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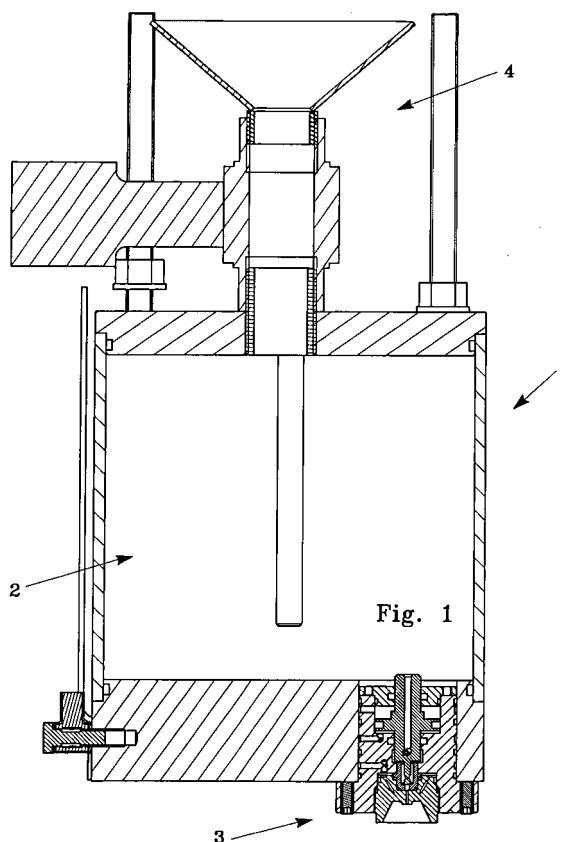
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(54) **Equipment for spraying wax stripes onto plates**

(57) Equipment for spraying wax stripes or similar onto materials in shape of plates, including an extruder (1) suitable to spray the melted wax, installed on a support (5) that allows its shifting on a plane parallel to the plane of the plate to be sprayed and a reservoir (2) for the feeding of the melted wax to said extrusion unit (1), where said reservoir (2) is installed directly on the extrusion unit and is provided with heating devices (10) for the melting of the wax, being provided means (4) suitable to feed said reservoir (2) with solid grains of wax when the level of the melted wax falls below a previously fixed level.

Also devices are provided suitable to sense size and position of the plates and to control consequently the shifts of the extrusion unit (1).



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Description

[0001] This invention proposes an equipment for spraying spiral stripes, continuous or in segments, or cords or points of thermo-fusible materials, in particular wax, onto materials in shape of plates, like plates in glass, marble, pottery, plastic, wood or similar products, both flat and convex.

[0002] The equipment according to the invention is characterized by the fact that it provides that the reservoir where the wax is melted is directly applied to the extruders, with the material in granules which is periodically fed into this reservoir, in order to reduce the period of time the wax remains in melted state and to allow to limit the temperature reached to values slightly greater than the melting values, avoiding in this way the phenomenon of the wax "carbonization".

[0003] According to a preferred embodiment of the invention, the reservoir for melting has small size and the granules are fed periodically by means of a system of pressurized air which drags the granules from the feed hopper to the reservoir, devices being provided for driving the starting of this feed device when the level of the material inside the reservoir falls beyond a certain limit.

[0004] As it is known, in order to manipulate and in particular to carry materials in plates, like for instance glass plates, pottery tiles and so on, the plates are laid the ones against the others on a slightly inclined support, putting between one plate and the other a sheet in a material like for instance paper or cardboard, which has the purpose to avoid the scratching caused by the friction between the plates.

[0005] The use of paper or cardboard sheets is not however an optimum solution, both because the use of paper sheets implies a rather high cost and because these products must then be eliminated, with further costs

[0006] For this reason, a system was recently developed, which provides to spray, onto one surface of the plates, stripes of a soft material suitable to avoid that the two surfaces of contiguous plates get directly in contact.

[0007] In particular equipments were produced suitable to melt and spray onto the glass plates a wax layer which acts as a separating element, which has a low cost and can be easily removed.

[0008] The machines of this type known today include a big reservoir which is filled with wax and heated to the point the melting is caused, one or more extruders which spray the melted wax onto the plates, for instance when these come out from the furnace, and a series of pipes which connect this reservoir with the various extruders.

