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(54) **MACHINE AND METHOD FOR THE TREATMENT OF A BASE ARTICLE OF THE CERAMIC PROCESSING INDUSTRY**

(57) A machine and method for the treatment of a base article (4), to which a covering material (in particular, enamel) has been applied; the machine comprises a cleaning device (9), which, in turn, comprises at least one wheel (10), having a support body (11) and a peripheral layer (12), in particular comprising sponge, adapted to come into contact with the base article (4) in order to

clean at least an area of the base article (4); at least one mechanical locking device (14) is provided, which is adapted to fix the peripheral layer (12) to the support body (11); the first peripheral layer (12) comprises an oblong strip, which extends around the first support body (11) and has a first and a second end (15, 16), which are arranged so as to face each other.

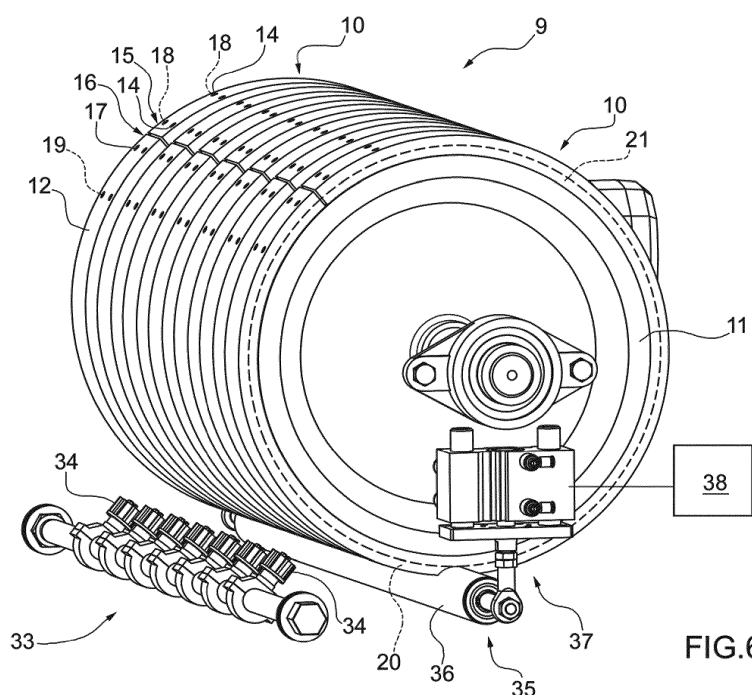


FIG.6

Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This patent application claims priority from Italian patent application no. 102017000124836 filed on 02/11/2017.

TECHNICAL FIELD

[0002] The present invention relates to a machine and a method for the treatment of a base article (BC) of the ceramic processing industry.

[0003] The present invention furthermore relates to a plant for the production of objects of the ceramic processing industry, in particular sanitary fixtures.

BACKGROUND of THE INVENTION

[0004] In the field of the production of ceramic items, it is common practice to use a plant comprising an enamelling machine for enamelling an intermediate ceramic article so as to obtain a base article; a cleaning device, which comprises a plurality of wheels, each having a respective support body and a peripheral layer adapted to come into contact with the base article to clean at least an area of said base article; a shaft, on which the wheels are mounted; and an actuator device to rotate the shaft around its longitudinal axis.

[0005] Normally the enamelling machine leaves a part of the outer surface of the ceramic article free from the enamel (typically, when the final ceramic object has been mounted in its position of use, said part is placed in contact with and fixed to a wall or a floor). The presence of smudges or drops of enamel on the cited part produces scrap pieces during the firing process in the kiln: the enamel at high temperature sticks to the refractory material on which the piece rests, resulting in breakage due to chipping during removal from the support causing non-conformity. Furthermore, if breakage does not occur, and smudges or drops remain, mounting of the ceramic article in its final position of use (for example on walls or floors) is difficult or in any case inaccurate. Therefore, ceramic objects that present these defects are discarded, once identified at the end of production. The cited cleaning device therefore has the function of reducing the risk of these problems occurring and a large number of ceramic objects being discarded.

[0006] The cleaning device further comprises a squeezing roller adapted to come into contact with the peripheral layers; and a collection tank arranged below the wheels.

[0007] The peripheral layer consists of an uninterrupted sponge ring. Said ring is typically obtained by cutting an annular element from a sheet of sponge having a thickness equal to the width of the wheels.

[0008] During use, the peripheral layer is subject to wear due to rubbing on the base articles. Following said

wear, the thickness of the peripheral layer is reduced, therefore decreasing the effectiveness of the cleaning action performed by the same on the surface concerned of the base article. Furthermore, due to the wear, the peripheral layer needs to be replaced frequently.

[0009] The operations for replacement of the peripheral layer are extremely long and laborious (a normal machine requires approximately one day's work) since it is necessary to remove and reassemble different parts of the machine.

[0010] JPH07710U describes a rotating drum, which has a spongy peripheral surface, and a nozzle to direct water onto the outer surface of the drum.

[0011] CN203185482 describes a device for cleaning tiles provided with a drum having a sleeve made of spongy material.

[0012] US3765329 describes a locking device to install a cover on a cylinder.

[0013] The object of the present invention is to provide a machine and a method for the treatment of a base article and a plant for the production of objects of the ceramic processing industry which overcome, at least partially, the drawbacks of the known art and, at the same time, are easy and inexpensive to produce.

SUMMARY

[0014] According to the present invention, a machine, a method and plant are provided as claimed in the following independent claims and, preferably, in any one of the claims depending directly or indirectly on the independent claims.

BRIEF DESCRIPTION OF THE FIGURES

[0015] The invention is described below with reference to the attached drawings, which illustrate some non-limiting embodiment examples thereof, in which:

- figure 1 is a schematic plan view of a plant according to the present invention;
- figure 2 is a perspective view of a machine (which is part of the plant of figure 1) according to the present invention;
- figure 3 is a side view of the machine of figure 2;
- figure 4 is a perspective view of a part of the machine of figure 2;
- figure 5 is a top view on an enlarged scale of the part of figure 4;
- figure 6 is a perspective view of the part of figures 4 and 5 with some details removed for the sake of clarity; and
- figure 7 is a side view of the part of figure 6.

DETAILED DISCLOSURE

[0016] In figure 1, the number 1 indicates overall a plant for the production of an object 2 (enamelled) of the ce-

ramic processing industry, in particular a sanitary fixture, for example a wash basin and/or a sink and/or a console and/or a shower tray. The plant 1 comprises an enamelling machine 3, which is adapted to apply a covering material (in particular, enamel) on an intermediate article (known per se and not illustrated) to obtain a base article 4 of the ceramic processing industry; a machine 5 for treatment of the base article 4; and a conveying system 6 for conveying the base article 4 (along a predefined path P) from the enamelling machine 3 to the machine 5 and through the machine 5.

[0017] According to some non-limiting embodiments, the plant 1 further comprises a kiln 8 (or dryer) for firing the base article 4 so as to obtain the object 2 (enamelled). In these cases, the conveying system 6 is adapted to convey the base article 4 from the machine 5 to the kiln 8 (through the kiln 8) and the object 2 from the kiln 8 to an output station 7.

