US 20240228084A1

(19) **United States**

(12) **Patent Application Publication**

DROCCO

(10) **Pub. No.: US 2024/0228084 A1**

(43) **Pub. Date: Jul. 11, 2024**

(54) **HIGH-SPEED AUTOMATIC LINE FOR PRODUCING PAINTS**

(71) Applicant: **DROMONT S.p.A.**, Grinzane Cavour (Cuneo) (IT)

(72) Inventor: **Luca DROCCO**, Alba (Cuneo) (IT)

(21) Appl. No.: **18/398,350**

(22) Filed: **Dec. 28, 2023**

(30) **Foreign Application Priority Data**

Jan. 5, 2023 (IT) 102023000000099

Publication Classification

(51) **Int. Cl.**

B65B 3/30	(2006.01)
B65B 3/06	(2006.01)
B65B 7/28	(2006.01)
B65B 43/54	(2006.01)
B65B 63/00	(2006.01)
B65B 65/00	(2006.01)

(52) **U.S. Cl.**

CPC ***B65B 3/30*** (2013.01); ***B65B 3/06*** (2013.01); ***B65B 7/2842*** (2013.01); ***B65B 43/54*** (2013.01); ***B65B 63/00*** (2013.01); ***B65B 65/003*** (2013.01)

(57) **ABSTRACT**

An automatic line for producing paints and the like wherein a dispensing of the bases and colorants is programmed so as to dispense in an order a first base, a dose of colorant and a second base inside a retail container, so that before mixing, the colorant is confined between two bases and there is no risk of part of the colorant adhering to an inner face of the lid without participating in the mixing.