[0009] Both these pipes and the body of the extruders are appropriately thermically isolated and generally also heating systems are provided, formed for instance by electrical resistances, which keep the temperature inside the pipes and the extruders at values which are high enough to keep the wax at a fluidity sufficient to allow

its spraying without problems.

[0010] This solution however implies a remarkable inconvenient. The wax, in fact, kept at high temperature for a long period of time, undergoes the phenomenon of the so called "carbonization", which consists in a chemical alteration for which the wax once sprayed leaves on the plates a mark or a light trace which, if it cannot be noted on dull materials, is instead visible on transparent materials and on smooth surfaces, with bad aesthetic effects.

[0011] This problem is solved by this invention which proposes an equipment for spraying melted wax on materials in plates, where the reservoir for melting which is of small size is directly built-in in the extruder and the material is fed to this reservoir still in the shape of granules, at room temperature.

[0012] The wax is therefore melted only few minutes before the extrusion and therefore the period of time it remains in melted state is very little in comparison with what happens in the known equipments and also the maximum temperature the wax reaches can be lower, because the loss of heat, typical of equipments according to the state of art, do not occur.

[0013] Always in order to limit the period of time the wax remains in melted state, the reservoir for melting has little size, and sensors are provided, able to sense the level inside the reservoir and drive, when the level falls beyond a previously settled value, the equipments for the feeding of the granules in order to restore the quantity of material inside the reservoir itself.

[0014] This invention is now described in details with specific reference to the enclosed figures, where:

- figure 1 shows, in cross-section, the wax extrusion unit, whereas with extrusion unit the whole group is intended which holds the reservoir, the extrusion nozzle and the feeding devices for the wax in granules ;
- figure 2 is the perspective view, exploded, of the extrusion unit according to figure 1
- figures 3, 4, and 5 are respectively the side view, the front view and the plan view of the extrusion unit of the previous figures;
- figure 6 shows, in section, the details of the extrusion nozzle in an equipment according to the invention;
- figures 7, 8, and 9 are respectively the plan view, the side view and the front view of the equipment according to the invention where the means able to sense the position and the size of the plates are emphasized.

[0015] With reference to figure 1, number 1 specifies the extrusion unit in the whole, including a reservoir 2 for the melted wax, a spraying nozzle identified in the whole with 3 and a feeding system for the wax in granules, identified in the whole with 4.

[0016] With reference to figure 2, it is possible to see

that the extrusion unit is installed on a support arm 5, preferably a jointed arm, which allows the shifting of the extrusion unit in any direction on a horizontal plane, above the support face of the plates to be sprayed.

[0017] The structure of these arms is already known, and therefore it is not necessary a more detailed description.

[0018] On the arm the extrusion unit is installed by means of a series of rods 6.

[0019] The reservoir 2 is closed on the upper part by a head 7 with the shape of a plate with passage-ways 8 for the inlet of the wax granules to be melted, and is closed, at the base, by a heating head 9 essentially formed by a plate where electric resistances 10 are inserted, able to generate the heat needed for the wax melting, and a thermocouple 11 for the control of the temperature reached.

[0020] Always in the plate 9 a hole is provided where the extrusion nozzle 3 is installed.

[0021] In the reservoir also sensors are present, which are not shown in the figure because they are of known type, suitable to sense the level of the melted plastic inside.

[0022] To the rods 7 also a fastening plate 12 can be applied, which is used to install the extrusion unit on other types of support, for instance, in case of completely automatic machines.

[0023] The feeding system of the wax granules includes a funnel 13 which receives the wax granules through a pipe not shown in the figure, which can preferably pass along the arm 5 and which is connected to a main feeding reservoir and to systems able to generate a compressed air flow which drags the spheres from the reservoir to the funnel.

[0024] A ball valve 14 opens and closes the passage-way between the outlet of the funnel 13 and a pipe 15 which penetrates into reservoir 2.

[0025] All this will then be appropriately held inside a case 16.

[0026] The spraying unit 3 can be seen in details in figure 6.

[0027] This unit includes a body 17 to be inserted into the hole provided in plate 9, which presents inside a cylindrical chamber 18 where a piston 19 slides, integral with a pin 29, which, on the lower part, is integral with a sphere 21 for the closing of the spraying nozzle 22.