[0018] Alternatively or additionally, the plant 1 comprises a machine for moulding (of per se known type and not illustrated), in particular for casting, the above-mentioned intermediate article (not illustrated) starting from a ceramic material (in particular, substantially liquid), more precisely a slip. In these cases, the conveying system is also adapted to convey the intermediate article from the moulding machine to the enamelling machine 3.

[0019] The machine 5 comprises a cleaning device 9, which in turn comprises at least one wheel 10 (in particular, a plurality of wheels 10; more in particular, seven to eighteen wheels 10), having a support body 11 (in particular, made of metal) and a peripheral layer 12, in particular comprising sponge (more in particular, made of sponge), adapted to come into contact with the base article 4 to clean at least an area of the base article 4; and an actuator device 13 to cause rotation of the wheel 10 (in particular, about an axis passing through the centre of said wheel 10).

[0020] In particular, the enamelling machine 3 is adapted to apply enamel only on one part of the intermediate article. In this way the base article 4 has a part of its outer surface substantially without enamel (on which, however, drops or smudges of enamel can form during the enamelling or during transport from the enamelling machine 3 to the machine 5). Said part of the outer surface of the base article 4 comprises or corresponds to the area with which the peripheral layer 12 comes into contact. In other words, the machine 5 is adapted to clean the enamel from the part of the outer surface of the base article 4 to which no enamel has been directly applied (and which will then be used to couple the object 2 to a wall or to a floor).

[0021] With particular reference to figures 4 to 6, the machine 5 (in particular, the cleaning device 9; more in particular, the wheel 10) further comprises at least one mechanical locking device 14 adapted to fix the peripheral layer 12 to the support body 11. The peripheral layer 12 comprises an oblong strip, which extends (in the direction of its longitudinal extension) (at least partially; in

particular, partially) around the support body 11 and has two ends 15 and 16, which are arranged facing each other. In other words, the oblong strip is (folded on itself) and wound (along its longitudinal extension) around the support body 11.

[0022] The presence of the locking device 14 allows the peripheral layer 12 to be mounted on the wheel 10 easily and quickly.

[0023] According to some non-limiting embodiments, the locking device 14 (is arranged at the ends 15 and 16 and) is structured so as to secure the two ends 15 and 16 to the support body 11.

[0024] Advantageously but not necessarily, the machine 5 (in particular, the cleaning device 9) further comprises at least one further mechanical locking device 17 adapted to fix the peripheral layer 12 to the support body 11. In particular, the locking device 17 is arranged at the end 16 to fix the peripheral layer 12 to the support body 11. More in particular, the locking device 17 is adapted to fix the end 16 to the support body 11.

[0025] According to some non-limiting embodiments, the locking device 14 is arranged at the end 15, in particular to fix the end 15 to the support body 11.

[0026] In some cases, the machine 5 (more precisely, the cleaning device 9; even more precisely, the wheel 10) comprises at least two (in particular, four) locking devices 14 and at least two (in particular, four) locking devices 17. In these cases, in particular, the two locking devices 14 (and 17) are each arranged at a respective side edge of the above-mentioned oblong strip.

[0027] According to some non-limiting embodiments, the (each) locking device 14 comprises (is) an element selected from the group consisting of: a screw, a nail, a clamp, a pin or a combination thereof. In particular, the (each) locking device 14 comprises (is) an element selected from the group consisting of: a screw, a nail and a combination thereof.

[0028] Additionally or alternatively, the (each) locking device 17 comprises (is) an element selected from the group consisting of: a screw, a nail, a clamp, a pin or a combination thereof. In particular, the (each) locking device 17 comprises (is) an element selected from the group consisting of: a screw, a nail and a combination thereof.

[0029] Advantageously but not necessarily, the peripheral layer 12 has at least two through holes 18 and 19 each arranged at a respective one of said ends 15 and 16.

[0030] In this way, mounting of the oblong strip on the support body 11 is particularly easy and quick.

[0031] The (each) locking device 14 is arranged at the (inside the) through hole 18. In particular, the (each) locking device 14 extends through the through hole 18. According to some embodiments, the (each) locking device 14 extends partially (in some cases, totally) through the through hole 18.

[0032] The (each) locking device 17 is arranged at the (inside the) through hole 19. In particular, the (each) locking device 17 extends through the through hole 19. According to some embodiments, the (each) locking device

17 extends partially (in some cases, totally) through the through hole 19.

[0033] In some cases, the peripheral layer 12 has at least two (in particular, four) through holes 18 and at least two (in particular, four) through holes 19 each arranged at a respective one of said ends 15 and 16. In these cases, in particular, the two through holes 18 (and the two through holes 19) are each arranged at a respective side edge of the above-mentioned oblong strip.

[0034] As better shown in figures 6 and 7, advantageously but not necessarily, the peripheral layer 12 comprises an outer layer 20, which comprises sponge (in particular Geraniocell foam rubber), and an inner layer 21, which comprises rubber (in particular, Para rubber) and is arranged between the outer layer 20 and the support body 11. In particular, the outer layer 20 and the inner layer 21 are integrally joined to each other.

[0035] This particular structure offers various advantages. Of these, we cite the fact that in this way the outer layer 20 has a more rigid and stable support, which is an aid during assembly and can prevent any damage to the outer layer 20. In this regard, it is important to underline that the peripheral layer 12 is obtained, advantageously but not necessarily, by water jet cutting of a sheet of sponge (preferably coupled to a Para rubber sheet) so as to obtain the above-mentioned oblong strip. With respect to the state of the art (which entails the cutting of closed annular elements), cutting of the oblong strip is simpler and enormously reduces the production of offcuts.

[0036] According to some non-limiting embodiments, the oblong strip has a width of approximately 50-60 mm and a thickness of approximately 18-20 mm.

[0037] Advantageously but not necessarily, the length of the oblong strip is (slightly) less than the outer perimeter of the support body 11. In this way, during assembly, the oblong strip is tensioned so as to guarantee the best adhesion to the support body 11 (at the same time reducing the risk of formation of folds and/or depressions). Typically, the oblong strip is approximately 1-3 cm shorter than the outer perimeter of the support body 11.

[0038] In particular, the ends 15 and 16 are not (brought into) in contact. In other words, the ends 15 and 16 are spaced from each other, more in particular by a distance from 0.5 cm to 2 cm.

[0039] The ends 15 and 16 are each delimited by a respective end edge which, advantageously but not necessarily, extends in an orthogonal (or diagonal) direction with respect to the side edges of the oblong strip. In particular, the end edges are substantially parallel to each other (when the outer support 20 is not mounted on the machine). More precisely, the end edges tend to take the shape of an angle (more precisely, a "V" shape) once assembled on the supports.

[0040] According to some preferred but non-limiting embodiments, the machine 5, in particular the cleaning device 9, comprises a shaft 22, which is integral with the support body 11 of the wheel 10 and extends through a

central area of said support body 11. The actuator device 13 is adapted to cause rotation of the shaft 22 about its longitudinal axis.

