

[54] APPARATUS FOR MANUFACTURING SILICONE GEL SHEET

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[58] Field of Search 425/4 C, 91, 92, 96, 425/99, 101, 113, 114, 117, 122, 200, 197, 209, 817 C, 127, 371, 394, 406, 407, 378 R, 377, 373, 89, 116, 115, 220, 223, 224, 325, 354, 366, 270, 281, 283; 156/246, 249, 539, 242, 501, 540, 247, 231, 324; 264/510, 241, 267, 101, 102, 213, 216, 217, 352, 331.12, 240, 349, DIG. 6

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[57] ABSTRACT

An apparatus for manufacturing silicone gel sheet comprising a material supplying means which supplies kneaded silicone gel material to a nozzle, a nozzle which admits to flow silicone gel material supplied from said material supplying means and is provided with a discharging port which is open to be narrow and long, at least one movable receiving means which receives a sheet-formed strip made of silicone gel material discharged from said nozzle and moves in accordance with the discharging speed of the sheet-formed strip, and a heating section for heating and gelling the sheet-formed strip made of silicone gel material on said movable receiving means.

2 Claims, 3 Drawing Sheets

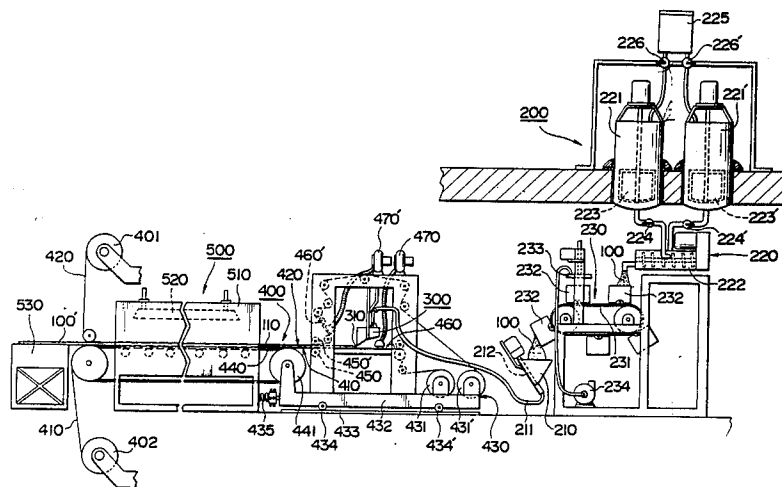


FIG. 1

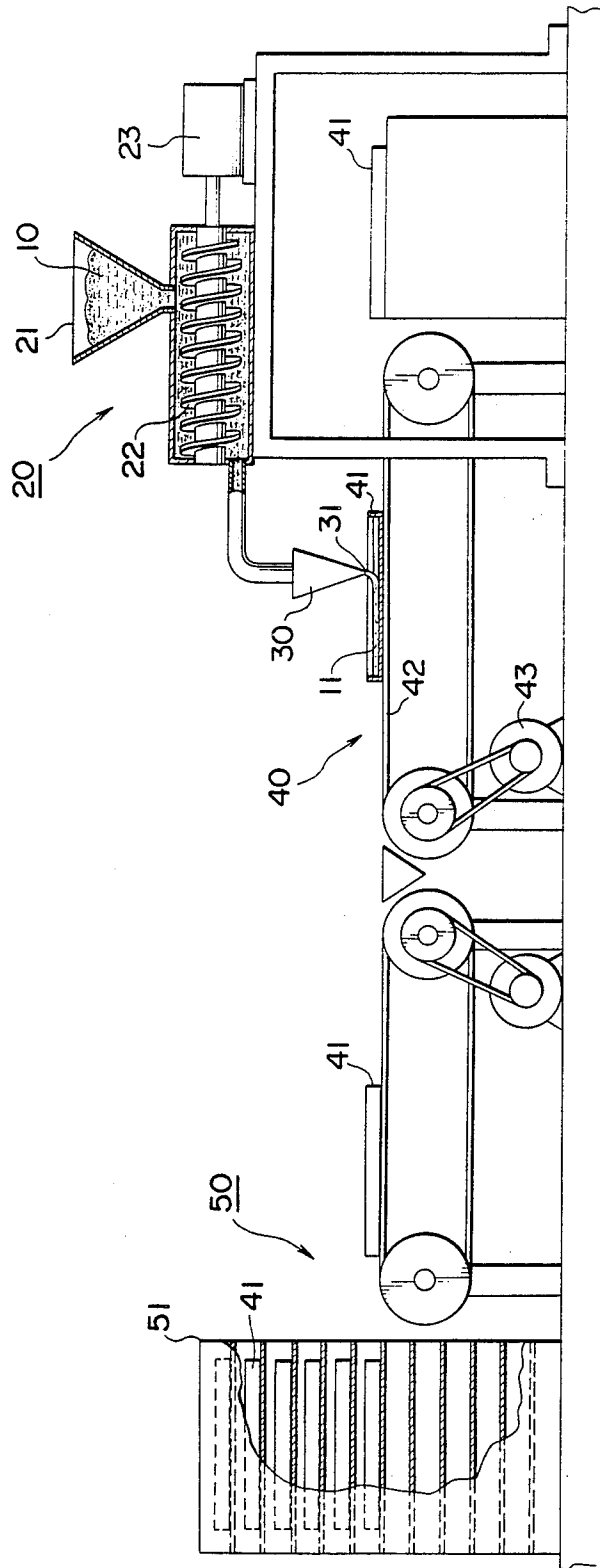


FIG. 2

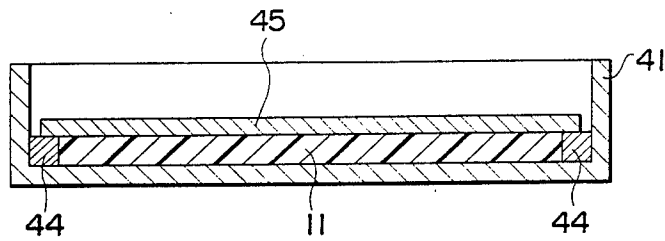
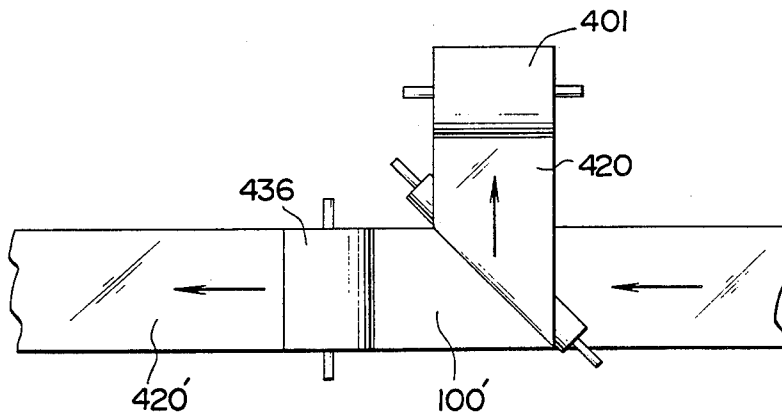


