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71 Applicant: Savorgnan, Valerio
n. 42 via S. Margherita
I-33070 Tamai (Pordenone)(IT)

71 Applicant: Mio, Dino
n. 70 via Centro
I-30026 Summaga di Portogruaro(IT)

72 Inventor: Savorgnan, Valerio
n. 42 via S. Margherita
I-33070 Tamai (Pordenone)(IT)

72 Inventor: Mio, Dino
n. 70 via Centro
I-30026 Summaga di Portogruaro(IT)

74 Representative: D'Agostini, Giovanni, Dr.
n. 17 via G.Giusti
I-33100 Udine(IT)

54 Process and device for thin sheet press sticking on furniture panel.

57 Process and equipment for veneering a thin layer "T" on a support panel "P" by means of an upper plate 2 and lower plate 6 press in which the upper plate 2 supports a frame of support 1 of an elastic rubber sheet "G" stretched perimetrically 5 to form an airtight chamber "A" connected with vacuum and pressure means, co-operating with a respective inlet/outlet 4, 7 between the plates 2, 6 to shape under pressure the rubber sheet "G" on the contour of the panel "P" whose surface has to be covered with said veneer "T" carrying out the glueing.

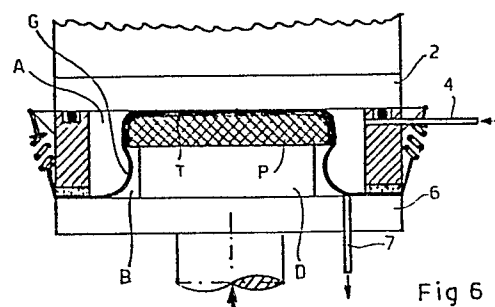


Fig 6

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Process and equipment for veneer press to glue a thin layer
on a variously shaped panel surface

The invention relates to a process and relative equipment for veneering through a veneer press thin layers on curve and/or flat surfaces, particularly for production of panels, as for instance the panels for small doors used in furniture
5 production.

The equipment could be more particularly applied to the planes of the usual presses for furniture panel production or be the main characteristic of a specific press for non-flat surfaces.

10 Therefore a further object of the present invention is a press provided with such equipment or system fit to realize the process constituent the characteristic form of the present invention.

15 The methods of pressing for glueing thin layers, as for instance valuable wood layers, on curve surfaced panels, are well known in prior art, as for instance the process of

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pressing with oil-cushion, as disclosed in the Italian patent, application No. 83412 A/80, filed on July 28, 1980, concerning a: "Flexible pressing plate device and press particularly for the veneering of non-flat panels".

- 5 The use of such a system allows the veneer or layer, through the utilization of a cushion containing a fluid, normally hydraulic oil, to fit perfectly to the shape of the panel producing its shaping on the panel surface with glueing; but this is a specific solution.
- 10 Other well known methods of pneumatic veneering are very expensive because the pressing plates have a cushion usually heated using a diathermic oil that requires a long time to get hot. Also the utilization of pneumatic presses with electric resistance heating plates is not efficient, so that
- 15 several industries are looking for an alternative, more profitable, simple and more efficient method of glueing.

The purpose of the present invention is the realization of a new process of veneering or glueing thin layers on panels

20 with variously shaped surface allowing the utilization also with flat surface and furthermore allows the glueing, besides on the larger external surface of the panel, also on the perimetric surfaces and this using low-cost equipments and with a very efficient, profitable process.

25

- On this basis the invention solves the problem utilizing a veneering method under the effects of the pressure and/or depression obtained on a rubber sheet with the pneumatic action of compressed air on one side and the depression
- 30 caused by a vacuum pump on the other side.

In order to accelerate the glueing, heat is transmitted to the pieces through a rubber sheet previously heated by contact with the hot surfaces of the pressing plates and the inlet of heated compressed air.

- 5 The intervention times of the pressures through the available temperatures and used materials (layer thickness, type of rubber, etc.) are regulated by a preferably automatic cycle previously set.
- 10 Standard equipment according to the invention is more particularly constituted by:
- a metal frame of a pre-established size, with connecting means to be connected to the upper pressing plates;
 - a rubber sheet of an adequate thickness and
- 15 preferably of about 3 mm., heat resistant, whose sizes are slightly larger than those of the frame to which it has to be hung;
- an insulated air bag, with heat-exchanger to be connected to the net of compressed air or to a compressor;
- 20
- a volumetric vacuum pump;
 - an electro-valve set;
 - an electric-pneumatic control board with cycle computer.