[0041] According to some preferred non-limiting embodiments, the machine 5, in particular the cleaning device 9, comprises a plurality of wheels 10 (as defined above). In particular, in these cases, the shaft 22 is integral with the support bodies 11 of the wheels 10 and extends through a central area of said support bodies 11.

[0042] Advantageously but not necessarily, the machine 5 comprises a conveying device 23 (part of the conveying system 6) to convey the base article 4 along a given path (part of the predefined path P), through a cleaning station 24, at which the cleaning device 9 is arranged.

[0043] Alternatively, the machine 5 does not comprise the conveying device 23 (in this case, the base article 4 is conveyed again towards the direction of its previous arrival).

[0044] Advantageously but not necessarily, the machine 5 comprises a control system 25 which is adapted to coordinate operation of the conveying device 23 and of the actuator device 13 so that the area of the peripheral layer 12 at which the mechanical locking devices 14 and 17 are arranged does not come into contact with the base article 4, in particular so that the base article 4 does not come into contact with the ends 15 and 16. This reduces the risk of the base article 4 being damaged or overturned during cleaning.

[0045] According to some non-limiting embodiments, the control system 25 comprises a sensor 26 to estimate the position and/or the movement of the base article 4 along the given path; a sensor 27 (in particular, a proximity detector) to estimate the angular position of the shaft 22 about its axis; and a control unit 28, which is adapted to adjust operation of the actuator device 13 and the conveying device 23 based on the data detected by the sensors 26 and 27.

[0046] According to some non-limiting embodiments (as better illustrated in figure 2), the conveying device 23 comprises a plurality of belts, which are adapted to support the base article 4 and each of which is wound around pulleys, at least one of which is driven (directly or indirectly) by an operating system (comprising, for example, a motor of a per se known type and not illustrated).

[0047] In accordance with some non-limiting embodiment examples, the sensor 26 is an encoder connected to one of the above-mentioned pulleys (and/or to an operation system of said pulleys - for example a motor or a shaft connected to a motor).

[0048] According to some non-limiting embodiments, the machine 5 also comprises a further cleaning device 29, which can be equal to or different from the cleaning device 9, but is defined as described above for the cleaning device 9. In the following discussion and in the attached drawings, parts of the cleaning device 29 are identified by the same reference numbers as the corresponding parts of the cleaning device 9.

[0049] In particular, the cleaning devices 9 and 29 are arranged along the predefined path P.

[0050] Advantageously but not necessarily, the machine 5 further comprises a conveying assembly 30 (figure 1) to convey the base article 4 along a conveying path (part of the predefined path P and in particular comprising the above-mentioned given path), through the cleaning station 24, at which the cleaning device 9 is arranged, and a cleaning station 32, which is upstream of the cleaning station 24 along the conveying path and at which the cleaning device 29 is arranged.

[0051] According to some non-limiting embodiments, the conveying assembly 30 (part of the conveying system 6) comprises the cited conveying device 23 and a transfer unit 33 which is adapted to feed the base article 4 (from the enamelling machine 3) to the machine 5 (more precisely, to the cleaning device 29).

[0052] In particular, the transfer unit 33 comprises an anthropomorphic robot or a Cartesian axis manipulator device, which is adapted to support the base article 4 and is provided with a support element 34 (only partially illustrated) having a plurality of prongs spaced from one another. In these cases, in use, during its movements, the anthropomorphic robot or the manipulator device transfers the base article 4 to the area of the cleaning station 32 so that the prongs are arranged between the wheels 10 of the cleaning device 29. It should be noted that the areas covered by the prongs are subsequently cleaned by the wheels of the cleaning device 9.

[0053] Advantageously but not necessarily, the wheel 10 of the cleaning device 29 is arranged staggered (in the direction of forward movement along the conveying path) with respect to the wheel of the cleaning device 9. More precisely, the wheels 10 of the cleaning device 29 are arranged staggered (in the direction of forward movement along the conveying path) with respect to the wheels of the cleaning device 9. In this way, it is possible to clean the entire part of the outer surface of the base article 4, which must remain substantially without enamel.

[0054] According to some non-limiting embodiments, the control system 25 is adapted to control operation of the conveying assembly 30 and of the actuator devices 13 of the cleaning devices 9 and 29, so that the base article 4 does not come into contact with the ends 15 and 16 and/or with the areas of the peripheral layers 12, the locking devices 14 being arranged in said areas. This reduces the risk of the base article 4 being damaged or overturned during the cleaning.

[0055] Advantageously but not necessarily, the cleaning device 9 (and/or 29) comprises a washing device 33 (figures 6 and 7), which comprises at least one emitting nozzle 34 (in particular a plurality of emitting nozzles 34; more in particular, an emitting nozzle 34 for each wheel 10) to direct a washing fluid towards the wheel 10, and a squeezing device 35 to compress the peripheral layer 12 so as to drain at least part of the washing fluid from the peripheral layer 12. The squeezing device 35 com-

prises a contact element 36 (in particular, a roller) which is adapted to come into contact with the peripheral layer 12; at least one actuator 37 to push the contact element 36 towards the wheel 10; and a control unit 38 (in particular, connected to the or partially coinciding with the control unit 28) to adjust operation of the actuator 37 so that the contact element 36 exerts a given pressure (as constant as possible) on the peripheral layer 12.

[0056] In this way it is possible to maintain good washing quality and efficiency of the peripheral layer/s even when the peripheral layer/s becomes/become worn.

[0057] More in particular, the control unit 38 comprises at least one sensor to detect and adjust the pressure exerted by the contact element 36 on the peripheral layer 12 and is adapted to operate the actuator 37 based on the data detected by said sensor.

[0058] Advantageously but not necessarily, the washing device 33 also comprises a collection tank 39 arranged at least partially below the wheel 10 to collect at least part of the washing fluid; and a movement device (for example a hydraulic or mechanical jack) to move the collection tank 39 (upwards and/or downwards).

[0059] According to some non-limiting embodiments not illustrated, the machine 5 (in particular, the cleaning device 9; more in particular, both the cleaning device 9 and the cleaning device 29) comprises a positioning device (e.g. comprising an asynchronous motor or a stepper motor or a fluid-dynamic actuator or similar) to modify the position of the wheel/s 10 transversally (in particular, perpendicularly) to the predefined path P and to the axis/axes of rotation of the wheel/s 10. More precisely, said positioning device is adapted to move the wheel/s 10 vertically.

[0060] Advantageously but not necessarily, the control system 25 is adapted to control the positioning device according to the weight of the base article 4. More precisely, in use, the positioning device raises (slightly) the wheel/s 10 when the base article 4 is relatively light, and lowers the wheel/s 10 when the base article 4 is relatively heavy.

[0061] In this way it is possible to maintain the wheel/s 10 in an optimal position (more precisely, define the correct pressure of the sponge pushing against the base article 4) with respect to the base article 4 which, according to the weight, is positioned higher or lower (in the cleaning station/s 24 and/or 32). In this regard, it should be noted that, according to the weight of the base article 4, the belts of the conveying device 23 can deform to a greater or lesser extent, therefore modifying the height of the base article 4.

