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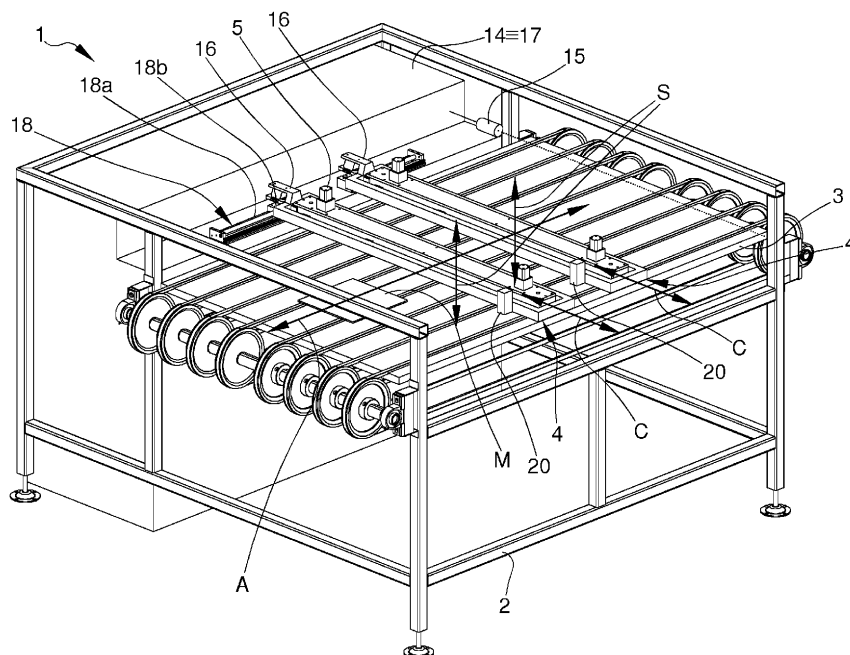
(54) PIECE OF EQUIPMENT FOR GLAZING MANUFACTURED ARTICLES

(57) The piece of equipment (1) for glazing manufactured articles comprises:

- one base frame (2);
- one line of forward movement (3) adapted to move at least one manufactured article (M) to be decorated;
- one main body (4) arranged on top of the line of forward movement (3) and made hollow to define one inner chamber (4a) for the collection of liquid glaze to be applied onto the manufactured article (M), wherein the inner

chamber (4a) is provided with one feeding opening (5) of the liquid glaze and with a plurality of orifices (6) for dispensing the liquid glaze connected to the feeding opening (5);

- one adjustment assembly (8, 11) of the dispensing of the liquid glaze from the orifices (6);
- vibration means (16) associated with the main body (4) and which can be activated to set the latter in vibration.

Fig.1**EP 4 321 258 A1**

Description

Technical Field

[0001] The present invention relates to a piece of equipment for glazing manufactured articles, particularly ceramic manufactured articles of the tile type.

Background Art

[0002] A variety of equipment for the application of glaze to tiles are known in the ceramic industry.

[0003] These comprise a first known type of equipment called, in technical jargon, "bell", which allows the formation of a glaze film under which the tile is made to pass.

[0004] This first type has some drawbacks.

[0005] First of all, it involves the heavy use of glaze to maintain the continuity of the film which, in addition to having high costs and giving rise to considerable material waste, also results in a significant increase in the weight of the tile.

[0006] For this reason, the use of the bell is found to be unsuitable to glazing tiles made by means of the single-firing process which are known to require a small amount and weight of glaze.

[0007] Another drawback of this first known piece of equipment is the difficulty of applying the glaze evenly on the tiles.

[0008] In fact, the amount of glaze applied is greatest at the edges of the tile and least in the central area.

[0009] Last but not least, in order to cover the entire surface of the tile, the film defined by the bell must have greater extension than the tile itself, which results in a large waste of material.

[0010] A second type of equipment known in the ceramic industry involves glazing by means of a series of nozzles which are adapted to dispense strips of glaze of equal width onto the manufactured article.

[0011] In doing so, the adjacent strips join together to define a substantially homogeneous layer of glaze.

[0012] In addition, in order to adjust the frequency of glaze dispensing, each of these nozzles is generally provided with a relevant plug, which can be electronically controlled, adapted to selectively open/close a relevant glaze outlet port.

[0013] Although this technical expedient makes it possible to reduce the waste of dispensed liquid glaze, this second type of known equipment also has several drawbacks, among which it is possible to mention the fact that the glaze thus applied has shading, in the areas where the dispensed strips join, which ends up undermining the quality and aesthetic performance of the finished product.

[0014] A third type of known equipment, operating according to a methodology known by the technical term of "airless", involves the application of glaze by means of misting.

[0015] In this case, the misting of liquid glaze is by means of a plurality of nozzles arranged within relevant

glazing booths.

[0016] This third type also has some drawbacks.

[0017] Similar to the bell-type piece of equipment, in fact, even those operating according to airless methodology result in a high waste of material, as much as 50% of that dispensed, which remains in suspension inside the relevant booth.

[0018] For this reason, most of the booths to date used for this glazing methodology are provided with a special suction system provided with one or more filters precisely adapted to prevent the dispersion of misted glaze particles into the atmosphere.

[0019] This fact gives rise, however, to additional drawbacks related to the disposal of the glaze accumulated in the filters.

[0020] Still another drawback of this third type of piece of equipment consists in the fact that applying the glaze evenly on the surface to be covered is quite difficult in the case of medium to large-sized tiles.

[0021] Still other equipment is provided by patent documents US 2003/230647 and DE 4416747. The equipment described by these documents involves a hollow body provided with a plurality of orifices for the outflow of glaze and within which a rotating roller is housed; as a result of its rotation, the roller allows or prevents the outflow of the glaze contained in the hollow body.

[0022] However, these devices also have drawbacks, as they do not allow for even application of the glaze on the manufactured articles to be decorated.

Description of the Invention

[0023] The main aim of the present invention is to devise a piece of equipment for glazing manufactured articles to evenly distribute glaze over the surface of the relevant manufactured articles, thus achieving a high surface quality.

[0024] Within this task, one object of the present invention is to make a piece of equipment for glazing manufactured articles which allows easy and flexible management of the amplitude, frequency and position of the dispensed glaze.

[0025] Another object of the present invention is to make a piece of equipment for glazing manufactured articles that allows minimizing the waste of material.

[0026] Still one object of the present invention is to devise a piece of equipment for glazing manufactured articles that does not require the use of vacuum systems to dispose of the glaze particles that remain in the air as a result of its application.

[0027] Not the least object of the present invention is to devise a piece of equipment for glazing manufactured articles with high productivity and efficiency.

[0028] Another object of the present invention is to devise a piece of equipment for glazing manufactured articles that can overcome the aforementioned drawbacks of the prior art within the framework of a simple, rational, easy and effective to use as well as affordable solution.