This embodiment is to be applied in a press system as

25 above-stated to carry out the pressing of a panel whose surface has to be covered, after being smeared with glue, with a thin covering, like a valuable wood layer or veneer and pressed between the lower pressing plate and the upper pressing plate of the press with the overhanging interposition

30 of said rubber sheet in co-operation with the action of two opposed chambers, an upper one "A" and a lower one "B"

respectively, in which through a vacuum action in the upper chamber to recall up and heat the rubber sheet, pressing and depression action in the lower chamber or pressure in the upper chamber, the recall down of the rubber sheet is

- 5 allowed to make it adhere perfectly to the shape of the panel to cover, shaping in the same way under pressure the veneer, which under said pressure action of the rubber sheet and of the heat will glue on the covered panel surface.

- 10 The advantages offered by the invention are mainly:

- on the usual presses for the furniture-makers that have a large working area, it is possible to set up several of these equipments allowing the increase of production with many panels each plane;

- 15 - a very low running cost can be realized because it is possible to heat the plates sooner with the heat sources already existing in the works (water, oil, etc.) thus eliminating all the negative consequences which are caused by the use of diathermic oil in the hydraulic cushions when
20 they break causing the leakage of oil, as it is proved that the breakage of said cushions is extremely easy;

- the maintenance is reduced to a minimum;

- possible breakages of the rubber sheets do not compromise the carrying on of the work, as it is possible to
25 stop the leak (temporarily) with the application of any patching as a pad, not excluding, when the breakage concerns the central plane, the utilization of an overhanging particle board panel;

- it is not necessary to protect the wood layer against
30 the stretching because they do not occur (which allows to eliminate the utilization of valuable, strengthened wood

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layers, etc.); furthermore, obvious free movements are acquired which facilitate the work process allowing saving of preparation for the wood layer;

- it is possible to press surfaces in cod, reaching
5 very high limits, changing the plate or rubber sheet elasticity;

- the produced panels, having been pressed under vacuum, come out completely dry, thanks to the removal of the damp produced by the steam of the glue during the same glueing,
10 with the consequent advantage that the pieces produced in this way do not undergo deformations and the painting is then facilitated, without considering that the work environment is free from pollution by noxious gas produced by the chemical reaction of the glue because, due to the
15 under vacuum system said fumes are sucked in by the pumping system of the pump which causes the vacuum and then ejected to the outside.

The above mentioned characteristics, better pointed out in the annexed claims, will be better understood and illustrated
20 with the help of the following detailed description of a preferred embodiment of the invention and in accordance with the illustrative representations of the three enclosed sheet of drawings in which:

Figure 1 is a schematic view in trasversal vertical
25 section in frontal elevation of the equipment applied to the press before the pressing stage;

Figure 2 is a view of the schematic representation of Figure 1 in which the behaviour of the rubber sheet "G" under the depression action applied to the upper chamber
30 and without the pressing of the panel to cover with the wood layer to glue is visualized;

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Figures 3 and 4 are a schematic representation of a panel "P" whose upper and lateral surfaces have to be covered through the glueing with a thin wood layer (veneer) "T" after the said smearing as explained before on the
5 glueing surfaces;

Figure 5 is the pressing step with the lifting of the lower pressing plate in which the pressing of the wood layer "T" against the sheet "G" is carried out;

Figure 6 is a schematic representation, like the
10 preceding one, in which it is illustrated the pressing step in the upper chamber "A" overhanging the flexible rubber sheet "G" and the vacuum forming in the lower chamber "B" due to the recall of the rubber sheet "G" to the layer "T" around the surfaces to glue;

15 Figure 7 is a solution with two flanked equipments.

As it can be seen in the above mentioned figures the equipment consists therefore of support means constituted by a perimetric airtight frame 1, through fixing systems on the upper plate 2 of the press and with the intermediation
20 of an airtight annular packing 3.

Said airtight frame "1" has the shape of a top and bottom opened box supplied with at least one piping 4 for the connection of the inner chamber "A" with the outside for the passage of a fluid which can be put in or taken from the chamber "A"
25 under pressure or depression with suitable means of pressure and vacuum formation. (not represented).

