(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 086 371**
A2

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **83100710.9**

(22) Date of filing: **26.01.83**

(51) Int. Cl.³: **B 65 D 30/24**, B 65 B 1/00

(30) Priority: **30.01.82 JP 13959/82**
11.06.82 JP 100977/82

(43) Date of publication of application: **24.08.83**
Bulletin 83/34

(84) Designated Contracting States: **CH DE FR GB IT LI NL SE**

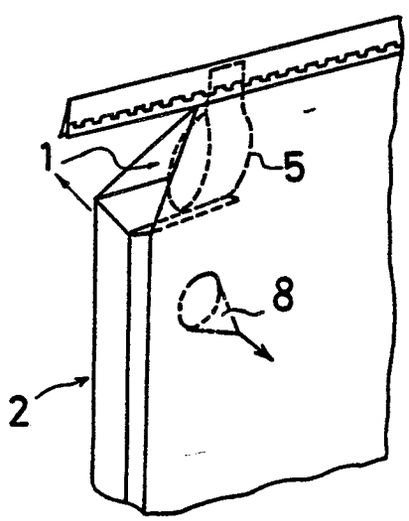
(71) Applicant: **Nakajima Seisakusho Co., Ltd.,**
55 Ishihara-nishimachi Kisshoin, Minami-ku
Kyoto 601 (JP)

(72) Inventor: **Nakajima, Shigeo, 7-7 Tenjinnomori**
Morimoto-cho, Mukoh-shi Kyoto (JP)
Inventor: **Kojima, Katsuhiko, 4369 Ishibe Oaza**
Ishibe-cho, Koga-gun Shiga (JP)
Inventor: **Endoh, Osamu, 15 Hattanda-cho Kisshoin,**
Minami-ku Kyoto (JP)

(74) Representative: **Goddar, Heinz, Dr. et al, FORRESTER &**
BOEHMERT Widenmayerstrasse 4/I,
D-8000 München 22 (DE)

(54) Sack with sealing member for packing powder materials therein, method and apparatus therefor.

(57) A sack (2, 2′) comprises a sealing member (1, 1′) which is provided at an appropriate position of the sack (2, 2′), and a dried adhesive agent is spread on the inner walls of the sealing member (1, 1′). A supply pipe (3) comprises a curved head from which a nozzle (21) projects. The supply pipe (3) is inserted to supply powder materials into the sack (2,2′), via an aperture of the sealing member (1,1′), and then, after supply, the pipe (3) comes within the inner walls of the sealing member (1,1′) where an activator is jetted from the nozzle (21). Sealing of the sack (2,2′) is performed during it falls from a supporting member (30), owing to the outward pressure of the powder materials supplied in the sack (2,2′).



EP 0 086 371 A2

0086371

TITLE OF INVENTION

Sack with Sealing Member for packing powder materials therein, Method and Apparatus therefor

BACKGROUND OF INVENTION

This invention is broadly concerned with a sack for packing powder materials therein, and is particularly concerned with a sack with a sealing member by which the sack is sealed off containing the powder materials therein.

This invention is also directed to a method and an apparatus for packing powder materials into a sack.

Conventionally, there has been provided a method for packing powder materials into a sack and for sealing off the sack containing the powder materials therein: a method that, after supplying powder materials into a sack through a supply pipe which is inserted into a sealing member of the sack, an appropriate dose of an adhesive agent is jetted from slits or fine holes, arranged on the cylindrical surface of the supply pipe, to the inner surface of the sealing member mounted at a predetermined position of the sack. Thus, the adhesion is given to the sealing member, whereby the sack can be sealed off containing the supplied powder materials therein, because the sealing member is pressed outward by the powder materials

contained in the sack when the sack is released from the supply pipe.