[0029] The aforementioned objects are achieved by this piece of equipment for glazing manufactured articles having the characteristics of claim 1.

Brief Description of the Drawings

[0030] Other characteristics and advantages of the present invention will become more apparent from the description of a preferred, but not exclusive, embodiment of a piece of equipment for glazing manufactured articles, illustrated by way of an indicative, yet non-limiting example, in the accompanying tables of drawings in which:

Figure 1 is an axonometric, overall view of the equipment according to the invention;

Figure 2 is an axonometric, detailed view of a part of the equipment according to the invention;

Figure 3 and Figure 4 are cross-sectional views of the same part in Figure 2 in two different operating configurations;

Figure 5 is a longitudinal cross-sectional view of the part in Figure 2 in an alternative embodiment.

Embodiments of the Invention

[0031] With particular reference to these figures, reference numeral 1 globally denotes a piece of equipment for glazing manufactured articles.

[0032] In this regard, it is specified that, within the scope of this disclosure, the use of the term "manufactured articles" preferably refers to slab-shaped semi-finished products made of ceramic material, particularly of the ceramic tile type.

[0033] It cannot, however, be ruled out that the same term can also be used to denote slab-shaped semi-finished products made of different material, e.g. marble, stone or other materials still known to the expert in the field.

[0034] Having specified this, the piece of equipment 1 for glazing manufactured articles comprises, first of all:

- at least one base frame 2 for resting onto the ground;
- at least one line of forward movement 3 associated with the base frame 2 and adapted to move at least one manufactured article M to be decorated along at least one direction of forward movement A;
- at least one main body 4 arranged on top of the line of forward movement 3 and made hollow to define at least one inner chamber 4a for the collection of liquid glaze to be applied onto the manufactured article M, wherein such inner chamber 4a is provided with at least one feeding opening 5 of the liquid glaze and with a plurality of orifices 6 for dispensing the liquid glaze connected to the feeding opening 5.

[0035] Detailing more about the main body 4 it is good to specify that it has elongated conformation.

[0036] More specifically, the main body 4 has substan-

tially prismatic conformation.

[0037] Again, the main body 4 is developed transversely with respect to the direction of forward movement A.

[0038] More precisely, the main body 4 is arranged orthogonally with respect to the direction of forward movement A.

[0039] Conveniently, the piece of equipment comprises at least one bar element 7 associated with the main body 4 in a removable manner and provided with the orifices 6.

[0040] The bar element 7 is particularly installable on the lower face of the main body 4, that is, on that facing the line of forward movement 3.

[0041] In detail, the bar element 7 is made at least partly of stainless steel.

[0042] It is important to note that providing a bar element 7 which is associated in a removable manner with the main body 4 and, therefore, removable from the latter when necessary, makes it possible to greatly simplify and accelerate any operations of cleaning the orifices 6, thus reducing downtime with respect to the state of the art mentioned above.

[0043] In this regard, the piece of equipment 1 comprises a plurality of bar elements 7, at least one of the bar elements 7 being provided with a different number of orifices 6 from at least another bar element 7.

[0044] In actual facts, the bar elements 7 are removable from the main body 4 and are interchangeable with each other.

[0045] This fact turns out to be a particularly convenient technical expedient since it allows the number of orifices 6 from which to dispense the liquid glaze to be varied in a completely intuitive and easy manner.

[0046] In other words, it is possible to glaze manufactured articles M of even very different sizes simply by installing on the main body 4, the bar element 7 provided with the number of orifices 6 corresponding to the aforementioned size.

[0047] It is easy to appreciate how this allows obtaining a piece of equipment 1 that is particularly versatile and efficient in its use.

[0048] Advantageously, each bar element 7 comprises a plurality of dispensing needles of the liquid glaze, not shown in the figures, which are arranged parallel to each other and on each of which a relevant orifice 6 is formed.

[0049] The use of dispensing needles enables precise and timely control of the liquid glaze dispensing, distributing it dropwise onto the manufactured articles M in the form of droplets of predefined size.

[0050] By doing so, the dispensed liquid glaze can be kept in laminar flow, benefiting the quality of the glaze made.

[0051] That said, however, the possibility of making bar elements 7 that are structurally different and, in particular, lacking the aforementioned dispensing needles cannot be ruled out; in this case, for example, the orifices 6 can be obtained directly on the bar element 7.

[0052] Concerning the feeding opening 5, it is specified

that the main body 4 is preferably provided with two of them, arranged on opposite sides of each other.

[0053] Providing two feeding openings 5 allows, in fact, recirculation of the liquid glaze through the inner chamber 4a, so as to avoid sedimentation phenomena within it.

[0054] It is easy to appreciate, however, that the number of feeding openings 5 can be varied at will and can, e.g., be greater than two or equal to one.

[0055] Conveniently, the orifices 6 are aligned with each other along at least one axis of alignment B to define, on the main body 4, at least one row of orifices 6.

[0056] Specifically, the axis of alignment B is arranged transversely with respect to the direction of forward movement A.

[0057] More specifically, the axis of alignment B is arranged orthogonally to the direction of forward movement A.

[0058] In a particular embodiment, not shown in the figures, the orifices 6 are arranged aligned to define a plurality of rows running along relevant axes of alignment B which are parallel to each other, where the orifices 6 aligned with each other along a relevant axis of alignment B are arranged offset from each other, along the direction of forward movement A, with respect to the orifices 6 aligned along another axis of alignment B.

[0059] As clearly visible in Figure 2, the feeding opening 5 and the row of orifices 6 are arranged on the main body 4 in opposite positions to each other.

[0060] Specifically, the feeding opening 5 is arranged on top of the main body 4 (i.e., on the face of main body 4 away from the line of forward movement 3) while the row of orifices 6 is arranged below on the main body 4 (i.e., on the face of the main body 4 towards the line of forward movement 3) to allow the liquid glaze to be dispensed on the manufactured articles M carried along the latter.

[0061] Optionally, the piece of equipment 1 comprises at least one pulsing device 20, associated with the main body 4 and adapted to set the latter in high-frequency vibration, e.g. at frequencies above 10 KHz.

[0062] According to the preferred embodiment, the pulsing device 20 is of the type of an ultrasonic transducer, e.g. of the type of a sonotrode.

[0063] In detail, the pulsing device 20 is adapted to vibrate and, thus, agitate the liquid glaze contained in the inner chamber 4a, causing any microbubbles in the same to burst.

[0064] It is clear that, thanks to the pulsing device 20, the risks of sedimentation of the liquid glaze on the orifices 6 are greatly reduced compared to the prior art and, with them, the possibility of liquid glaze even partly plugging the orifices themselves.

