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(54) Method and apparatus for blending plastic molding materials

Verfahren und Vorrichtung zum Mischen plastischer Gussmaterialien

Procédé et dispositif pour mélanger des matériaux plastiques de moulage

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Description

The present invention relates to a method and apparatus for blending plastic moulding materials by setting blending ratios of main materials such as virgin materials (natural pellets) for plastic moulding to subsidiary materials such as colouring agents like a master batch.

Conventionally, as an apparatus for blending plastic moulding materials by setting blending ratios of virgin materials as main materials to colouring agents as subsidiary materials, a rotating disc type metering feeder is known, which is adapted to perform the blending by vertically moving a scraper with respect to a volumetric metering chamber formed on the rotating disc (see Japanese Published Unexamined Patent Application No H3-113325).

However, as the conventional scraper adjusting the metering chamber on a rotating disc of volumetric metering type is manually operated, there is such a problem that feeding an amount of a virgin material to a master batch must be set manually each time when a virgin material or a master batch (colouring material) is changed, even if the material has been used before, which takes time and reduces the operating efficiency.

It is a problem of said conventional method that the operating efficiency decreases, as a colour or material change cannot be done in a short time, although a colour change or the like must be performed without interrupting material feeding specifically in extrusion molding.

Hence, it is an object of the present invention to provide an improved method and apparatus, in the light of the problems of the above conventional method, whereby feeding an amount of main material to a subsidiary material is automatically set based on a measured value and scale factor of the subsidiary material such as a master batch and measured data of a main material such as a virgin material.

In this specification, for distinguishing a main material from a subsidiary material, a plastic resin material is generally defined as a main material, and a colouring agent, plasticizer, flame retardant or the like which is added to a raw material is defined as a subsidiary material. As an optimal standard for the distinction, however, a material with a higher blending ratio should be reasonably defined as a main material, and a material with a lower blending ratio as a subsidiary material. Plural supplemental materials (additives) may be classified into a main material and a subsidiary material by such distinguishing method.

The present invention enables a continuous moulding without loss even in extrusion moulding, and an automatic adjustment of the amount desired to be blended by a scraper without the need of manpower, thereby increasing precision of blending main and subsidiary materials. Thus, the present invention makes it possible to obtain a higher quality product, and contributes to reduction of cost for subsidiary materials, as it avoids waste of subsidiary materials which are low in blending ratio and expensive.

The other objects, characteristics and advantages will be clearly understood from the following description.

According to the present invention there is provided a method for blending plastic moulding materials, which method uses apparatus capable of metering the amount of the materials to be blended, which apparatus utilises a rotating disc provided with metering chambers from which the required amounts of materials may be discharged for blending, wherein the amount of material discharged from a metering chamber is determined by the stroke length of a scraper movable with respect to the metering chamber, and in which method a blending ratio of main material to subsidiary material is set, characterised in that the method comprises:

determining the amount of one material of the main material or subsidiary material which is to be discharged for blending based on the amount of the other material discharged for blending and a scale factor which is determined by the desired blending ratio of the main and subsidiary materials;
calculating for at least one position of the stroke length of the scraper the corresponding amount of that one material which would be discharged with the stroke length of the scraper in that position and inputting that information as a fixed value into the memory of a control system of the apparatus;
obtaining the stroke length of scraper required to give the determined amount of the one material to be discharged for blending; and
automatically controlling the setting of the scraper to the stroke length which corresponds to the required determined amount of that one material.

To adjust the stroke length of scraper, two points, e.g. the minimum and maximum values, or three or more points may be inputted, or inputs may be dependent on the bulk density of a material.

A type of virgin material, type and scale factor of colouring agent or scraper position for the virgin material can be prestored in a memory with relation to a tradename or code number of the desired product so that the blending amount of the virgin material to the colouring agent is automatically set by selecting the tradename or code number of that product.

It is preferred that a colour change is achieved by a colour change signal and a selection of a product tradename. Preferably, a material currently used is automatically switched to a different material by a material change signal.

In order to realize the above method according to the present invention there is also provided an apparatus for blending plastic moulding materials comprising:

a base having material discharge ports and a space for containing a rotating disc; the rotating disc rotatably contained in said space and having two or

more lines of a plurality of metering chambers in concentric circles; one or more material discharge ports for measuring, blending and discharging materials fed to the lines of the metering chambers by rotatively displacing the materials; a chute for concentrating the material discharge ports in one place; and scrapers for adjusting the amount of main or subsidiary material fed and metered in said metering chambers;

wherein said apparatus further comprises a microcomputer for:

determining the amount of one material of the main material or subsidiary material which is to be discharged for blending based on the amount of the other material discharged for blending and a scale factor which is determined by the desired blending ratio of the main and subsidiary materials;
calculating for at least one position of the stroke length of the scraper the corresponding amount of that one material which would be discharged with the stroke length of the scraper in that position and inputting that information as a fixed value into its memory;
obtaining the stroke length of scraper required to give the determined amount of the one material to be discharged for blending; and
automatically controlling the setting of the scraper to the stroke length which corresponds to the required determined amount of that one material.

The discharging amount and scale factor of either the subsidiary or main material, blending rate of the other material, stroke length of the scrapers, type of the main or subsidiary material with relation to tradename or code number of a product, type and scale factor of the colouring agent and other necessary data are inputted in the microcomputer.

The chute is preferably detachable from the material discharge port in the base.

The metering chambers of the lines on the rotating disc and the material discharge ports in the base can be in communication with air injection pipes by way of ducts connected to an air supply source, so that compressed air from the air supply source is injected to the metering chambers and the material discharge ports. After metering is completed, the compressed air is blown to the metering chambers, material discharge ports and chute to prevent material and dusts from adhering thereto.

For a better understanding of the present invention and to show how it may be put into effect, reference will now be made, for the purposes of illustration only, to the accompanying drawings, in which:

Fig. 1 is a sectional view of a volumetric metering and blending apparatus and chute used for a method of the invention;
Fig. 2 is a top plan view of Fig. 1 with the cover removed, showing the metering start position;
Fig. 3 is a plan view showing a rotating disc rotated to the metering completed position from the state shown in Fig. 2;
Fig. 4 is a sectional view about a scraper;
Fig. 5 is an exploded perspective view schematically showing the metering and blending apparatus;
Fig. 6 is a block diagram of a control system;
Fig. 7 is a schematic front view comprehensively showing an embodiment of the invention;
Fig. 8 is an operational chart for extrusion molding;
Fig. 9 is an operational chart for injection molding;
Fig. 10 is a schematic front view comprehensively showing another embodiment of the invention;
Fig. 11 is an operational chart for extrusion molding;
Fig. 12 is a plan view showing an inner rotating disc;
Fig. 13 is a developed sectional side view showing a portion of inner rotating disc;
Fig. 14 is a disassembled perspective view of a detachment mechanism; and
Fig. 15 is a plan view showing positioning means for a slide ring and slide ring case.

An embodiment according to the invention is described below by reference to Figs. 1 to 9 and 12 to 15.

A volumetric metering and blending apparatus indicated by reference numeral 1 comprises a base 10 having a material discharge port 11 and a space 12 for containing a rotating disc; the rotating disc 20 rotatably contained in the space 12 and having two lines L1 and L2 of a plurality of metering chambers 21 and 22 in a concentric circle; one or more material discharge ports 11 for measuring, blending and discharging materials fed to the lines L1 and L2 of the metering chambers 21 and 22 by rotatively displacing the materials; a chute 17 for concentrating the material discharge ports 11 in one place; scrapers 5 and 5' for adjusting a feeding amount of main or subsidiary material metered in the metering chambers 21 and 22; and a cover 30 for covering the rotating disc 20 and having material supply sources 2 and 3, which contain such materials as powdered raw plastic materials or colouring agents, by way of flange joints.

The rotating disc 20 has two or more (two in the illustrated embodiment) lines L1, L2 of plural metering chambers 21 • • • 21, 22 • • • 22 comprising through-holes circumferentially formed with equal spacing therebetween on concentric different circles from the centre toward the outer circumference thereof, and the metering chambers 21 and 22 are rendered to be equal.

The shape, diameter, depth, volume, number, location and the like of the unit metering chambers 21, 22 in the lines L1, L2 • • • are optional. Alternately, a circular groove (not shown) may be employed instead of the metering chambers 21 • • • 21, 22 • • • 22. Although

the rotating disc is divided into an outer rotating disc 20 and an inner rotating disc 20a separatedly, it may be formed integrally. The inner rotating disc 20a has a circular concave groove 24 formed thereon to avoid galling.

At optional locations above the metering chambers 21, 22 of the lines L1, L2 • • •, there are provided the above-mentioned material supply sources 2 and 3. In other words, as shown in Fig. 2, when the rotatable disk 20 rotates counterclockwise as depicted by an arrow, a supply port 2a of first material supply source 2 for feeding such material A as natural pellets (a main material) is provided at a selected position along the first line L1, and a scraper 5 is placed on the rotating disc 20 at the downstream side of first material supply source 2 so that it freely moves in the vertical direction to provide a desired measured value.

A supply port 3a of second material supply source 3 for feeding such material B as a colouring agent like master batch (a subsidiary material) is provided in a selected position along the second line L2 at the downstream side of first material supply source 2. A scraper 5' may be placed on the rotating disc 20 at the downstream side of second material supply source 3.

The number of material supply sources is not limited to two as above, but may be three or more optionally.

In this way, different materials are fed to the lines L1, L2 • • • of the rotating disc 20 (20a) and metered in the respective metering chambers 21, 22 • • •.

A small cylinder 23 is suspended centrally in the lower part of rotating disc 20 (20a), and a pivot is inserted through the small cylinder 23 thereabove and connected therewith by a nut 9 or the like in the upper part, while the lower part of the pivot is supported by a bearing 8 which is further connected to a driving source 6 by way of a gear system 26.

Either of the connecting methods between the base 10 and the rotating disc 20, and between the rotating disc 20 and the pivot 7 are optional and are not limited to be as structured in the embodiment.

The base 10 has a outer circumferential wall 14 in the upper direction formed thereon, and a circular step 15 is formed in the outer circumference of the outer wall 14 on the upper end to engage with a cover 30 such that it is trapped therein. Below the planar part of base 10 is formed one or more material discharge port 11, whereby materials fed to the metering chambers 21, 22 • • • of the lines L1, L2 • • • are blended and discharged by rotational displacements, and a chute 17 concentrating the material discharge port 11 in one place is connected therewith in the lower part.

