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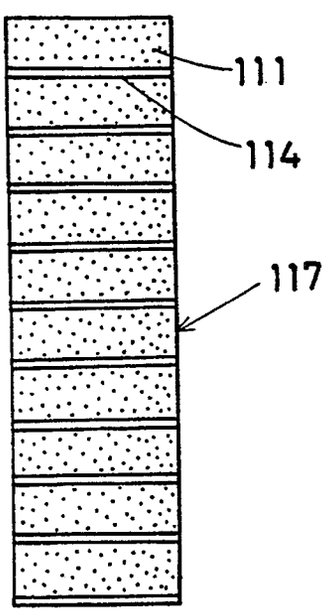
(54) A group of masking members and method of attaching them.

(57) A group of masking members consisting of a plural number of flat type masking members each of which has an adhesive layer on one side and said masking members are placed one upon another and mutually adhered by said adhesive layer thereof, is provided in the present invention. Further, an attaching method employing a masking tool in which said group of masking members is put is provided in the present invention.

Fig.1



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A GROUP OF MASKING MEMBERS AND A METHOD OF ATTACHING THEM

The present invention relates to masking members to protect parts of an article such as a car body from surface treatment such as coating, plating, vacuum evaporation, phosphatizing and the like.

Further, the present invention relates to a method of attaching masking members, and a method of protecting articles using the masking members.

When a surface treatment is effected on the surface of an article, and if said surface of said article has a part on which said surface treatment should not be effected for the reason that another surface treatment is to be effected on said part after said surface treatment, or said surface treatment spoils the appearance of said article and so on, said parts of said surface of said article may be covered and protected with a masking member.

In the case of corrosion, sound and vibration-proof coating for the underside of a car body, said parts may be parts on which brackets, frames and the like are attached, or holes such as water ejecting holes, shaft holes, harness holes and the like. If said corrosion, sound and vibration proof coating by using a coating agent, such as a polyvinylchloride-sol, a tar-urethane mixture and the like is effected on or in said parts or said holes, in a case of said parts on which brackets, frames, and the like are attached, it is difficult to attach firmly said brackets, frames and the like to said part because of the coating layer formed by said coating. In the case of holes, the surface treatment leaks from said holes to waste said coating agent and further it may be that said coating agent fills in said holes or stains the inside of said holes.

In a case where the surface of an article has many parts to be protected from surface treatment such as coating of the underside of a car body as above described, many masking members must be attached, perhaps more than 200 parts for one car body before said surface treatment and accordingly many masking members must also be removed from said parts after said surface treatment.

Further, in a case of a continuous mass-production line, said masking members must be attached and removed in a short time.

Still further in the case of a continuous mass-production line, it is desirable that said masking members are automatically attached and removed.

Hitherto, a panel type masking member having an adhesive layer on one side has been provided (USP 4,835,026). Said masking member is used to protect a flat surface part of an article and said masking member is attached to said flat surface part by said adhesive layer manually.

An object of the present invention is to allow saving of labour and time in attaching of said masking member. In preferred forms the invention makes attaching of said masking members suitable for automatic operation, in particular.

According to the invention there is provided a group of masking members consisting of a plural number of generally flat masking members each of which has an adhesive layer on one side, said masking members being placed one upon another and separably adhered to each other by said adhesive layers.

The invention also provides a method of attaching masking members of a such group of masking members to a part of an article which is to be protected comprising putting said group of masking members in a masking tool which comprises a cylinder having an inlet at one end and an outlet at the other end, and a transporting means for said group wherein said adhesive layer of each masking member faces in the direction of the outlet of said cylinder, successively transporting said group to the outlet of said cylinder by operation of said transporting means to put out that masking member located in the lowest position of said group from the outlet of said cylinder, and attaching said masking member to said part of an article by said adhesive layer thereof.

Further, the invention provides a method of treating a surface by applying to a part of the surface at least one masking member from such a group of masking members or attaching a masking member using the above method, and applying coating or other treatment to the surface so that the said part is not coated or treated and removing the masking member.

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. 7 relate to a first embodiment of the present invention using a first masking tool. In these,

Fig. 1 and Fig. 2 are the side views of a group of masking members.

Fig. 3 is a side sectional view showing a masking member being separated from a masking tool.