[0065] Providing for a pulsing device 20 turns out, therefore, to be a particularly advantageous technical expedient to keep the orifices 6 clean, so as to increase the reliability of use of the piece of equipment 1 and facilitate the outflow of the glaze from them.

[0066] In addition, the piece of equipment 1 comprises

at least one adjustment assembly 8, 11 for the dispensing of the liquid glaze from the orifices 6.

[0067] Going into detail, the adjustment assembly 8, 11 comprises at least one plugging body 8 arranged inside the inner chamber 4a and associated with at least one respective orifice 6.

[0068] In the present case, the plugging body 8 is movable between at least one opening position (Figure 3), wherein it is raised with respect to the orifice 6 and allows dispensing the liquid glaze therefrom, and at least one closing position (Figure 4), wherein it is superimposed on the orifice 6 and prevents the liquid glaze from being dispensed therefrom.

[0069] In actual facts, the plugging body 8 selectively allows or prevents the liquid glaze dispensing from the orifice 6 depending on whether it is in the opening position or in the closing position, respectively.

[0070] Specifically, the plugging body 8 comprises at least one stem 8a and at least one closure element 8b associated with one end of the stem 8a and adapted to plug the orifice 6, the stem 8a being fitted in a sliding manner through a port 9 formed on the main body 4 (see Figure 3 and 4).

[0071] As can be seen, the closure element 8b is associated with the lower end of the stem 8a (i.e., the one of the two arranged at the shorter distance from the orifice 6).

[0072] It should be pointed out, in fact, that some of the liquid glaze in the inner chamber 4a can, under certain operational circumstances, go inside the port 9 and risk, once it dries up inside, plugging it, hindering the proper movement of the plugging body 8.

[0073] Precisely in this regard, the piece of equipment 1 comprises at least one flexible membrane 21 arranged sealed in the inner chamber 4a and associated with the stem 8a so as to insulate the port 9 from the liquid glaze contained in the inner chamber 4a.

[0074] Thus, the flexible membrane 21 allows the retention of the liquid glaze in the inner chamber 4a, preventing it from entering the port 9 and, consequently, avoiding possible failure of the piece of equipment 1 due to the seizure of the plugging body 8 in the port 9.

[0075] Advantageously, the adjustment assembly 8, 11 comprises command means 11 of the displacement of the plugging body 8 between the opening position and the closure position.

[0076] In detail, the command means 11 comprise at least one eccentric 12 associated with the plugging body 8 and rotatable around at least one axis of adjustment to move the plugging body 8 between the opening position and the closing position.

[0077] To be precise, the axis of adjustment is substantially parallel to the axis of alignment B.

[0078] In other words, the axis of adjustment is substantially perpendicular to the direction of forward movement A.

[0079] Preferably, the eccentric 12 is arranged where one end of the plugging body 8 is located.

[0080] Specifically, the eccentric 12 is associated with the upper end (i.e., the one of the two arranged furthest from the orifice 6) of the stem 8a.

[0081] In actual facts, the eccentric 12 and the closure element 8b are arranged at opposite ends of the stem 8a.

[0082] The rotation of the eccentric 12 around the axis of adjustment, therefore, allows sufficient force to be exerted on the plugging body 8 to push it from the opening position to the closing position, thus plugging the orifice 6 and preventing the dispensing of the liquid glaze therefrom.

[0083] Conveniently, the command means 11 comprise elastic means 13 associated with the plugging body 8 and adapted to counteract the displacement of the plugging body 8 from the lowered position to the raised position.

[0084] In the present case, the elastic means 13 have a first end, locked together with the plugging body 8 and a second end, opposite the first end, stopping against a relevant stopping surface 4b of the main body 4.

[0085] Specifically, the stopping surface 4b is arranged on top of the first end, so the elastic means 13 are compressed where the plugging body 8 switches from the lowered position to the raised position and are decompressed where the plugging body 8 switches from the raised position to the lowered position.

[0086] In other words, the elastic means 13 exert a resistant force on the plugging body 8 to the switch of the same from the lowered position to the raised position while they are adapted to push it towards the lowered position.

[0087] Specifically, the elastic means 13 consist of one or more coil springs of the compression type.

[0088] Having described the embodiment shown in the figures of the command means 11, it is pointed out that the same can be made in a different manner than what has just been stated.

[0089] For example, the possibility cannot be ruled out of providing command means 11 of the piezoelectric type or other types still known to the expert in the field that allow, however, adequate movement of the plugging body 8 between the lowered position and the raised position.

[0090] It is specified, in this regard, that the main body 4 may comprise a single plugging body 8 which is associated with each of the orifices 6 and is adapted to close the latter at the same time.

[0091] Thus, in this case, the liquid glaze is dispensed simultaneously through all the orifices 6 when the plugging body 8 is in the raised position.

[0092] Similarly, the dispensing of liquid glaze does not occur (i.e., it is simultaneously cut off from all orifices 6) when the plugging body 8 is in the lowered position.

[0093] In other words, there are two modes of operation of the piece of equipment 1 in this case; one consisting in the simultaneous dispensing of the liquid glaze itself from each orifice 6, and the other consisting of its total and simultaneous stop.

[0094] A piece of equipment 1 working with the mode of operation just described is particularly convenient in the operational cases where the manufactured articles M are of the fixed size, that is, they are provided with substantially equal surface dimensions to each other.

[0095] As an alternative to this first case, the main body 4 may comprise a plurality of plugging bodies 8, each associated with at least one respective orifice 6.

[0096] Specifically, the command means 11 are, in this case, associated with a plurality of plugging bodies 8 separate from each other and adapted to command the displacement thereof between their relevant opening position and closing position independently of each other.

[0097] This means that the dispensing of the liquid glaze from the orifices 6 can be partialized, that is, it can occur from one or more orifices 6 and be prevented, at the same time, from the other orifices 6.

[0098] In this way it is possible to adjust the area covered by the liquid glaze dropping from the orifices 6 depending on the number of orifices from which the liquid glaze itself is dispensed.

[0099] This type of operation is particularly convenient in operational cases wherein the manufactured articles M are of variable size, that is, they are provided with variable surface dimensions.

[0100] Conveniently, the piece of equipment 1 comprises:

- at least one electronic control unit 14 operationally connected to the command means 11 and configured to adjust the operation thereof; and
- at least one detection device 15 which is operationally connected to the electronic control unit 14 and is configured to detect the presence of at least one manufactured article M along the line of forward movement 3 and to send, as a result of such detection, at least one presence/absence signal of the manufactured article M to the electronic control unit 14, the latter commanding the command means 11 to allow/prevent the dispensing of liquid glaze from the orifices 6 depending on the reception of the presence/absence signal.

[0101] In other words, the electronic control unit 14 adjusts the command means 11 so that the liquid glaze can be dispensed if the detection device 15 detects the presence of a manufactured article M along the line of forward movement 3.