Perimetrically through fixing and elastic stretching systems
5 a flexible and elastic rubber sheet "G" is stretched, which, under the depression action through suction of the
30 air contained in chamber "A" can be deformed as represented in Figure 2 coming elastically in perfect contact and

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adhesion with the surface of the upper plate 2 of the press. The lower plate of the press, which for this purpose can move up and down for the pressing operation 6, is supplied with a piping 7 reentering the inner perimeter of chamber

5 "A" defined by the perimetric frame 1 and furthermore on the movable lower plate 6 there is a support "D" fit to support the panel to be pressed "P" whose upper and lateral external surface has to be covered through the glueing of a wood layer of flexible type "T" as represented in Figure 2.

10 The piping 7 of the lower plate 6 will obviously be connected to the well known means of operating of a pump to realize a depression in the lower chamber "B" which takes place after the pressing operation of Figure 5 between the flexible rubber sheet "G" and the lower plate 6 to get a vacuum action

15 starting from a position as represented in Figure 5 to shape, through the depression action, the rubber sheet "G" as represented in Figure 6; and this with the operating of the depression means which preferably is also suitable for operating in the piping 4 of the upper plate 2 alternatively

20 as follows : operating of the vacuum in the upper chamber "A", pressing, operating of the depression in the lower chamber "B" by vacuum action in the outlet 7 of the lower plate 6 with free atmospheric pressure on the upper chamber "A" or under pressure by means of the inlet realizing with

25 such an operation the glueing under the temperature and pressure action as represented in Figure 6.

More particularly to obtain the quick glueing and the complete polymerisation the upper plate of the press 2 will be brought to a temperature of 95-120°C and in the same way the lower

30 plate of the press will be brought at the same or about at the same temperature, more or less according to the specific

requirements.

With such a system also the heating of the rubber sheet "G" will thus be carried out and it will transmit heat to the wood layer to be pressed and the lower plate 6 will transmit
5 heat to the panel to be glued.

A further system to accelerate the glueing will be carried out through the utilization of inlet of preheated air in such a way to accelerate the glueing and polymerisation system.

10 The process steps are essentially:

- when the equipment is at rest the so equipped press is as represented in Figure 1 and the frame 1 fixed on the upper plate of the press will hold the rubber sheet "G" well stretched through a packing of lesser tightness of contact 8;
15 - before starting the production cycle the vacuum in chamber "A" will be carried out and the rubber sheet "G" will be made to adhere to the lower surface of the upper plate of the press which for this purpose is heated at 95-120°C thus heating through conduction at direct contact the
20 rubber sheet "G";

- in the meantime the parts to glue will be prepared as represented in Figures 3,4 smearing some glue on the panel to be covered "P" or applying on the wood layer to be covered "T" a possible further smearing of glue also on the free
25 lateral surfaces, keeping in mind that the glue smearing can be applied both on the rough panel to be covered and on the wood layer according to the specific requirements and the available equipments;

- then the panel "P" with its veneer "T" with their
30 support "D" will be placed on the lower plate 6 of the press system as represented in Figure 2;

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- at last the lower pressing plate will be lifted under the pressing action, to press the two pieces to glue "P", "T" as represented in Figure 5;

- this pressing operation carried out, the vacuum in
5 the upper chamber "A" will be taken away and it will be applied to the lower chamber "B" and all will be combined with the inlet of hot fluid under pressure in the upper chamber "A" as represented in Figure 6, thus completing the pressing operation and relative glueing;

10 - then the pressures are reversed realizing again the depression in the upper chamber "A" and the opening of the plates takes place with a perfectly reversed process for the removal of the piece so glued.

It stands to reason that with the closing of the press
15 the two pieces to glue are compressed between the two hot plates of the same press getting hot and the pressure of the machine will press the wood layer under the rubber sheet in such a way that it cannot undergo stretchings during the extension of the said rubber sheet in the parts not concerned
20 of the flat surfaces and consequently breakages cannot occur. This mechanical pressure will increase further on the specific pressure in that part of the piece without increasing the necessary pneumatic pressures for the curve surfaces thus allowing a reduction of the resistant moments of the
25 frame of the same press developing also a levelling action on the flat surface of the panel eliminating possible stagnations of glue, etc... After the closing of the press, the valves arranged and programmed on purpose with the cycle will reverse the flow of the fluids in the chambers "A" and
30 "B" starting the very step of the glueing of the remaining surfaces which, as already mentioned at the beginning, takes

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place for the combined action of the pneumatic pressure in the upper chamber "A" and the pneumatic depression in the lower chamber "B" and the mechanical pressure in the upper flat part of the piece.