Fig. 4A, B, C, D are respectively perspective views of some embodiments of said masking member used in said first embodiment.

Fig. 5 shows another arrangement of a group of masking members used in said first embodiment.

Fig. 6 is a perspective view showing a manu-

facturing method of a group of masking members.

Fig. 7 is a partial side sectional view of an article after coating.

Fig. 8 is a partial perspective view of said article after the removal of said masking member.

Fig. 9 is a side sectional view of a masking tool of a second embodiment.

Fig. 10 is a side sectional view showing that a masking member of a group in a masking tool sucked by a sucker.

Fig. 11 is a partial side sectional view of said sucker.

Fig. 12 is a side view showing that said masking member is removed from a part of an article by said sucker.

Fig. 1 to Fig. 7 relate to a first embodiment of the present invention. Referring now to Fig. 1 to Fig. 7, a flat type masking member (111) has a smooth and flat surface of the upper side (113) and an adhesive layer (114) is formed on the lower side (112) and a plural number of said masking members (111) are placed one upon another to form a group of masking members (117) as shown in Fig. 1. In said group of masking members (117), said masking members (111) are mutually adhered by said adhesive layer (114) thereof. A masking tool (120) comprises a cylinder (121) having an inlet (122) at one end and an outlet (123) at the other end, a friction sheet (129) attached to the inside of said cylinder (121), and a piston (124) as a transporting means. Said piston (124) is inserted into said cylinder (121) from said inlet (122) thereof and a handle (126) which is rotatably attached on said inlet (122) by an axis (125) is connected to the piston rod (124A) of said piston (124) wherein a pin (128) of said piston rod (124A) is inserted in a groove (127A) of a bracket (127) of said handle (126). Said group of masking members (117) is put into said cylinder (121) of said masking tool (120) and said adhesive layer (114) of each masking member (111) faces in a direction to the outlet (123) of said cylinder (121) and said piston (124) of said masking tool (120) contacts with the upper side (113) of one of said masking members (111) which is located in the upper most position of said group of masking members (117) as shown in Fig. 2.

Said masking members (111) of said group (117) are successively transported from the inlet (122) to the outlet (123) in said cylinder (121) by operation of said piston (124) by said handle (126). Said handle may be operated by hand, oil pressure, electromagnetic means, and the like. Thus, one of said masking members (111) located in the lowest position of said group (117) is pushed out from the outlet (123) of said cylinder (121) by said operation of said piston (124) and attached to a part (131) having a flat surface of an article (130) by said adhesive layer (114) of said masking member (111) as shown in Fig. 2. After then, said masking member (111) is separated from said group (115) in said cylinder (121) of said masking tool (120) as shown in Fig. 3. Adhesion between the member and surface to be protected is stronger than that between masking members of the group.

If desired, said masking tool (120) is operated by a robot and in this case, said masking members (111) are automatically attached to said part (131). Further, said piston (124) may be directly operated by a pressure oil cylinder, an electromagnetic cylinder, and the like instead of said handle (126).

Said masking member (111) is made of a material, such as of a plastic or a rubber such as polystyrene, polyethylene, polypropylene, ethylene-propylene copolymer, polyvinyl-chloride, polyvinylidene chloride, polymethacrylate, styrene-butadiene copolymer, acrylonitrile-butadiene copolymer, polybutadine polyisoprene, polyisobutylene, polychloroprene, isoprene-isobutylene copolymer, natural rubber, polyurethane, melamine resin, urea resin, phenol resin, epoxy resin and the like; foams of said plastic or said rubber; a mixture of said plastic or said rubber with a filler such as calcium carbonate, talc, bentonite, fly ash, blast furnace slag, and the like; a fiber material such as thermoplastic resin - impregnated fiber; a thermosetting resin -impregnated fiber; wooden material such as wood, hardboard, plywood and the like; metal material and the like; composite material consisting of a plural number of materials selected from the group of said materials.

In said group of masking members (117), it is desirable that the peeling strength between said masking member (111) and said part (131) of said article (13) be made larger than the peeling strength between a pair of said masking members (111), (111) mutually in contact.

To satisfy the above described conditions, the contact area between said masking member (111) and said part (!31) should be larger than the contact area between a pair of said masking members (111), (111) mutually in contact, or the bonding strength between said masking member (111) and said part (131) should be larger than the bonding strength between a pair of said masking members (111), (111) mutually in contact.