The scraper 5 is engaged with a driving shaft 50 forming, for example, a trapezoidal screw thread, as shown in Fig. 4, and coupled to a driving source 51 so that the displacement amount of the scraper can be changed. The driving source 51 is provided with a gear 54 on an output shaft 52 thereof to rotate a potentiometer (PM) 53 for position detection, wherein the gear 54 is in engagement with a gear 55 of the potentiometer 53. The scraper 5 is guided by a pin 56 provided for vertical movement thereof with the direction maintained constant.

As a position detecting means, for example, an encoder or the like may be employed instead of the potentiometer 53.

Numeral 100 in Figs. 1 and 6 shows a microcomputer. The microcomputer 100 has in its memory the measured value and/or scale factor of either the subsidiary or main material, blending ratio of the other material, at least one position of stroke length of the scrapers 5, 5', type of a main or subsidiary material with relation to tradename or code number of a product, type and scale factor of a colouring agent and other necessary data through a setter 101, analog-to-digital (A/D) converter 102 or the like. The measured data may be automatically inputted, as shown in Fig. 6, by an electronic scale 103, host computer or plastic machine 104 or the like. In Fig. 6, a central processing unit is indicated by numeral 105, a random access memory by numeral 106, and a read only memory by numeral 107.

In this case to explain the type of control using two measured points, the maximum and minimum stroke length of the scraper 5 (discharge position of the scraper) is stored in the memory as detection values of the potentiometer 53, so that a position within the variable amount can be optionally detected (as a motion stroke length) for movements.

In order to obtain an automatic position setting, that is, to get a required amount of virgin material (i.e. to set a discharge amount required), firstly a measured amount and scale factor of master batch (subsidiary material: the weight (volume) of the master batch is discharged constantly per unit time under the condition that the scraper 5' is kept in a fixed position) and the scale factor of virgin material (main material to the master batch are inputted (the measured amount of master batch is less than the required amount of virgin material; the scale factor is based on a blending ratio of main material to subsidiary material).

Succeedingly, the measured data (measured amounts of virgin material per unit time) at the minimum stroke position of scraper 5 (the lowest position toward the bottom of metering chambers 22) and the maximum stroke position of scraper 5 are inputted. The discharge amount of virgin material is proportional to the stroke length of scraper 5. If the discharge amount is not proportional to the stroke length of scraper 5, a higher precision can be obtained by inputting several data taken at optional positions and if the measured amount of virgin material is used volume-unit, the discharge volume of virgin material is certainly proportional to the stroke length of scraper 5, so that it is possible to get the proportional relation between them by measuring only one position of stroke length of scraper 5 corresponding to one discharge amount of virgin material.

On the basis of the above proportional relation, calculating a required position of scraper 5 (required stroke

length of scraper 5) corresponding to the above required amount of virgin material and controlling the required position of scraper 5 for using the potentiometer 53 and positioning of the scraper to discharge a required amount of virgin material (main material) based on the discharge amount and scale factor of master batch (subsidiary material) and scale factor of virgin material (based on the blending ratio of materials) is computed and automatically set.

The invention enables the automatically setting of a blending amount of virgin material to a colouring agent by prestoring the type of the virgin material, type and scale factor of the colouring agent, positioning of the scraper for virgin material and the like with relation to a tradename or code number of a product into a memory and designating the tradename or code number of the product.

In this case, regarding the control, the data of the above embodiment are registered and stored in the memory by material used, for example, by tradename or code number of products. When changing materials, if the material to be used has been used before, it can be automatically reset by accessing to the data registered and stored in the memory. An embodiment of the control block is as shown in Fig. 6.

The invention enables to change colours by designating a colour change signal and tradename of a product. This is applicable when producing products of different tradenames with virgin material and master batch of a same material except scale factors of the master batch being different. By designating tradename of the product and accessing to the measured data, scale factor of master batch and positioning of the scraper for virgin material, which are registered, the discharge amount of virgin material and positioning of the scraper are automatically set for colour changing.

Fig. 7 shows an exemplary apparatus for the above method, wherein a virgin material contained in a first material supply source 2 is fed to a volumetric metering and blending apparatus 1 through a charging hopper 64 and receiving hopper 4 by suction force of a suction air source 18. On the other hand, a colouring agent such as master batch in second material supply sources 3 • • • 3 is fed to the volumetric metering and blending apparatus 1 through pipings and a collector 60 for multiple materials switching by air from an air source 65 of pressure feed type. In the figure, a chute is depicted by numeral 17, a plastic moulding machine by numeral 19 and an opening and closing valve by numeral 66. Fig. 8 is an operational chart for extrusion moulding. In this case, a colour change command is provided by a host computer, extruder or the like, designating a tradename of the succeeding product.

Fig. 9 shows an operational chart for injection moulding. In this case, a collector 60 for multiple materials switching is provided on the side of master batch material so that plural master batch materials of different colours can be supplied and the moulding operation is discontinuously performed, and air purging means 61 is provided, as shown in Fig. 7, for purging at the side of plastic moulding machine 19.

Here, a colour change command is provided by the plastic moulding machine 19, host computer or the like.

The present invention also makes it possible to automatically switch from a material currently used to a different material by means of a material change signal. In this case, switching between different virgin materials may be possible as well.

Furthermore, Figs. 10 and 11 show another embodiment having a collector 60 for multiple materials switching at the side of virgin material as well to allow material changing by both collectors, wherein the same parts being depicted by the same numerals as in Fig 7 for convenience. In Fig. 10, an air source is indicated by numeral 67, and an opening and closing valve by numeral 68. Fig. 11 is an operational chart for extrusion moulding in the arrangement shown in Fig. 10. In Fig. 11, material A, purging material and material B are inclusively depicted by numeral 62, and material B, purging material and material C by numeral 63.

As shown in Figs. 1 to 3, 5 and 12 to 13, the inner rotating disc 20a is fitted into an accommodation chamber 25 formed centrally in the upper part of outer rotating disc 20. The inner rotating disc 20a has the above-mentioned circular concave groove 24, a plurality of metering chambers 21 formed in orthogonal relationship with the circular concave groove 24, a scraper 5' provided depending on requirement and scraping means 27 for scraping off materials adhered inside the circular concave groove 24. When each of the metering chambers 21 is positioned at the material outlet 28 for subsidiary material formed in the outer rotating disc 20, it comes into communication with the material discharge port 11 in the base 10, and the subsidiary material is metered in such communicating state and dropped to the chute 17 through the material discharge port 11. Preferably, the circular concave groove 24 is slightly larger in width and height than the maximum length of material particle to be metered and blended.

The scraping means 27 is provided at a position with a spacing of one metering chamber 21 or larger spacing from the material outlet 28. As shown in Fig. 13, for example, the scraping means 27 is mounted under the cover 30 for fitting into the circular concave groove 24, so that the material adhering inside the circular concave groove 24 is scraped off into the metering chamber 21 contacting the front 27a of scraping means 27 by rotational movement of the rotating disc 20a. In this way, precision in metering the material is improved.

For the same purpose as the scraping means 27, as shown in Fig. 2, the rotating disk 20 is provided with a scraping means 29 on the outer rotating disc 20 between the material supply port 2a and the material discharge port 11 in the base 10. Thus, the material adhered to the planar surface between the metering chambers 22 and 22 is scraped off into the material discharge port 11.

The chute 17 is easily detachable from the material

discharge port 11 in the base 10 by means of a detachment mechanism 200, wherefore such advantages as cleaning being facilitated can be obtained.

The detachment mechanism 200 having such a structure as shown in Figs. 1, 14 and 15 is described below. The detachment mechanism 200 comprises a slide ring 210 having a plurality of tapered concave parts 211, 212 and 213 formed with a selected spacing on the upper surface thereof and a threaded hole 214 through which a shaft 241 of a handle 240 is inserted; a slide pipe 220 fitted into the slide ring 210 and having outward flanges 221, 222 and 223 formed to face the tapered concave parts 211, 212 and 213; and a slide ring case 230 having, in the centre thereof, a conduit port 231 in communication with the material discharge port 11 in the base 10 and a ring-shaped empty chamber 232 fitted to the slide ring 210 and slide pipe 220 in the circumferential direction, and combined with the lower surface of base 10 in the upper surface thereof by means of a bolt or the like. In Fig. 14, a bolt hole is indicated by numeral 233, and a slide hole for horizontal rotation of the shaft 241 of handle 240 by numeral 234, wherefore the handle 240 is inserted through the slide hole 234 and screwed fixedly in the threaded hole 214.

A spring 242 is provided between the upper surface 224 except the outward flanges 221 to 223 of slide pipe 220 and the bottom surface 10a of base 10, so that the slide pipe 220 is always lowered by the spring 242. By providing a ball 243 between the tapered concave parts 211 to 213 and outward flanges 221 to 223, the slide pipe 220 comes to the lowest position, when the ball 243 is at the lowest position a in the tapered concave parts 211 to 213, and is set at an open edge 17a of the chute 17 pressure-fitted thereto. In this state, V-shaped grooves 225 and 235 as shown in Fig. 15 are formed outside the outward flanges 221 to 223 of slide pipe 220 and inside the empty chamber 232 of slide ring case 230, and the slide pipe 220 is prevented from rotating by placing the ball 243 in engagement between both V-shaped grooves 225 and 235. In order to remove the chute 17 in the set position, by holding and rotating the handle 240 through a predetermined angle, as the ball 243 moves to a position b shown in Fig. 4, the slide ring 210 moves upward against the pressing force of spring 242 and the pressure fitting between the lower end of pipe 220 and the open edge 17a of chute 17 is released, the chute 17 can be removed holding the grip 31.

As shown in Fig. 1, air injection pipes 153, 154 and 156 are provided in communcation with the metering chambers 21 and 22 in lines L1 and L2 of the rotating disc 20 and the material discharge port 11 in the base 10 by way of ducts 151, 152 and 155 connected to the air source 150, so that compressed air is injected to the metering chambers 21 and 22, and the material discharge port 11, in order to prevent materials from adhering to the metering chambers 21 and 22 and the material discharge port 11.

In Fig. 1, a level sensor is indicated by numeral 250. A crushed material supply port 260 may be employed in the metering chamber 22, as shown in Fig. 2, so that three types of materials can be metered and blended.