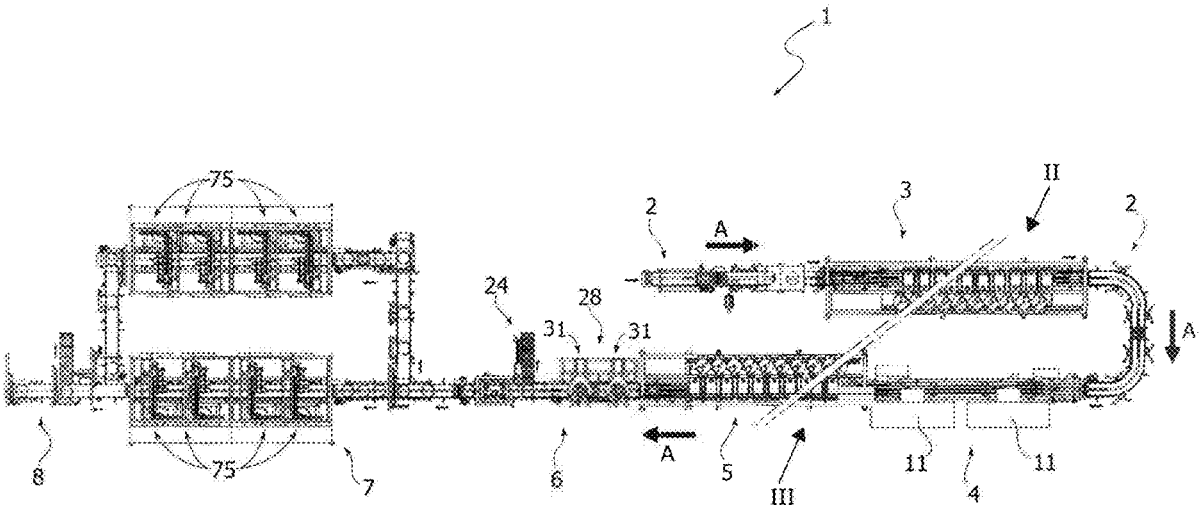


FIG. 1

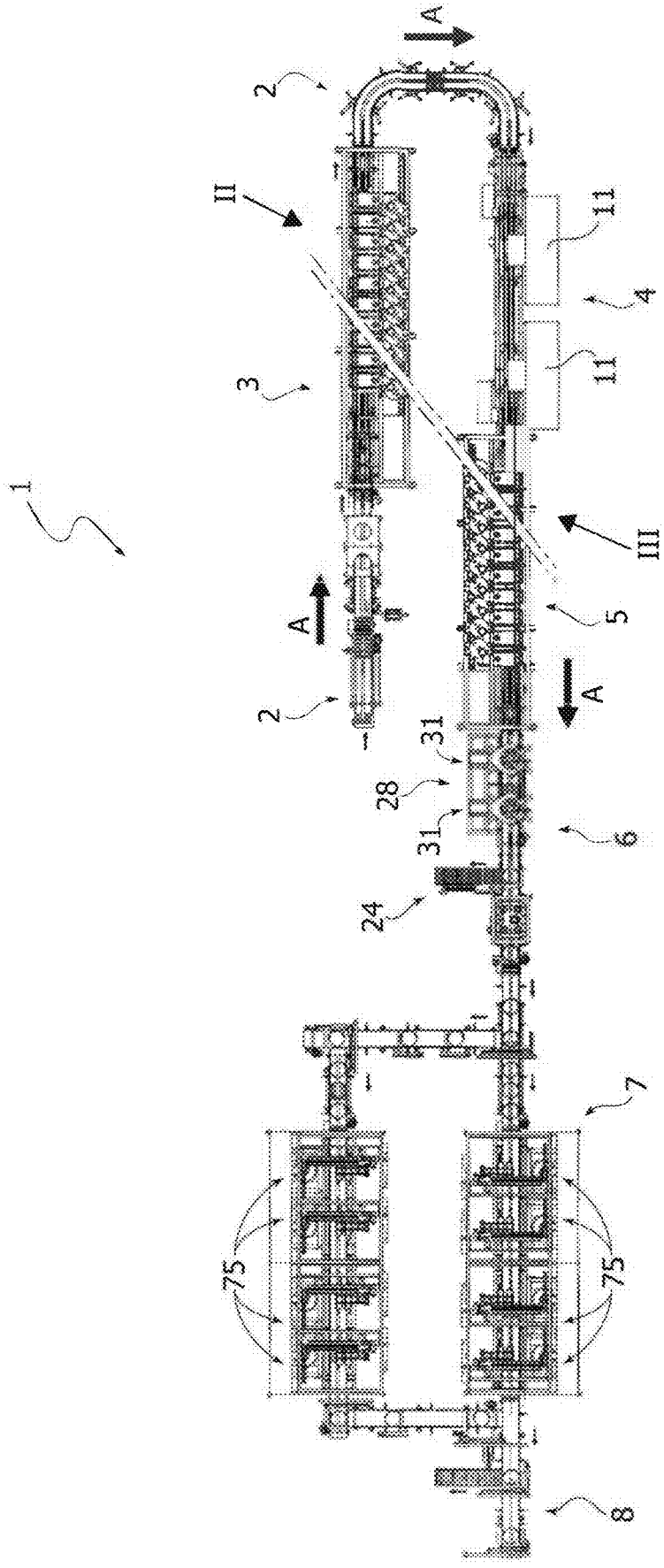


FIG. 2