In a case where the contact area between said masking member (111) and said part (131) is larger than the contact area between adjacent said masking members (111), (111) said adhesive layer (114A) is fully formed on the lower side (112A) of said masking member (111A) and a dent (115A) having a smooth and flat surface (116A) in the bottom thereof is formed on the upper side (113A) of said masking member (111A) as shown in Fig.

4A, or said adhesive layer (114B) is partially formed on the circumference of the lower side (112B) of said masking member (111B) and a smooth and flat surface is fully formed on the upper side (113B) wherein four projections (115B) are respectively formed on the four corners of said upper side (113B) as shown in Fig. 4B and Fig. 4C, or said adhesive layer (114C) is fully formed on the lower side (112C) of said masking member (111c) and a projection (111C) having a smooth and flat surface (116C) is formed on the upper side (113C) of said masking member (111C) as shown in Fig. 4D.

Further, as shown in Fig. 5, there is provided another group of masking members (117D) consisting of a plural number of flat type masking members (111D) each of which has an adhesive layer (114D) on the lower side (112D) thereof and a release sheet (115D) on the upper side (113D). Said release sheet (115D) may be such as polyethylene sheet, polypropylene sheet and the like.

In said group of masking members (117D), said release sheet (115D) is intermediate between a pair of said masking members (111D), (111D) mutually in contact and consequently one masking member (111D) may be easily separated from another masking member (111D).

To manufacture said group of masking members (118), a plural number of panels (110) are placed one upon another to form an accumulation of said panels (118) as shown in Fig. 6. Each of said panels (110) has an adhesive layer (114A) on the lower side and a plural number of dents (115A) arranged along the length and breadth on the upper side. Said group of said panels (118) is then cut along the dotted lines shown as in Fig. 6 by employing a heated wire, a cutter, an ultrasonic wave-cutter, a water-jet and the like to obtain said group of masking members (117). If desired, in a case where said masking members (111D) is respectively made of thermoplastic material, said masking members (111D) are mutually attached by the melted side surface thereof by contacting with said heated wire besides, said masking member (111D) is mutually adhered by said adhesive layer (114D) thereof.

In the case of said group of masking member (117A) shown in Fig. 5, a plural number of panels each of which has an adhesive layer on the lower side and a release sheet on the upper side are placed one upon another to form an group of said panels and then said group of said panels is cut as above described.

As above described, said masking member (111) is attached to said part (131) of said article (130) by said adhesive layer (114) formed on the lower side (112) of said masking member (111) and after this, a paint such as a polyvinylchloride-sol, a urethane resin, an asphalt, a rubber-asphalt mixture, a tar-urethane mixture and the like is coated on the surface of said article to form a coating layer (150) as shown in Fig. 7. After said coating, said masking member (111) is removed from said part (131) as shown in Fig. 8.

Fig. 9 relates to a second embodiment of the present invention. A masking tool (220) of this embodiment comprises a cylinder (221) having an inlet (222) at one end and an outlet (223) at the other end, and a pair of endless belts (224), (224) acting as a transporting means. Each of said endless belts (224), (224) is suspended on a pair of rollers (225), (226) wherein one set of said rollers (225) is rotatably attached to the inlet (222) of said cylinder (221) and the other set of said rollers (226) are rotatably attached to the outlet (223) of said cylinder (221). Said endless belts (224), (224) are respectively made of a friction material such as a rubber, a cloth having a flocking layer, and the like.

Said group of said masking members (117) of the first embodiment is put into said cylinder (221) of said masking tool (220) wherein said group of masking members (117) is pressed between a pair of said endless belts (224), (224) in said cylinder (221) of said masking tool (220). Said group of masking members (117) are successively transported from the inlet (222) to the outlet (223) in said cylinder (221) by driving said rollers (225), (226) by a driving means such as a motor and the like to attach one of said masking members (111) located in the lowest position of said group (117) to a part of an article as same as the first embodiment.