Claims

1. A method for blending plastic moulding materials, which method uses apparatus capable of metering the amount of the materials to be blended, which apparatus utilises a rotating disc provided with metering chambers from which the required amounts of materials may be discharged for blending, wherein the amount of material discharged from a metering chamber is determined by the stroke length of a scraper movable with respect to the metering chamber, and in which method a blending ratio of main material to subsidiary material is set, characterised in that the method comprises:

   determining the amount of one material of the main material or subsidiary material which is to be discharged for blending based on the amount of the other material discharged for blending and a scale factor which is determined by the desired blending ratio of the main and subsidiary materials;
   calculating for at least one position of the stroke length of the scraper the corresponding amount of that one material which would be discharged with the stroke length of the scraper in that position and inputting that information as a fixed value into the memory of a control system of the apparatus;
   obtaining the stroke length of scraper required to give the determined amount of the one material to be discharged for blending; and
   automatically controlling the setting of the scraper to the stroke length which corresponds to the required determined amount of that one material.

2. A method for blending plastic moulding materials as claimed in claim 1, wherein a type of virgin material, type and scale factor of colouring agent, and scraper position for the virgin material are prestored in the memory with relation to a tradename or code number of a product so that the blending amount of the virgin material to the colouring agent is automatically set by selecting the tradename or code number of that product.

3. A method for blending plastic moulding materials as claimed in claim 1 or 2, wherein a colour change is achieved by a colour change signal and a selection of a product tradename.

4. A method for blending plastic moulding materials as claimed in claim 1 or 2, wherein a material currently used is automatically switched to a different mate-

rial by a material change signal.

5. An apparatus for blending plastic moulding materials comprising:

a base (10) having material discharge ports (11) and a space (12) for containing a rotating disc; the rotating disc (20) rotatably contained in said space (12) and having two or more lines (L1, L2) of a plurality of metering chambers (21, 22) in concentric circles; one or more material discharge ports (11) for measuring, blending and discharging materials fed to the lines (L1, L2) of the metering chambers (21, 22) by rotatively displacing the materials; a chute (17) for concentrating the material discharge ports (11) in one place; and scrapers (5, 5') for adjusting the amount of main or subsidiary material fed and metered in said metering chambers (21, 22);

wherein said apparatus further comprises a microcomputer (100) for:

determining the amount of one material of the main material or subsidiary material which is to be discharged for blending based on the amount of the other material discharged for blending and a scale factor which is determined by the desired blending ratio of the main and subsidiary materials;
calculating for at least one position of the stroke length of the scraper the corresponding amount of that one material which would be discharged with the stroke length of the scraper in that position and inputting that information as a fixed value into its memory;
obtaining the stroke length of scraper required to give the determined amount of the one material to be discharged for blending; and
automatically controlling the setting of the scraper to the stroke length which corresponds to the required determined amount of that one material.

6. An apparatus according to claim 5, wherein the metering value and/or scale factor of either the subsidiary or main material, blending rate of the other material, stroke amount of the scrapers (5, 5'), type of the main or subsidiary material with relation to tradename or code number of a product and type and scale factor of the colouring agent as data are inputted in the microcomputer.

7. An apparatus according to claim 5 or 6, wherein the chute (17) is provided detachably from the material discharge port (11) in the base (10).

8. An apparatus according to claim 7, wherein the metering chambers (21, 22) of the lines (L1, L2) on the rotating disc (20) and the material discharge ports (11) in the base (10) are in communication with air injection pipes (153, 154, 156) by way of ducts (151, 152, 155) connected to an air supply source (150), so that compressed air from an air supply source (150) is injected to the metering chambers (21, 22) and the material discharge ports (11).

Patentansprüche

1. Verfahren zum Mischen von Kunststoff-Formmaterialien, wobei in dem Verfahren eine Einrichtung verwendet wird, die die Menge der zu mischenden Materialien messen kann, und die Einrichtung eine sich drehende Scheibe benutzt, die mit Meßkammern versehen ist, aus denen die zum Mischen erforderlichen Materialmengen entleert werden können, und die aus einer Meßkammer entleerte Materialmenge von der Hublänge eines Abstreichers bestimmt wird, der bezüglich der Meßkammer beweglich ist, und in dem Verfahren ein Mischungsverhältnis von Hauptmaterial zu Hilfsmaterial eingestellt wird, dadurch gekennzeichnet, daß das Verfahren umfaßt:

das Bestimmen der Menge eines Materials, das entweder das Hauptmaterial oder das Hilfsmaterial ist, und das zum Mischen zu entleeren ist, ausgehend von der Menge des anderen zum Mischen entleerten Materials und von einem Skalierfaktor, der durch das gewünschte Mischungsverhältnis von Hauptmaterial und Hilfsmaterial bestimmt ist;
das Berechnen, und zwar für zumindest eine Stellung der Hublänge des Abstreichers, der entsprechenden Menge des einen Materials, das mit der Hublänge des Abstreichers in dieser Stellung entleert würde, und das Eingeben dieser Information als Festwert in den Speicher eines Regelsystems der Einrichtung;
das Feststellen der Hublänge des Abstreichers, die erforderlich ist, um die bestimmte Menge des einen Materials zu erhalten, das zum Mischen zu entleeren ist; und
das automatische Regeln der Einstellung des Abstreichers auf die Hublänge, die der erforderlichen festgestellten Menge des einen Materials entspricht.

2. Verfahren zum Mischen von Kunststoff-Formmaterialien nach Anspruch 1, wobei die Art des neu hergestellten Materials, die Art und der Skalierfaktor des Färbemittels und die Abstreicherstellung für das neu hergestellte Material vorab im Speicher abgelegt sind, und zwar mit Bezug auf einen Handelsnamen oder die Codenummer eines Produkts, so daß durch die Wahl des Handelsnamens oder

der Codenummer des Produkts die Menge des neu hergestellten Materials, die dem Färbemittel zuzumischen ist, automatisch eingestellt wird.

3. Verfahren zum Mischen von Kunststoff-Formmaterialien nach Anspruch 1 oder 2, wobei durch die Auswahl eines Produktnamens und ein Farbwechselsignal ein Wechsel in der Farbe erzielt wird.

4. Verfahren zum Mischen von Kunststoff-Formmaterialien nach Anspruch 1 oder 2, wobei durch ein Materialwechselsignal von einem momentan verwendeten Material automatisch auf ein anderes Material umgeschaltet wird.

5. Einrichtung zum Mischen von Kunststoff-Formmaterialien, umfassend:

ein Grundteil (10), das Materialentleerungsöffnungen (11) aufweist und einen Raum (12) zur Aufnahme einer sich drehenden Scheibe, wobei die sich drehende Scheibe (20) drehbar im Raum (12) aufgenommen ist und zwei oder mehr Reihen (L1, L2) mit einer Anzahl Meßkammern (21, 22) in konzentrischen Kreisen aufweist;
eine oder mehrere Materialentleerungsöffnungen (11) zum Messen, Mischen und Entleeren von Materialien, die den Reihen (L1, L2) mit den Meßkammern (21, 22) durch drehende Verschiebung des Materials zugeführt wurden;
eine Rutsche (17) zum Zusammenführen der Materialentleerungsöffnungen (11) an einem Ort; und
Abstreicher (5, 5') zum Einstellen der Menge des Hauptmaterials oder des Hilfsmaterials, das den Meßkammern (21, 22) zugeführt und dort gemessen wird,

wobei die Einrichtung zudem einen Mikrocomputer (100) umfaßt, geeignet zum:

Bestimmen der Menge eines Materials, das entweder das Hauptmaterial oder das Hilfsmaterial ist und das zum Mischen zu entleeren ist, ausgehend von der Menge des anderen zum Mischen entleerten Materials und von einem Skalierfaktor, der durch das gewünschte Mischungsverhältnis von Hauptmaterial und Hilfsmaterial bestimmt ist;
Berechnen, und zwar für zumindest eine Stellung der Hublänge des Abstreichers, der entsprechenden Menge des einen Materials, das mit der Hublänge des Abstreichers in dieser Stellung entleert würde, und das Eingeben dieser Information als Festwert in den Speicher des Mikrocomputers;
Feststellen der Hublänge des Abstreichers, die erforderlich ist, um die bestimmte Menge des einen Materials zu erhalten, das zum Mischen zu entleeren ist; und
das automatische Regeln der Einstellung des Abstreichers auf die Hublänge, die der erforderlichen und festgestellten Menge des einen Materials entspricht.

6. Einrichtung nach Anspruch 5, wobei als Daten in den Mikrocomputer eingegeben werden: der Meßwert und/oder der Skalierfaktor entweder des Hilfsmaterials oder des Hauptmaterials, die Mischrate des anderen Materials, die Hublänge der Abstreicher (5, 5'), die Art des Hauptmaterials oder des Hilfsmaterials in bezug auf den Handelsnamen oder die Codenummer eines Produkts, und die Art und der Skalierfaktor des Färbemittels.

7. Einrichtung nach Anspruch 5 oder 6, wobei die Rutsche (17) von der Materialentleerungsöffnung (11) im Grundteil (10) abgenommen werden kann.

8. Einrichtung nach Anspruch 7, wobei die Meßkammern (21, 22) der Reihen (L1, L2) auf der sich drehenden Scheibe (20) und die Materialentleerungsöffnungen (11) im Grundteil (10) mit Lufteinblasleitungen (153, 154, 156) verbunden sind, und zwar über Rohre (151, 152, 155), die an eine Luftversorgungsquelle (150) angeschlossen sind, so daß Druckluft aus einer Luftversorgungsquelle (150) in die Meßkammern (21, 22) und Materialentleerungsöffnungen (11) eingeblasen wird.

Revendications

1. Procédé de mélange de matières destiné au moulage de matières plastiques, le procédé mettant en oeuvre un appareil permettant le dosage de la quantité des matières à mélanger, l'appareil comprenant un disque rotatif ayant des chambres de dosage à partir desquelles les quantités nécessaires des matières peuvent être évacuées pour le mélange, et étant tel que la quantité de matière évacuée par une chambre de dosage est déterminée par la longueur de la course d'un racloir mobile par rapport à la chambre de dosage, et dans lequel un rapport de mélange d'une matière principale et d'une matière secondaire est déterminé, caractérisé en ce qu'il comprend :

la détermination de la quantité d'une première matière parmi la matière principale et la matière secondaire qui doit être évacuée pour le mélange en fonction de la quantité de l'autre matière évacuée pour le mélange, et d'un facteur qui est déterminé par le rapport voulu de mélange des matières principale et secondaire,
le calcul, pour au moins une position de la lon-

gueur de la course du racloir, de la quantité correspondante d'une première matière qui serait évacuée pour la longueur de la course du racloir ayant cette position et la saisie de cette information sous forme d'une valeur fixe dans la mémoire d'un système de commande de l'appareil,

l'obtention de la longueur de la course du racloir nécessaire pour donner une quantité déterminée de la première matière à évacuer pour le mélange, et

le réglage automatique du racloir à la longueur de la course qui correspond à la quantité déterminée voulue de ladite matière.

