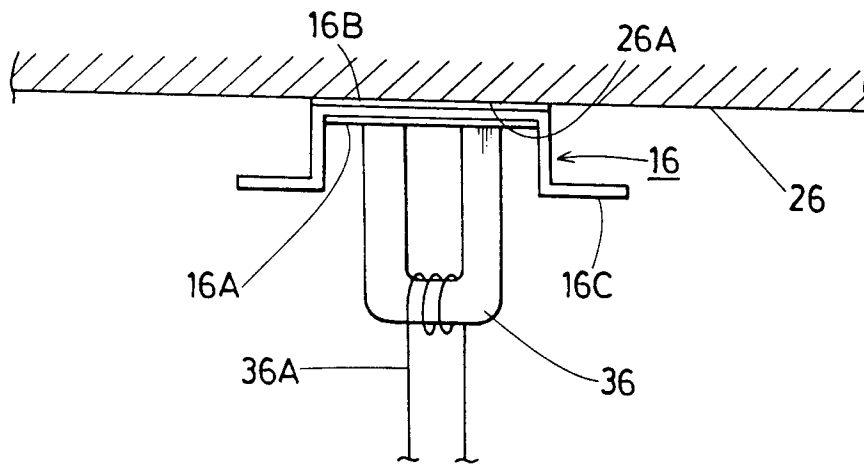


Fig. 20

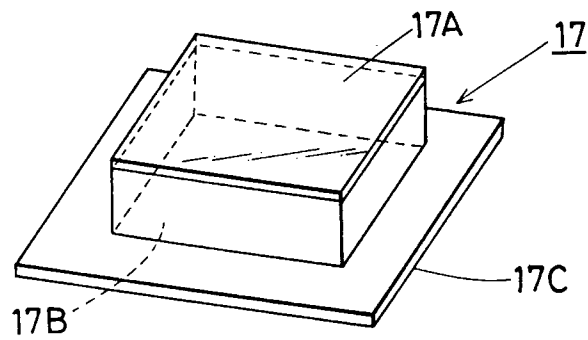


Fig. 21

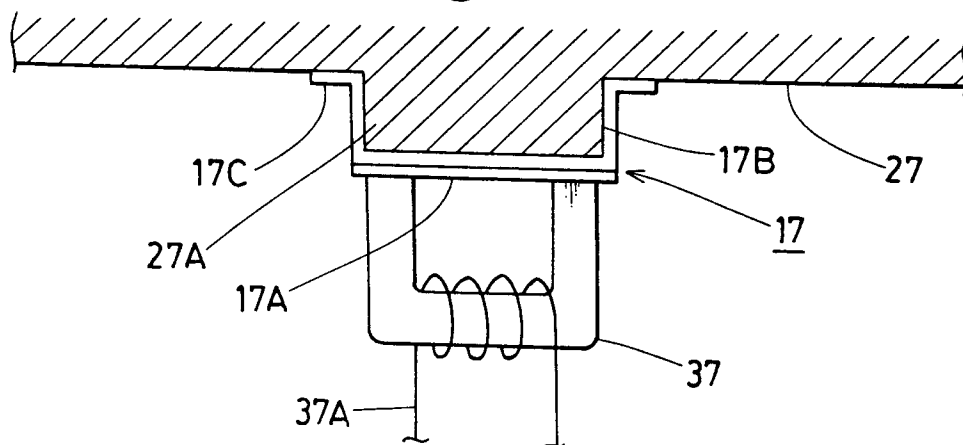


Fig. 22

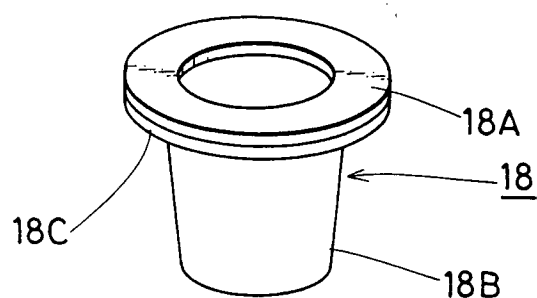
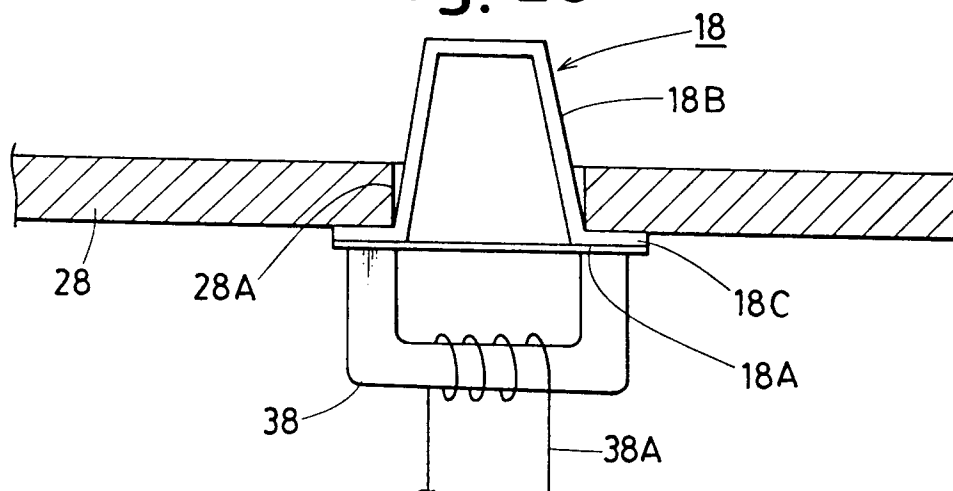


Fig. 23



# INTERNATIONAL SEARCH REPORT

International Application No PCT/JP91/00696

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (If several classification symbols apply, indicate all) <sup>6</sup>		
According to International Patent Classification (IPC) or to both National Classification and IPC		
Int. Cl <sup>5</sup> B05B15/04		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched <sup>7</sup>		
Classification System	Classification Symbols	
IPC	B05B15/04	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched <sup>8</sup>		
Jitsuyo Shinan Koho	1926 - 1990	
Kokai Jitsuyo Shinan Koho	1971 - 1990	
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT</b> <sup>9</sup>		
Category <sup>10</sup>	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
A	JP, U, 60-140673 (Sumitomo Metal Industries, Ltd.), September 18, 1985 (18. 09. 85), (Family: none)	1
A	JP, U, 62-126274 (Mitsubishi Motors Corp.), August 11, 1987 (11. 08. 87), (Family: none)	1
<p><sup>10</sup> Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"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)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"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</p> <p>"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"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</p> <p>"Δ" document member of the same patent family</p>		
<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
July 18, 1991 (18. 07. 91)	August 5, 1991 (05. 08. 91)	
International Searching Authority	Signature of Authorized Officer	
Japanese Patent Office		