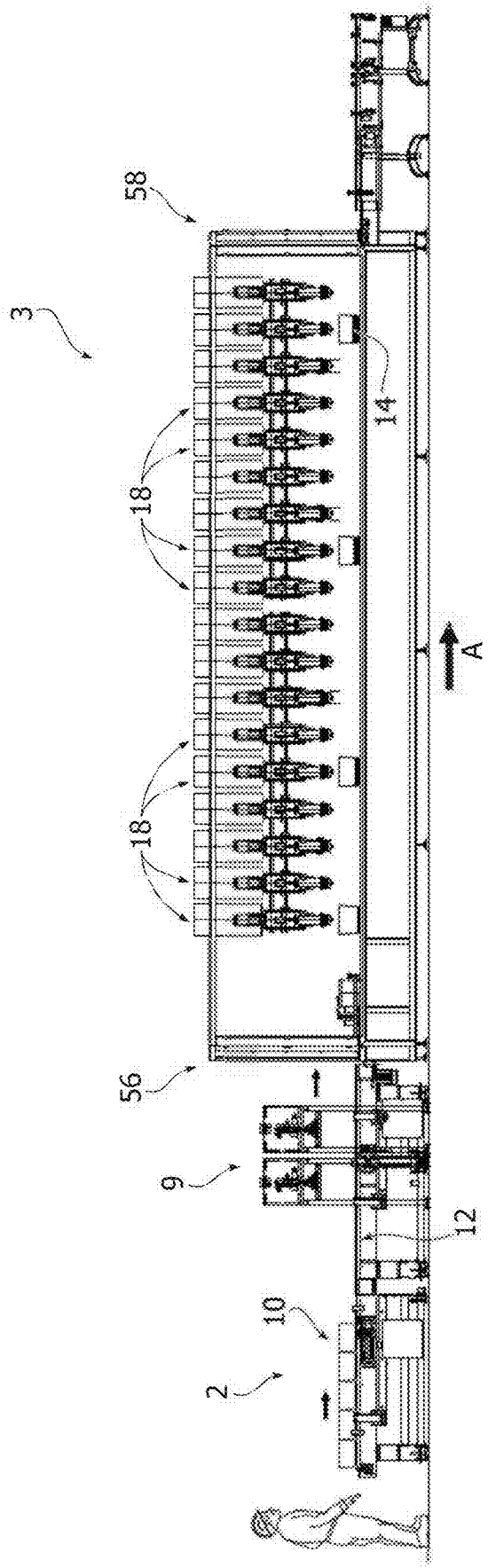


FIG. 3

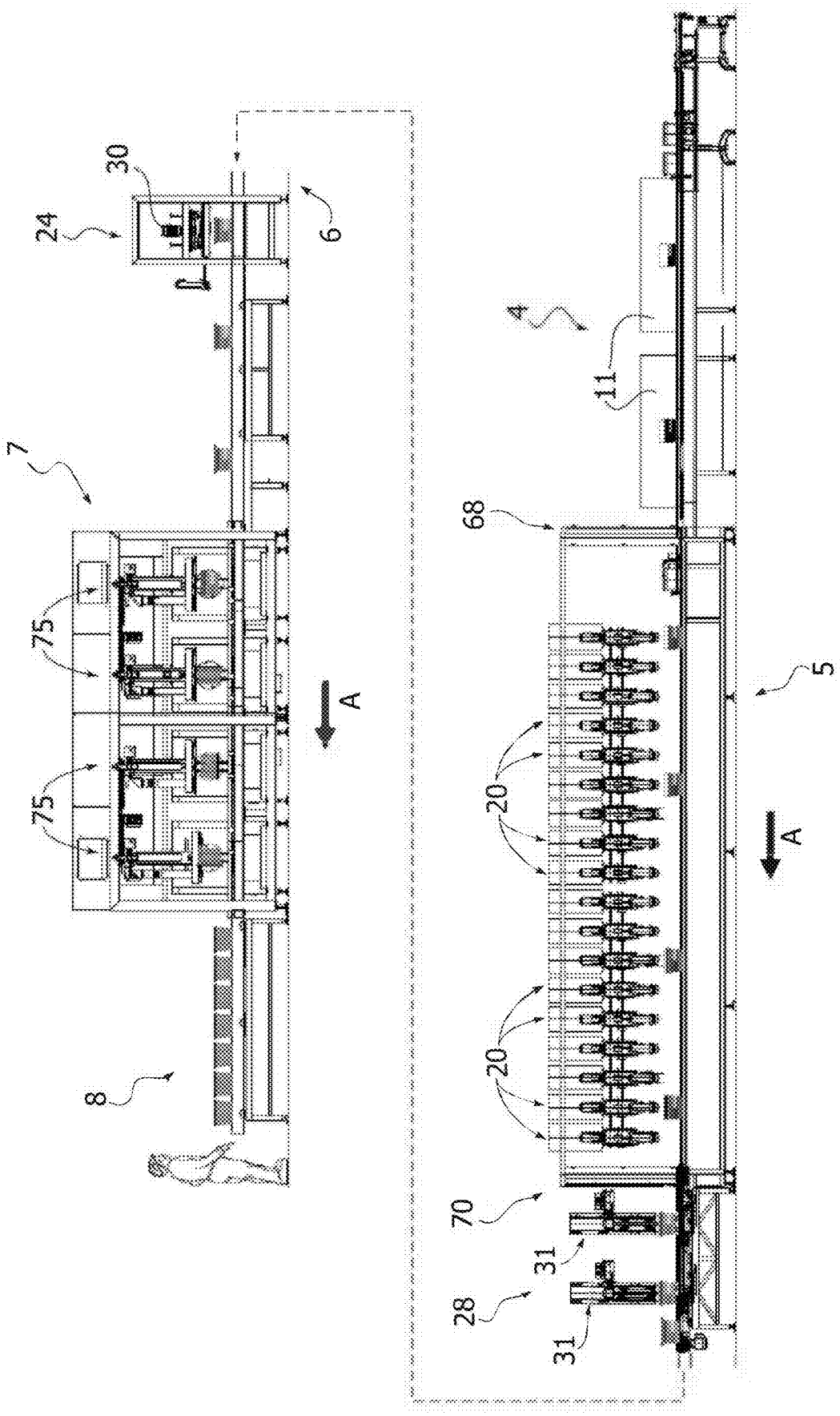


FIG. 4

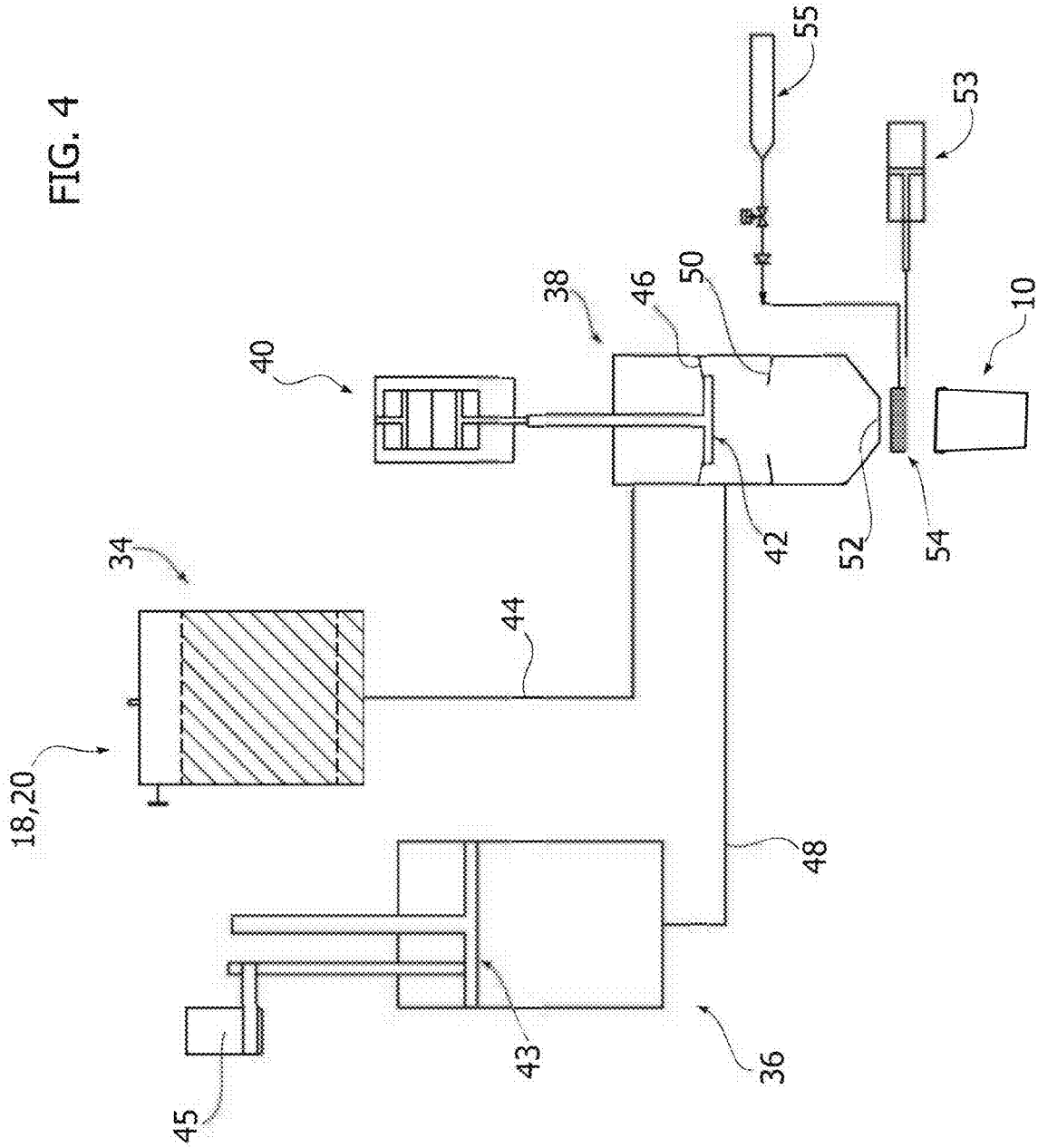