2. Procédé de mélange de matières pour le moulage de matières plastiques selon la revendication 1, dans lequel un type de matière vierge, un type et un facteur d'échelle d'un agent colorant, et une position de racloir de la matière vierge sont préalablement conservés en mémoire avec une marque de fabrique ou un numéro de code d'un produit de manière que la quantité de matière vierge a mélanger à la matière colorante soit réglée automatiquement par sélection de la marque de fabrique ou du numéro de code de ce produit.

3. Procédé de mélange de matières de moulage de matières plastiques selon la revendication 1 ou 2, dans lequel le changement de couleur est obtenu par un signal de changement de couleur et par sélection d'une marque de fabrique et d'un produit.

4. Procédé de mélange de matières pour le moulage de matières plastiques selon la revendication 1 ou 2, dans lequel une matière actuellement utilisée est commutée automatiquement sur une matière différente par un signal de changement de matière.

5. Appareil de mélange de matières pour le moulage de matières plastique, comprenant :

une base (10) ayant des orifices (11) d'évacuation de matières et un espace (12) destiné à contenir un disque rotatif, le disque rotatif (20) étant logé afin qu'il puisse tourner dans ledit espace (12) et ayant au moins deux lignes (L1, L2) de plusieurs chambres de dosage (21, 22) sous forme de cercles concentriques, un ou plusieurs orifices (11) d'évacuation de matières destinés à mesurer, mélanger et évacuer les matières transmises aux lignes (L1, L2) de chambres de dosage (21, 22) par déplacement en rotation des matières, une goulotte (17) destinée à concentrer les orifices (11) d'évacuation de matières à un emplacement, et des racloirs (5, 5') destinés à ajuster la quantité de matière principale ou secondaire transmise et dosée dans les chambres de dosage (21, 22),

dans lequel l'appareil comporte en outre un microordinateur (100) destiné :

à déterminer la quantité d'une première matière parmi la matière principale et la matière secondaire qui doit être évacuée pour le mélange d'après la quantité de l'autre matière évacuée pour le mélange, et un facteur d'échelle qui est déterminé par le rapport voulu de mélange des matières principale et secondaire,

à calculer, pour au moins une position de la longueur de la course du racloir, la quantité correspondante de la première matière qui serait évacuée pour la longueur de la course du racloir ayant cette position et à saisir l'information sous forme d'une valeur fixe dans sa mémoire,

à obtenir la longueur de la course du racloir nécessaire pour donner la quantité déterminée de la première matière à évacuer pour le mélange, et

à commander automatiquement le réglage du racloir à la longueur de la course qui correspond à la quantité nécessaire déterminée de ladite matière.

6. Appareil selon la revendication 5, dans lequel la valeur de dosage et/ou le facteur d'échelle de la matière secondaire ou principale, le rapport de mélange de l'autre matière, l'amplitude de la course des racloirs (5, 5'), le type de la matière principale ou secondaire sous forme de sa marque de fabrique ou d'un numéro de code du produit, et le type et le facteur d'échelle de l'agent colorant sous forme de données sont saisis dans le microordinateur.

7. Appareil selon la revendication 5 ou 6, dans lequel la goulotte (17) est disposée de façon amovible sur l'orifice (11) d'évacuation de matières formé dans la base (10).

8. Appareil selon la revendication 7, dans lequel les chambres de dosage (21, 22) des lignes (L1, L2) formées sur le disque rotatif (20) et les orifices (11) d'évacuation de matières formés dans la base (10) sont en communication avec des conduites (153, 154, 156) d'injection d'air par l'intermédiaire de conduits (151, 152, 155) raccordés à une alimentation pneumatique (150), si bien que de l'air comprimé d'une alimentation pneumatique (150) est injecté dans les chambres de dosage (21, 22) et les orifices (11) d'évacuation de matières.

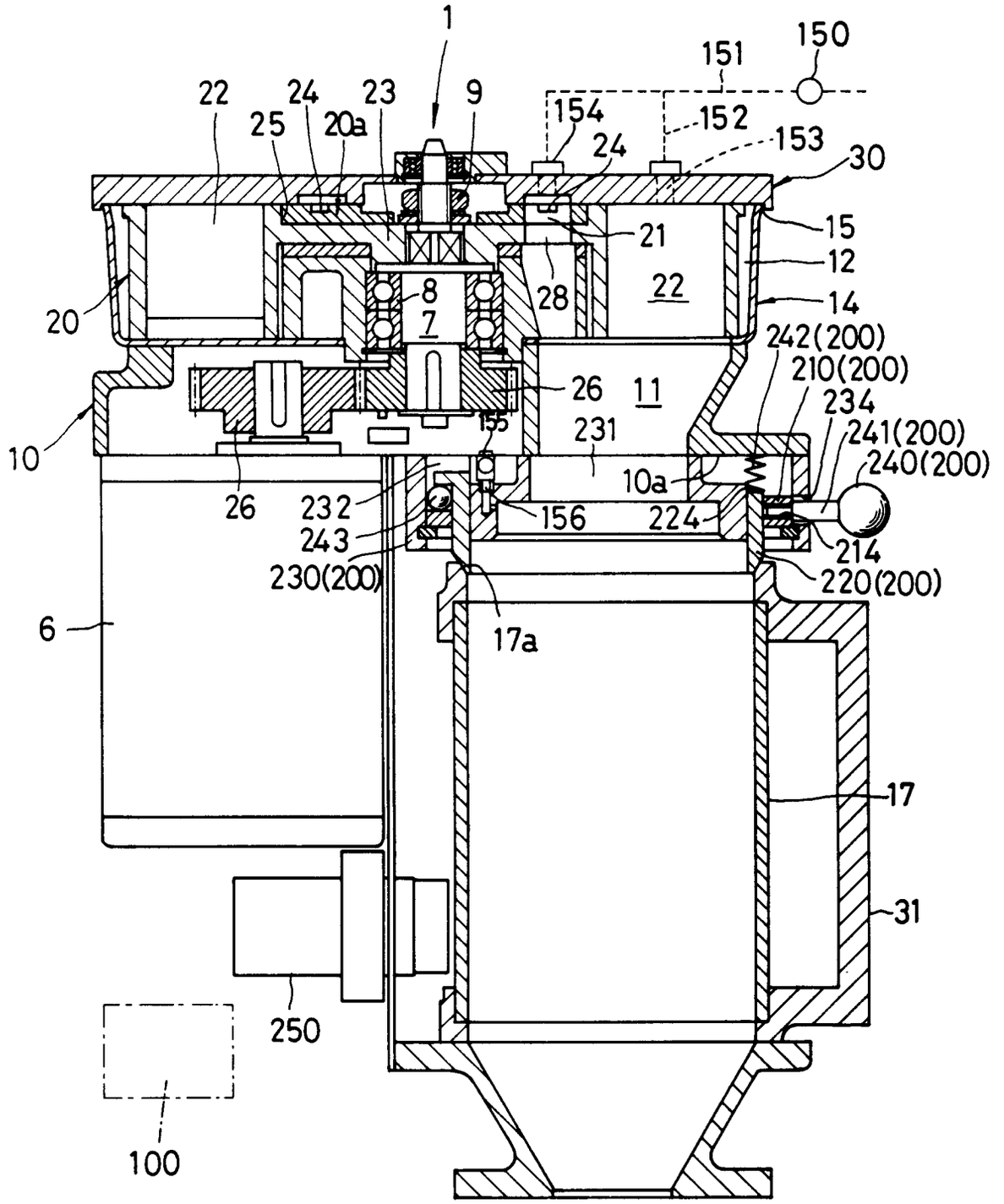

1
150
151
22
24
23
9
154
152
153
25
20a
24
30
21
15
12
22
20
8
7
28
14
242(200)
210(200)
26
11
234
241(200)
231
240(200)
10
155
10a
26
232
156
224
214
243
230(200)
220(200)
6
17a
17
31
250
100