[0062] According to some non-limiting embodiments, the weight of the base article 4 is determined (by weighing) upstream of the cleaning station/s 24 and/or 32. Alternatively, the control system 25 stores the weight of each base article 4 which can be treated by the device 9 (or the height to which the wheel/s 10 must be set for each base article 4 which can be treated by the device 9) and controls the positioning device accordingly.

[0063] Alternatively or additionally, the control system 25 is adapted to control the positioning device according to the wear (and, therefore, the thickness) of the peripheral layer 12.

[0064] More precisely, the greater the wear (and therefore the lesser the thickness) of the peripheral layer 12, the higher the wheel/s 10. This compensates for the reduction in thickness.

[0065] According to specific embodiments, the control system 25 raises the wheel/s 10 the more the wheel/s 10 is/are used (the utilization time is an indirect indication of the wear) .

[0066] In accordance with the present invention a method is also provided for the treatment of a base article 4 (as described above) of the ceramic processing industry (in particular, to which a covering material - in particular enamel - has been applied) . The method comprises a cleaning phase, during which a machine 5 as described above for the treatment of the base article 4, in particular its cleaning device, cleans at least one area of the base article 4.

[0067] The subject of the present invention has several advantages with respect to the state of the art. Among these is the fact that the present invention allows surprisingly rapid acceleration of the operations for replacement of the peripheral layer/s. In this regard, it has been observed that an operator replaces the peripheral layers of a conventional machine in approximately one working day. With the present invention the replacement times of the peripheral layers are reduced to between approximately half an hour (when operating on one single wheel 10) to approximately 2 hours (when operating on eighteen wheels 10).

[0068] In the case discussed herein, to replace a peripheral layer 12 the operator only has to detach the worn peripheral layer 12 from the support body 11 (for example by pulling it with sufficient force and/or removing the fixing devices), secure a first end 15 by means of the relative locking device/s 14, cause a rotation of the support body 11 in controlled mode keeping the oblong strip aligned with the respective support and fix the second end 16 by means of the relative locking device/s 17. It is not necessary to remove further parts of the machine and subsequently reassemble them in order to replace the peripheral layer 12.

Claims

1. A machine for the treatment of a base article (4), to which a covering material (in particular, enamel) has been applied, of the ceramic processing industry for the production of objects (in particular, enamelled objects), in particular sanitary fixtures; the machine comprises a first cleaning device (9), which, in turn, comprises at least one first wheel (10), having a first support body (11) and a first peripheral layer (12), in particular comprising sponge, adapted to come into

contact with the base article (4) in order to clean at least an area of the base article (4); and a first actuator device (13) to cause the rotation of the first wheel (10);

the machine being **characterized in that** the cleaning device (9) comprises at least one first mechanical locking device (14), which is adapted to fix the first peripheral layer (12) to the first support body (11); the first peripheral layer (12) comprises an oblong strip, which extends at least partially around the first support body (11) and has a first and a second end (15, 16), which are arranged so as to face each other; the machine comprising at least one second mechanical locking device (17) to fix the first peripheral layer (12) to the first support body (11); the first peripheral layer (12) having a first through hole (18) and at least a second through hole (19) each arranged at a respective one of said first and second ends (15, 16); the first mechanical locking device (14) extending at least partially through the first through hole (18); the second mechanical locking device (17) extending at least partially through the second through hole (19).

2. The machine according to claim 1, wherein said first end (15) and said second end (16) are spaced.

3. The machine according to claim 2, wherein the second mechanical locking device (17) is arranged at the second end (16); the first mechanical locking device (14) is arranged at the first end (15); said first end (15) and said second end (16) are spaced by at least 0.5 cm.

4. The machine according to any one of the preceding claims, wherein the first peripheral layer (12) comprises an outer layer (20), which comprises sponge, and an inner layer (21), which comprises rubber and is arranged between the outer layer (20) and the first support body (11).

5. The machine according to any one of the preceding claims and comprising a plurality of wheels (10); and a shaft (22), which is integral to the support bodies (11) of the wheels (10) and extends through a central area of the support bodies (11); the first actuator device (13) being adapted to cause the shaft (22) to rotate around a longitudinal axis thereof.

6. The machine according to any one of the preceding claims and comprising a conveying device (23) to convey the base article (4) along a given path, through a first cleaning station (24), at which the first cleaning device (9) is arranged; and a control system (25), which is adapted to coordinate the operation of the conveying device (23) and of the first actuator device (13) so that the base article (4) does not come into contact with the first and the second end (15,

16), in particular so that the area of the first peripheral layer (12) where the first and the second mechanical locking device (14, 17) are arranged does not come into contact with the base article (4).

7. The machine according to claim 6, and comprising a shaft (22), which is integral to the first support body (11); the first actuator device is adapted to cause the shaft (22) to rotate around its longitudinal axis; the control system (25) comprises a first sensor (26) to estimate the position and/or the movement of the base article (4) along the conveying path; a second sensor (27) to estimate the position of the shaft (22) around its own axis; and a control unit (28), which is adapted to adjust the operation of the first actuator device (13) and/or of the conveying device (23) based on the data detected by the first and the second sensor (26, 27).
8. The machine according to any one of the preceding claims and comprising a second cleaning device (29) provided with a second wheel (10), which has a second support body (11) and a second peripheral layer (12), in particular comprising a sponge, adapted to come into contact with the base article (4) in order to clean at least a further area of the base article (4); a second actuator device to cause the second wheel (10) to rotate around a further rotation axis, which is different from (in particular, staggered with respect to and parallel to) the rotation axis around which said first actuator device (13) is adapted to cause said first wheel (10) to rotate; and at least a third mechanical locking device (14) adapted to fix the second peripheral layer (12) to the second support body (11); the second peripheral layer (12) comprises an oblong strip, which extends at least partially around the first support body (11) and has a third and a fourth end (15, 16), which are arranged so as to face each other; in particular, the second cleaning device (29) comprises at least one fourth mechanical locking device (17), which is arranged at the fourth end (16) in order to fix the second peripheral layer (12) to the second support body (11); in particular, the third locking device (14) is arranged at the third end (20).
9. The machine according to claim 8, wherein the second peripheral layer (12) has a third and at least a fourth through hole (18, 19) arranged, respectively, at the third end and at the fourth end (15, 16); the third mechanical locking device (14) extends at least partially through the third through hole (18); the fourth mechanical locking device (17) extends at least partially through the fourth through hole (19); in particular, the second cleaning device (29) is defined as the first cleaning device (9).
10. The machine according to claim 8 or 9 and compris-

ing a conveying assembly (30) to convey the base article (4) along a conveying path, through a first cleaning station (24), where the first cleaning device (9) is arranged, and a second cleaning station (32), which is upstream of the first cleaning station (24) along the conveying path and where the second cleaning device (29) is arranged; and a control system (25), which is adapted to control the operation of the conveying assembly (30), of the first actuator device (13) and of the second actuator device so that the base article (4) does not come into contact with the first, the second, the third and the fourth end (15, 16), in particular so that the areas of the first peripheral layer (12) and of the second peripheral layer where the first, the second, the third and the fourth mechanical locking device (14, 17) are arranged do not come into contact with the base article (4); in particular, the conveying assembly (30) comprises the conveying device (23).