FIG. 4



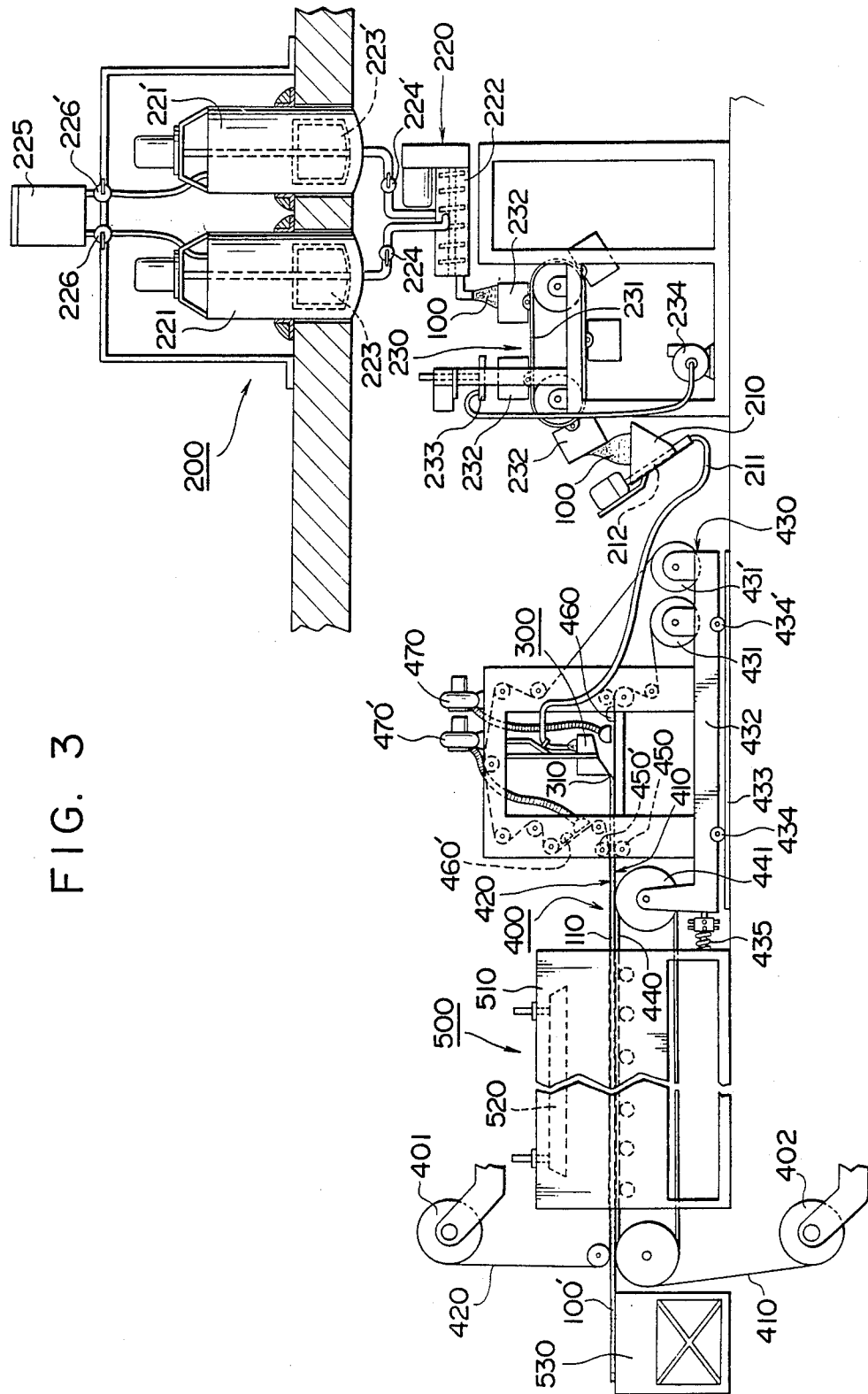


FIG. 3

APPARATUS FOR MANUFACTURING SILICONE GEL SHEET

BACKGROUND OF THE INVENTION

The present invention relates to an apparatus to be used to manufacture gelled thin sheet made of silicone as material.

Silicone gel is an extremely useful material as a buffer material or a shock absorbing material. Silicone gel to be used for such application has, in most cases, a penetration value of approximately 50 to 200 measured according to JIS (Japanese Industrial Standard) K 2530-1976-(50 g load) and a small thickness.

In the conventional method for manufacturing a thin silicone gel sheet material as described above, silicone material such as, for example, Toray Silicone CY52 (trademark) (manufactured by Toray Silicone Kabushiki Kaisha) has been kneaded, transferred into a tray type container, uniformly leveled with a spatula type plate used by hand, and heated with a flat holding plate made of metal or glass placed on the silicone material extended in the tray type container.