FIG. 1

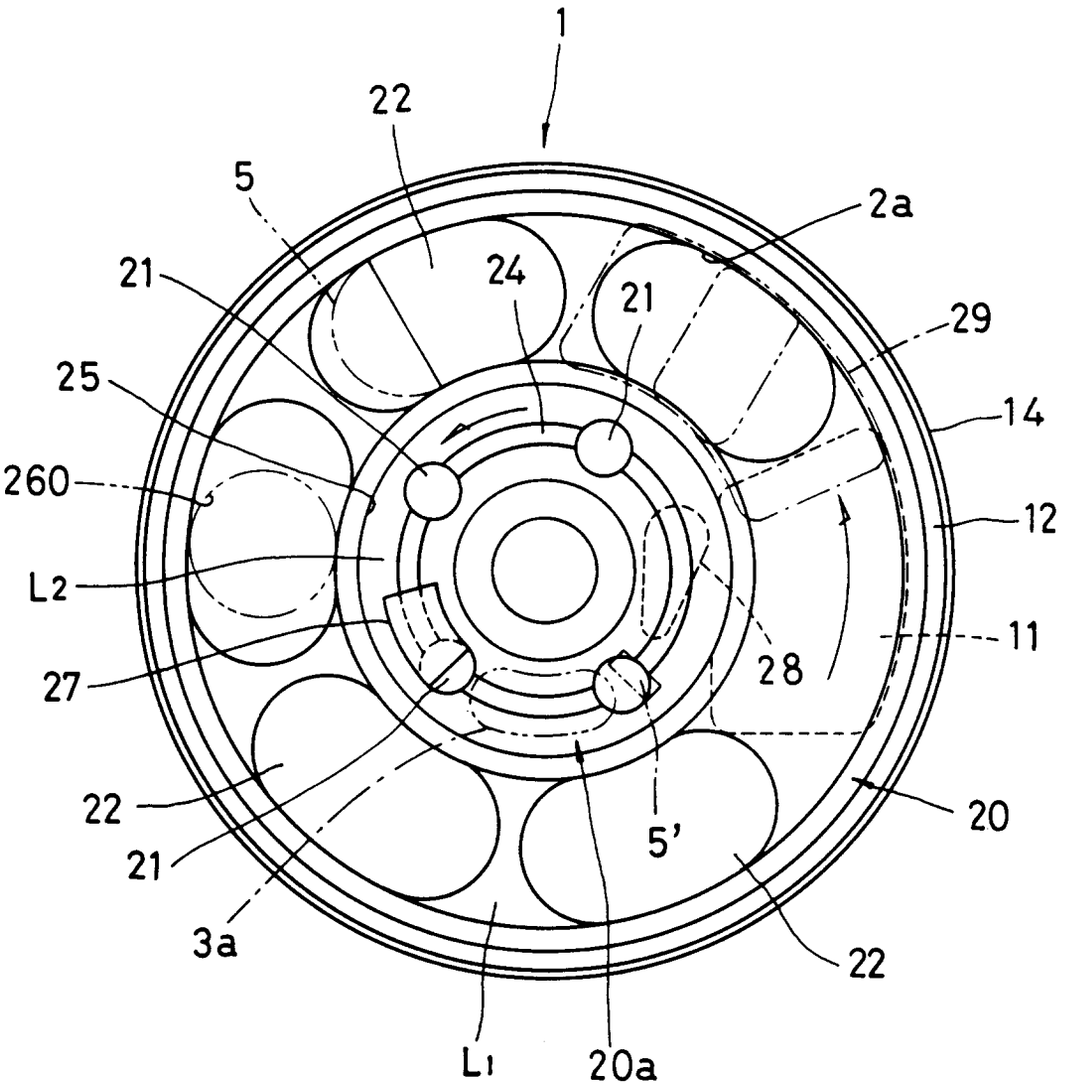


FIG. 2

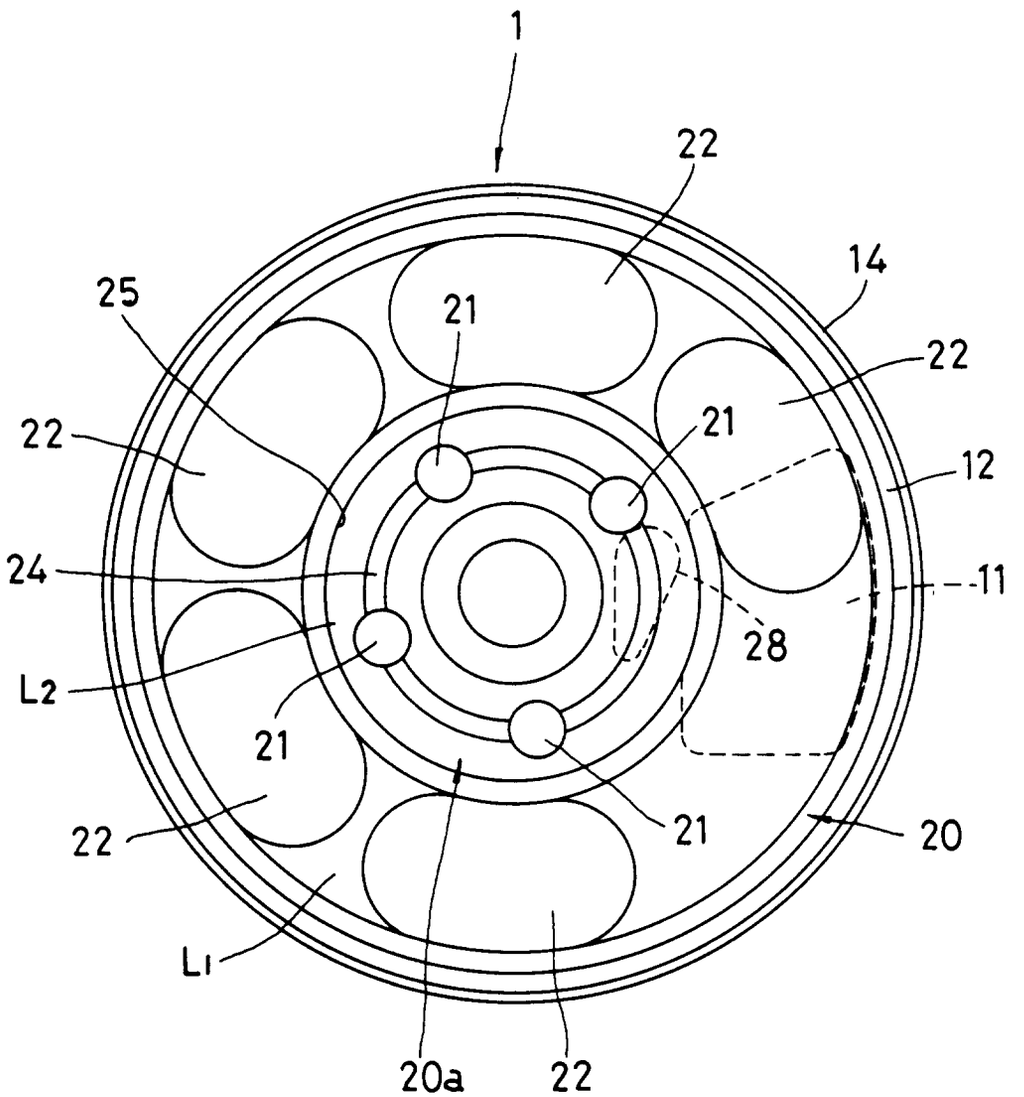


FIG. 3

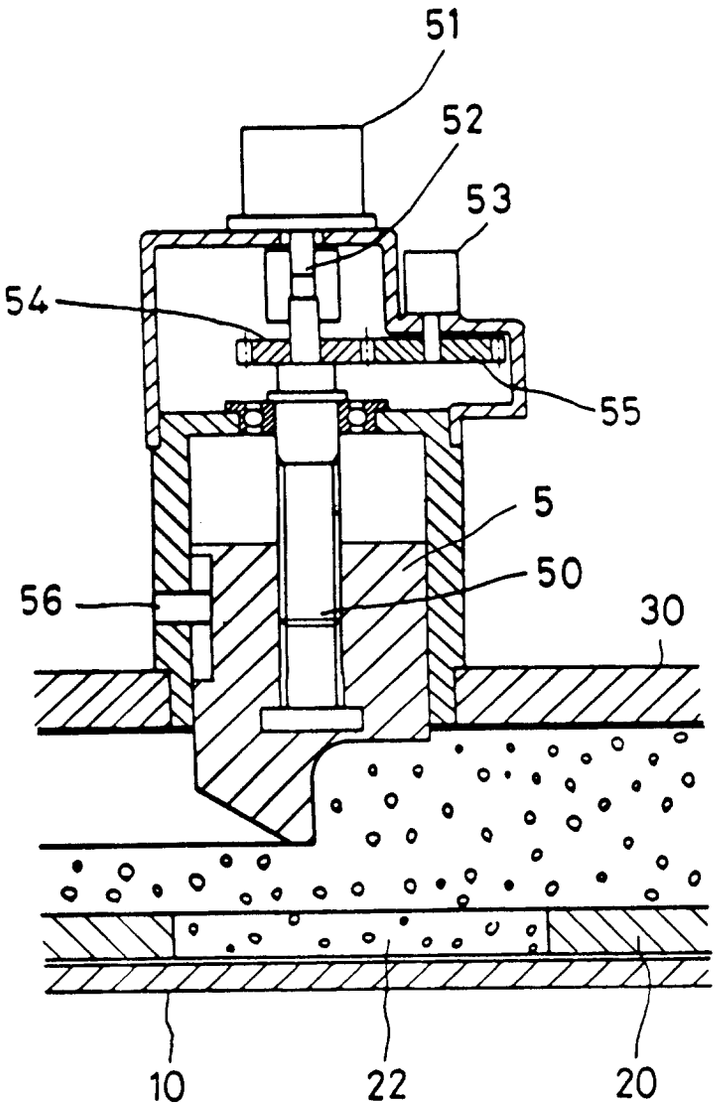


FIG. 4

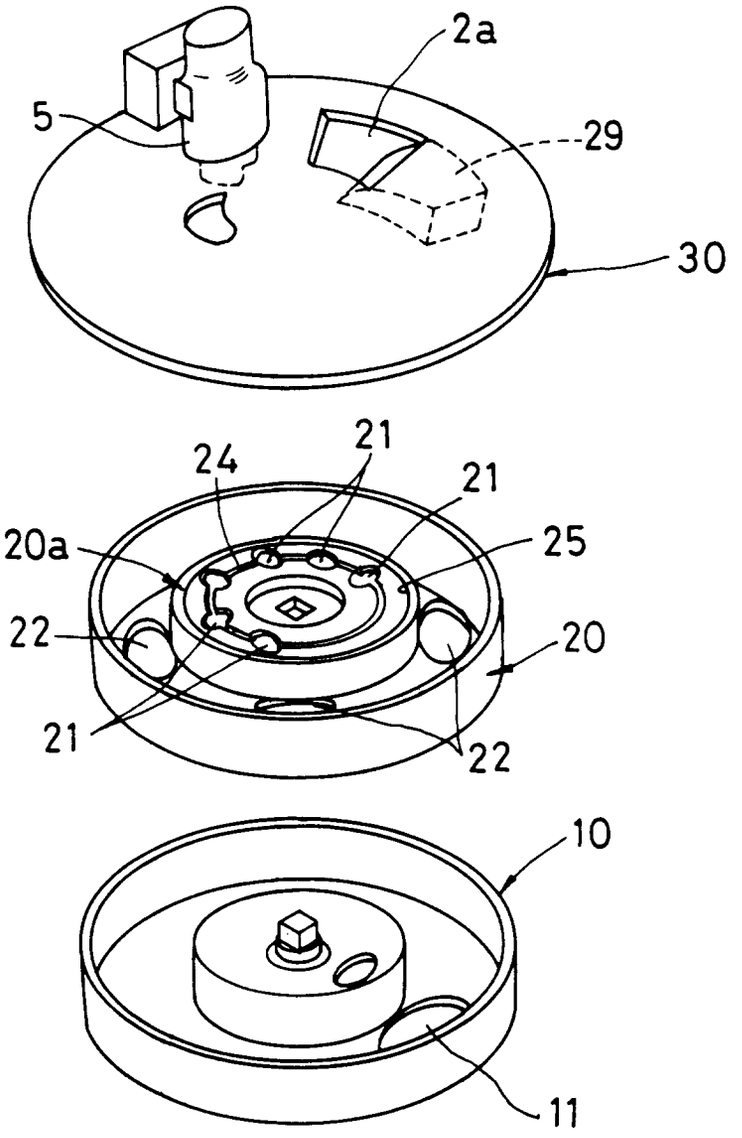
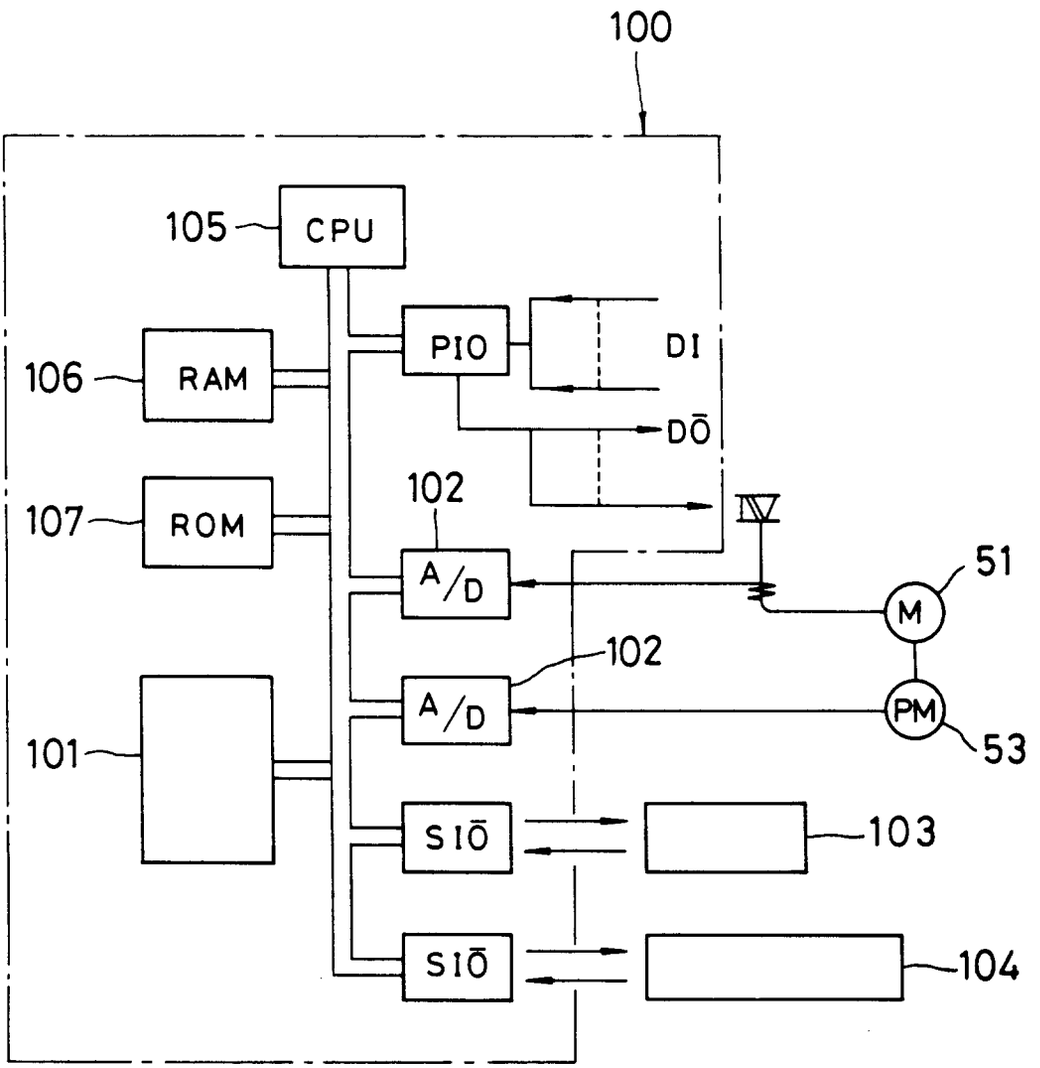


FIG. 5


100
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CPU
106
RAM
107
ROM
101
PIO