[0102] Similarly, the electronic control unit 14 adjusts the command means 11 so as to stop the dispensing of liquid glaze in case the detection device 15 does not detect the presence of any manufactured article M along the line of forward movement 3.

[0103] In this regard, the detection device 15 is preferably of the type of a photocell, but it cannot be ruled out that it may be of a different type known to the expert in the field as long as it allows, however, to efficiently detect the presence/absence of the manufactured arti-

cles M along the line of forward movement 3.

[0104] Conveniently, the detection device 15 can also be configured to detect the size of the manufactured articles M conveyed along the line of forward movement 3.

[0105] In this sense, depending on the dimensions detected by the detection device 15, the electronic control unit 14 operates on the command means 11 so as to control the number of plugging bodies 8 required so that the glaze flowing out of the orifices 6 covers the entire surface of the manufactured articles M to be decorated.

[0106] In all cases, it is easy to appreciate how this technical expedient allows the piece of equipment 1 to glaze manufactured articles M of somewhat variable sizes quite efficiently, making it extremely versatile in their use.

[0107] Conveniently, the electronic control unit 14 can be configured to allow the adjustment of the pressure and/or frequency of the liquid glaze dropping from the orifices 6.

[0108] In this sense, the plugging body 8 can be made to move alternately between the raised position and the lowered position at variable speeds, thus allowing even finer adjustment of the amount of glaze dispensed from the orifices 6.

[0109] Conveniently, the piece of equipment 1 comprises at least one sensor device, not shown in the figures, which is associated with the main body 4 and is configured to detect any plugging of the orifices 6.

[0110] Specifically, the sensor device is operationally connected to the electronic control unit 14, the latter being configured to allow the interruption of the dispensing of the liquid glaze from the plugged orifices 6.

[0111] Specifically, the sensor device is of the type of a pressure and flow sensor, but it cannot be ruled out that it may be of the type of a different sensor known to the expert in the field and able to effectively detect any plugging of the orifices 6.

[0112] It is good to highlight the fact that providing a sensor device makes it possible to promptly interrupt the dispensing of liquid glaze from any plugged orifices 6 and, in so doing, further minimize the possibility of failure of the piece of equipment 1, increasing even more its operational efficiency.

[0113] According to the invention, the piece of equipment 1 comprises vibration means 16 associated with the main body 4 and which can be activated to set the latter in vibration, moving it along at least one direction of agitation C.

[0114] In particular, the direction of agitation C has at least one component perpendicular to the direction of forward movement A.

[0115] The direction of agitation C comprises at least one component substantially parallel to the axis of alignment B.

[0116] In accordance with a first embodiment shown in Figure 1, the direction of agitation C has a single non-zero component which is arranged substantially orthogonal to the direction of forward movement A.

[0117] In other words, the direction of agitation C is arranged substantially perpendicular to the direction of forward movement A.

[0118] In accordance with a second embodiment, alternative to the previous one, the direction of agitation C has a first component perpendicular to the direction of forward movement A and a second component parallel to the direction of forward movement A.

[0119] Thus, in this case, the direction of agitation C resulting from the combination of the individual components is arranged inclined, that is, at an angle other than 90°, with respect to the direction of forward movement A.

[0120] In addition, the direction of agitation C can be of the linear type, e.g., transverse to the direction of forward movement A as just described, or it can be curvilinear, e.g., circular.

[0121] Specifically, the vibration means 16 comprise at least one of: an electromagnetic vibrator, a connecting rod-crank mechanism or an ultrasonic vibrator.

[0122] Preferably, the vibration means 16 are adapted to bring the main body 4 into vibration with a lower frequency than that of the pulsing device 20.

[0123] In more detail, the vibration means 16 involve the technical effect of changing the trajectory of glaze escaping from the orifices 6, which varies depending on the direction of agitation C and the intensity thereof, while the pulsing device 20 causes agitation of the glaze contained in the inner chamber 4a in order to facilitate the outflow thereof.

[0124] It is important to point out that providing for vibration means 16 yields important technical advantages and makes it possible, in particular, to remedy several problems of the prior art previously complained of.

[0125] In fact, thanks to the vibration of the main body 4 along the direction of agitation C, the liquid glaze dispensed from the various orifices 6 traces, on the manufactured articles on which it is deposited, a plurality of paths that, intersecting each other, give rise to a distribution that is considerably more uniform and, therefore, aesthetically valuable than the prior art mentioned above.

[0126] The type of paths traced on the manufactured articles M by the glaze flowing out of the orifices 6 depends on the direction of agitation C imparted by the vibration means 16. For example, the glaze released from the orifices 6 may take a substantially sinusoidal path in the case where the direction of agitation C is of the linear type, or a substantially helical path in the case where the direction of agitation C is of the circular type.

[0127] Not only that, but since the vibration of the main body 4 distributes the liquid glaze over a larger area, this same expedient allows, for the same number of manufactured articles M to be glazed, the amount of liquid glaze used to be reduced.

[0128] Again, the technical expedient in question also makes it possible to drastically reduce the likelihood of even partial plugging of the orifices 6, thus achieving a piece of equipment 1 with high productivity and operational efficiency.

[0129] Note, by the way, how the previously mentioned flexible membrane 21 operates synergistically in conjunction with the vibration means 16 in this regard and thus results in a further increase in the benefits just outlined.

[0130] Advantageously, the vibration means 16 are adapted to move the main body 4 along a substantially vertical direction of shaking S so as to move the orifices 6 close to/away from the manufactured article M (Figure 1).

[0131] This means that the vibration means 16 can set the main body 4 in oscillation not only horizontally along the direction of agitation C but also vertically along the direction of shaking S.

[0132] For example, it is possible to control the vibration means 16 so that they are made to vibrate exclusively along the direction of agitation C, exclusively along the direction of shaking S or alternately between the two directions according to predetermined modes.

[0133] It is important to specify that the possibility of operating the main body 4 in vibration along the two aforementioned directions results in a significant increase in the range of graphic yields obtainable on the manufactured articles M as well as in their aesthetic quality, thus giving the piece of equipment 1 more versatility and practicality of use.

[0134] Appropriately, the piece of equipment 1 comprises elastic means 22 positioned between the main body 4 and the base frame 2. The elastic means 22 are adapted to release the main body 4 from the base frame 2 so as to avoid that the vibration imparted by the vibration means 16 be partly discharged onto the base frame itself. Due to the presence of the elastic means 22, the vibration imparted by the vibration means 16 is thus completely absorbed by the main body 4.

[0135] Conveniently, the piece of equipment 1 comprises at least one electronic management and control unit 17 operationally connected to the vibration means 16 and configured to adjust the frequency and/or amplitude of vibration induced on the main body 4 along the direction of agitation C.