FIG. 5

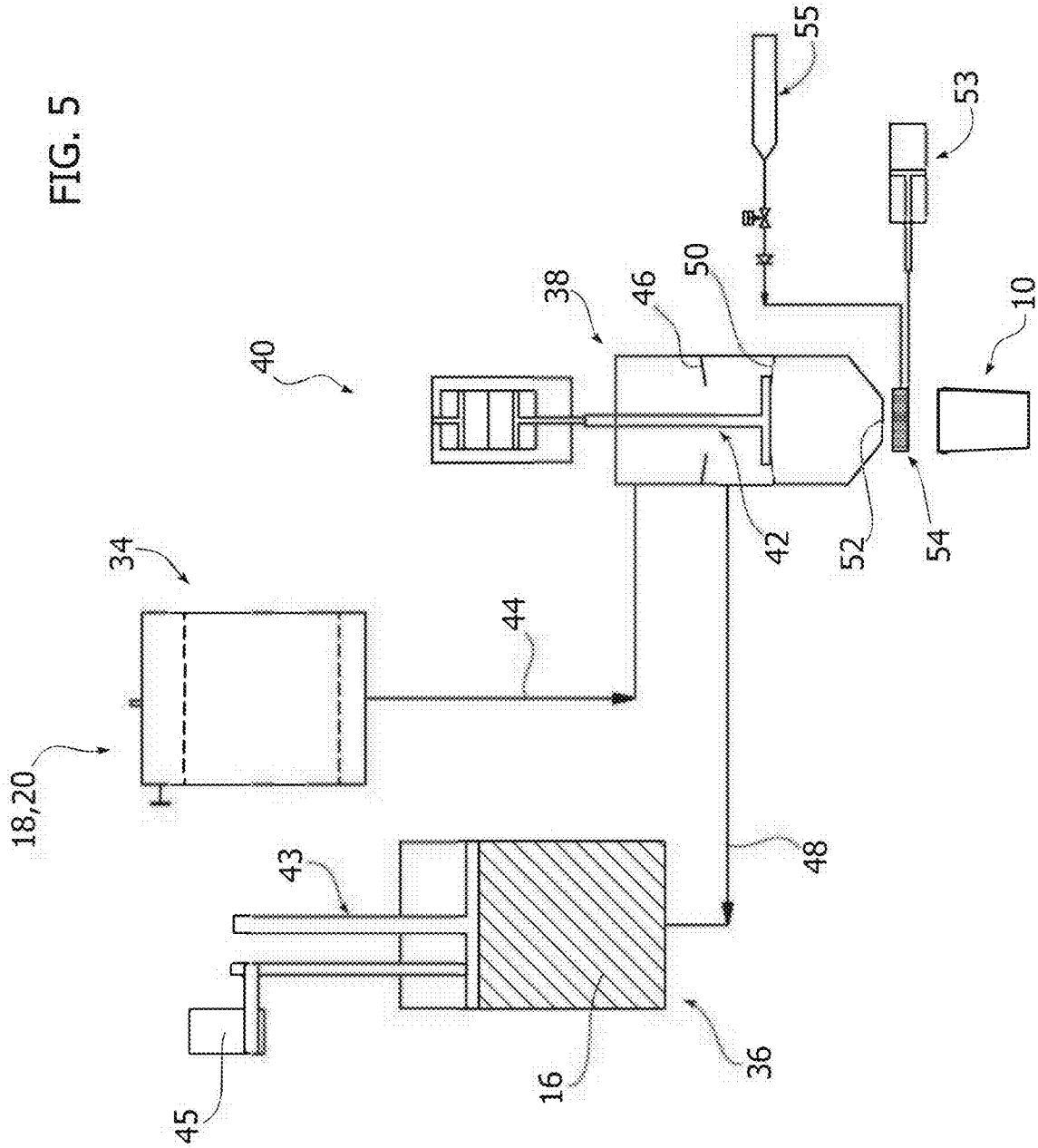
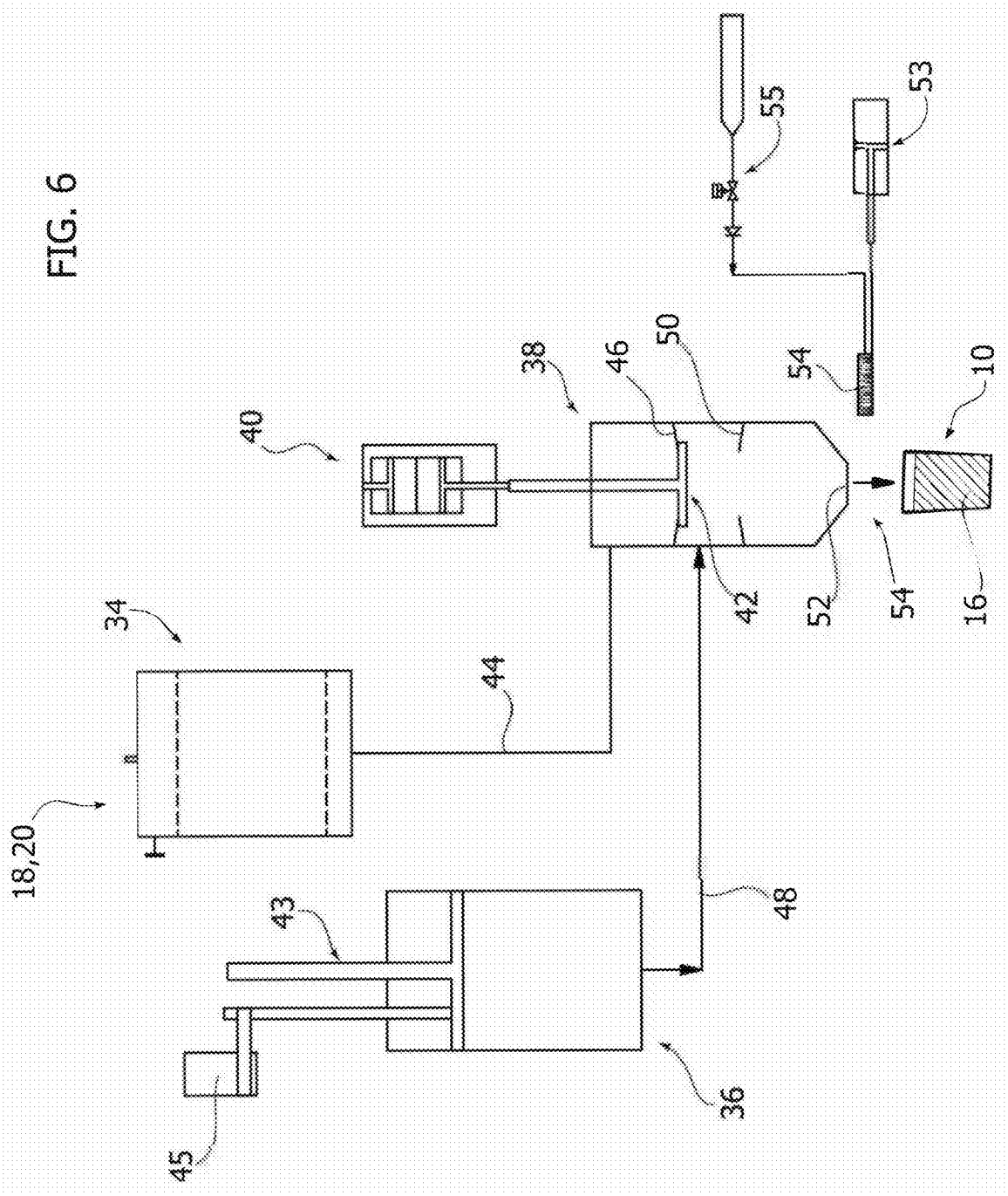