In such a prior method, however, there have been various problems. That is, the slits or fine holes arranged on the cylindrical surface of the supply pipe, which tends to be damped by an adhesive agent, would inconveniently bunged because of the agglutination of powder materials when the supply pipe is released from the sack. Moreover, it is difficult to clean the bunged slits or holes particularly when the packing operation is reopened after long discontinuance. Thus it is necessary to clean manually the bunged slits or holes every time the reopen of the packing operation is intended, which is very troublesome and inefficient for an operator.

On the other hand, different problems are caused in the sack itself: since the continuous packing operation tends to cause the outer cylindrical surface of the supply pipe to grow sticky by an adhesive agent when the packing operation is continuously performed, if this sticky condition of the pipe is kept or grown further, the sealing member is torn off by the adhesion of the pipe when the sack is released from the pipe.

SUMMARY OF INVENTION

Thus the present invention is intended to solve or at least improve all such problems as mentioned above.

Circumstantially speaking:

It is an object of this invention to enable a packing operation of powder materials without any bunging at the slits or holes provided on the supply pipe and without any destruction of the sack itself.

It is another object of this invention to provide a sack with a sealing member with simple construction which enables the secure sealing.

It is another object of this invention to provide an apparatus for packing powder materials into the sack, the apparatus being applicable not only to the sack according to the present invention, but also to any conventional types of a sack.

It is another object of this invention to provide a method of packing powder materials into the sack and of sealing the sack itself.

Other objects and features of this invention will be clearly understood by a person who skilled in this field.

BRIEF DESCRIPTION OF DRAWINGS

The invention will be described by way of example, with reference to the accompanying drawings, wherein:

Figures 1 and 2 show respectively a front view of a sack according to the invention;

Figure 3 shows an enlarged perspective view of a part of Figure 1;

Figure 4 shows a longitudinal sectional view of a supply pipe according to the invention;

Figure 5 shows a perspective view of Figure 4;

Figure 6 shows a side view of a packing apparatus to which the supply pipe is provided;

Figure 7 shows a front view of Figure 6; and

Figures 8 to 10 are respectively a side view of the packing apparatus, and show its operation in the course of time.

DETAILED DESCRIPTION OF INVENTION

Referring to Figures 1 and 2 which shows respectively a different type of sacks into which powder materials is supplied, the first sack 2 shown in Figure 1 is closed at both the upper and lower ends 11, 12 by means of sewing and is comprised of treble kraft forming a gore in both sides of the sack, while the second sack 2' shown in Figure 2 is closed at both the upper and lower ends 11', 12' by means of pasting, and is comprised of treble kraft forming a gore in both the ends. A sealing member 1, 1' is provided at an appropriate position of the sack 2, 2' respectively. The sealing member 1, 1' comprises an aperture through which a supply pipe 3 (shown in Figures 4 and 5) is inserted into the sack. The inner walls opposite to each other, of the sealing member, include a dried layer which is previously formed by spreading and

drying an adhesive agent thereon. The adhesive agent to be used to the layer is such a kind of one as is immediately activated to give to the layer a stick adhesion when an activator (for example water or a certain kind of solvent adaptable to the adhesive agent) is supplied. Thus it is desirable particularly to kraft to use such an adhesive agent as substantially comprised of natural macromolecule, for example casein or gum arabic, or of synthetic macromolecule, for example polyvinyl alcohol or polyvinyl ether, because such adhesive agent can easily be activated to be damped again. It is also desirable to choose such a kind of adhesive agent as takes a certain time until the agent becomes sticky, during which the supply pipe 3 is released from the sack, and is not affected by an environmental temperature. In such a manner, an adaptable adhesive agent is chosen and is spread on the inner walls of the sealing member, then dried. If it is difficult to form the layer on the walls already made up, the layer can be formed in another way: previously spreading and drying a chosen adhesive agent on a surface of a strip 5, for example of kraft; holding the strip so that the layer is faced together; and pasting the holded strip to the inner walls adjacent to the aperture so that the layer is faced together. In this case, the holded ends of the strip 5 is sewed together with the end 11 of the sack.

Though the above description is directed to such

a case as the sack is made of kraft, if the sack is made of canvas, polystyrene is infiltrated to a part of the sack adjacent to the aperture to form the sealing member.