[0136] Specifically, the electronic management and control unit 17 is configured to adjust both the frequency and amplitude of vibration along the direction of agitation C.

[0137] Thus, to the above advantages must be added the one related to the possibility of easily and flexibly controlling the distribution of the liquid glaze on the manufactured articles M.

[0138] This allows the vibration amplitude and frequency of the main body 4 to be adjusted, if necessary, depending, e.g., on the size of the manufactured articles M and/or on the desired aesthetic effect.

[0139] It should be noted in this regard that the electronic management and control unit 17 can advantageously coincide with the electronic control unit 14.

[0140] In this case, therefore, the electronic management and control unit 17 is operationally connected to

both the vibration means 16 and the command means 11 and is responsible for the adjustment of the operation of both.

[0141] Conveniently, the piece of equipment 1 comprises a plurality of main bodies 4.

[0142] Preferably, the main bodies 4 are arranged in succession along the direction of forward movement A.

[0143] It cannot however be ruled out that two or more of these may be positioned side by side.

[0144] Specifically, the electronic management and control unit 17 is programmed to allow for the liquid glaze to be dispensed from each of the main bodies 4 independently of each other.

[0145] In other words, it is possible to partialize the dispensing of liquid glaze among the various main bodies 4, allowing it from some of the latter and preventing it, at the same time, from the others.

[0146] It is easy to appreciate how this benefits the versatility of the piece of equipment 1 and allows, among other things, the drying times of glazed manufactured articles M to vary substantially at will.

[0147] In this regard, the piece of equipment 1 comprises close/away moving means 18 associated with the main bodies 4 and adapted to selectively adjust the relevant distance along the direction of forward movement A.

[0148] In detail, the close/away moving means 18 comprise at least one guide 18a, extending substantially parallel to the direction of forward movement A, and a plurality of sliders 18b, each of which is locked together with a respective main body 4 and is mounted along the guide 18a in a sliding manner.

[0149] Specifically, as visible in Figure 1, the close/away moving means 18 comprise a plurality of guides 18a on each of which a respective slider 18b is mounted in a sliding manner.

[0150] Again, motorized means, not shown in the figures, are provided to enable the sliders 18b to slide along the guides 18a.

[0151] For example, motorized means can be enslaved to the electronic management and control unit 17 so that a user can adjust the mutual distance between the main bodies 4 by interacting with that component.

[0152] In all cases, the close/away moving means 18 make it possible, in actual facts, to selectively vary the distance between two adjacent main bodies 4 that is, to move the latter close or away along the direction of forward movement A in a manner totally independent of the other main bodies 4.

[0153] This expedient, therefore, makes it possible to increase even more the versatility of use of the piece of equipment 1 by obtaining, as a result of the selective adjustment of the distance between each pair of adjacent main bodies 4, an absolutely precise, accurate and aesthetically valuable glazing of the manufactured articles M.

[0154] It has in practice been ascertained that the described invention achieves the intended objects.

[0155] Particularly emphasized is the fact that the spe-

cial expedient of providing vibration means allows for uniform and homogeneous distribution of the liquid glaze on manufactured articles to be decorated, regardless of their size.

[0156] In this way, high surface quality can be achieved in the case of both small and medium-to-large sized manufactured articles.

[0157] Not only that, but this expedient allows, for the same number of manufactured articles to be glazed, the amount of liquid glaze required to be reduced, minimizing material waste compared to the prior art mentioned above.

Claims

1. Piece of equipment (1) for glazing manufactured articles, comprising:

- at least one base frame (2) for resting onto the ground;
- at least one line of forward movement (3) associated with said base frame (2) and adapted to move at least one manufactured article (M) to be decorated along at least one direction of forward movement (A);
- at least one main body (4) arranged on top of said line of forward movement (3) and made hollow to define at least one inner chamber (4a) for the collection of liquid glaze to be applied onto said manufactured article (M), wherein said inner chamber (4a) is provided with at least one feeding opening (5) of said liquid glaze and with a plurality of orifices (6) for dispensing said liquid glaze connected to said feeding opening (5);
- at least one adjustment assembly (8, 11) of the dispensing of said liquid glaze from said orifices (6);

characterized by the fact that it comprises vibration means (16) associated with said main body (4) and which can be activated to set the latter in vibration, by moving it along at least one direction of agitation (C).

2. Piece of equipment (1) according to claim 1, **characterized by** the fact that said direction of agitation (C) has at least one component perpendicular to said direction of forward movement (A).

3. Piece of equipment (1) according to claim 2, **characterized by** the fact that said direction of agitation (C) has a first component perpendicular to said direction of forward movement (A) and a second component parallel to said direction of forward movement (A).

4. Piece of equipment (1) according to one or more of

the preceding claims, **characterized by** the fact that said vibration means (16) are adapted to move said main body (4) along a substantially vertical direction of shaking (S) so as to move said orifices (6) close to/away from said manufactured article (M).

5. Piece of equipment (1) according to one or more of the preceding claims, **characterized by** the fact that it comprises elastic means (22) positioned between said main body (4) and said base frame (2).

6. Piece of equipment (1) according to one or more of the preceding claims, **characterized by** the fact that it comprises at least one pulsing device (20) of the ultrasonic type, associated with said main body (4) and adapted to set the latter in vibration at a higher frequency than said vibration means (16).

7. Piece of equipment (1) according to one or more of the preceding claims, **characterized by** the fact that said adjustment assembly (8, 11) comprises:

- at least one plugging body (8) arranged inside said inner chamber (4a) and associated with at least one respective said orifice (6), said plugging body (8) being movable between at least one opening position, wherein it is raised with respect to said orifice (6) and allows dispensing said liquid glaze therefrom, and at least one closure position, wherein it is superimposed on said orifice (6) and prevents said liquid glaze from dispensing therefrom;
- command means (11) for commanding the displacement of said plugging body (8) between said opening position and said closure position.