FIG. 6



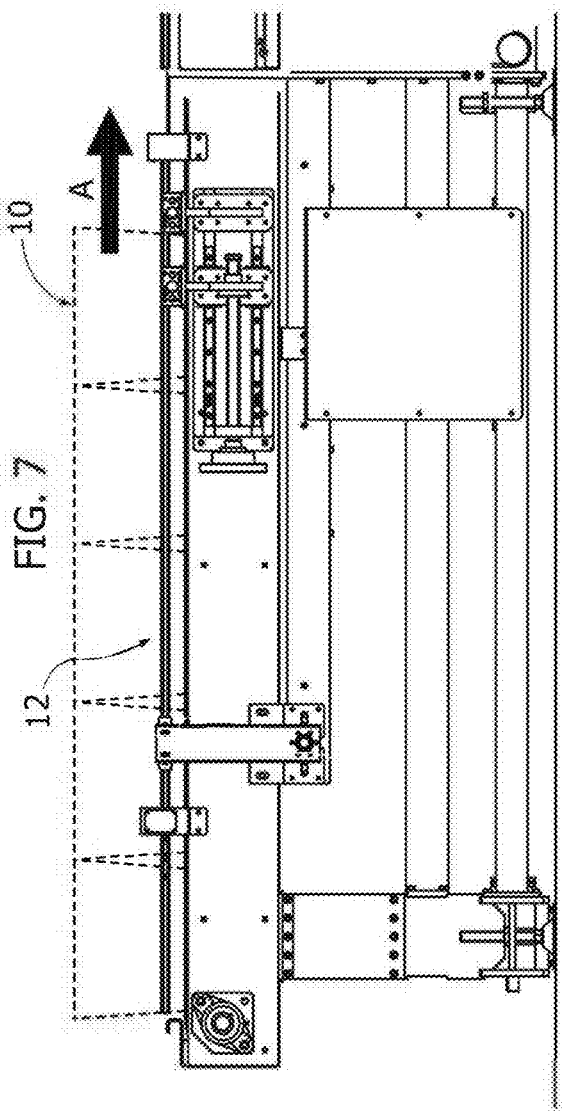


FIG. 7

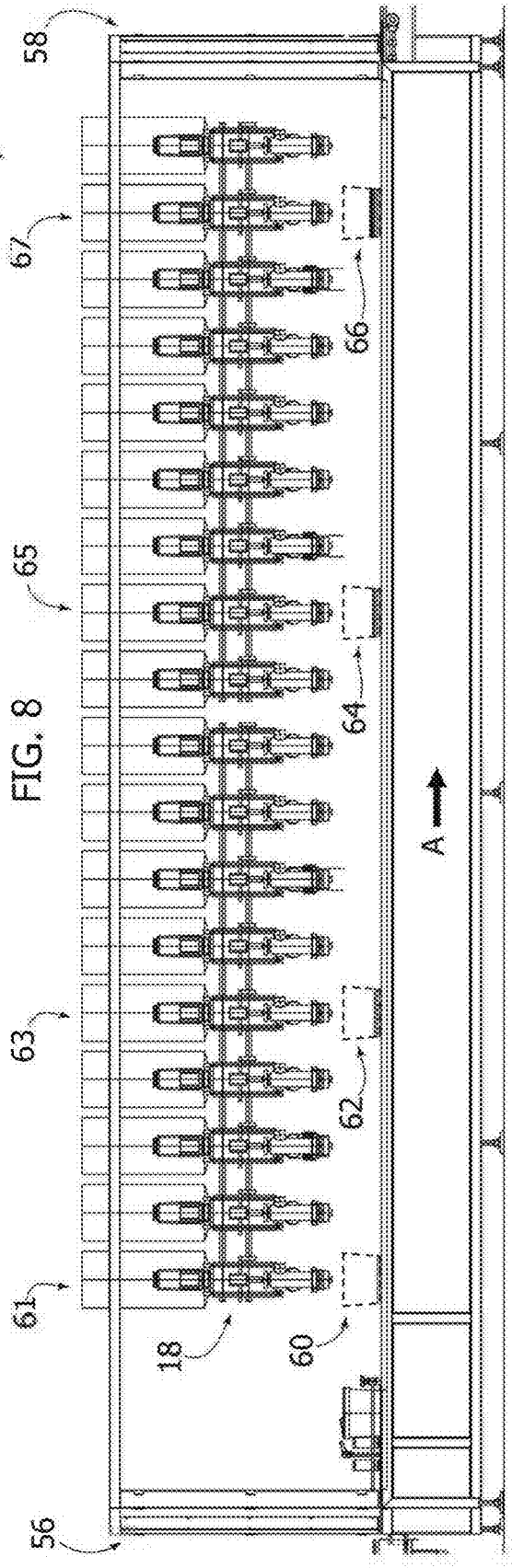


FIG. 8

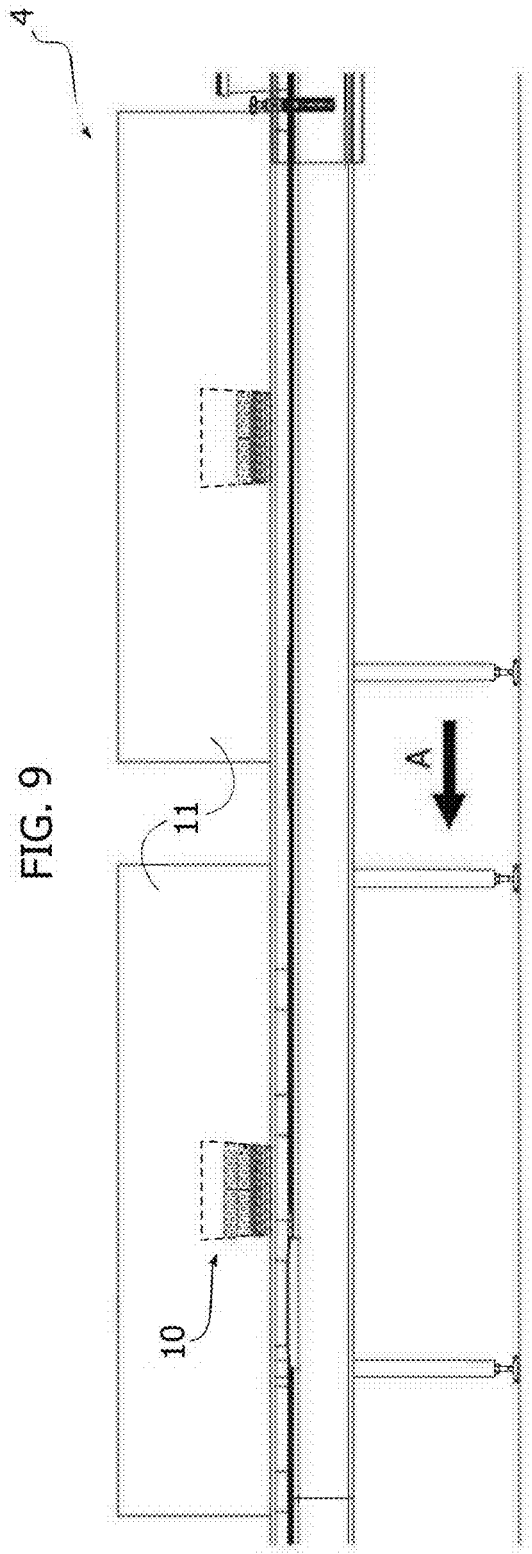


FIG. 9

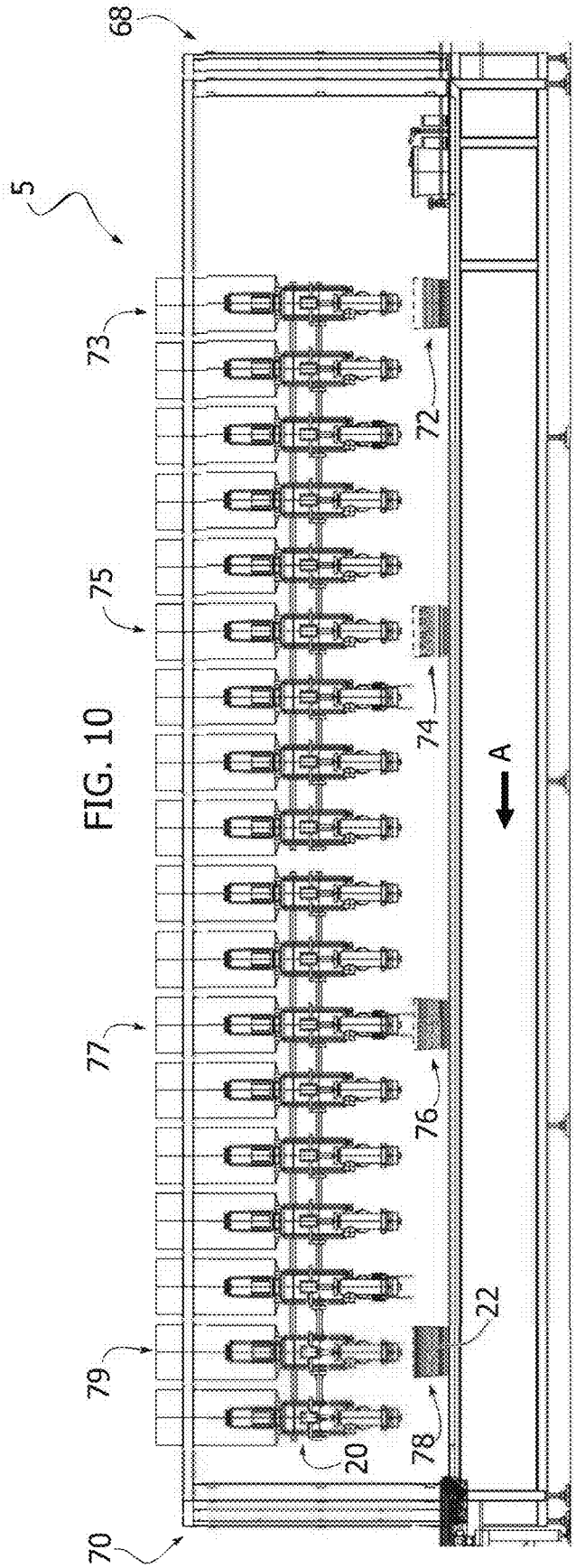


FIG. 10

FIG. 12

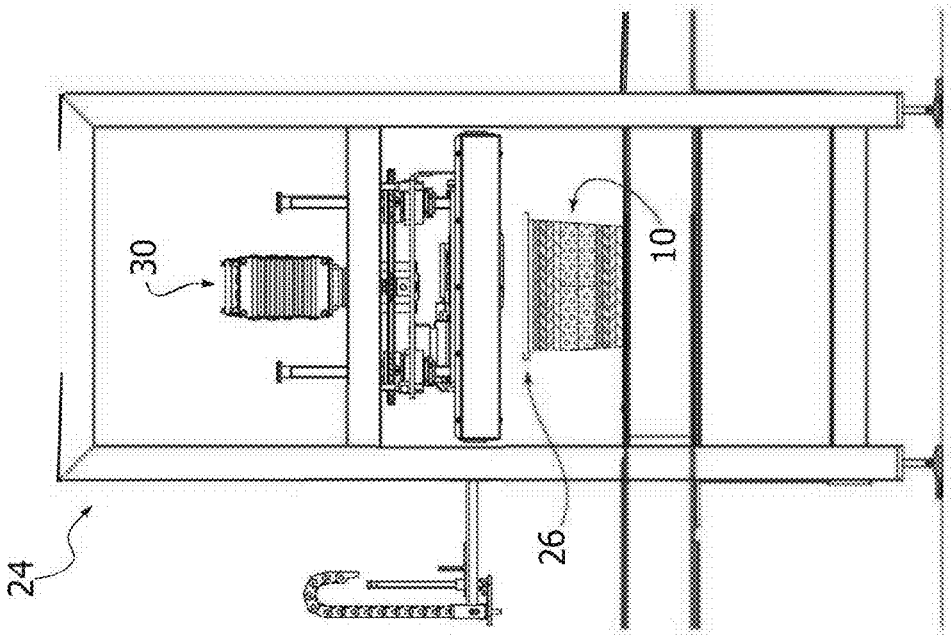


FIG. 11