Fig. 10 to Fig. 12 relate to a third embodiment of the present invention. In this embodiment, a sucking tool (140) as shown in Fig. 10 is used. Said sucking tool (140) comprises an oil pressure cylinder (141), a pipe (143) attached at the end of the piston rod (142) of said oil pressure cylinder (141), a sucker (144) attached at the end of said pipe (143), and a vacuum tube (145) in which a trap intermediates. Said sucker (144) is made of a rubber, a plastics, a metal, and the like. Said sucker (144) of said sucking tool (140) is contacted with the upper side (113) of one of said masking members (111) which is located in the uppermost position of said group of masking members (117) in said masking tool (120) turned upside down as shown in Fig. 10. Said masking member (111) is sucked by said sucker (144) of said sucking tool (140) and then transported to said part (131) of said article (130) to attach said masking member (111) to said part (131) by said adhesive layer (114) thereof before coating as shown in Fig. 12. Said masking member (111) attached to said part (131) is separated from said sucker (144) of said sucking tool (140) by opening said vacuum tube

(145) in the atmosphere or by putting the air into said vacuum tube (145).

In this embodiment, said group of masking members (117) is put into said cylinder (121) facing said adhesive layer (114) of each masking member (111) of said group (117) in a direction to the inlet (122) of said cylinder (121).

Claims

1. A group of masking members consisting of a plural number of generally flat masking members each of which has an adhesive layer on one side, said masking members being placed one upon another and separately adhered to each other by said adhesive layers.

2. A group of masking members in accordance with claim 1, wherein the peeling strength between a masking member and a part of an article which is to be protected by said masking members is larger than the peeling strength between an adjacent pair of said masking members.

3. A group of masking members in accordance with claim 1 or 2, wherein the contact area available to be between a masking member and said part of said article which is to be protected is larger than the contact area between adjacent masking members.

4. A method of attaching masking members of a group in accordance with claim 1, 2 or 3 to a part of an article which is to be protected comprising putting said group of masking members in a masking tool which comprises a cylinder having an inlet at one end and an outlet at the other end, and a transporting means for said group wherein said adhesive layer of each masking member faces in the direction of the outlet of said cylinder, successively transporting said group to the outlet of said cylinder by operation of said transporting means to put out that masking member located in the lowest position of said group from the outlet of said cylinder, and attaching said masking member to said part of an article by said adhesive layer thereof.

5. An attaching method for masking members of an group in accordance with claim 1, 2 or 3 comprising putting said accumulation of masking members in a masking tool which comprises a cylinder having an inlet at one end and an outlet at the other end and a transporting means for said group wherein said adhesive layer of each masking member faces in the direction of the inlet of said cylinder, successively transporting said group to the outlet of said cylinder by operation of said transporting means to push out one of said masking members located at the outlet end of said group from the outlet of said cylinder, sucking up said masking member by a sucker to separate said masking member from said group and transporting said masking member to a part of an article to attach said masking member to said part by said adhesive layer thereof.

6. A method of attaching masking members in accordance with claim 4 or 5, wherein said transporting means is a piston which contacts with the upper side of one of said masking members located in the uppermost position of said group of masking members in said cylinder of said masking tool.

7. An attaching method for masking members in accordance with claim 4 or 5 wherein said transporting means is a pair of endless belts pressing said group of masking members in said cylinder of said masking tool.

8. The combination of a group of masking members according to claim 1, 2 or 3 and a masking tool comprising a cylinder having an inlet at one end and an outlet at the other end, and a transporting means for said group wherein said adhesive layer of each masking member faces in the direction of the outlet of said cylinder.

9. The combination of a group of masking members according to claim 1, 2 or 3 and a masking tool which comprises a cylinder having an inlet at one end and an outlet at the other end and a transporting means for said group wherein said adhesive layer of each masking member faces in the direction of the inlet of said cylinder, and a sucker to separate said masking member from said group and transport said masking member to a part of an article to attach said masking member to said part by said adhesive layer.

10. A method of treating a surface by applying to a part of the surface at least one masking member from a group according to claim 1, 2 or 3 or using the method of claim 4, 5, 6 or 7, and applying coating or other treatment to the surface so that the said part is not coated or treated and removing the masking member.