A sack according to the invention can be easily sealed off after powder materials is supplied therein, when the sack is made of kraft, by jetting an adapted activator (for example water or a certain kind of solvent adated to the layer formed on the inner walls of the sealing member) to the inner walls of the sealing member, or, when the sack is made of canvas, by jetting an adapted activator (for example toluene or xylene).

Thus, the sack according the invention does not require that an adhesive agent is directly jetted from slits or fine holes provided on the cylindrical surface of the supply pipe, but does require that an adapted activator such as water or a certain kind of solvent is jetted therefrom. An advantageous feature of the invention will be easily understood by a person who skilled in this field. In practical use, the unconvenient problem of bunging at the slits or fine hole of the supply pipe is largely improved, and thus maintenance and efficiency of a packing apparatus is considerably raised.

Referring to Figures 4 and 5 which shows respectively a construction and an external view of the supply pipe 3, the pipe is fixed to a frame 10 of a

packing apparatus by means of a flange 6. The pipe 3 comprises a curved head adapted to insertion into an aperture of the sealing member, and the lower part of the head comprises a port 13 adapted to discharge of powder materials. The rear end of the pipe 3 is connected to a conveying pipe (not shown), which is further connected to a hopper (not shown), and through which powder materials is conveyed, thus the powder materials stocked in the hopper can be brought to the supply pipe 3 by and together with compressed air. An expansible tube 4 is mounted on the body part of the pipe 3, both the ends of the tube 4 are respectively firmly fastened on the body part. An air pipe A is provided to the pipe 3 so as to supply compressed air between the tube 4 and the outer surface of the body of the pipe, thus the tube 4 is expanded by the compressed air supplied through the air pipe A, then, when the supply pipe 3 is inserted in the sack, the tube 4 can be firmly contacted with the adjacent part of the aperture and streches it. Thus, the tube 4 can support the sack itself in collaboration with a supporter 30 (shown in FIgures 6 to 10) provided at the lower part of the packing apparatus, and the tube 4 also serves as a shutting member that shut up the space between the supply pipe 3 and the aperture of the sealing member, to prevent the supplied powder materials from discharging out of the sack

through the space. A discharge pipe B is provided within the supply pipe 3 so as to extend to the port 13 at the one end thereof, and the other end of the pipe B is connected, via a filter (not shown), to a circuit (not shown) which is open to the air, whereby the compressed air supplied into the sack can be dischearged through the discharged pipe B when powder materials is supplied into the sack. An activator pipe W is provided also within the pipe 3 extending longitudinally to project from the front end of the head, and a jet nozzle 21 is detachably mounted to the front end of the pipe W by screw. The other end of the pipe W is connected, via a solenoid valve (not shown), to an airtight tank in which an activator (for example water or ethanol) is stocked under the compression, for example of 2 Kg/cm^2G, thus the activator can be supplied, under the compression, to the nozzle 21 by controlling the solenoid valve with a micro-switch 25 and a timer the operations of which will be described hereafter in detail. The nozzle 21 comprises fine holes (for example of four to six) provided on the cylindrical surface thereof, through which the activator is radially jetted in spray when the activator is supplied through the pipe W. Thus, the spread and dried adhesive agent of the layer formed on the inner surface of the sealing member is activated by receiving the jetted spray of the activator.

Referring to Figures 6 to 10, the packing apparatus comprises, as mentioned above, a frame 10 to which the supply pipe 3 is fixed by means of the flange 6, and the apparatus further comprises a pair of bent levers 22 which are respectively pivotably mounted to the respective side of the apparatus by an axile 20. Both the levers 22 are connected each other, at the top ends of the longer arem thereof, by a rod 23 which extends laterally relative to the apparatus. A shorter arm of either one of the levers 22 is designed so as to contact alternatively with micro-switches 24, 25 at the lower or the upper position of the shorter arm. As can be seen from Figure 6, the levers 22 are pivotably mounted on the frame 10 so that a clock-wise moment acts on the axile 20 because of its own weight of the levers 22 and of the centroid thereof, as far as no external force is given thereto. The apparatus further comprises a supporting member 30, which is pivitably mounted by an axile 26 to the frame 10. The axile 26 is connected, via a linkage (not shown), to an operation rod of an air cylinder (not shown). The supporting member 30 is pivotably mounted at the lower part of the apparatus so as to be kept horizontal, when the operation rod is pushed forward, and so as to be kept inclined forward, when it is drawn back.