- 5 The rubber sheet "G" preheated by contact with the hot parts of the press, lying on the curve surfaces of the piece will carry heat and give this heat to the glueing surfaces of the same piece through the respective wood layer of covering. At the same time the compressed and preheated air in the
- 10 upper chamber "A" will contribute to give heat by the rubber sheet to the curve parts that cannot receive heat from the heated upper plate 2, thus reducing to a minimum the drying and hardening times of the same glue.

- The pressure of the compressed air will be regulated in
- 15 accordance to the shape of the pieces and their number; anyhow, the value cannot exceed that of the setting of the highest pressure valve installed on the bag whose values will be calculated on the basis of the mechanical resistances offered by the frame.

- 20 For the opening of the press the automatically piloted electro-valves (not represented but of a well known type) will obviously intervene after a predetermined time reversing the flow of the fluids in the chambers "A" and "B" of the frame and thus setting the rubber sheet in the starting
- 25 position as said in the condition preceding the pressing, so starting another preheating step of the rubber sheet which will last all the necessary time for discharging the glued pieces and smearing and introducing the new ones.

- After having resettled the pressure balances between chambers
- 30 "A" and "B" another automatic control impulse will cause the opening of the press thus concluding the pressing cycle,

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obviously followed by the discharge of the same pieces.
Of course all the execution details can change but without
altering the innovatory substance of the invention as
described, illustrated and essentially below claimed.

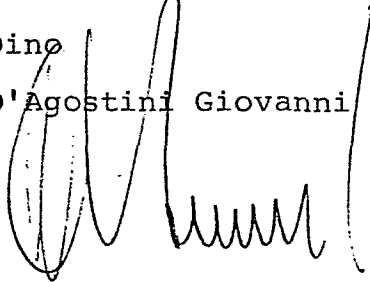
5 Udine, June 8, 1982.

p. SAVORGNAN Valerio

MIO Dino

The Representative

Dr. D'Agostini Giovanni



Claims:

1. Process for glueing through pressing a thin layer on a curve and/or flat surface, especially for the covering with thin wood layers through glueing or veneering of furniture panels, using an upper heated pressing plate (2) and a lower heated pressing plate (6) movable in pressing condition, characterized in that an airtight support frame (1) is placed between said pressing plates upper (2) and lower (6) respectively of said press and in which said support frame (1) supports at least a flexible sheet (G) perimetrically stretched with elastic means of stretching (5) in order to realize an airtight chamber (A) with a fitted upper pressing plate (2), being said chamber (A) connected by connecting duct means (4) to a pressure/vacuum means to allow in the flexible sheet under different pressure between said chamber (A) and the outside, constituting an opposed chamber (B), various development forms and in which for the veneering the following steps are carried out:
- 20 - on the panel (P) surface to be veneered glue is smeared and the layer (T) is placed on it, being the ensemble placed on the lower pressing plate (6), in the meantime or before the vacuum has been realized in chamber (A) to recall up the said flexible sheet (G) to adhere to the lower surface of the preheated upper pressing plate
 - 25 - the pressing between the upper plate and the lower plate respectively (2 and 6) of the press, heated for this purpose, is carried out pressing the pieces to glue (P) and (T) between them and between the lower plate and the upper plate respectively;
 - 30 - the depression in the upper chamber (A) is taken

away and then air is conveyed under pressure in the same chamber (A) to push down in the opposed lower chamber (B) the said flexible sheet (G) around the perimetric edge of the support (P) whose layer (T) has to be glued;

5 - the pressure is kept in such a condition for a suitable time till the completion of the glueing, then the pressure in the upper chamber (A) is taken away and the depression is re-applied bringing again the said flexible sheet (G) in adhesion to the lower surface of the
10 upper pressing plate (2);

 - the separation between the pressing plates, upper (2) and lower (6) respectively, is carried out and the glued piece is taken away and the cycle starts again.

15 2. Process as claimed in claim 1 characterized in that the air put in the upper chamber (A) under pressure is heated.

3. Process as claimed in claims 1 and/or 2, characterized in that the lower plate (6) is supplied with a duct toward the
20 outside (7) opened in the area under the upper chamber (A) to realize a connection with a lower annular chamber (B) and connected with vacuum means to co-operate in the step in which, after the pressing, an air pressure is realized in the upper chamber (A).