Fig. 2

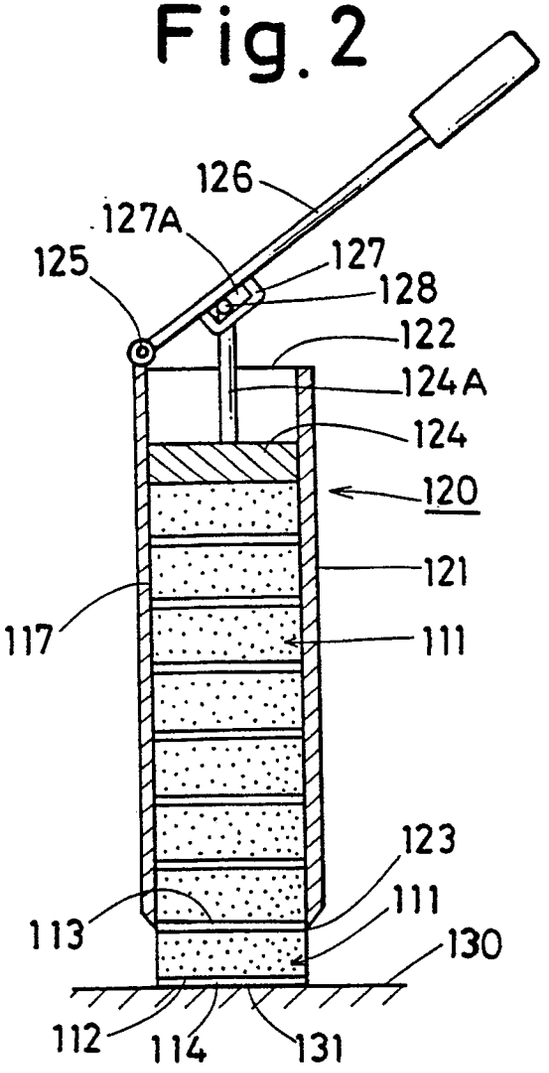

Fig. 1

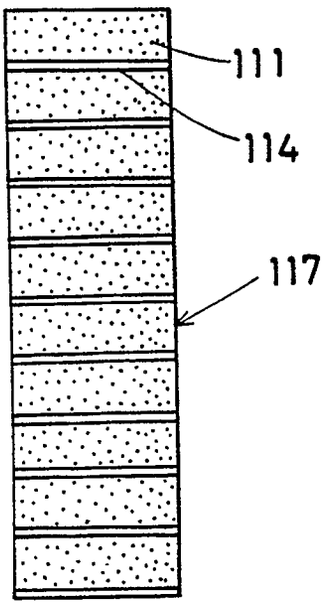

Fig. 3

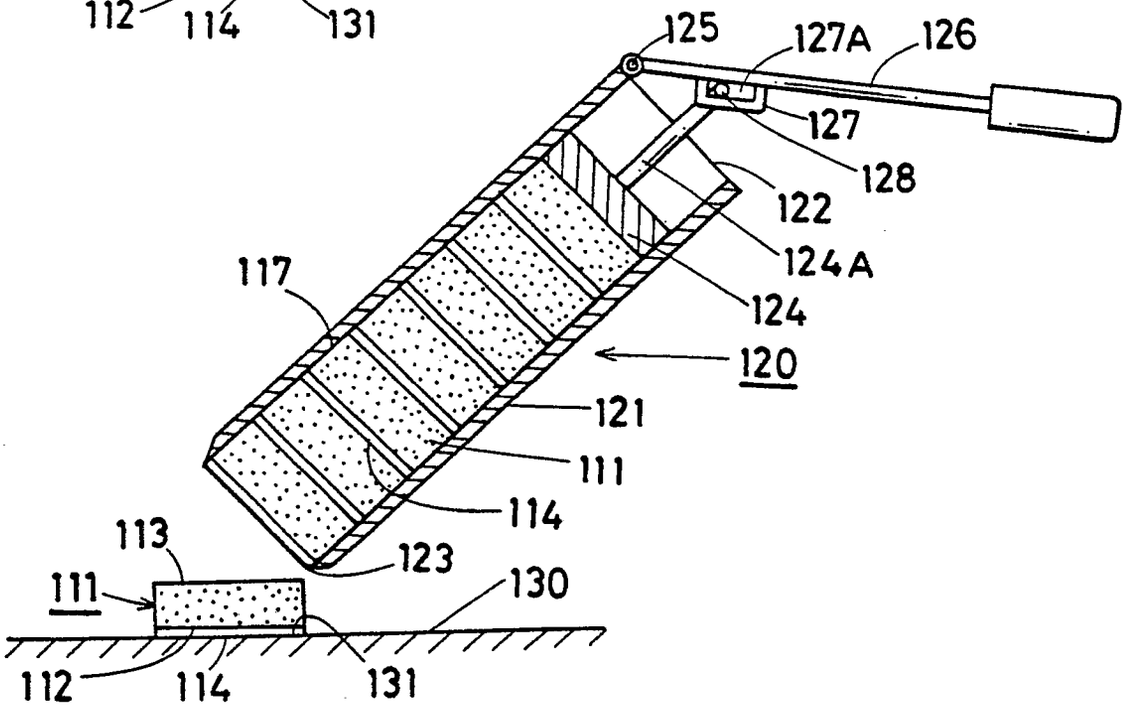