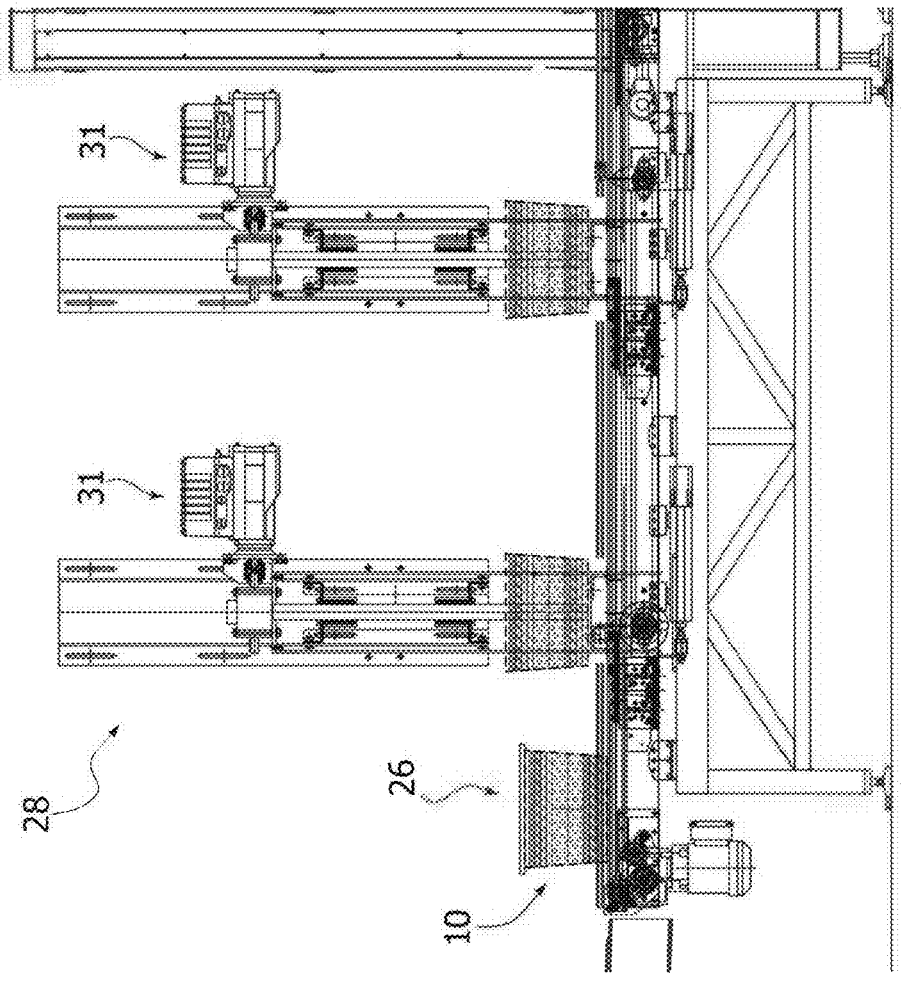


FIG. 13

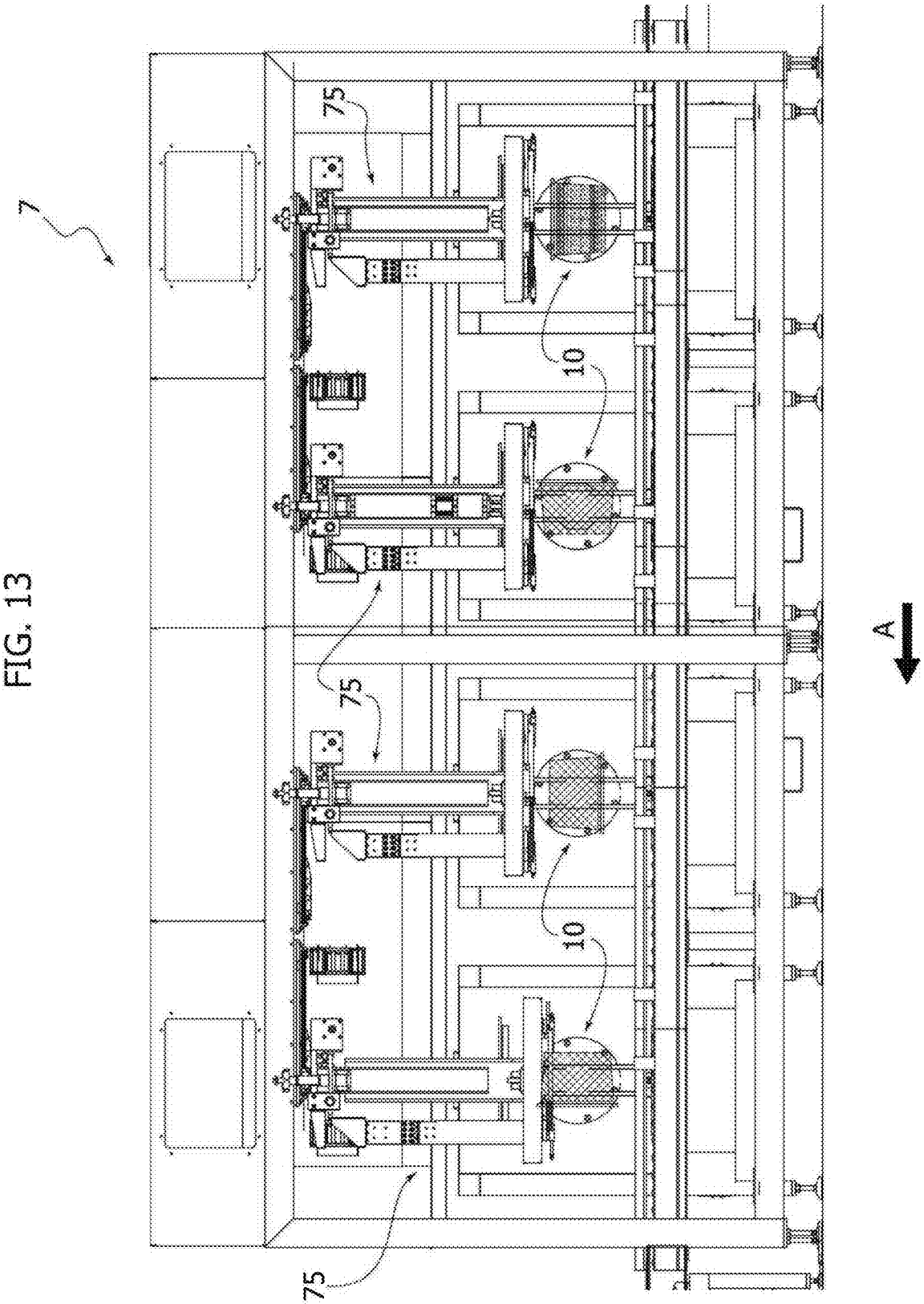
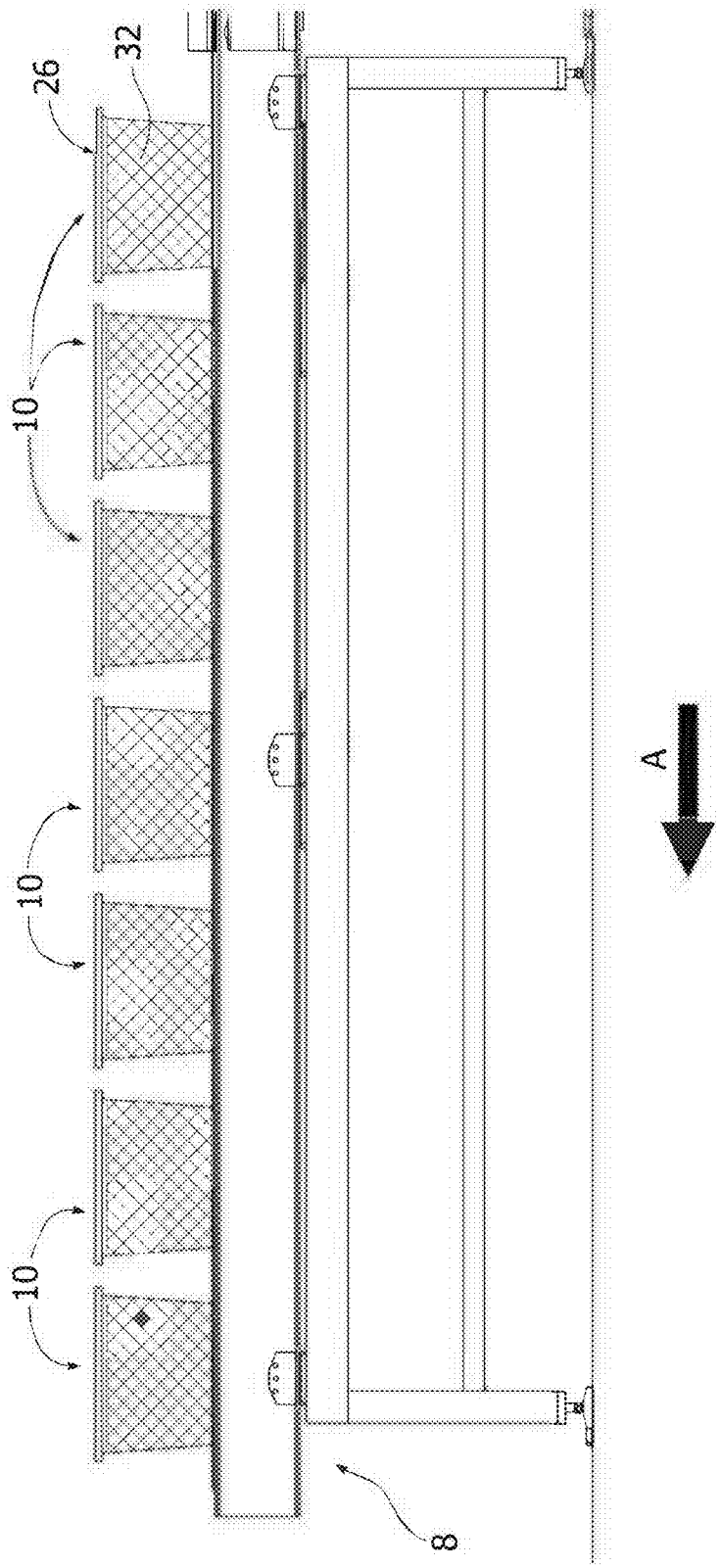


FIG. 14



HIGH-SPEED AUTOMATIC LINE FOR PRODUCING PAINTS

FIELD OF THE INVENTION

[0001] The present invention relates to the production of paints and the like.