8. Piece of equipment (1) according to claim 7, **characterized by** the fact that said command means (11) comprise:

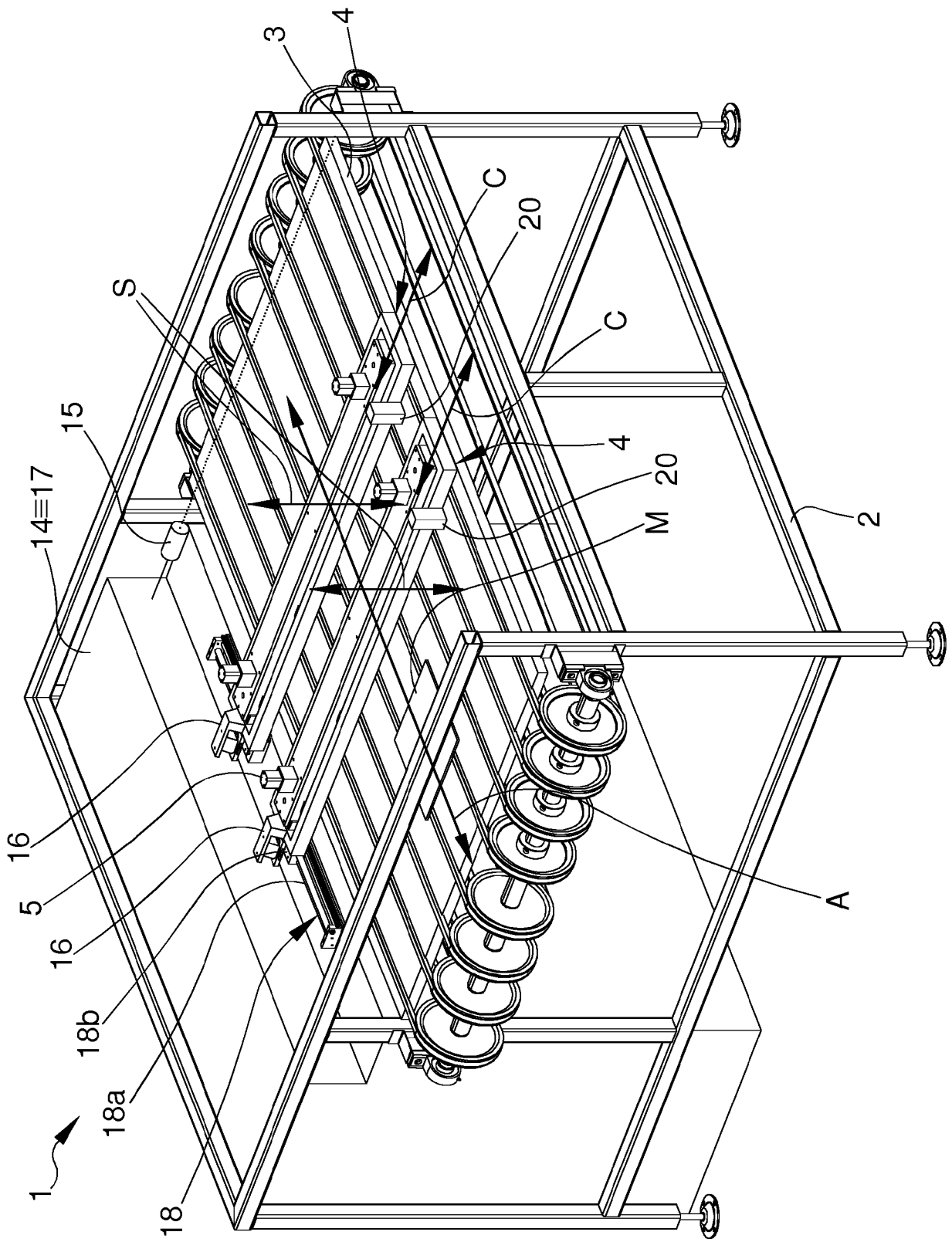
- at least one eccentric (12) associated with said plugging body (8) and rotatable around at least one axis of adjustment to move said plugging body (8) between said opening position and said closure position;
- elastic means (13) associated with said plugging body (8) and adapted to counteract the displacement of said plugging body (8) from said closure position to said opening position.

9. Piece of equipment (1) according to one or more of the preceding claims, **characterized by** the fact that:

- said plugging body (8) comprises at least one stem (8a) and at least one closure element (8b) associated with one end of said stem (8a) and adapted to plug said orifice (6), said stem (8a) being fitted in a sliding manner through a port

- (9) obtained on said main body (4);
 - it comprises at least one flexible sealing membrane arranged in said inner chamber (4a) and associated with said stem (8a) so as to insulate said port (9) from the liquid glaze contained in said inner chamber (4a). 5
10. Piece of equipment (1) according to one or more of the preceding claims, **characterized by** the fact that said main body (4) comprises a single said plugging body (8) which is associated with each of said orifices (6) and is adapted to close said orifices at the same time. 10
11. Piece of equipment (1) according to one or more of claims 1 to 9, **characterized by** the fact that said main body (4) comprises a plurality of said plugging bodies (8), each associated with one or more respective orifices (6), said command means (11) being associated with said plugging bodies (8) and being adapted to command the displacement thereof between said opening position and said closure position in an individual manner. 15
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12. Piece of equipment (1) according to one or more of the preceding claims, **characterized by** the fact that it comprises: 25
 - a plurality of said main bodies (4); and
 - close/away moving means (18) associated with said main bodies (4) and adapted to selectively adjust the relevant distance along said direction of forward movement (A). 30
13. Piece of equipment (1) according to claim 12, **characterized by** the fact that said close/away moving means (18) comprise: 35
 - at least one guide (18a) extending substantially parallel to said direction of forward movement (A), and 40
 - a plurality of sliders (18b), each of which is locked together with a respective said main body (4) and is mounted along said guide (18a) in a sliding manner. 45
14. Piece of equipment (1) according to one or more of the preceding claims, **characterized by** the fact that it comprises at least one bar element (7) associated with said main body (4) in a removable manner and provided with said orifices (6). 50
15. Piece of equipment (1) according to claim 14, **characterized by** the fact that said bar elements (7) are provided with a plurality of dispensing needles of said liquid glaze, arranged parallel to each other, on each of which a relevant said orifice (6) is formed. 55