Fig. 5

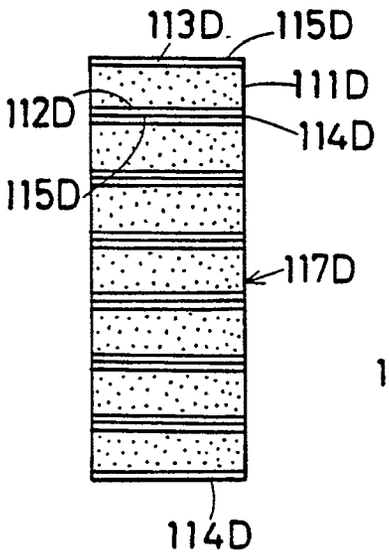

Fig. 4

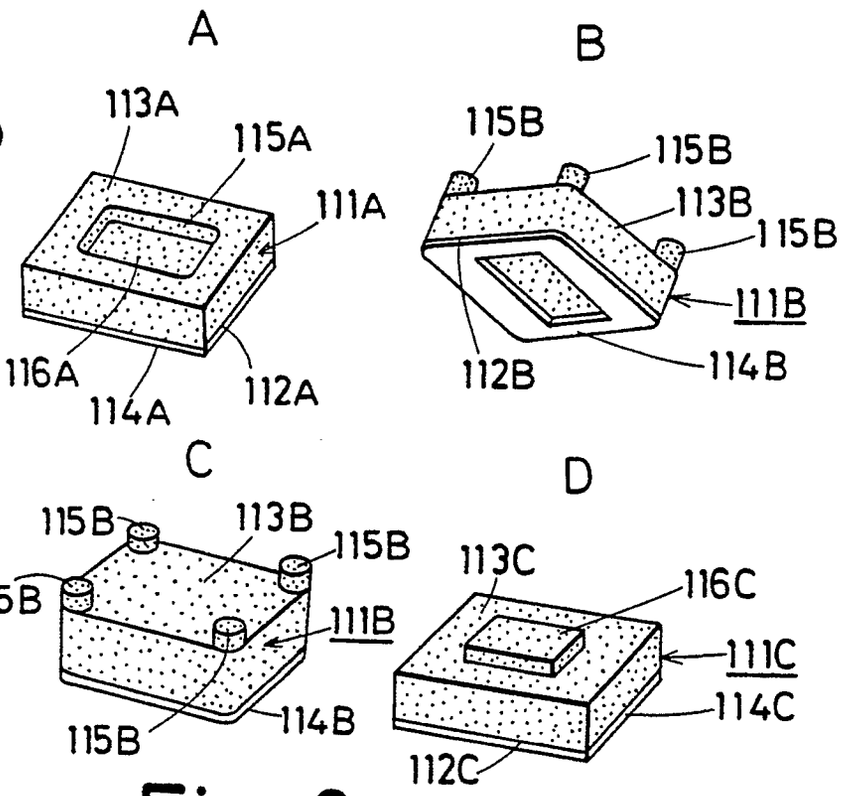

Fig. 6

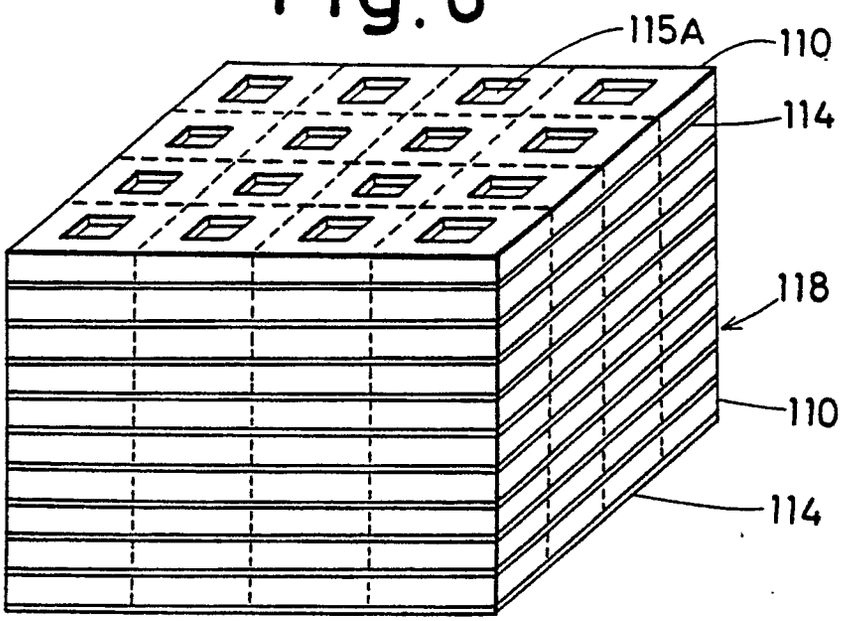