[0028] A pipe 23 passes through the pin 20 in order to put in communication the inner part of the reservoir with an annular chamber 24 from which the wax, coming from the reservoir, is then directed to the spraying nozzle 22.

[0029] The working happens as follows.

[0030] At the beginning of the processing reservoir 2 is loaded with a certain quantity of wax granules and the resistances 10 of the plate 9 are fed in order to produce the heat necessary for the melting.

[0031] At this point the machine is ready to be used and the operator moves the arm 5 shifting the spraying

unit 1 above the plates, spraying the melted wax.

[0032] To do this, the operator drives the lifting of the pin 20 so that the passage-way towards the spraying nozzle 22 is opened.

[0033] The pressure in the reservoir pushes the wax toward the pipe 23 of the pin, then passes the annular chamber 24 and from here to the spraying nozzle 22, to be pulverized and to deposit onto the plate below.

[0034] While the processing proceeds the level of the wax in the reservoir decreases and when it reaches a level below a previously fixed level, sensed by the sensor applied to the reservoir, the control of the machine (or the operator if the machine is not automatic) drives the opening of the ball valve 14 allowing that the wax granules coming from the main reservoir reach the funnel 13, from which they fall then into the reservoir.

[0035] This happens because of the pressurized air which flows along the pipe of the wax granules.

[0036] Pressurized air is always used for spraying the melted wax, once the granules, inside the reservoir, heat and melt.

[0037] Reservoir 2 has reduced size, in order to hold a limited quantity of wax. This allows that the wax in the reservoir gets used rapidly and is replaced by new material coming from the melting of the granules which are loaded from time to time.

[0038] All this allows both to avoid that the wax remains too long in melted state, solving in this way the problem of carbonization and to limit the maximum temperature for the heating of the wax, which passing directly from the reservoir to the spraying nozzle must only be heated at a temperature equal to, or little higher than, the melting temperature, without the need to reach higher temperatures suitable to compensate the losses of heat that occur in the known equipments during the passing of the pipes which connects the reservoir of the melted wax to the spraying nozzle.

[0039] Within the same solution idea different embodiments can be provided.

[0040] So, for instance, automatic spraying machines could be provided, where the movements of the spraying unit happen automatically, driven for instance by a numeric control.

[0041] In this case, the machine will be advantageously provided with a system, which can be seen in figures 7 and 9, suitable to sense the size, and in particular the width of the plates in order to control consequently the shifts of the extrusion unit.

[0042] For instance, the system could include a camera 30 with a CCD sensor which frames the support face 31 of the plates 23', 32' ...

[0043] The signal generated by the sensor is then sent to the electronic appliances for the control of the machine, which calculate the position and the size of the plates and intervenes, by means of software, on the systems which drive the shifting of the extrusion unit, so that the wax is sprayed exactly in the expected zones. Besides, always in case of a device with automatic shift-