11. The machine according to any one of the preceding claims, wherein the first cleaning device (9) comprises a washing device (33), which comprises at least one emitting nozzle (34) to direct a washing fluid at the first wheel (10) and a squeezing device (35) to compress the first peripheral layer (12) so as to drain at least part of the washing fluid from the first peripheral layer (12); the squeezing device (35) comprising a contact element (36) (in particular, a roller), which is adapted to come into contact with the first peripheral layer (12); an actuator (37) to push the contact element (36) towards the first wheel (10); and a control unit (38) to adjust the operation of the actuator (37) in such a way that the contact element (36) exerts a substantially constant given pressure upon the first peripheral layer (12).
12. The machine according to any one of the preceding claims, wherein the first cleaning device (9) comprises at least one collection tank (39) arranged at least partially under the wheel (10) so as to collect at least part of the washing fluid; and a moving device to move the collection tank (39) upwards and/or downwards.
13. A plant for the production of an object (2) of the ceramic processing industry, in particular sanitary fixtures; the plant (1) comprises an enamelling machine to apply a coating material (in particular, an enamel) to an intermediate article so as to obtain a base article (4); a machine (5) for the treatment of the base article (4) according to one of the preceding claims; a kiln or a dryer for the treatment of the base article so as to obtain said object (2) of the ceramic processing industry; and a conveyor system (6) to convey the base article (4) from the enamelling machine (3) to the machine (5) for the treatment of the base article

(4), through the machine (5) for the treatment of the base article (4) and from the machine (5) for the treatment of the base article (BC) to the kiln (8) and to convey the object (2) of the ceramic processing industry from the kiln (8) to an output station (7). 5

- 14.** A method for the treatment of a base article (4) of the ceramic processing industry, the method comprises a cleaning step, during which the machine (5) for the treatment of the base article according to any one of claims 1 to 12, in particular the cleaning device (9) thereof, cleans at least an area of the base article (4). 10

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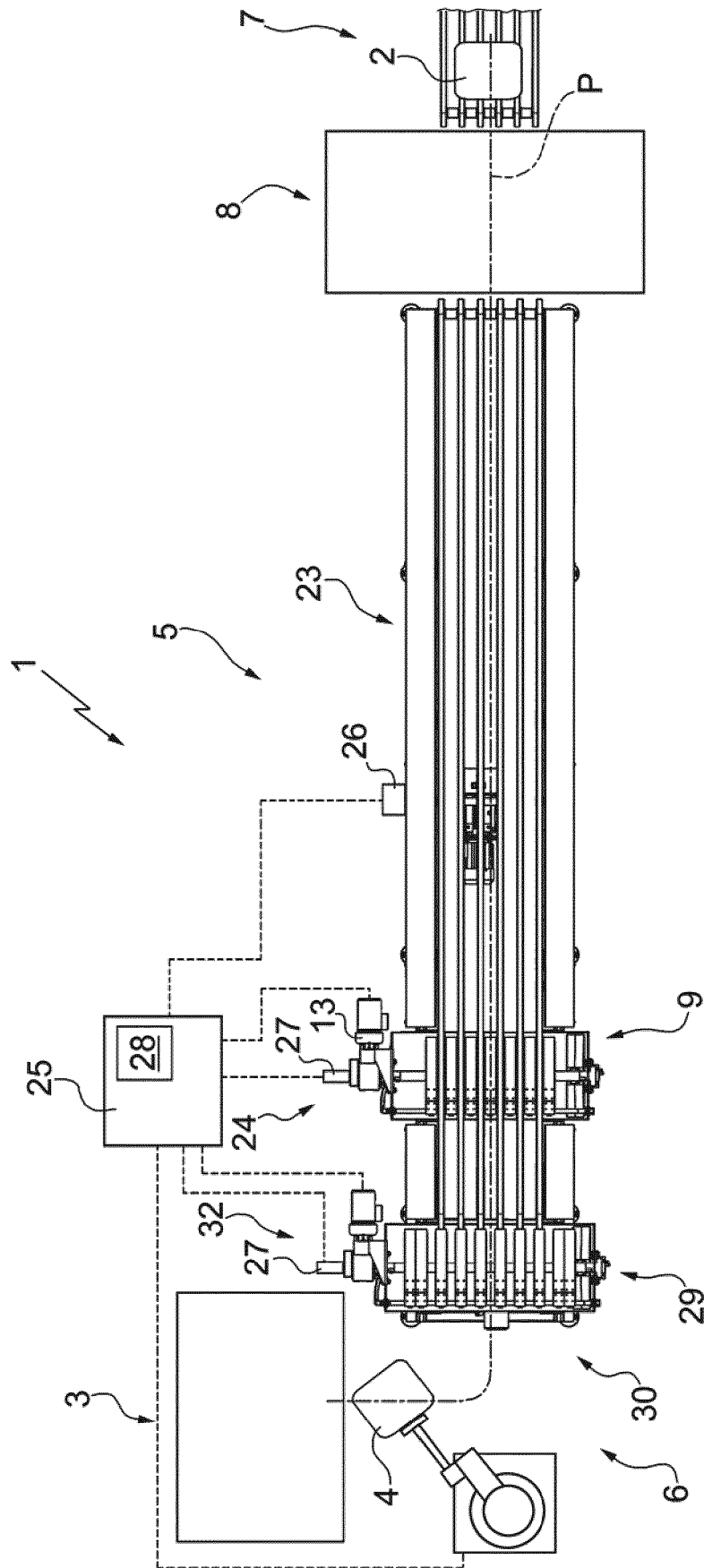