Fig. 7

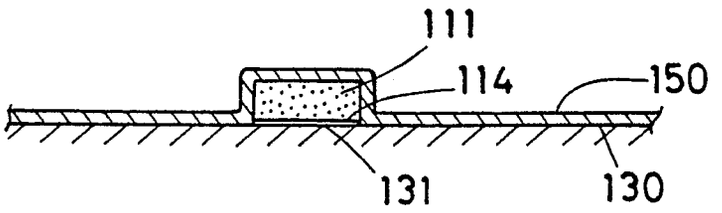

Fig. 8

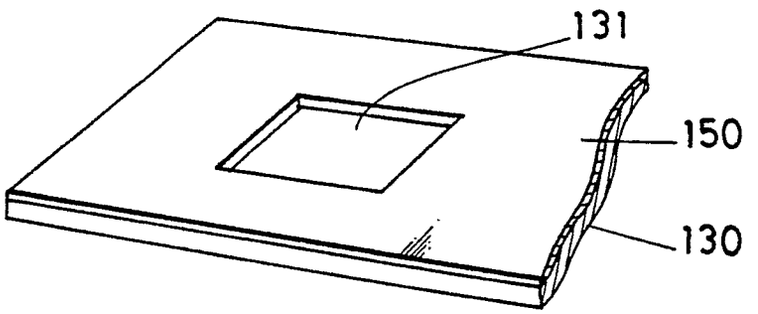

Fig. 9

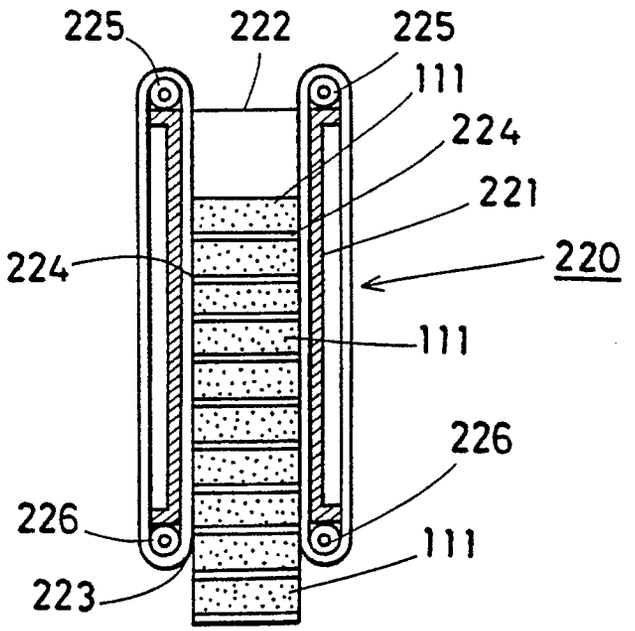

Fig.10