25

4. Equipment, applicable to a press with heated upper pressing plate and lower pressing plate under the upper pressing plate, to carry out the process as claimed in any preceding claims, comprising at least:

30 - a metallic bottom and top opened box frame (1) with airtight connecting means (3) to the lower surface of the

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upper pressing plate (2) and with periferically annular elastic stretching means (5) to stretch a flexible and elastic sheet (G) in airtight connection with the periferical annular lower edge (8) of the box frame (1) to realize an
5 airtight chamber (A), and supplied at least with a duct (4) for the passage of a fluid;

- a vacuum/pressure device connected with said duct (4) to realize the vacuum in said chamber (A) or the pressure alternatively in a programmed amount and for a preset time;

10 - control means to operate said system to carry out the depression and thus the recall up of the flexible and/or elastic sheet (G) against the upper pressing plate supporting the box frame (1) or to push off said sheet (G) from said plate surface;

15

5. Equipment as claimed in the preceding claim, in which said vacuum/pressure means are connected with an insulated bag, a heat exchanger, and an air vacuum compressor device pump.

20

6. Equipment as claimed in the two preceding claims, characterized in that the opposed lower pressing plate (6) is also supplied with a duct (7) flowing in the lower chamber (B) opposed to the upper chamber (A) realized with
25 the separation through the elastic movement of said flexible and elastic sheet (G). Being said duct (7) connected with a vacuum device or with the same vacuum device of the opposed chamber (A) to carry out the alternate vacuum either on one or on the other opposed chambers.

30

7. Equipment as claimed in the three preceding claims,

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characterized in that the control system is integrated with an electro-valve set, fit to deviate, open and close the flows of the fluid, in this specific case compressed air, for the alternate inlet or withdrawal in the respective
5 opposed chambers (A) and (B) in which said working is programmed and carried out through an electric pneumatic control set with cycle computer.

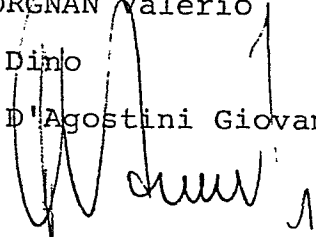
8. Equipment as claimed in any of the preceding claims,
10 characterized in that the support frame (1) of the flexible and/or elastic sheet (G) is fixed to the upper plate of the press (2) and in which the lower plate of the press (6) is supplied with an interchangeable spacer (D) set to support the pieces to be pressed and glued and in which the support
15 (1) is connectable with extension means to vary its height.