However, said kneaded silicone gel material provides the property that it has the viscosity of 1000 to 1200CP when it does not contain other substances and that of 5000 to 10,000CP when it is kneaded with fine hollow particles and the pot life at a normal temperature is short and therefore there has been a problem that the work of filling the tray type container with this silicone material and leveling it in the container has been extremely troublesome and unsuitable for volume production.

SUMMARY OF THE INVENTION

An object of the present invention is to provide an apparatus capable of automatically processing silicone gel material with high viscosity without manual operation and thus manufacturing a silicone gel sheet with the specified thickness.

To materialize this object, the apparatus in accordance with the present invention is provided with a device having a material supplying means for supplying kneaded silicone gel material such as, for example, a storing means such as a hopper into which the material is charged and a pressurized feeding means for feeding under pressure silicone gel material taken out from the hopper, a nozzle for discharging silicone gel material supplied from said material supplying means such as, for example, a nozzle having a narrow and long discharging port which is connected to said pressurized feeding means and horizontally open to discharge silicone gel material fed under pressure from said pressurized feeding means in the specified thickness and width, at least one movable receiving means which receives the sheet-formed strip made of silicone gel material discharged from said nozzle and moves keeping pace with the discharging speed of the sheet-formed strip such as, for example, a tray type container provided on the belt conveyor, and a heating section for heating the sheet-formed strip on said movable receiving means and said apparatus is adapted so that the sheet-formed strip made of silicone gel material which is discharged from said nozzle is extended over the movable receiving means along with movement of said movable receiving means and heated by the heating section to gel silicone gel material in the form of sheet.

Another object of the present invention is to provide an apparatus which is adapted so that the thin sheet-formed strip supplied to the movable receiving means is completely free from bubbles.

If silicone gel material of the sheet-formed strip contains bubbles, large bubbles will be included in the finished silicone gel sheet and its uniform shock absorbing performance will be impaired or silicone gel sheet will be partly damaged.

In case of the apparatus in accordance with the present invention, such problem is eliminated by sealing the tank which contains silicone gel material and reducing the internal pressure of the tank to expel bubbles from silicone gel material in the material supplying means, for example, immediately before it is fed into the hopper.

Another further object of the present invention is to provide an apparatus for laminating both sides of the sheet-formed strip supplied from the nozzle to the movable receiving means, that is, the thin silicone gel material with heat-resistant films at its both sides and rolling this laminated thin sheet-formed strip covered with films at its both sides by the rollers before heat treatment. Thus, the silicone gel sheet can be formed to have a uniform thickness.

These upper and lower films should preferably be easily removable from silicone so that they can be replaced with other types of films such as, for example, thermoplastic film, depending on the purpose of use of the silicone gel sheet.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a partly cutaway rough side view illustrating the construction of the apparatus in accordance with the present invention,

FIG. 2 is a vertical front view of the tray type container as the movable receiving means for use in the embodiment shown in FIG. 1,

FIG. 3 is a rough side view showing another embodiment of the apparatus in accordance with the present invention, and

FIG. 4 is a plan view showing the embodiment of the film replacing mechanism to be used in the apparatus shown in FIG. 3.

PREFERRED EMBODIMENT OF THE INVENTION

Referring to FIG. 1 which is a partly cutaway rough side view illustrating the construction of the apparatus in accordance with the present invention, there is shown the material supplying means 20 which supplies silicone gel material 10. This means 20 is provided with the hopper 21 which is the storing means and the screw conveyor 22 shown as the pressurized feeding means. This screw conveyor 22 is connected to the nozzle 30 to which silicone gel material 10 is supplied from the screw conveyor 22. The transfer unit 40 and the heating section combined with this transfer unit 40 are shown below said nozzle 30.

Said hopper 21 can be otherwise constructed if it can store silicone gel material 10. In the embodiment, the hopper is flared and opened upwardly to admit kneaded silicone gel material, which is supplied down to the screw conveyor 22 at a lower position by its own weight.

The screw conveyor 22 supplies under the specified pressure silicone gel material 10 supplied from the hopper 21 to the nozzle 30 and silicone gel material 10 is extruded from the nozzle 30 by virtue of this pressure.

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