Fig.1



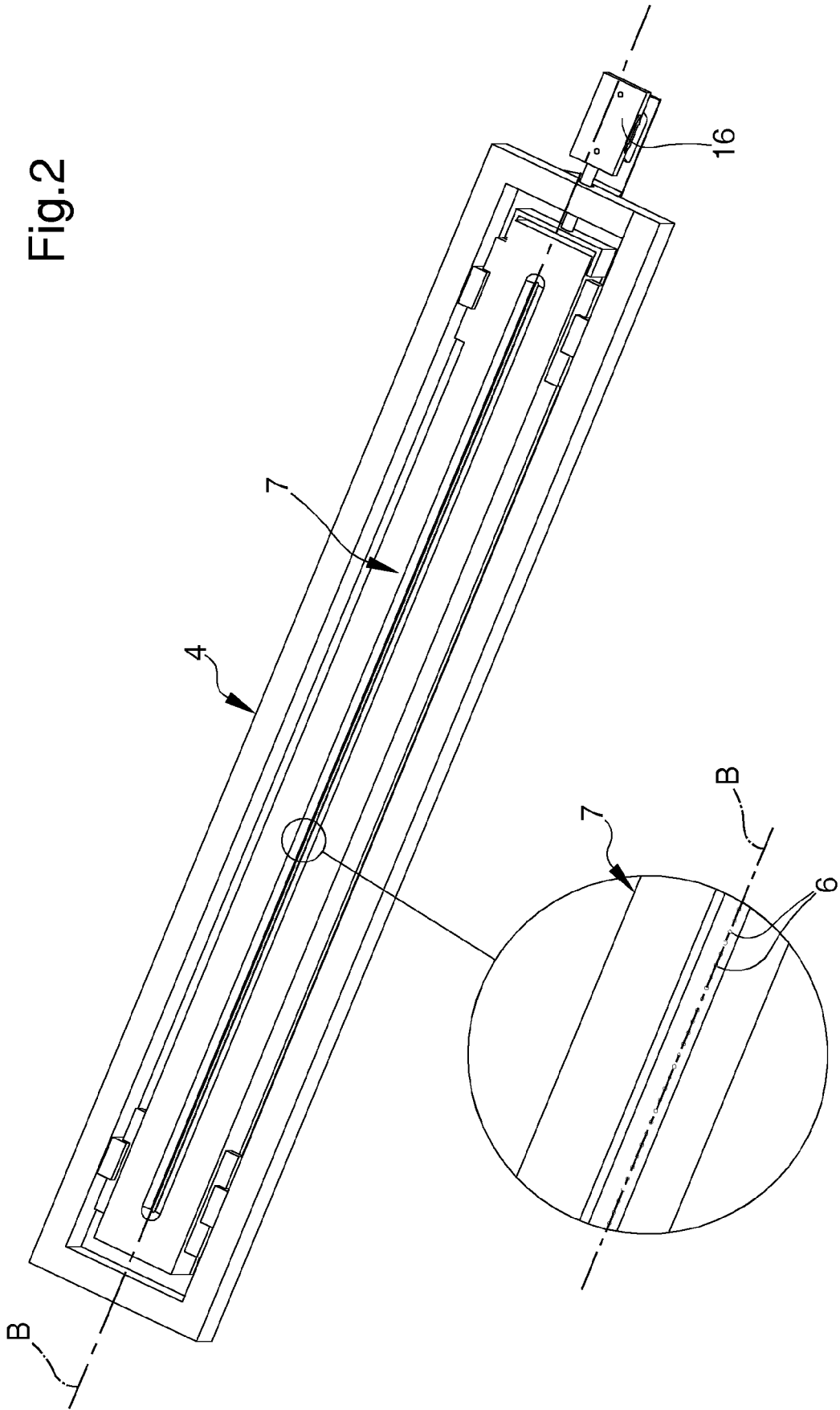


Fig.3

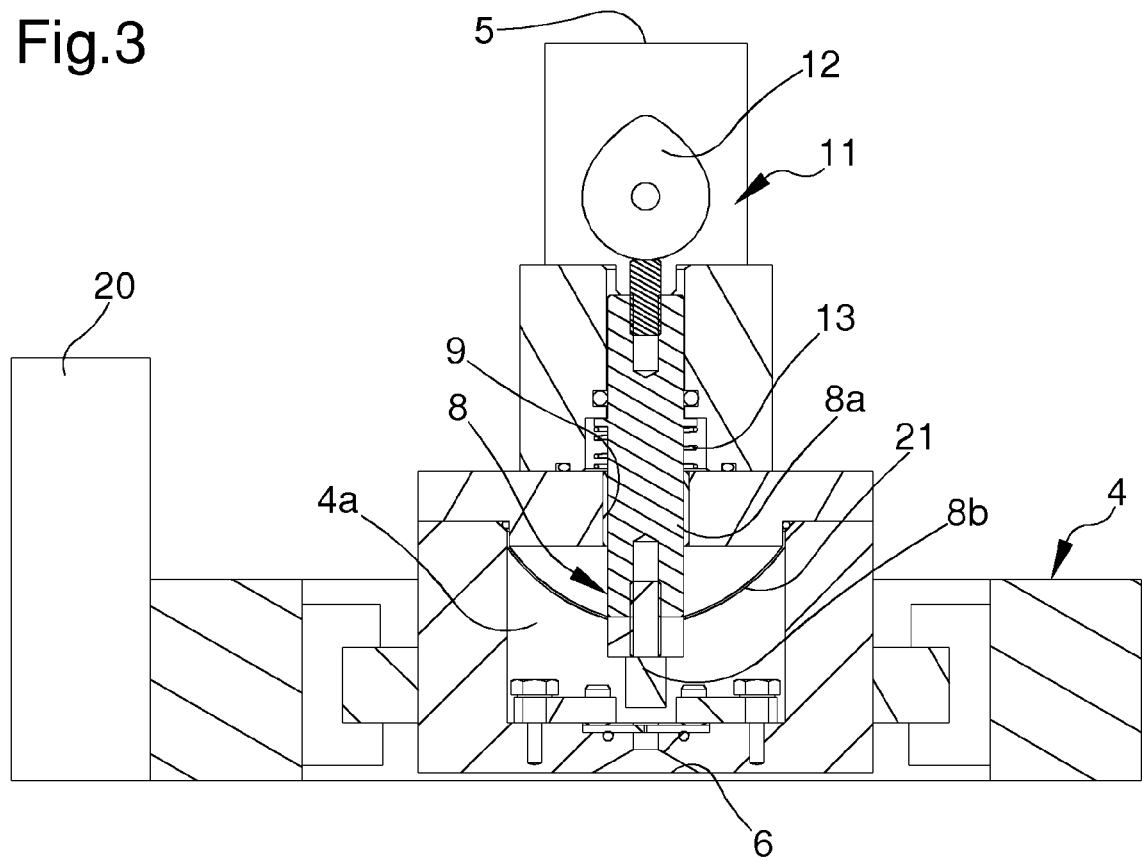
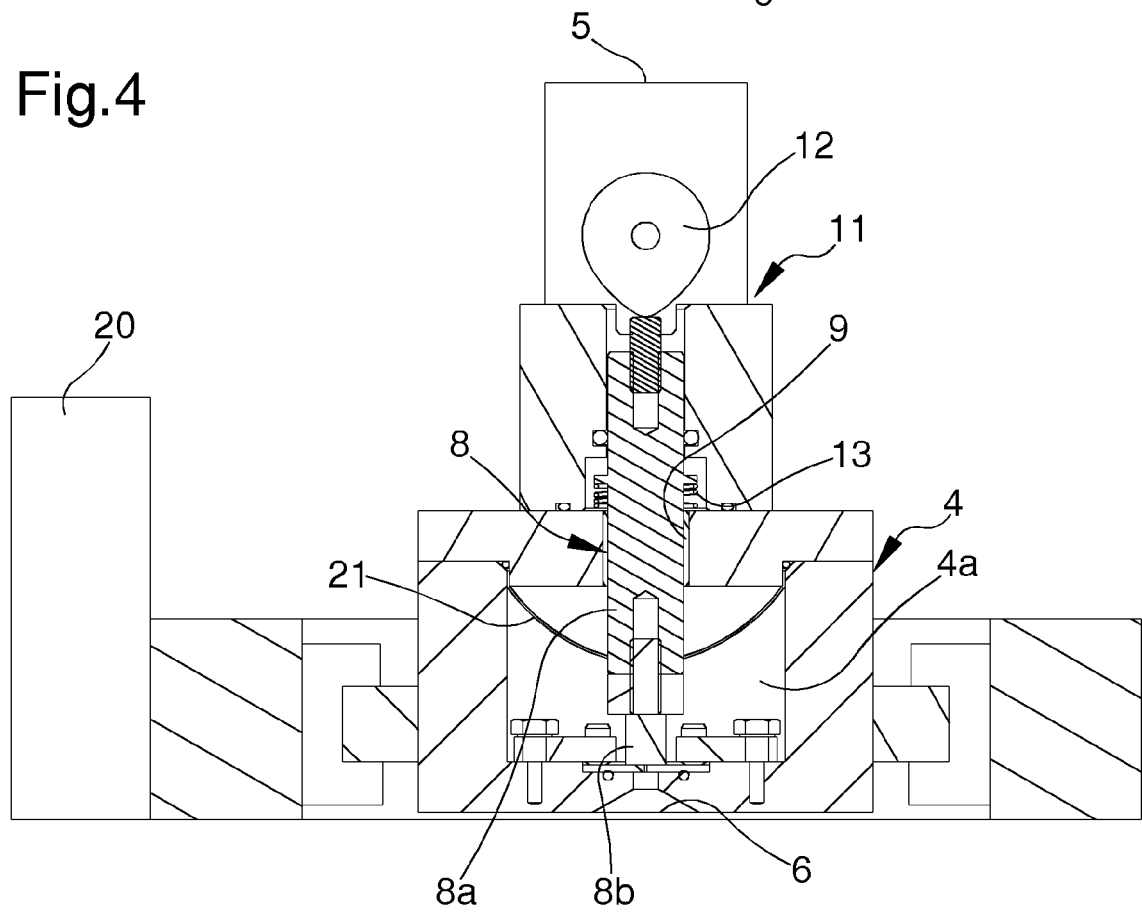