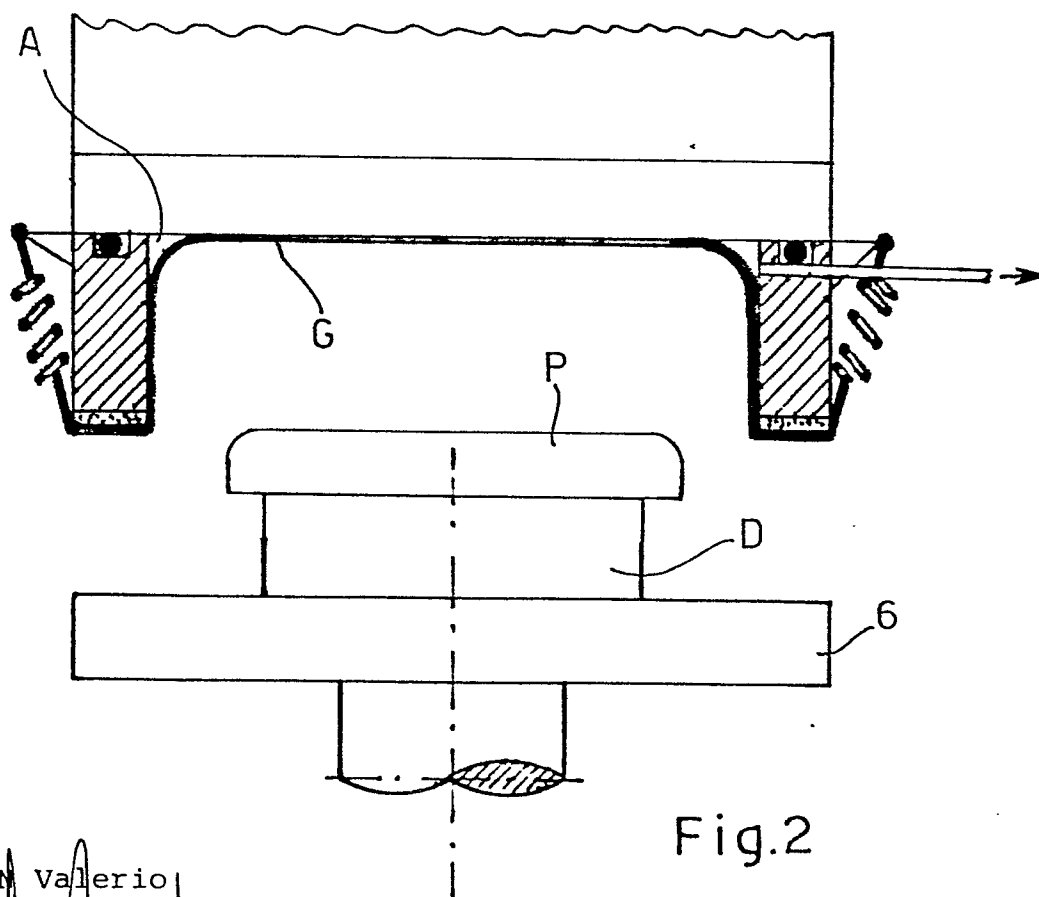
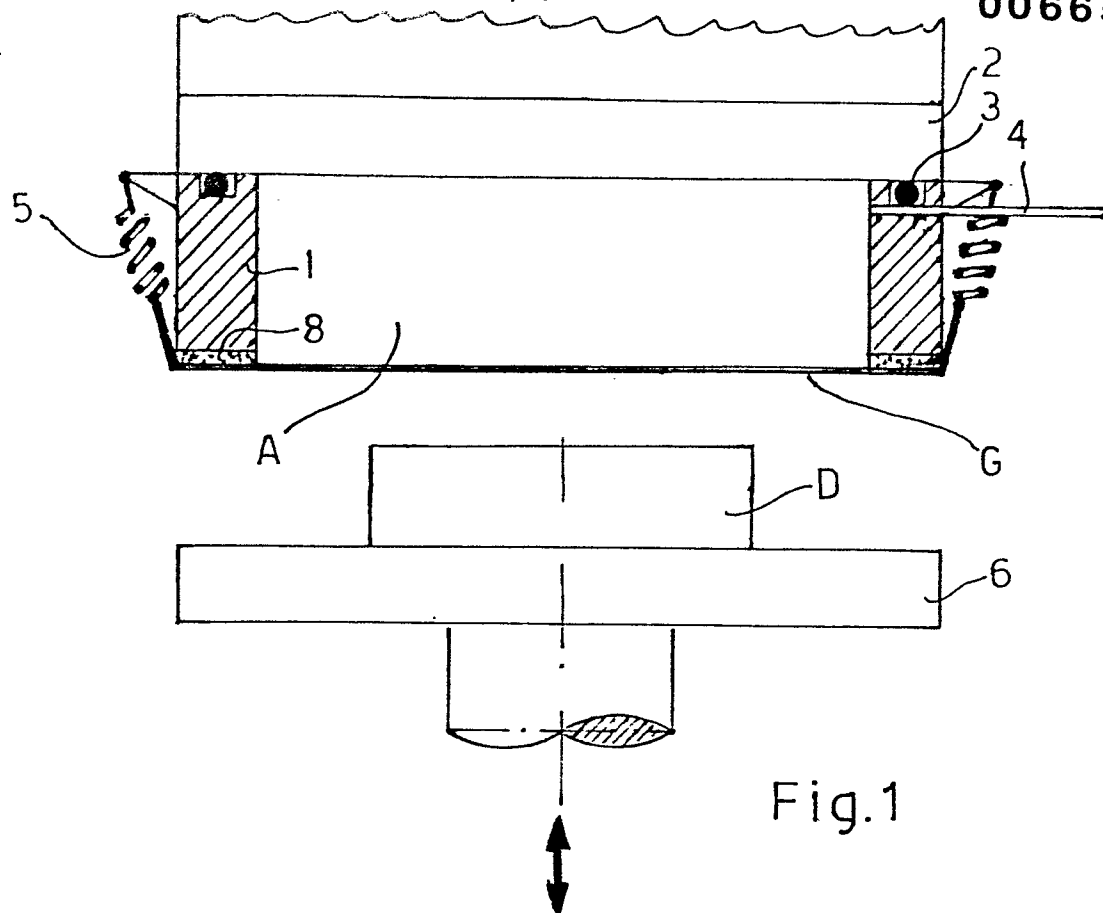
9. Press or plant supplied with an equipment as claimed in any of the preceding claims and fit to carry out the process as claimed in claims 1,2,3 with more than one of the claimed
20 equipments placed on the pressing plate.