FIG.1

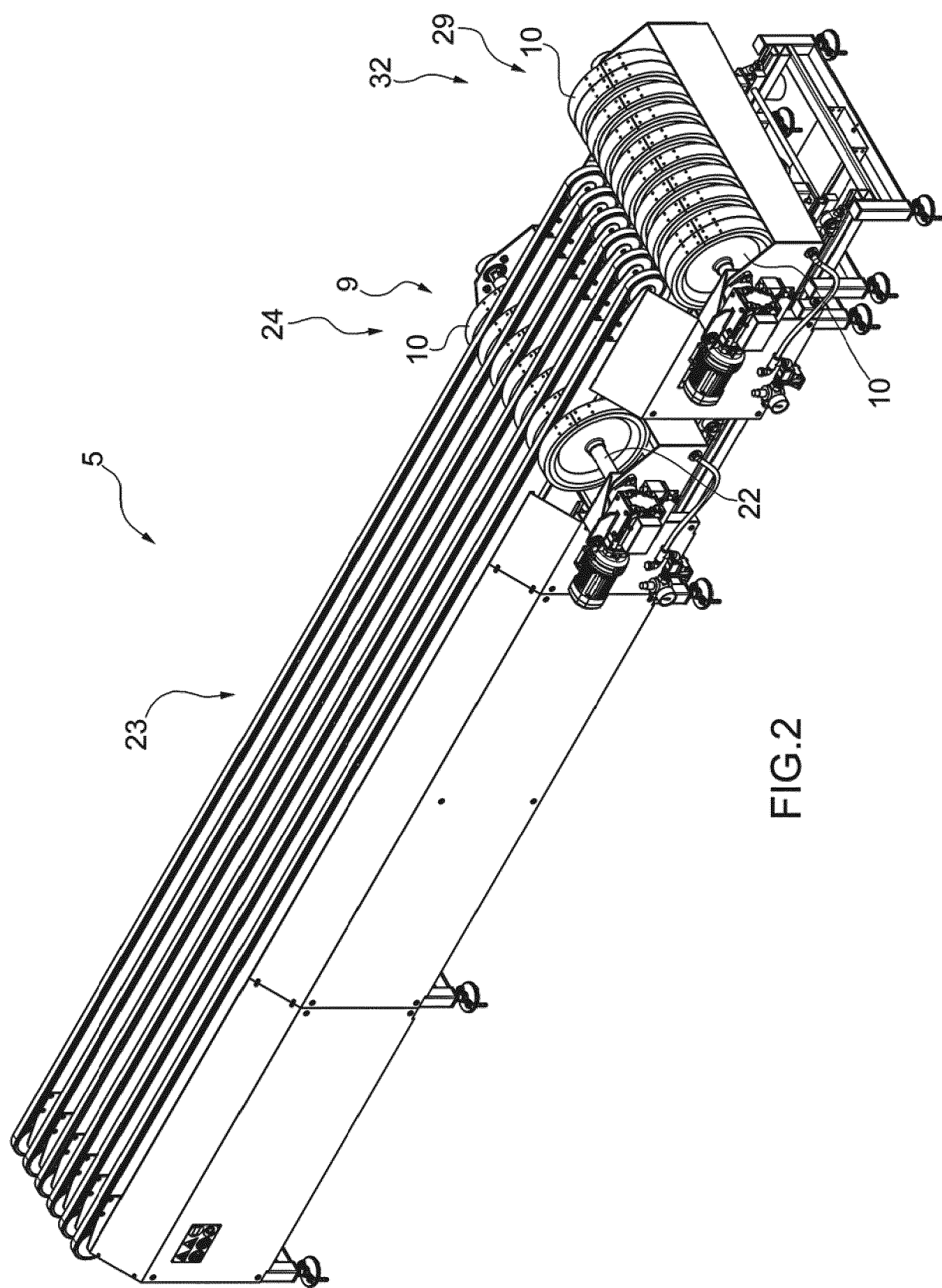


FIG.2

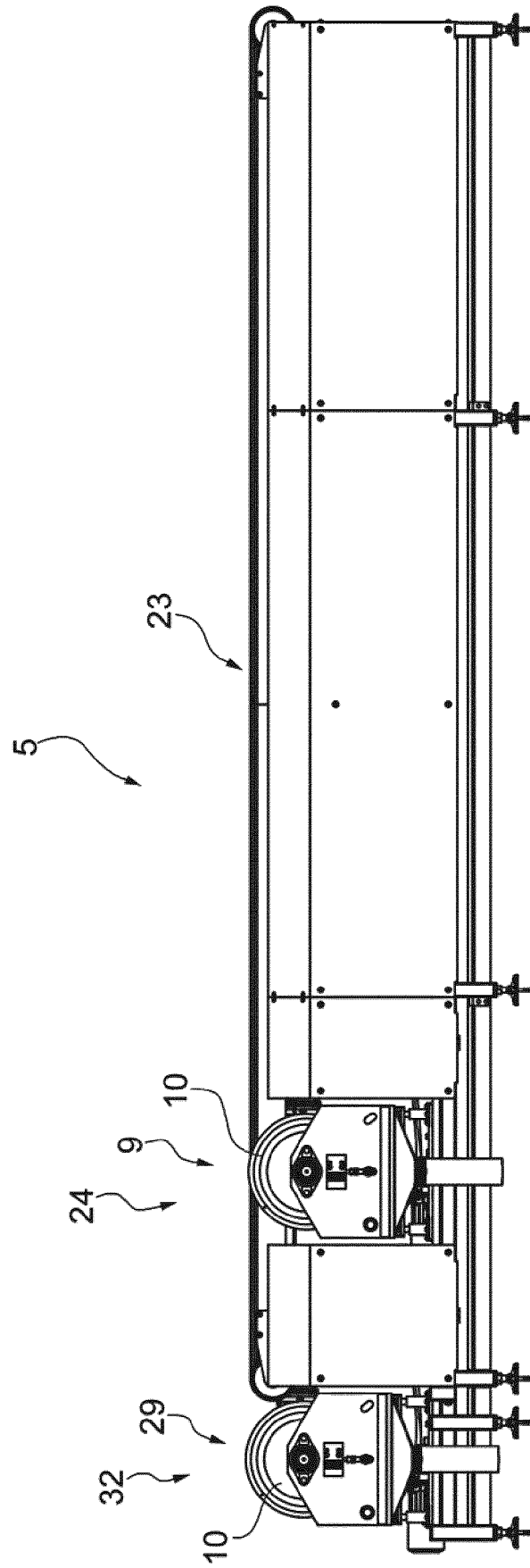


FIG.3

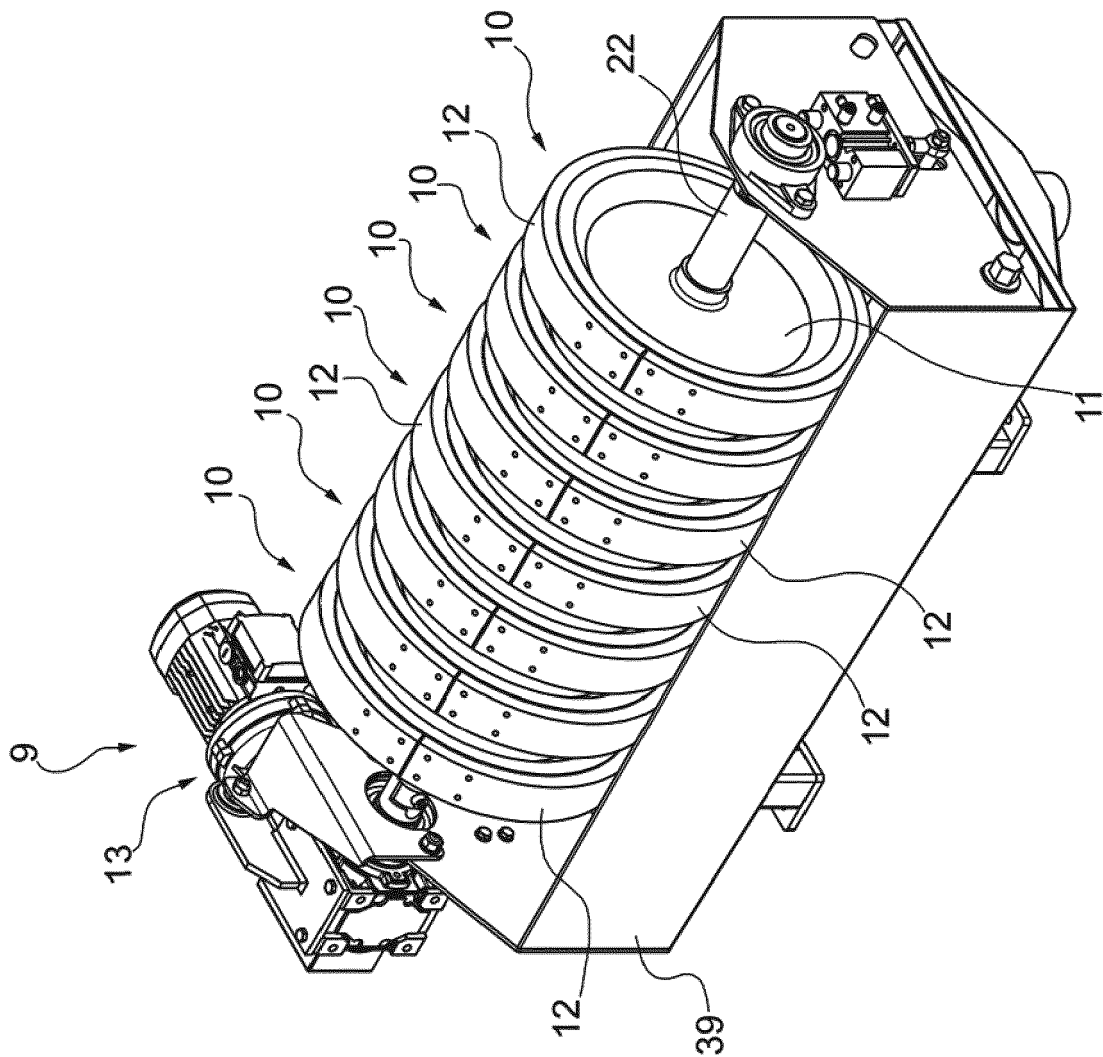


FIG.4