When the pipe 3 is insrted, through the aperture

of the sealing member, into the sack after a gore 27 of the sack is expanded by a sucking member 8 of a handling mechnism (not shown), as shown in Figure 3, the rod 23 is pressed backward by the gore 27, whereby the shorter arm of either one of the levers 22 is contacted with the micro-switch 24, to close the switch. Then, the compressed air is supplied, through the air pipe A, in response to the operation of the switch 24, whereby the expansible tube 4 is expanded, and simultaneously the compressed air is also supplied to the air cylinder, whereby the operation rod is pushed forward. Thus, as mentioned above, the sack is supported by both the expanded tube 4, at the aperture of the sealing member, and the supporting member 30 which is kept horizontal, at the bottom of the sack (Figure 8).

After these operations, the powder materials stocked in the hopper is supplied, through the supply pipe 3, by and together with the compressed air, into the sack. The compressed air supplied in the sack is discharged through the discharge pipe B, and the powder materials contained in the discharged air is filtrated by the filter. The powder materials supplied in the sack is automatically measured by a measuring mechnism (not shown) connected to the frame 10, and, when the supplied powder materials amounts to a predetermined weight, the supply of the powder materials is stopped,

and then the expanded sack is deflated by discharging the air supplied in the sack. Then, the operation rod of the air cylinder is drawn back by exchanging the supply circuit of the compressed air, whereby the supporting member 30 is inclined forward. Thus, the sack containing a predetermined amount of powder materials falls down owing to its own weight (Figures 9 and 10). When the sack falls down, the bent levers 22 are pivoted following to the movement of the sack. Since the micro-switch 25 is designed so as to be contacted to close by the shorter arm of the lever 22 when the nozzle 21 comes just within the inner walls of the sealing member during the sack is inclined to fall, the switch 25 is closed when the sack is inclined to a predetermined angle, which can be seen from Figure 9. After the switch 25 is closed, both the solenoid valve, provided in a predetermined position of a circuit coonected to the activator pipe W, and the timer connected to the solenoid valve are operated to supply an activator to the activator pipe W for a predetermined period (for example for 0.1 to 0.3 seconds). Thus the activator is jetted in spray, from the nozzle 21 to the inner walls of the sealing member, during the nozzle 21 is within the inner walls of the sealing member. The inner walls of the sealing member on which an adapted adhesive agent is previously spread and dried is damped by the activator, thus a

stick adhesion is given.

As can be easily understood, the start point of jetting the activator from the nozzle 21 is set at the time when the nozzle comes to the inside of the sealing member. Thus, the starting point is chosen by controlling an adjuster 28 so that the shorter arm of the lever 22 is contacted with the micro-switch 25 just when the shorter arm is stopped by the adjuster 28. On the other hand, the end point of jetting the activator is set at the time when the nozzle 21 is released from the inside of the sealing member. That is, jetting the activator is continued until the nozzle 21 is released from the sack. Thus, the period during when jet of the activator is continued is determined by setting the timer through previous tests.

The sack containing the powder materials therein, as shown in Figure 10, inclined following to the nclination of the supporting member 30, and falls owing to its own weight, for example onto a belt conveyer.

Since the sealing member provided to the sack according to the invention is designed so that the opposite walls of the sealing member is pressed each other by outward froce of the powder materials supplied in the sack, the sack can be sealed during falling.