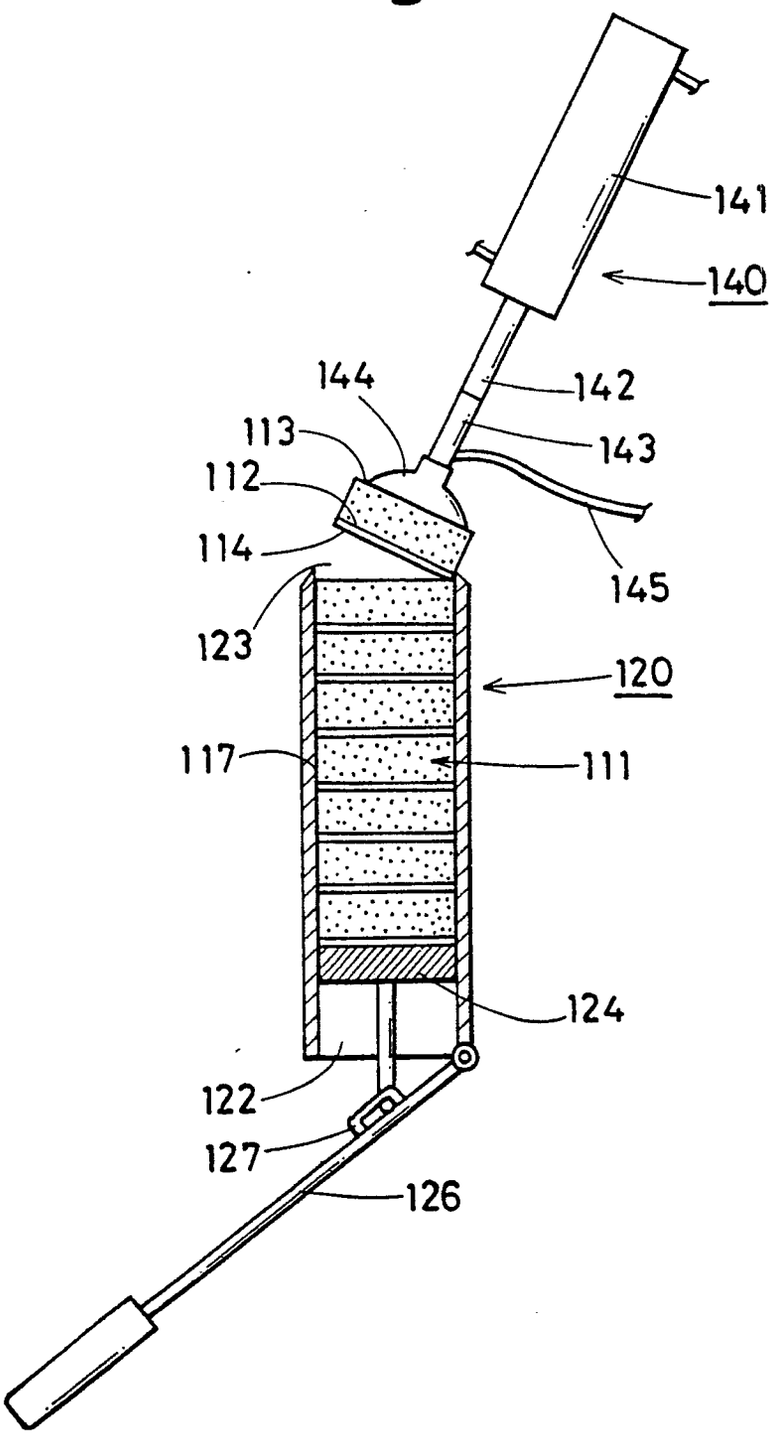
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Fig.11

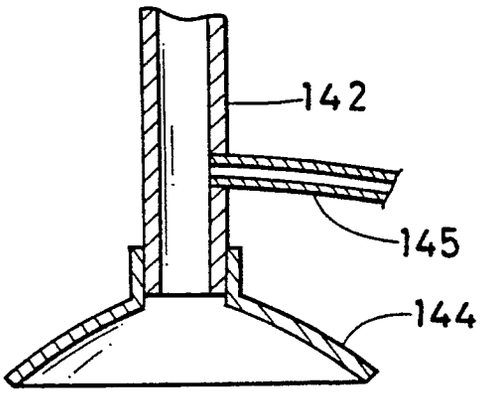

Fig.12