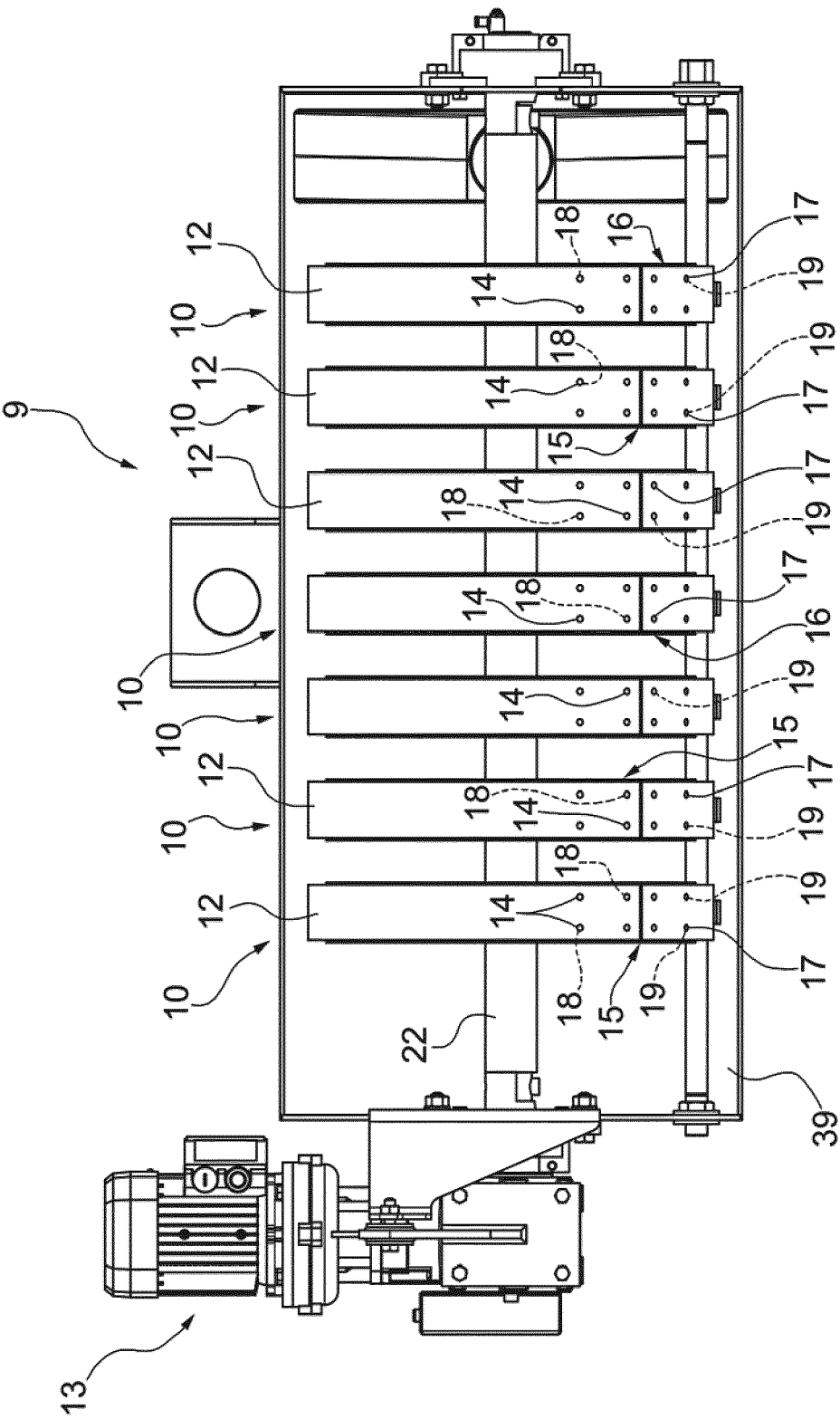
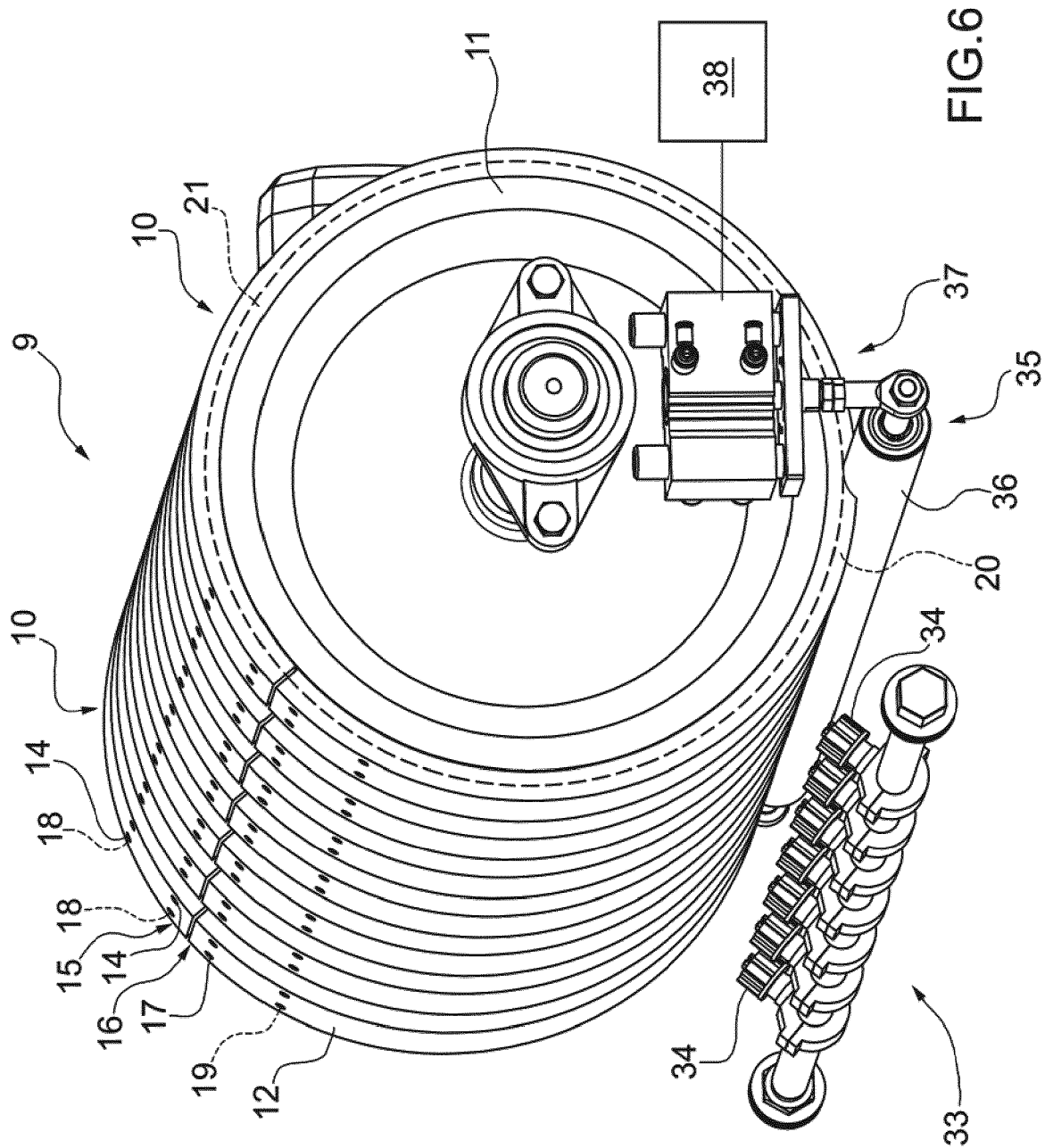
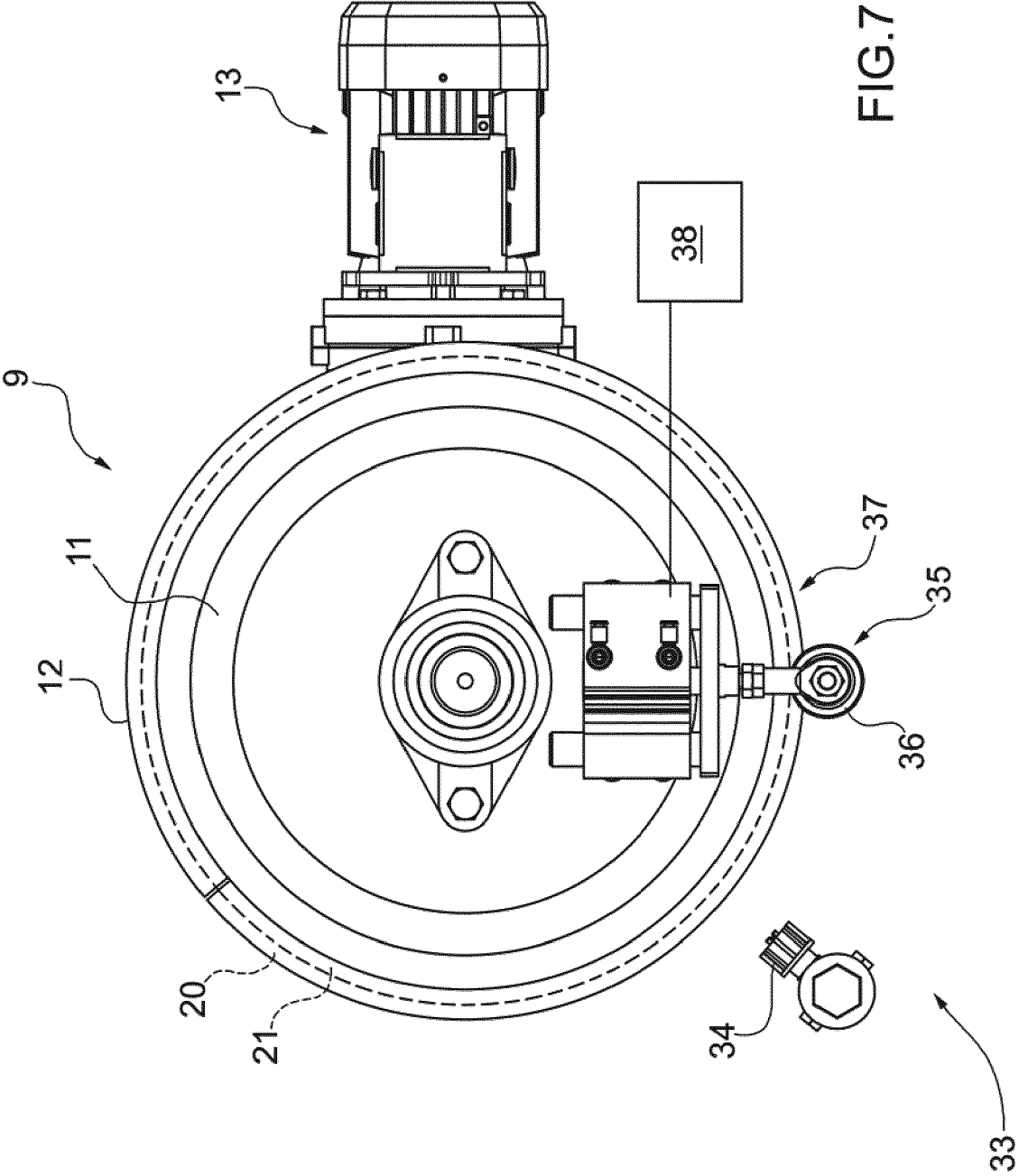


FIG.5







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Place of search The Hague		Date of completion of the search 14 March 2019	Examiner Voltz, Eric
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