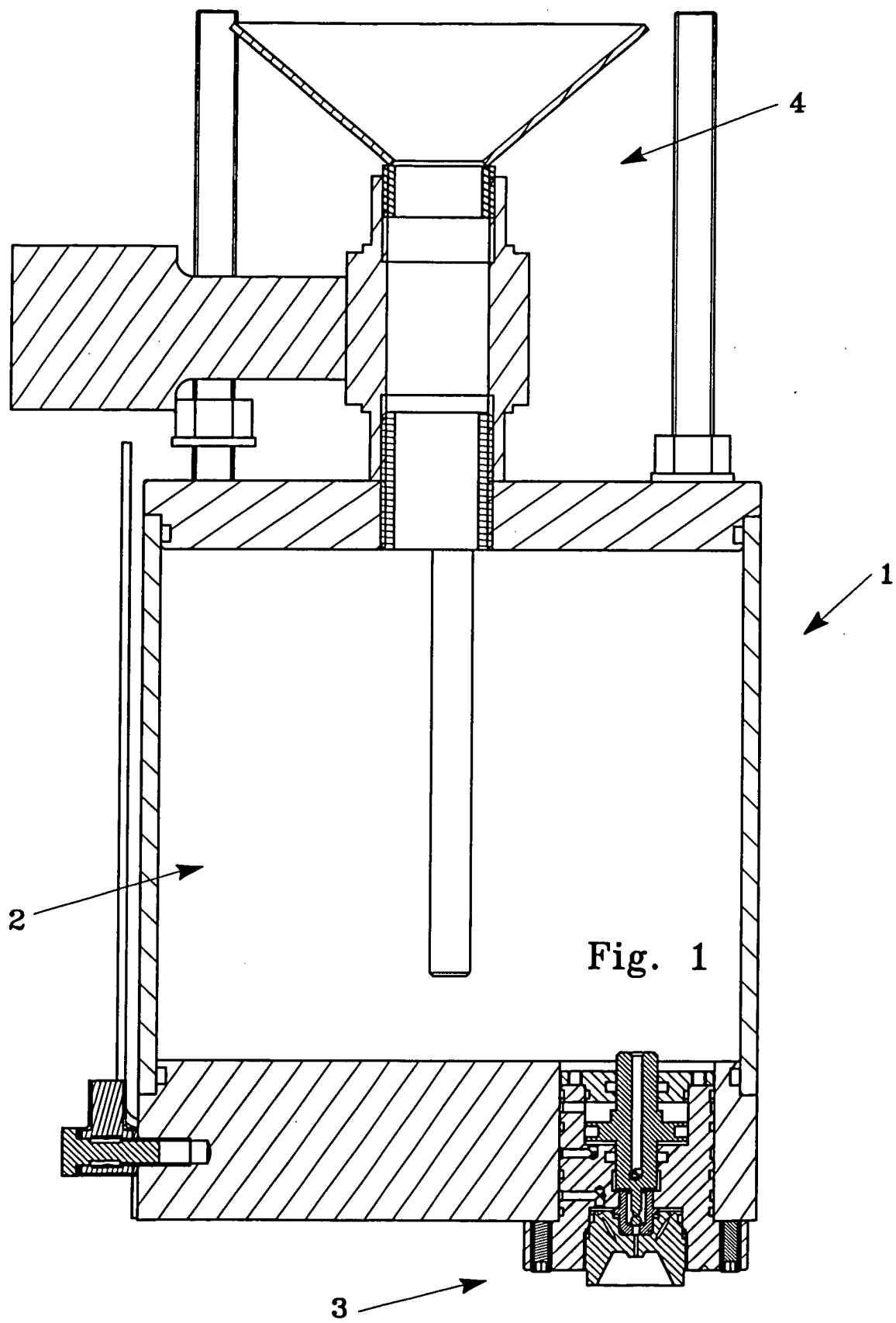
ing systems of the spraying unit, the loading of the funnel 13 can be provided when the spraying unit is parked in a starting-point, during the transfer of the plate to be covered.

[0044] In this case, of course, the feeding pipes of the wax granules towards the spraying head will not be needed any more.

[0045] A skilled in the art could then provide various changes and variations which should be all considered included in the scope of this invention.