DI
DŌ
102
A/D
102
A/D
51
M
PM
53
SIŌ
103
SIŌ
104

FIG. 6

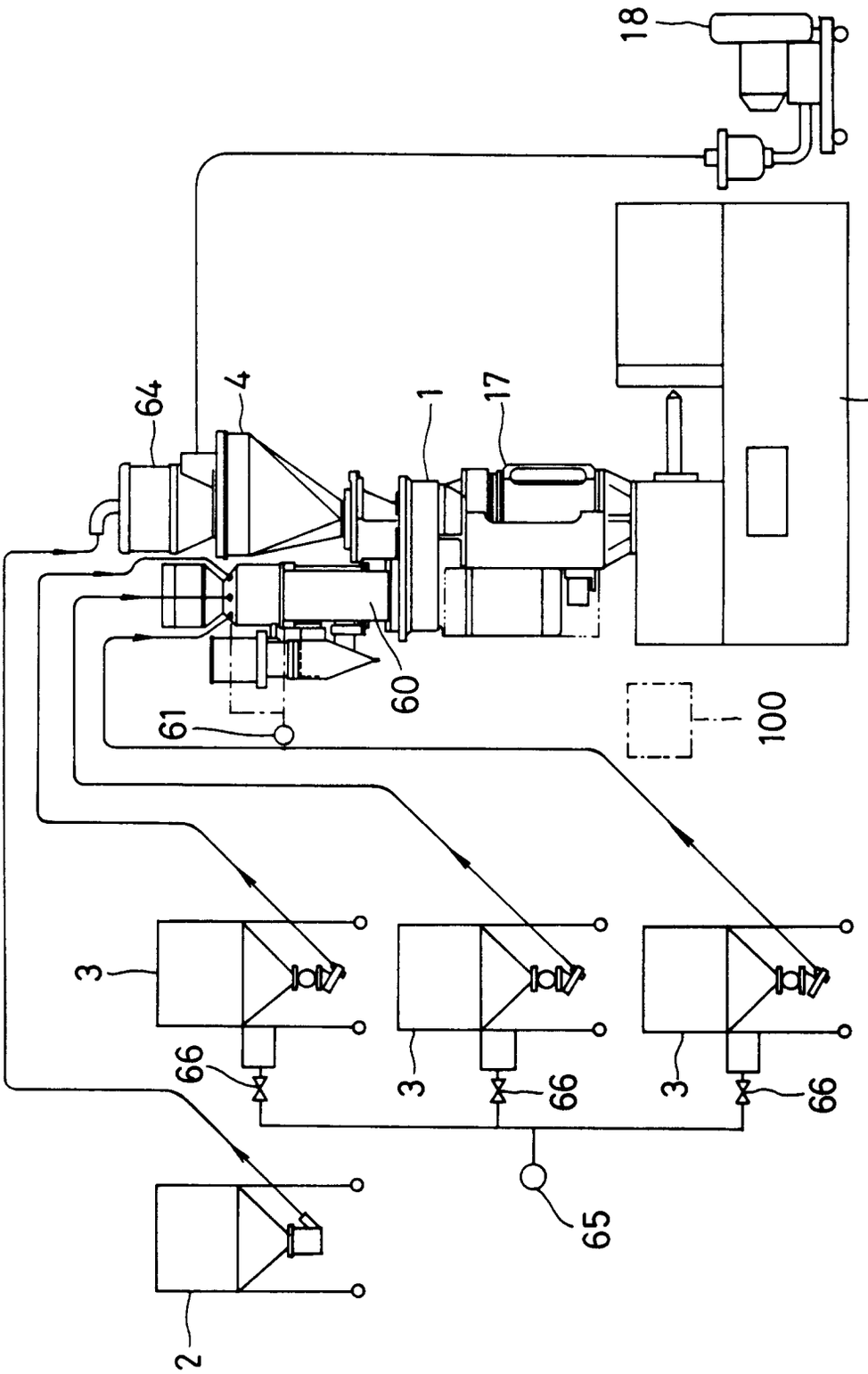


FIG. 7

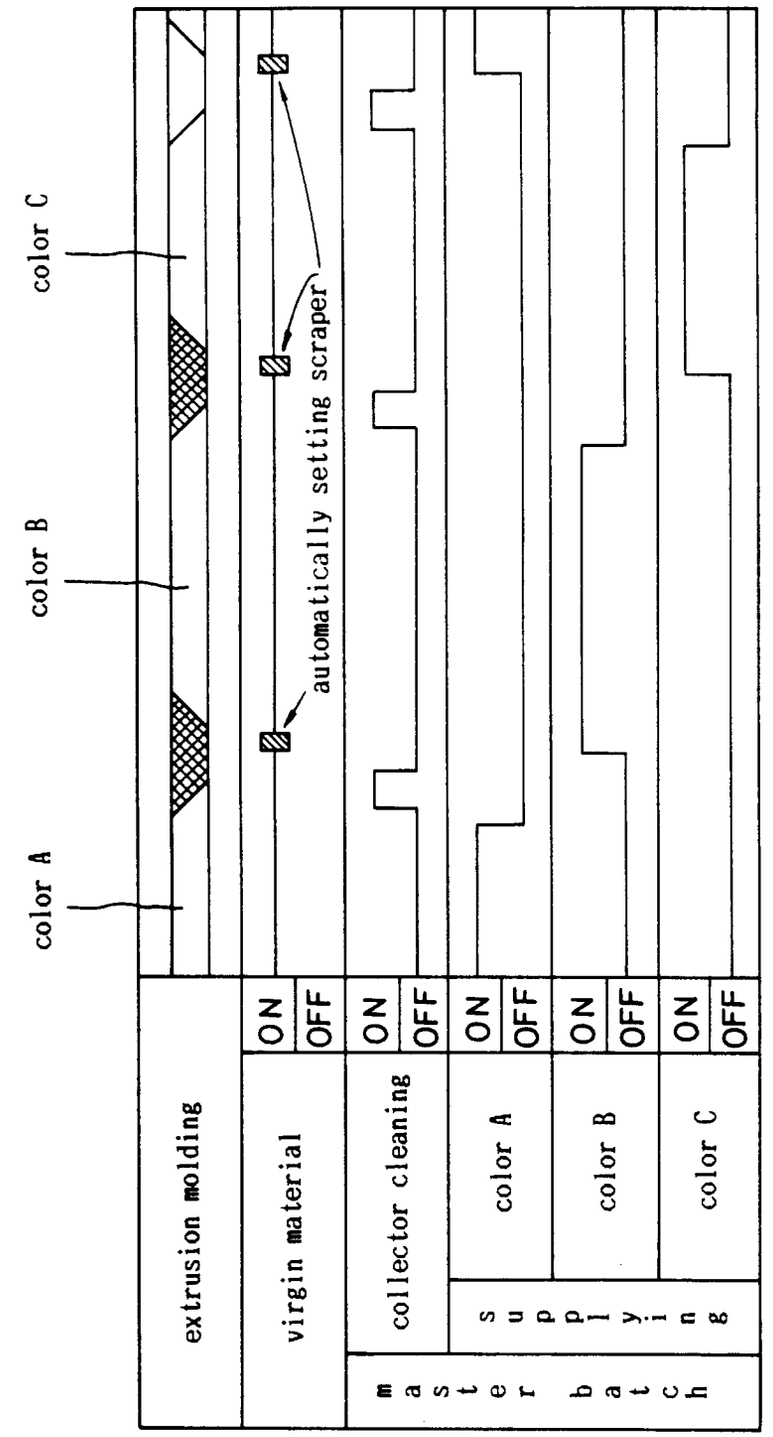

color A
color B
color C
automatically setting scraper
extrusion molding
virgin material
ON
OFF
master batch supplying
collector cleaning
color A
color B
color C
ON
OFF
ON
OFF
ON
OFF
ON
OFF