Fig.4



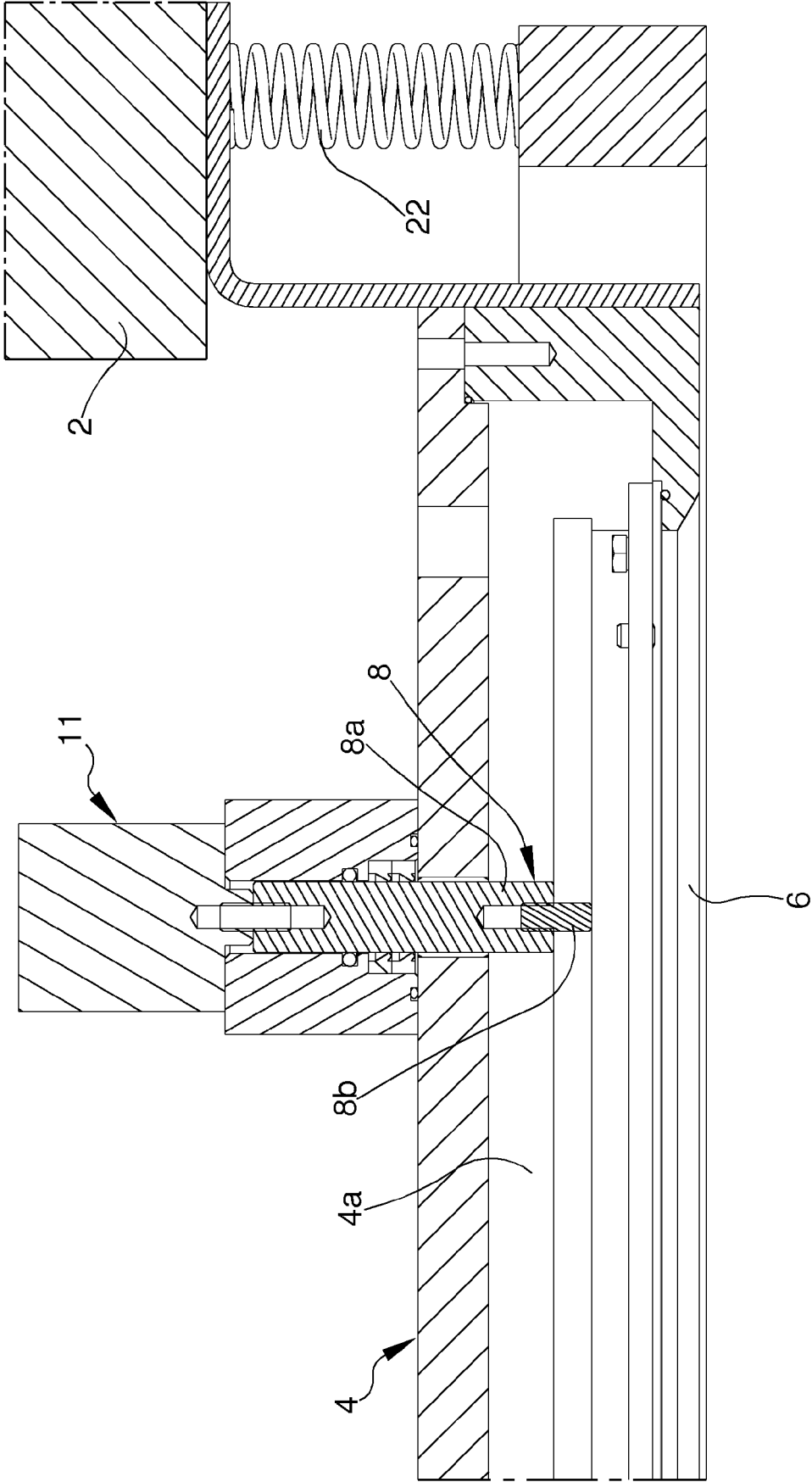


Fig.5



EUROPEAN SEARCH REPORT

Application Number

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Y	* paragraphs [0031] - [0034]; figures 1, 2 *	7, 14	B05B15/20 B05B15/50 B28B11/00
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Y	* column 15, line 28 - line 39; figure 7 *	7	

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	* page 3, column 1; figure 6 *		

Y	CN 103 950 297 A (TANG ZHENHUA) 30 July 2014 (2014-07-30)	14	
	* the whole document *		

The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			B05B B05C B28B B41J
Place of search		Date of completion of the search	Examiner
The Hague		15 December 2023	Bardet, Maude
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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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