Claims

1. Equipment for spraying wax stripes or similar onto materials in shape of plates, of the type including an extruder (1) suitable to spray the melted wax, installed on a support (5) that allows its shifting on a plane parallel to the plane of the plate to be sprayed, and a reservoir (2) for the feeding of the melted wax to said extrusion unit (1), **characterized by** the fact that said reservoir (2) is installed directly on the extrusion unit (1) and is provided with heating devices (10) for the melting of the wax, being provided means suitable to feed said reservoir (2) with solid grains of wax when the level of the melted wax falls below a previously fixed level.
2. Equipment for spraying wax stripes onto materials in shape of plates according to claim 1, **characterized by** the fact that the spraying nozzle (3) is built-in directly in the bottom wall of the reservoir.
3. Equipment for spraying wax stripes according to claim 2, **characterized by** the fact that it provides, above that reservoir (2), a funnel (13) for the loading of the wax granules, being provided a valve (14) for the closing of the passage-way between said funnel (13) and said reservoir (2), being more over provided means for the feeding of the solid grains, coming from the separate container of wax granules, leading to said funnel (13).
4. Equipment for spraying wax stripes according to claim 3, **characterized by** the fact that it provides, in said reservoir, means suitable to sense the level of the wax and drive the feeding of the solid wax granules when the level falls below a previously fixed value.
5. Equipment for spraying wax stripes according to any of the previous claims, **characterized by** the fact that the spraying nozzle (3) is formed by a pin (20) which can move between the closed position of a duct (22) for the spraying of the wax and the open position of the same, said pin (20) being crossed by a duct (23) which puts in communication the inner part of the reservoir (2) for the melted wax with a chamber (24) directed to said spraying duct (22).
6. Equipment for spraying wax stripes according to claim 5, **characterized by** the fact that it provides heating means (10) inserted in the bottom wall (9) of said reservoir (2).
7. Equipment for spraying wax stripes according to any of the previous claims, **characterized by** the fact that it provides pipes for the feeding of the wax granules built-in in the support arms of the spraying unit.
8. Equipment for spraying wax stripes according to each of the claims from 1 to 7, **characterized by** the fact that it provides numeric control systems suitable to drive the shifts of said spraying unit and means suitable to drive the shifts of said spraying unit in correspondence of a loading station for the wax granules when the level of the melted wax falls below the previously fixed limit.
9. Equipment for spraying wax stripes or similar onto materials in shape of plates, **characterized by** the fact that it provides:
 - a mobile support (5) of a spraying unit suitable (1) to allow the shifting of said unit (1) along a plane parallel to the plane of the plates to be sprayed;
 - a first reservoir for the feeding of wax in granules;
 - a second small size reservoir (2) installed on said mobile support (5) and connected to said first reservoir for the feeding of wax granules;
 - means (10) suitable to heat the wax contained in said second reservoir (2);
 - means suitable to blow pressurized fluid into said second reservoir (2);
 - a spraying nozzle (3) applied to the lower part of said second reservoir (2).
10. Equipment for spraying wax stripes according to claim 9, **characterized by** the fact that it provides means suitable to sense the size and the position of the plates on the plane and to send corresponding signals to the control system of the machine, being provided means suitable to control the shifts of the spraying unit dependent upon those signals.
11. Equipment for spraying wax stripes according to claim 10, **characterized by** the fact that said means for sensing the position and the size of the plates are formed by a CCD camera which frames the support face of the plates while these are fed.