[0002] In particular, the invention relates to the preparation of paints by mixing bases and colorants inside retail containers in which the finished paints are put on the market.

[0003] More specifically, the invention relates to an automatic high-speed line for producing paints.

STATE OF THE ART

[0004] Current systems for preparing paints inside retail containers envisage the preparation of retail containers pre-filled with neutral bases, the dosed introduction of colorants inside the retail containers pre-filled with neutral bases, and the agitation of the retail containers to mix the bases with the colorants and obtain the paints with the final color.

[0005] The patent IT102019000021804 by the same applicant discloses a system for coloring paints and the like within retail containers pre-filled with neutral bases, wherein the coloring of the neutral bases involves the dosed introduction of colorants into the retail containers and their agitation to mix the colorants with the neutral bases. The system comprises a treatment line having an inlet for pre-filled retail containers equipped with closing lids, a drilling station for forming holes in the container lids, a dosing station for introducing the colorants into the containers through the lid holes, a closing station for applying closing caps to the lid holes of the containers, and an agitation station for agitating the containers.

[0006] However, applying colorants over bases exposes the risk that during mixing by agitation, some of the colorant will adhere to the inside face of the lid and will not be mixed with the base. This leads to an incorrect dosage of the colorant in the respective base and an incorrect color of the final paint.

[0007] In addition, variety of different bases or a combination of them can be used in the production of paints. This implies that in a large-scale industrial production, it is necessary to set up a warehouse to store pre-filled containers with a large quantity of possible combinations of starting neutral bases, which would require very large warehouse dimensions.

OBJECT AND SUMMARY OF THE INVENTION

[0008] The aim of the present invention is to provide a high-speed automatic line for producing paints that overcomes the problems of the prior art.

[0009] According to the present invention, this object is achieved by an automatic line having the characteristics of claim **1**.

[0010] The claims form an integral part of the disclosure provided here in relation to the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The invention will now be described in detail with reference to the attached drawings, given purely by way of non-limiting example, wherein:

[0012] FIG. **1** is a plan view of an automatic line for producing paints and the like according to the present invention,

[0013] FIG. **2** is an elevation view of a first section of the automatic line indicated by the arrow II in FIG. **1**,

[0014] FIG. **3** is an elevation view of a second section of the automatic line indicated by the arrow III in FIG. **1**,

[0015] FIGS. **4-6** are schematic views of a volumetric dosing device in different steps of operation, and

[0016] FIGS. **7-14** are schematic elevation views illustrating the operation of the line according to the invention.

[0017] It will be appreciated that the accompanying drawings are schematic and that—in certain figures—some components may not be shown to assist in understanding the Figures. It will be appreciated that the various figures may also not be represented on the same scale.

DETAILED DESCRIPTION

[0018] With reference to FIGS. **1** to **3**, numeral 1 indicates an automatic high-speed line for preparing paints and the like by mixing bases and colorants inside retail containers **10**. By "retail containers" it is meant the containers in which the finished paints are placed on the market.

[0019] The line **1** comprises a first dosing unit **3**, an integrity control unit **9**, a coloring unit **4**, a second dosing unit **5**, a closing unit **6**, and a mixing unit **7**, arranged in series with each other along a line direction A.

[0020] The line **1** comprises a transport system **2** which transports the containers **10** through the integrity control unit **9**, the first dosing unit **3**, the coloring unit **4**, the second dosing unit **5**, the closing unit **6**, and the mixing unit **7**. The transport system **2** may feed the containers **10** along the line direction A continuously or intermittently. The transport system **2** comprises an inlet conveyor **12** on which an array of empty retail containers **10** without lids is arranged. The inlet conveyor **12** feeds the containers **10** in the line direction A inside the first dosing unit **3**.

[0021] With reference to FIG. **2**, the first dosing unit **3** comprises a plurality of volumetric dosing devices **18** spaced apart from each other along the line direction A. In the example illustrated in the figures, the first dosing unit **3** comprises eighteen volumetric dosing devices **18**, each of which is configured to deliver a different type of base composition.

[0022] With reference to FIGS. **1** and **3**, the containers **10** at the outlet of the first dosing unit **3** are fed to the coloring unit **4**. In the example illustrated in the figures, the coloring unit **4** comprises two dosing machines **11**, each of which is configured to dispense dosed quantities of colorants.

[0023] With reference to FIG. **3**, the containers **10** at the outlet of the coloring unit **4** are fed to the second dosing unit **5**. The second dosing unit **5** may be structurally identical to the first dosing unit **3**. The second dosing unit **5** also comprises a plurality of volumetric dosing devices **20**, each of which is configured to dispense a different type of base composition. Each of the volumetric dosing devices **20** of the second dosing unit **5** may dispense the same type of base composition as a homologous volumetric dosing device **18** of the first dosing unit **3**.

[0024] The containers **10** coming from the second dosing unit **5** are then fed to the closing unit **6** in which the containers **10** are closed using respective lids.

[0025] Finally, the closed containers **10** are then fed into a mixing unit **7** configured to mix the contents of the containers by agitation.

[0026] With reference to FIGS. **4** to **6**, each of the volumetric dosing devices **18**, **20** of the first and second dosing

units **3**, **5** comprises an accumulation tank **34**, a dosing tank **36**, and a dispensing cylinder **38**. The accumulation tank **34** is arranged at a higher height than the dosing tank **36** and the dosing tank **36** is arranged at a higher height than the dispensing cylinder **38**.

[0027] The dispensing cylinder **38** has a lower outlet opening **52**. The dispensing cylinder **38** comprises a piston **42** actuated by an actuator **40** and movable between a raised position and a lowered position and cooperating with an upper closing surface **46** and a lower closing surface **50**.

[0028] The dosing tank **36** comprises a dosing volume adjustment device, including a piston **43** actuated by an actuator **45**.

[0029] Each volumetric dosing device **18**, **20** comprises a first hydraulic line **44**, which connects the accumulation tank **34** to the dispensing cylinder **38**, and a second hydraulic line **48** which connects the dispensing cylinder **38** to the dosing tank **38**.

[0030] Each volumetric dosing device **18**, **20** may include a humidifier device **54** positioned at the lower outlet opening **52** of the dispensing cylinder **38** and comprising an actuator and a water supply unit.

[0031] When the piston **42** is in the raised position, as shown in FIG. **4**, the upper closing surface **46** is closed by the head of the piston **42**.

[0032] The actuator **45** regulates the position of the piston **43** so that the volume comprised in the dosing tank **36** is equal to that of the base composition to be dispensed for the single volumetric dispensing device **18**, **20**.

[0033] By activating the actuator **40** to move the piston **42** towards its lowered position, as shown in FIG. **5**, the upper closing surface **46** is opened and the lower closing surface **50** is closed. In this way, the accumulation tank **34** and the dosing tank **36** are put into fluid communication. In this step, the base composition is poured from the accumulation tank **34** to the dosing tank **36** by passing the base composition through the first hydraulic line **44**, the dispensing cylinder **38** and the second hydraulic line **48**. Pouring of the base composition is possible by exploiting the principle of communicating vessels, thanks to the fact that the accumulation tank **34** is arranged at a higher height than the dosing tank **36**.