FIG. 8

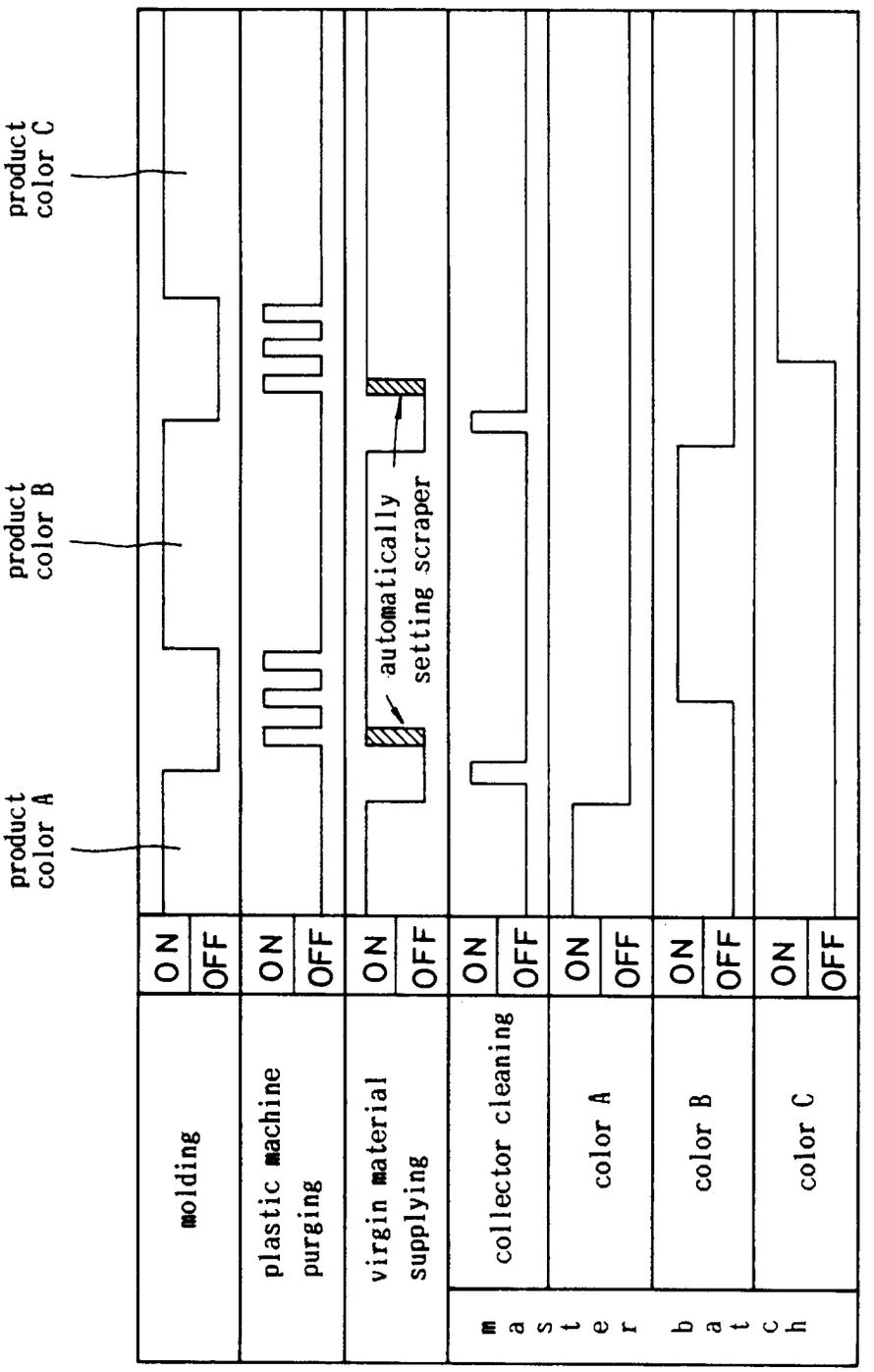

product color A
product color B
product color C
molding
ON
OFF
plastic machine purging
ON
OFF
virgin material supplying
ON
OFF
automatically setting scraper
master batch
collector cleaning
ON
OFF
color A
ON
OFF
color B
ON
OFF
color C
ON
OFF