Going back to the operation of supplying the powder materials, though the nozzle 21 is ordinarily

exposed to the powder materials supplied from the port 13 of the supply pipe 3, not an adhesive agent itself, but an activator is jetted from the holes arranged on the cylindrical surface of the nozzle 21, whereby bunging at the holes can be prevented. Particularly, if the powder materials is flour, it is desirable to use ethanol as an activator because flour is not acceptable to ethanol.

In such a manner, it is desirable to choose an adhesive agent which is previously spread and dried on the inner walls of the sealing member and an activator which is used to the dried adhesive agent, depending on a kind of powder materials to be packed.

In the above mentioned embodiments, the supply pipe 3 is used in combination with a sack according to the invention. However, the supply pipe according to the present invention is applicable to any conventional type of sacks, which requires an adhesive agent to be directly jetted from the holes of the nozzle 21. In case of application to a conventional type of sacks, an adhesive agent itself instead of an activator is designed so as to be jetted from the nozzle 21, under the greater compression in comparison with the foregoing embodiments (for example of 3 to 5 Kg/cm^2G) because of the greater viscosity. Even if the undesirable bunging is caused, which is apt to cause inevitably in practical use, the cleaning or mainte-

nance of the supply pipe 3 can be easily performed in the apparatus according to the invention, only by replacing the bunged nozzle by another.

Though it has been well known that the sealing member is sealed by means of a heat-melting adhesive agent, the present invention is also applicable to such a heat-melting method. In case of application to such a method, the heat-melting adhesive is previously spread and dried on the inner walls of the sealing member of the sack, and, on the other hand, an activator adapted to the adhesive agent is designed so as to be jetted from the nozzle 21. Further, a pair of heat plates is provided at an appropriate position of a belt conveyer on which the falled sack is received, whereby packing can be performed in the same manner as the foregoing embodiments.

CLAIMS

1. A sack for packing powder materials therein, comprising a sealing member (1,1') provided at an appropriate part of the sack (2, 2'), said sealing member (1, 1') including an aperture adapted to be inserted by a supply pipe (3) through which powder materials is supplied into the sack (2, 2'), characterized in that a dried layer made by previously an adhesive agent is provided on the inner walls of said sealing member (1, 1'), and in that said dried layer is activated by receiving an activator adapted to said adhesive agent, whereby said sealing member (1, 1') is sealed off containing powder materials therein.

2. A sack according to claim 1, characterized in that the sealing member (1, 1') includes a holded strip (5), on the inner surface of which the dried layer is provided

3. An apparatus for packing powder materials into a sack (2, 2'), characterized in that a supply pipe (3) is provided to an appropriate part, of the apparatus, adaptably to insert into an aperture of a sealing member (1, 1') of the sack (2, 2'), powder materials is supplied through said supply pipe (3) which is inserted into the sack (2, 2'), via the sealing member (1, 1'); in that a

supporting member (30) is pivotably mounted at a lower part of the apparatus, said supporting member (30) is pivoted between a horizontal position, during powder materials is supplied, and a forward inclined position, when supply is over, the sack (2, 2') is supported by said supporting member (30); and in that detecting means for detecting the condition in the apparatus is provided, said means detects firstly the loading of a sack (2, 2') at the predetermined position of the apparatus, whereby powder materials is started to supply into the sack (2, 2'), through said pipe (3), and detects secondly a predetermined inclination of the sack (2, 2') in which a predetermined amount of powder materials is supplied, the inclination is operated depending on that of said supporting member (3), whereby fluid means for producing an adhesion is applied to the sealing member (1, 1').

4. An apparatus according to claim 3, characterized in that said supply pipe comprises: a cylindrical body; a curved head adaptable to insertion into an aperture of the sealing member (1, 1'); an expansible tube (4) for shutting the space between said pipe (3) and the sealing member (1, 1'); a port provided at the lower part of said head, through said port powder materials is supplied into the sack (2,2'); and a nozzle (21) detachably mounted to and projecting from the front end of said head, said nozzle (21) includes fine holes

through which the fluid means is jetted to produce an adhesion to the sealing member (1,1'), at the time when said nozzle (21) is within the sealing member (1,1'), viz. at the predetermined inclination of the sack (2,2').