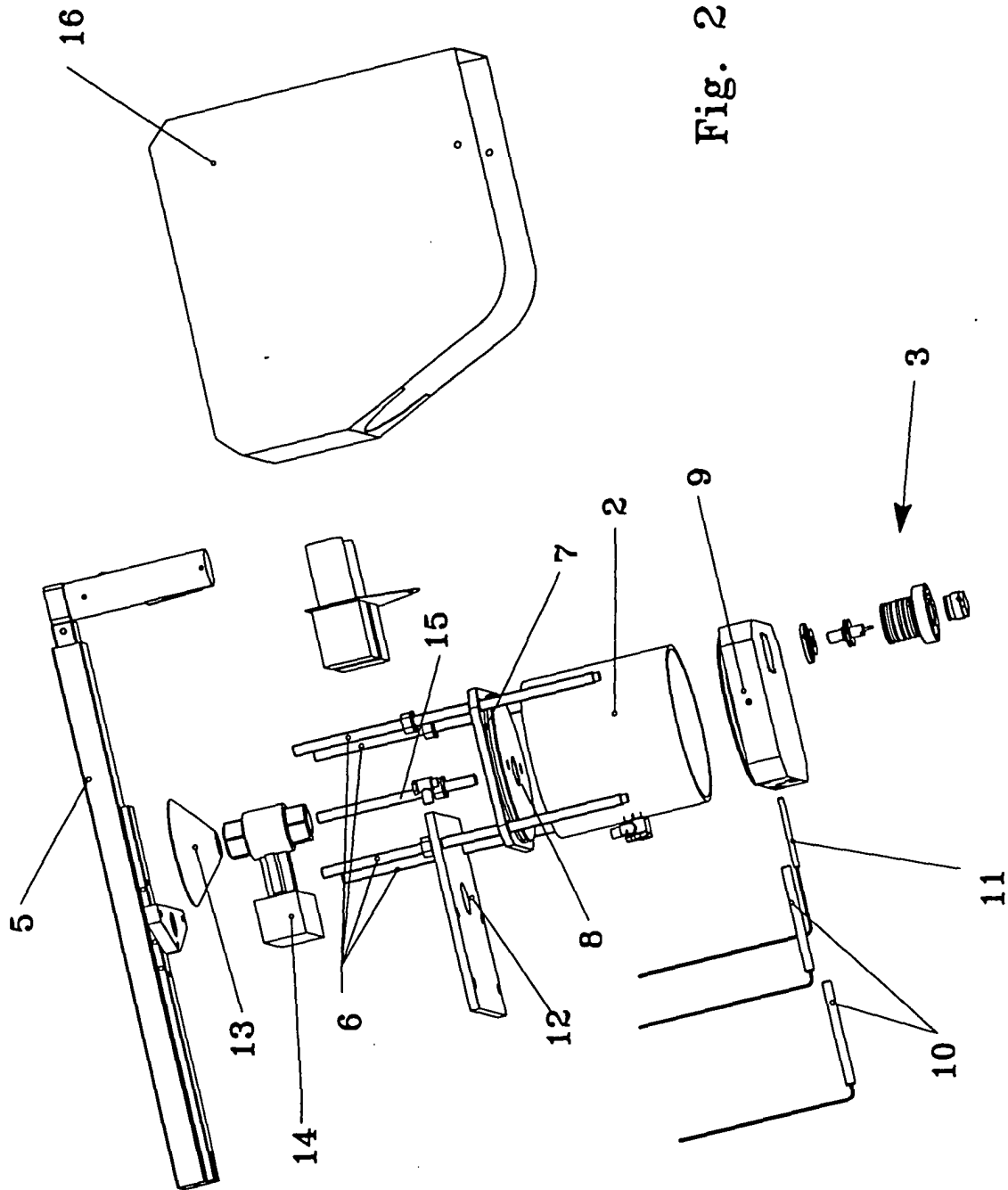


Fig. 2

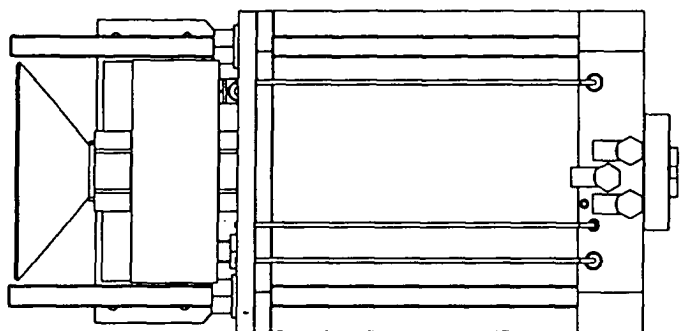


Fig. 4

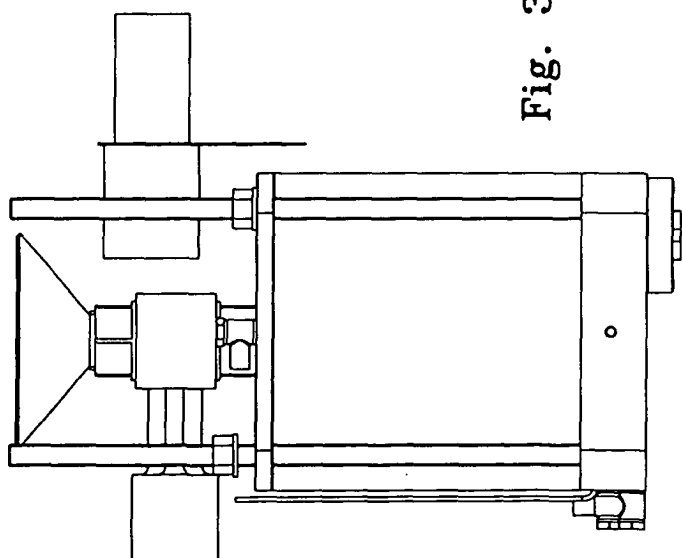


Fig. 3

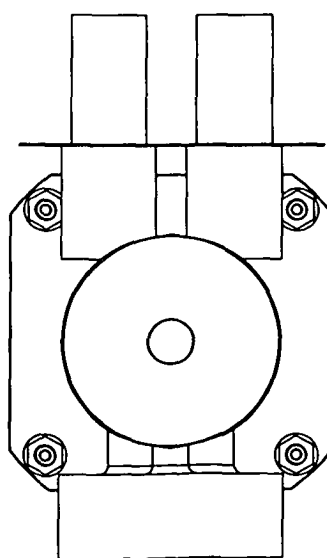


Fig. 5

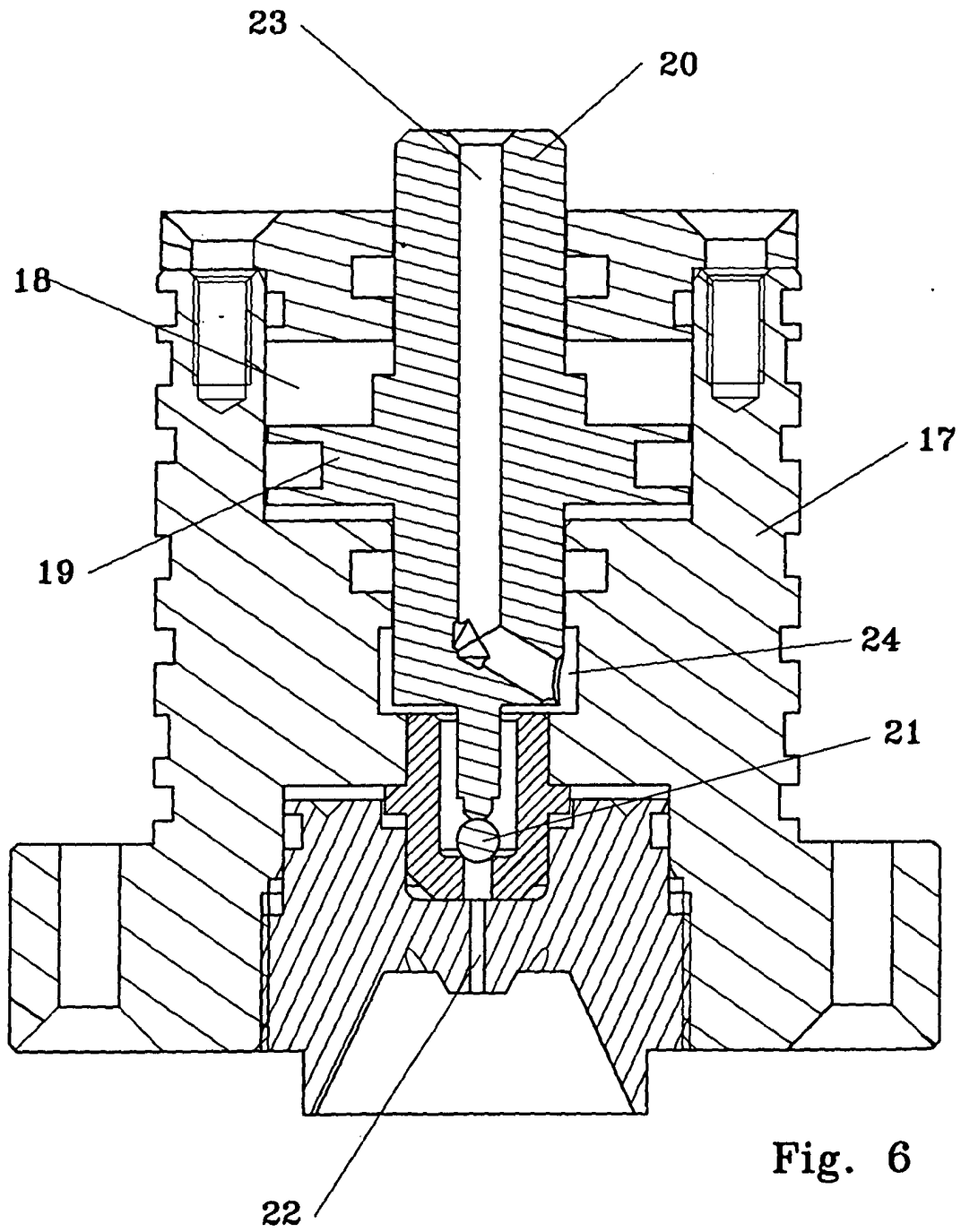


Fig. 6

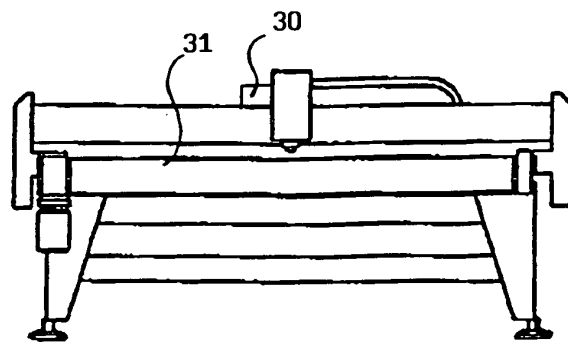


FIG. 9

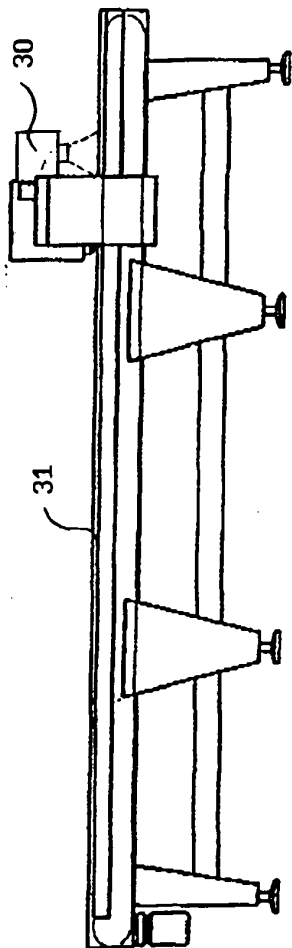


FIG. 8