Udine, June 8, 1982

The Representative

p. SAVORGNAN Valerio
Mio Dino
Dr. D'Agostini Giovanni





p. SAVIGNAN Valerio
e MIO Dino
the representative:
Dr. Giovanni D'Agostini

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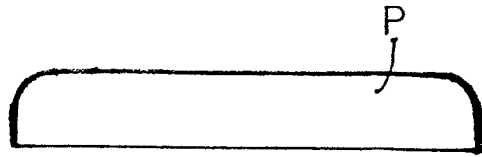


Fig. 3

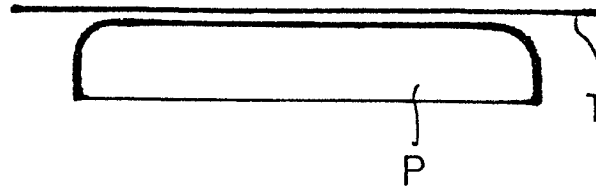


Fig. 4

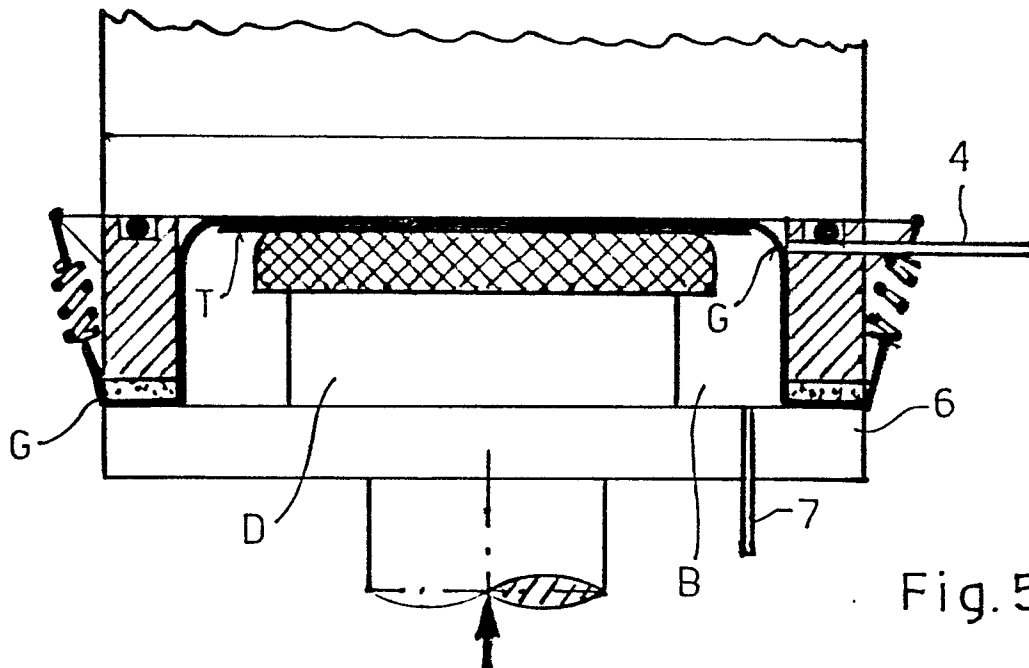


Fig. 5

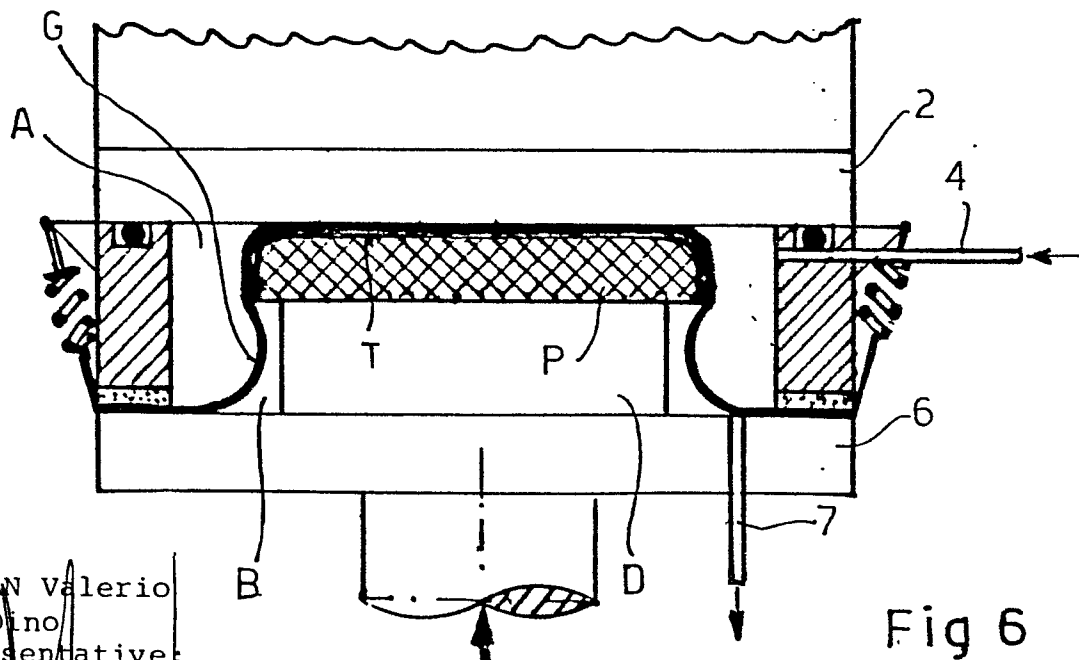


Fig 6

p.SAVORGNAN Valerio
e MIO Dino
the representative:
Dr.Giovanni Agostini

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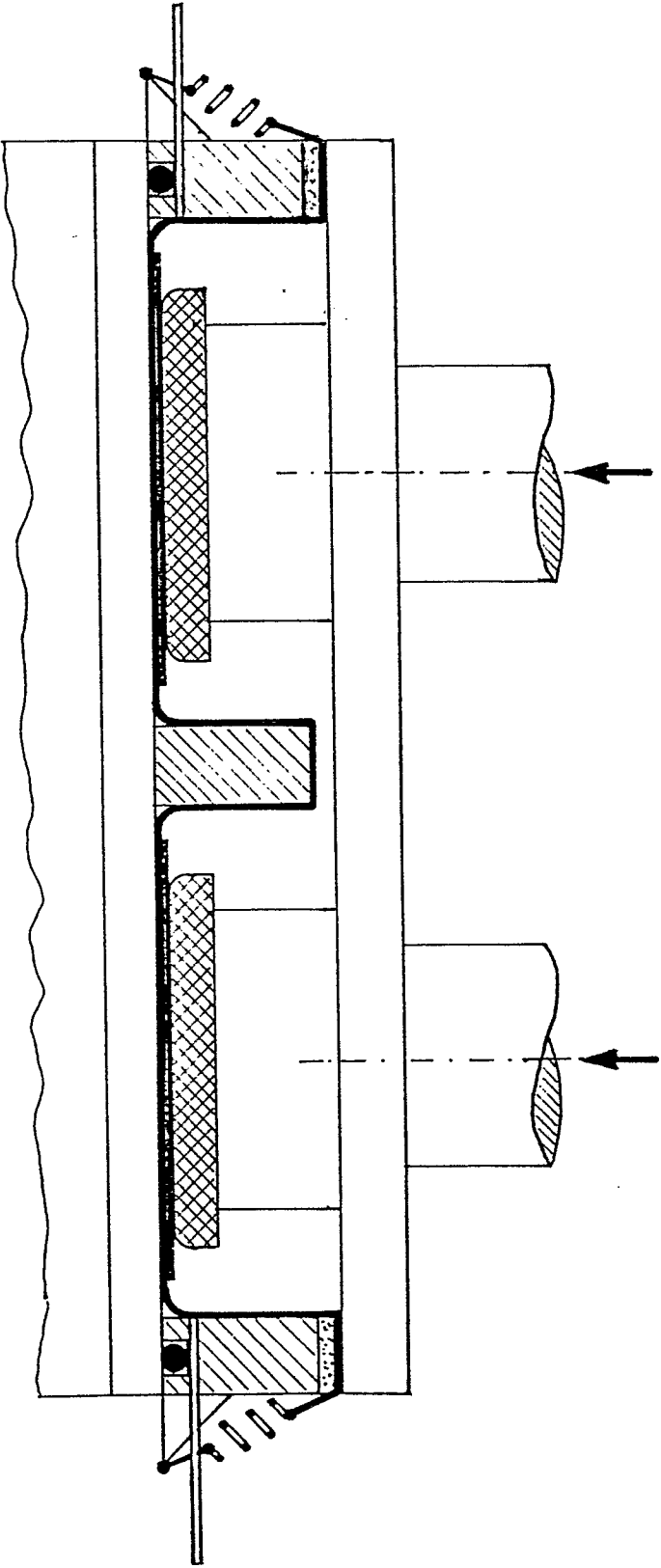


Fig.7

p. SAVORENAN Valerio
e MIO Dine
the representative:
Dr. Giovanni D'Agostini