5. An apparatus according to claim 3, characterized in that said detecting means comprises at least one bifurcate lever (22), an arm of which is pivotable relative to the apparatus depending on the inclination of the sack (2,2') loaded on the supporting member (30), whereby the other arm operates a switch (25) to apply the fluid means to the sealing member (1,1') when the sack (2,2') is inclined to a predetermined angle.

6. An apparatus according to claim 5, characterized in that the timing when said the other arm operates the switch (25) is adjustable by means of an adjuster (27) which limits the movement of said the other arm.

7. An apparatus according to claim 5, characterized in that another switch (24) is placed at the opposite side of the adjuster (27), said another switch (24) is closed to start the supply of powder materials and to control the movement of the supporting member (30), when a sack (2,2') is loaded on the supporting member (30), by which the lever (22) is pivoted inversely.

8. A method of packing powder materials in a sack, characterized in the steps of:

loading a sack (2,2') in which powder materials is to be supplied, on a supporting member (30) of a packing apparatus, and inserting a supply pipe (3) provided to the apparatus, into an aperture of the sealing member (1,1') mounted to an appropriate part of the sack (2,2');

supplying powder materials, through the supply pipe (3), into the sack (2,2');

detecting the amount of supplied powder materials, whereby supplying is stopped;

inclining the sack (2,2') by means of the supprting member (30);

detecting a predetermined inclination angle of the sack (2,2'), in said angle the supply pipe (3) is positioned within the sealing member (1,1') of the sack (2,2'), during which fluid means for producing an adhesion to the sealing member (1,1') is jetted, for a predetermined time, from a nozzle (21) mounted on the supply pipe (3);

discharging the sack (2,2') from the supporting member (30), owing to further inclination of the supporting member (30), the sack (2,2') is sealed off during falling by means of the outward pressure of powder materials itself onto the sealing member (1,1').