FIG. 9

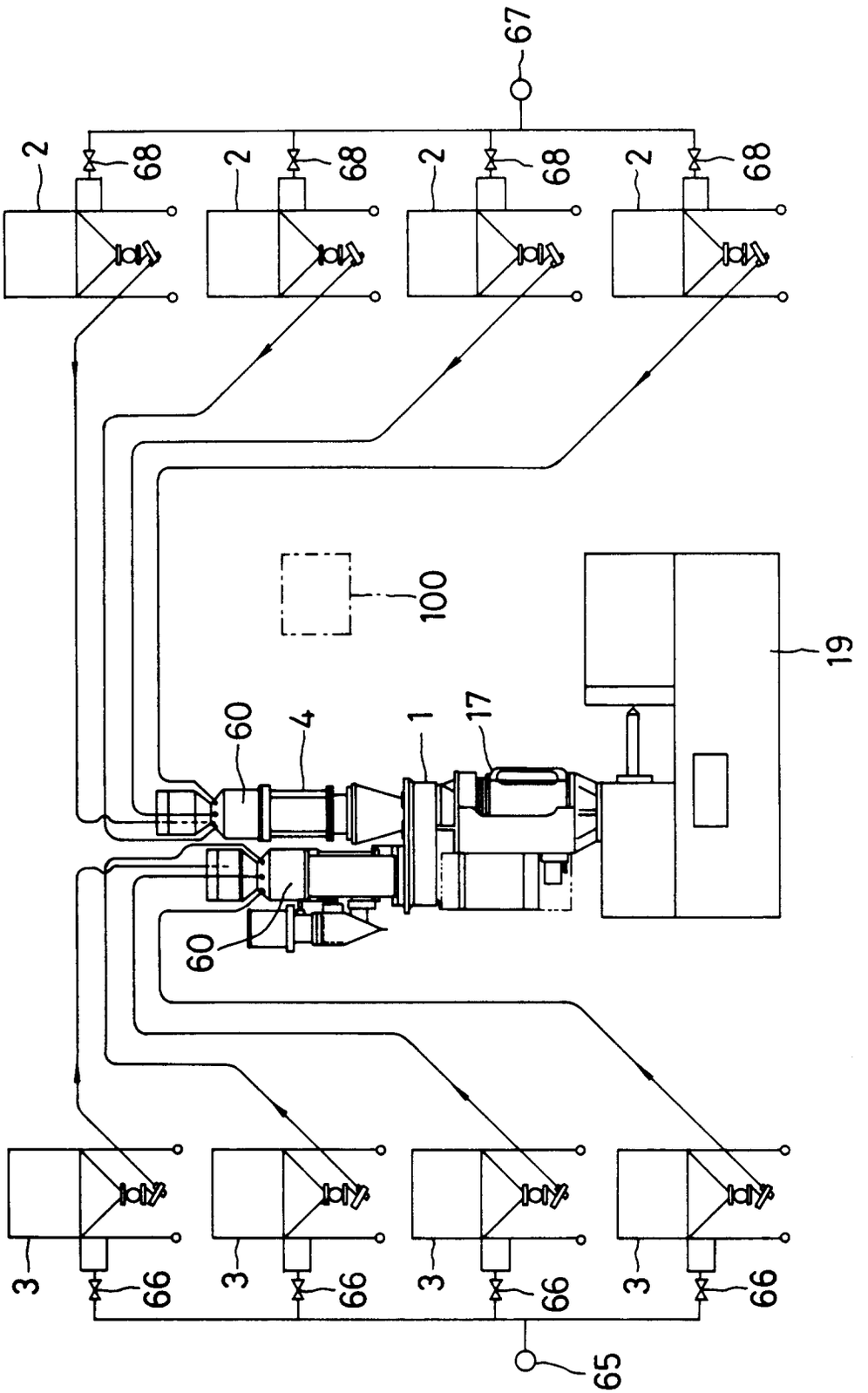


FIG.10

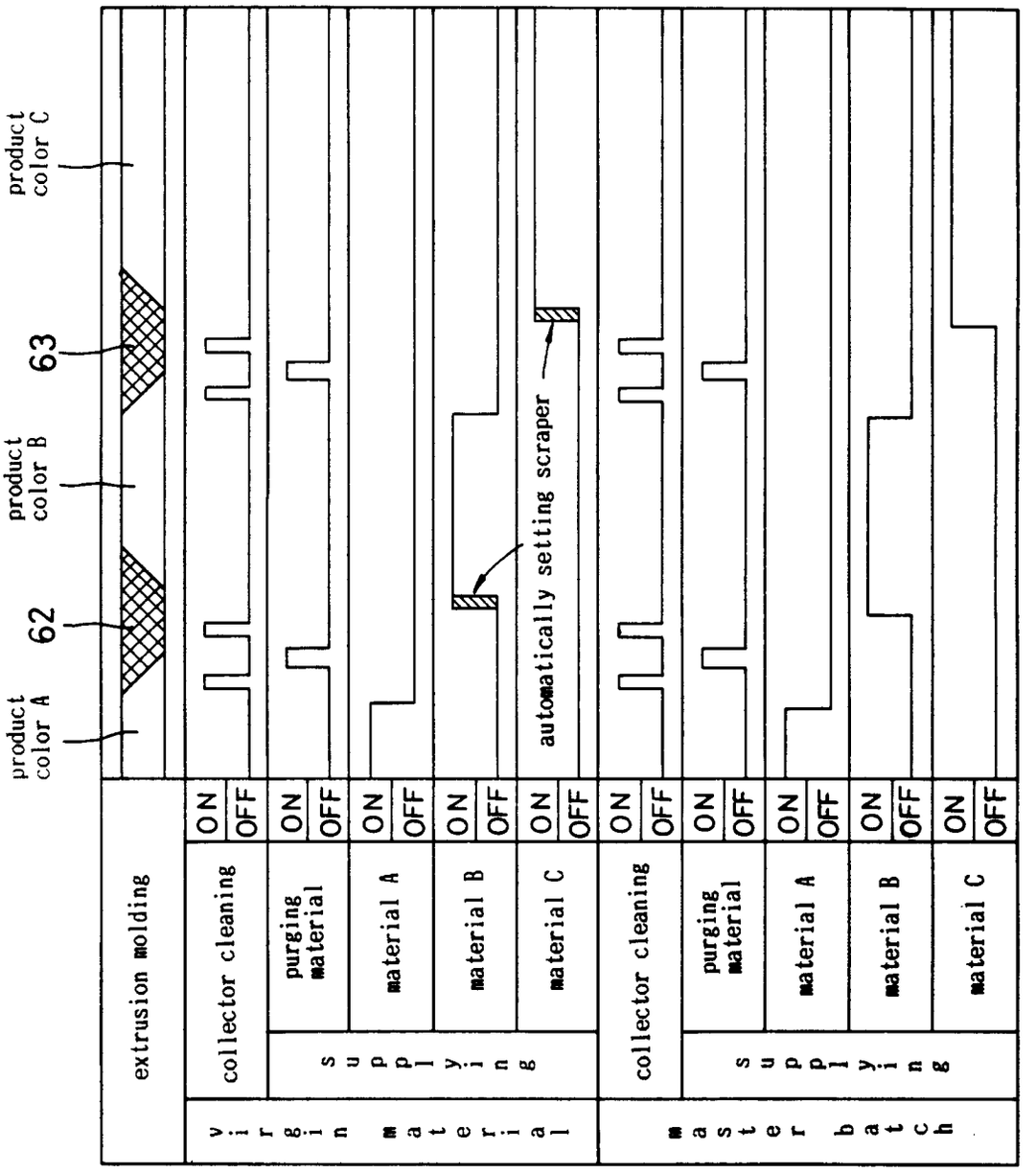

product color A
62
product color B
63
product color C
extrusion molding
virgin material
supplying
collector cleaning
purging material
material A
material B
material C
automatically setting scraper
ON
OFF
master batch
supplying
collector cleaning
purging material
material A
material B
material C
ON
OFF

FIG. 11

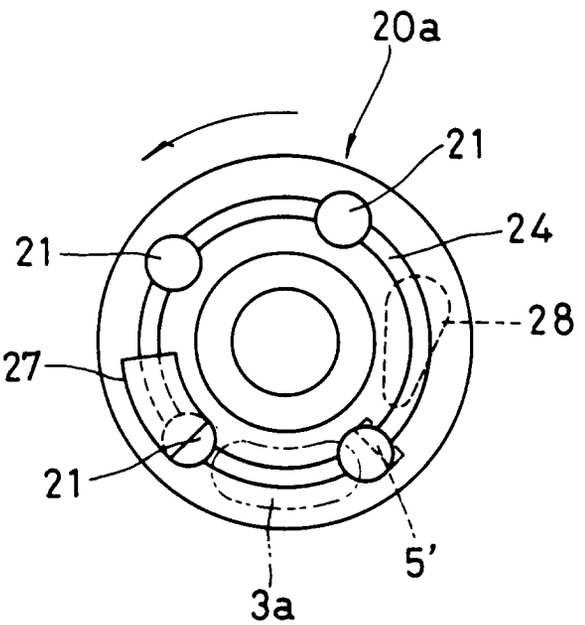


FIG.12

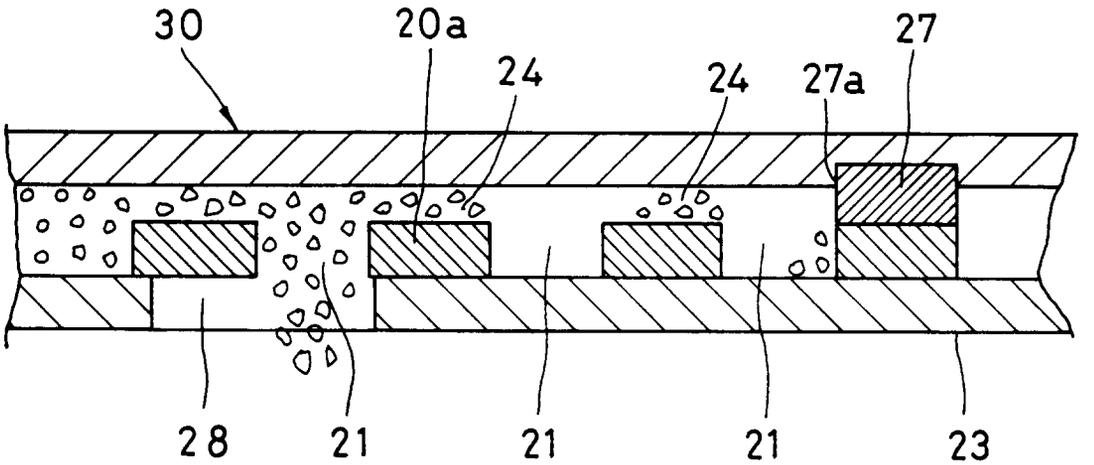
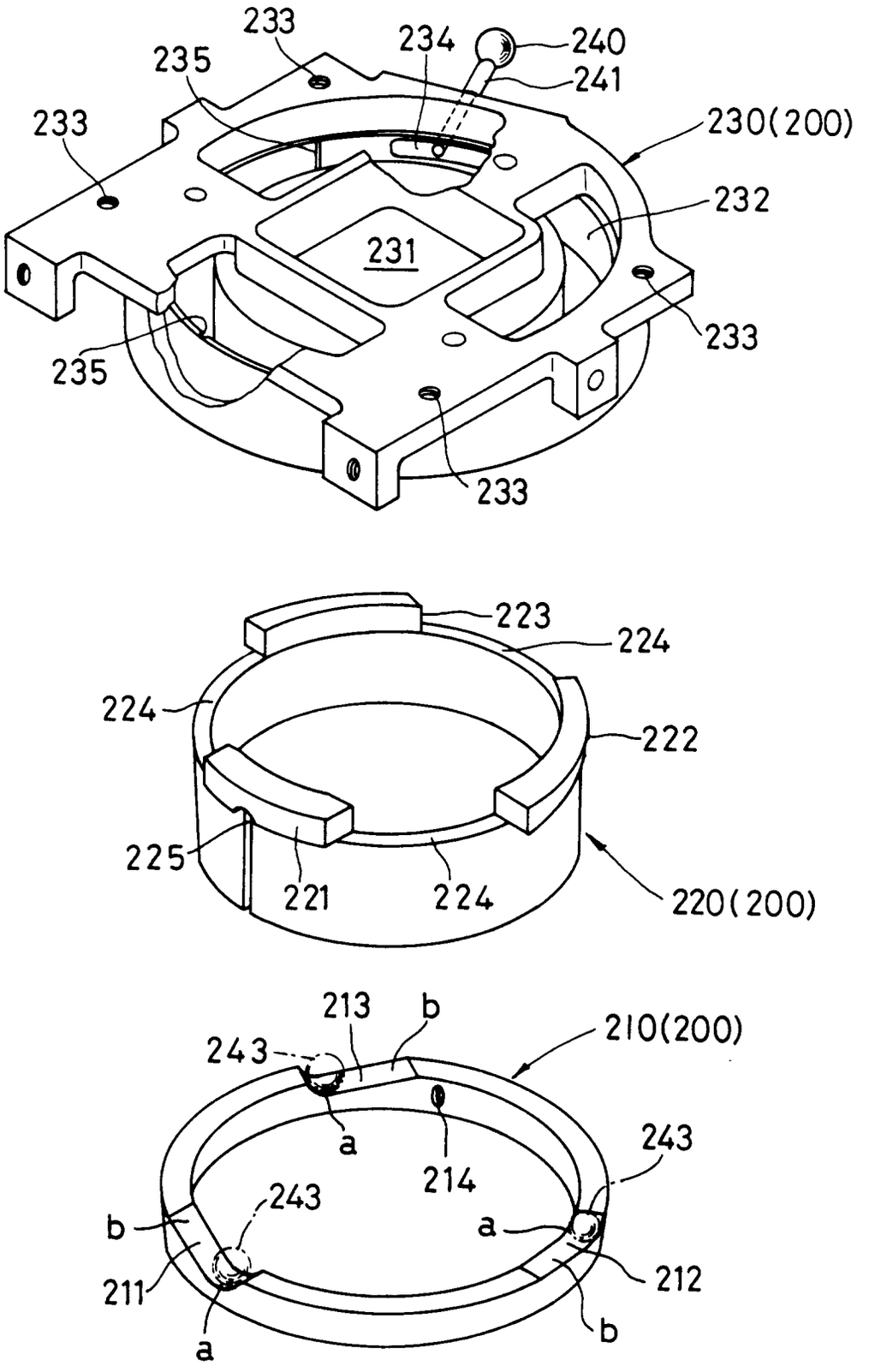


FIG.13


233
234
240
235
241
233
230(200)
232
231
233
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233
223
224
224
222
225
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220(200)
213
b
210(200)
243
a
214
243
b
243
a
211
212
a
b

FIG. 14

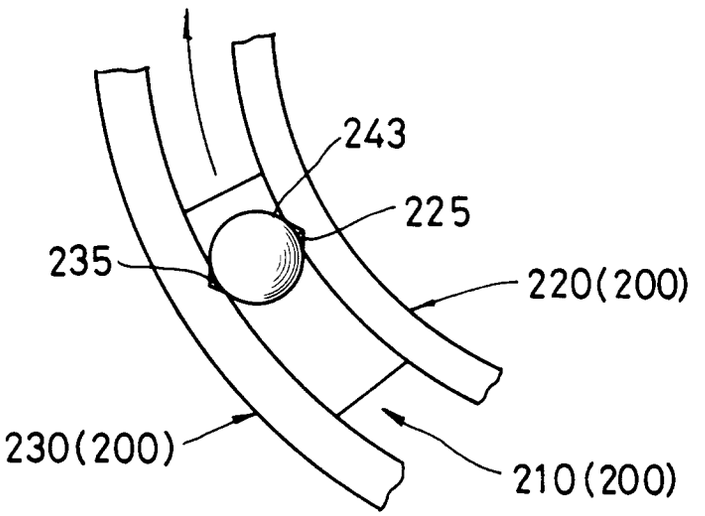

FIG.15