[0034] Once the base composition has been poured into the dosing tank **36**, the actuator **40** moves the piston **42** towards its raised position, opening the lower closing surface **50** and closing the upper closing surface **46**, as shown in FIG. **6**. In this way, the fluid communication between the accumulation tank **34** and the dosing tank **36** is interrupted, and the dosing tank **36** and the lower part of the dispensing cylinder **38** are put into fluid communication. In this step, the base composition contained in the dosing tank **36** is poured into the dispensing cylinder **38** and is then dispensed inside the containers **10** through the lower outlet opening **52** of the dispensing cylinder **38**. Pouring of the base composition is possible by exploiting the principle of communicating vessels, thanks to the fact that the dosing tank **36** is arranged at a higher height than the dispensing cylinder **38**.

[0035] At the end of the dispensing of the base composition inside the containers **10**, it is possible to activate the actuator **53** to move the humidifier device **54**, humidified by the water supply unit **55**, so as to keep the lower outlet opening **52** of the dispensing cylinder **38** humid between one dispensing and the next, and to prevent any residues of the base composition **16** from drying out at the dispensing point.

[0036] With reference to FIGS. **7** to **14**, the operation of the automatic line **1** is as follows.

[0037] With reference to FIG. **7**, an array of empty containers **10** without lids is arranged on the inlet conveyor **12**. The inlet conveyor **12** is configured to feed the containers **10** to the first dosing unit **3**. Before entering the first dosing unit **3**, the retail containers **10** are inspected in the integrity control unit **9**, which is configured to verify the structural integrity of the retail containers **10** (for example, that there are no holes or cracks on the surface of the container). In the event that the integrity control unit **9** deems the retail containers **9** unusable, they still continue in the line direction A along the automatic line, however neither base composition **16** nor any dose of colorant will be dispensed. With reference to FIG. **8**, the first dosing unit **3** receives the empty containers **10** without lids in an inlet station **56**. As already indicated previously, the first dosing unit **3** comprises a plurality of volumetric dosing devices **18** arranged sequentially along the line direction A. A container **10** which is introduced inside the first dosing unit **3** through the inlet station **56** is transported along the line direction A and is stopped at each of the dosing devices **18** which dispense the respective base composition **16** necessary to form a first base **14** with a required composition. For example, in FIG. **8** different positions **60**, **62**, **64**, **66** of the container **10** are represented after it has received a base composition **16** from the respective volumetric dosing devices **18** at the stations **61**, **63**, **65**, **67**. Once all the base compositions **16** necessary for forming the first base **14** have been received, the container **10** is taken to an outlet station **58** of the dosing unit **3**.

[0038] With reference to FIG. **9**, the containers **10** without lids coming from the first dosing unit **3** and containing the first base **14** are fed to the coloring unit **4**. The coloring unit **4** may comprise two or more dosing machines **11**, each of which is configured to dispense a required dose of colorant into the containers **10**. In this step, the doses of colorant are dispensed above the first base **14**, so as to form a layer of colorant (not shown in the figure) above the first base **14** inside the containers **10**.

[0039] With reference to FIG. **10**, the second dosing unit **5** receives the containers **10** containing the first base **14** and the dose of colorant coming from the coloring unit **4**, at an inlet station **68**. As already indicated previously, the second dosing unit **5**, which can be structurally identical to the first dosing unit **3**, comprises a plurality of volumetric dosing devices **20** arranged sequentially along the line direction A. A container **10** which is introduced inside the second dosing unit **5** through the inlet station **68**, is transported along the line direction A and is stopped at each of the dosing devices **20** which dispense the respective base composition **16** necessary to form a second base **22** with a required composition. For example, in FIG. **10** different positions **72**, **74**, **76**, **78** of the container **10** are represented after it has received a base composition **16** from the respective volumetric dosing devices **20** at the stations **73**, **75**, **77**, **79**. Once all the base compositions **16** necessary for forming the second base **22** have been received, the container **10** is taken to the outlet station **70** of the second dosing unit **5**.

[0040] The second base **22** is formed inside the container **10** above the first base **14** and the doses of colorant previously deposited in the container **10**.

[0041] In possible embodiments it is possible to use a continuously moving transport system **2** wherein the time

and method of dispensing the individual doses **16** from the dosing devices **18**, **20** are programmed to dispense the base composition **16** inside the container **10** when this translates close to the individual volumetric dosing devices **18**, **20**.

[0042] In other possible embodiments it is possible to use a transport system **2** in continuous motion and move the dosing devices **18**, **20** of the dosing units **3**, **5** so as to dispense the individual base compositions **16** inside the container **10**, following it into its path along the line direction A.

[0043] With reference to FIGS. **11** and **12**, the containers **10** containing a stratification of the first base **14**, the dose of colorant, and the second base **22**, coming from the second dosing unit **5** are then fed to a closing unit **6**. This closing unit **6** may comprise a lid application device **28** configured to apply lids **26** on top of respective containers **10**, and a pressure device **24** including at least one pressure element **30**, which presses on the lids **26** to secure them with interference in their respective containers **10**. The lid applying device **28** may comprise multiple lid applying stations **31**.

[0044] The pressure device **24** is also configured to reject from the automatic line **1** all the retail containers **10** that have been deemed unusable by the integrity control unit **9**.

[0045] With reference to FIG. **13**, the closed containers **10** are fed to the mixing unit **7**. The mixing unit **7** may comprise two or more agitating machines **75** configured to mix in a single composition **32** the distinct and stratified components of the first base **14**, the dose of colorant, and the second base **22** contained inside the closed containers **10**. Mixing is carried out by agitating the closed containers **10** and results in a finished and homogeneous paint.

[0046] With reference to FIG. **14**, the containers **10** coming from the mixing unit **7** are finally taken to the end of the automatic line **1** in an outlet area **8**, from which the finished products can be sent to units for labeling, palletizing, etc.

[0047] Of course, the details of construction and the embodiments can be widely varied with respect to those described and illustrated, without thereby departing from the scope of the present invention as defined by the claims that follow.

1. An automatic line for producing paints, comprising:
- a first dosing unit configured to form in each of a plurality of empty retail containers a first base including at least one first base dose;
- at least one coloring unit configured to dispense at least one dose of colorant into the retail containers coming from said first dosing unit and containing said first base;
- a second dosing unit configured to form a second base including at least one second base dose in the retail containers coming from said at least one coloring unit and containing said first base and said at least one dose of colorant;
- at least one closing unit configured to apply closing lids to respective retail containers to form closed retail containers; and
- at least one mixing unit configured to agitate said closed retail containers and to mix said first and second bases and said at least one dose of colorant.

2. The automatic line of claim **1**, comprising a conveying system configured to move said retail containers along a line direction, along a path which extends from said first dosing unit to said at least one mixing unit through said at least one coloring unit, and said second dosing unit.

3. The automatic line of claim **2**, wherein each of said first and second dosing units comprises a plurality of volumetric dosing devices spaced apart from each other along said line direction, and configured to dispense respective first and second base doses into said retail containers.

4. The automatic line of claim **3**, wherein said plurality of volumetric dosing devices in each of said first and second dosing units are configured to sequentially dispense respective first and second base doses in each of said retail containers, so as to form in each retail container an overall base including a plurality of different base doses.

5. The automatic line of claim **1**, wherein said at least one closing unit comprises a lid applying device configured to apply lids on respective retail containers and a pressing device configured to fix said lids to respective retail containers by force.

6. The automatic line of claim **1**, comprising an inlet conveyor configured to advance an array of the plurality of empty retail containers towards said first dosing unit.

* * * * *