0086371

FIG. 1

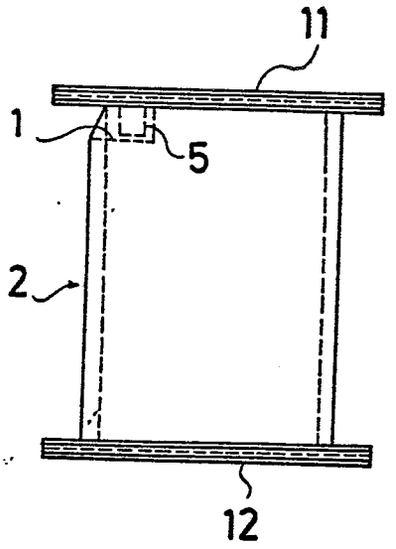


FIG. 2

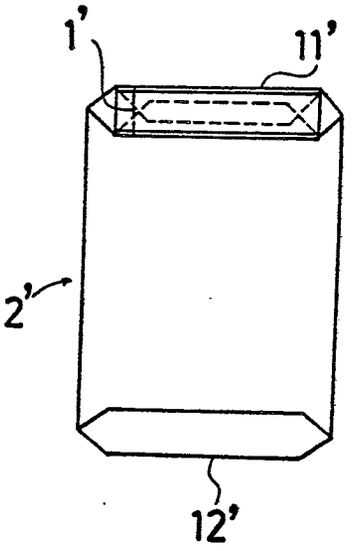


FIG. 3

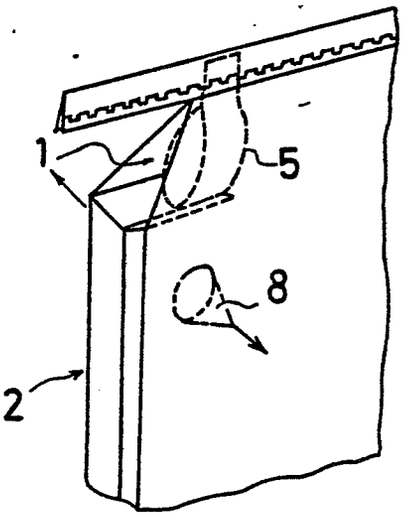


FIG.4

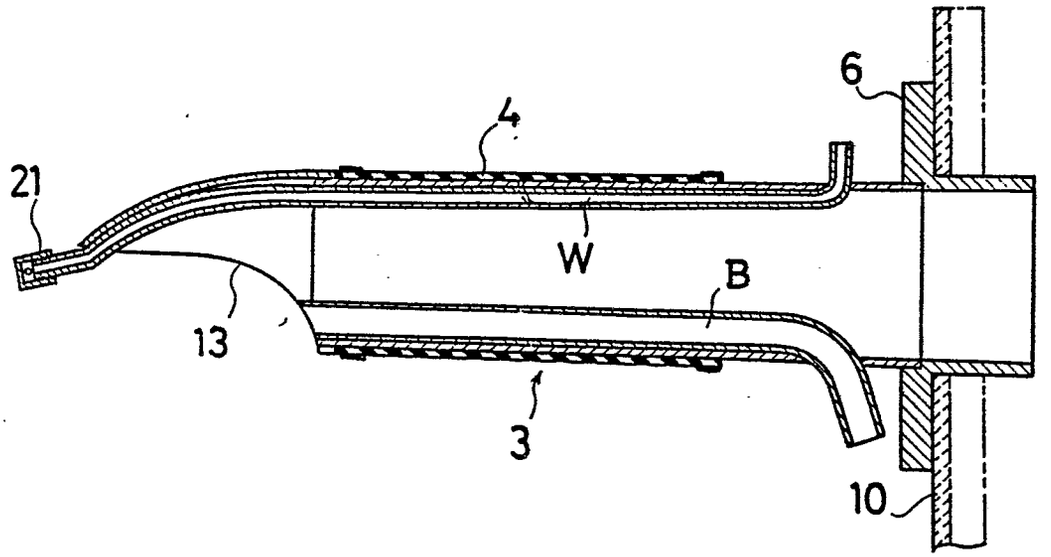


FIG.5