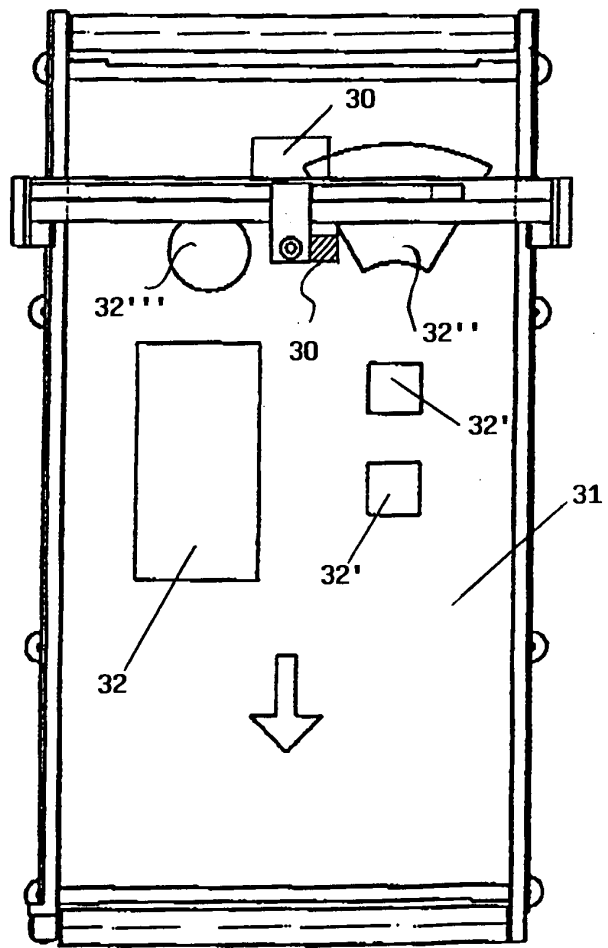


FIG. 7



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EUROPEAN SEARCH REPORT

Application Number
EP 03 00 9730

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
Y	US 4 545 504 A (WOODWORTH CHESTER L ET AL) 8 October 1985 (1985-10-08) * abstract; figure 1 * * column 3, line 29-60 * ---	1	B67D5/62 B05B7/08 B05C11/10
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			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			B67D B05B B05C
The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 16 June 2003	Examiner Eberwein, M
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 03 00 9730

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