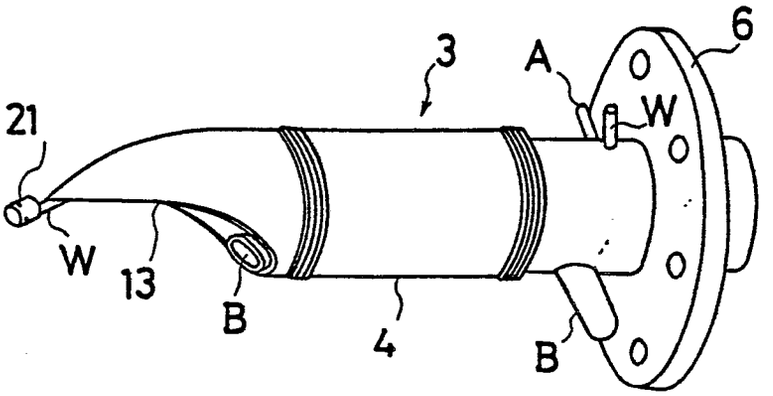


FIG.6

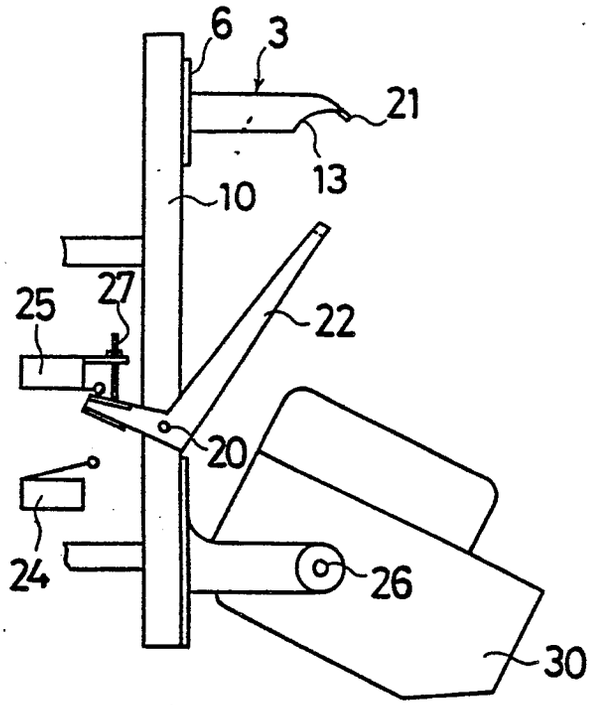


FIG.7

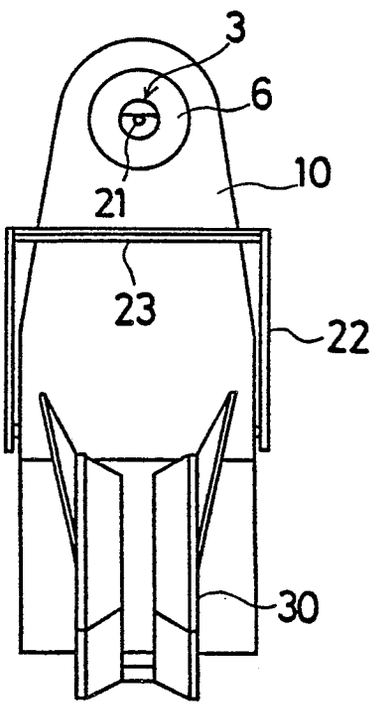


FIG.10

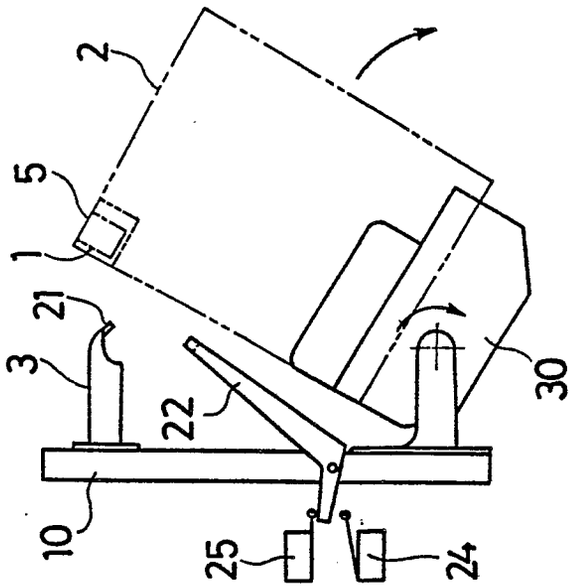


FIG.9

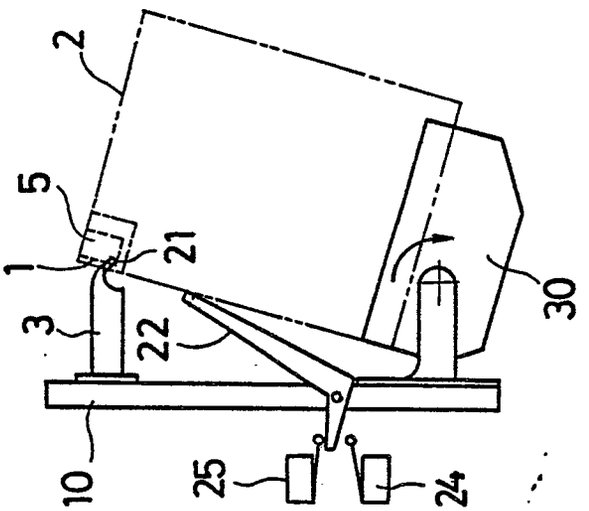


FIG.8