United States Patent

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[15] 3,645,505

[45] Feb. 29, 1972

[54] COLOR BLENDER FOR PLASTIC-PROCESSING MACHINES

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[22] Filed: **May 1, 1970**

[21] Appl. No.: **33,623**

[52] **U.S. Cl.** **259/10**, 222/142, 222/413, 259/155, 259/165

[51] **Int. Cl.** **B01f 7/08**, B01f 15/04

[58] **Field of Search** ..... 259/6, 21, 25, 26, 41, 69, 259/104, 154, 68, 179, 9, 10, DIG. 7, DIG. 8, DIG. 11, 155, 165; 222/142, 238, 413

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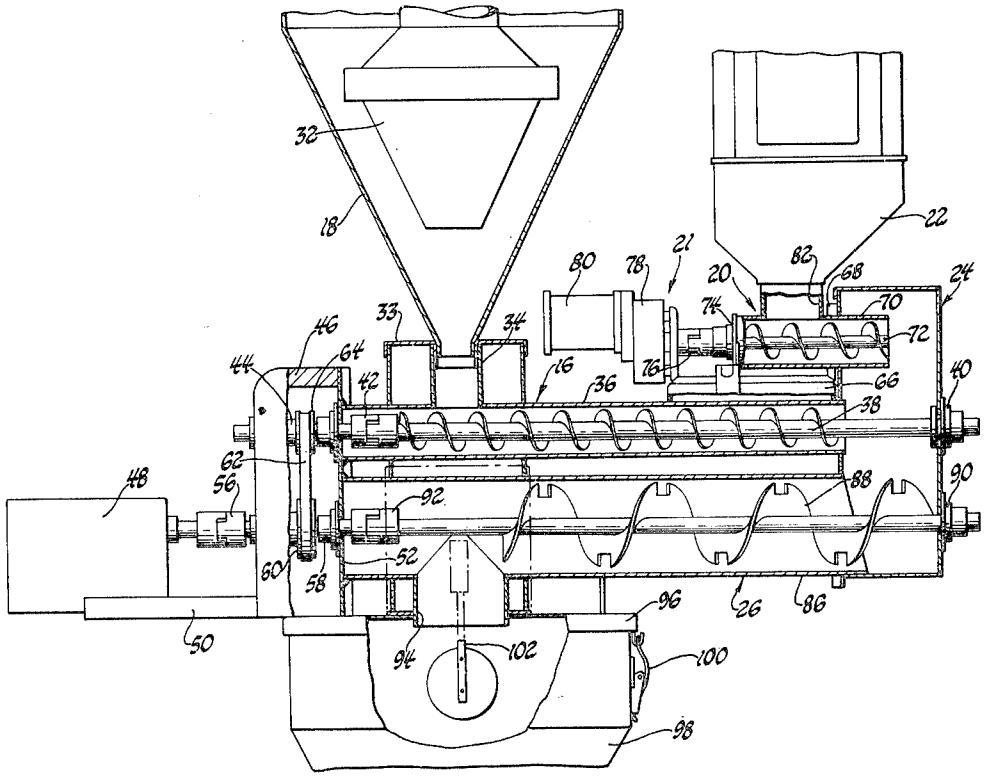
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[57] **ABSTRACT**

There is disclosed a color blender for plastic-processing machines of the type which is adapted to be mounted on the machine. The color blender comprises a constant rate screw-type conveyor for the primary material and a variable rate screw-type conveyor for the color additive, both of which have an outlet in a combining chamber. The materials are commingled in the combining chamber and a mixing conveyor thoroughly blends the components and delivers them to a receiver such as a holding hopper on the processing machine. The variable rate conveyor forms a part of a separable unit which may be readily replaced to change colors or the type of additive. The speed of the variable rate supply unit is adjusted to select the desired ratio of additive to primary material. The constant rate conveyor and the mixing conveyor are driven by a constant speed motor in synchronism with each other. In a modification the blender is provided with a pair of variable rate supply units together with the constant rate conveyor so that an additional component such as regrind material may be combined with the primary and color additive materials.

10 Claims, 8 Drawing Figures



Patented Feb. 29, 1972 3,645,505

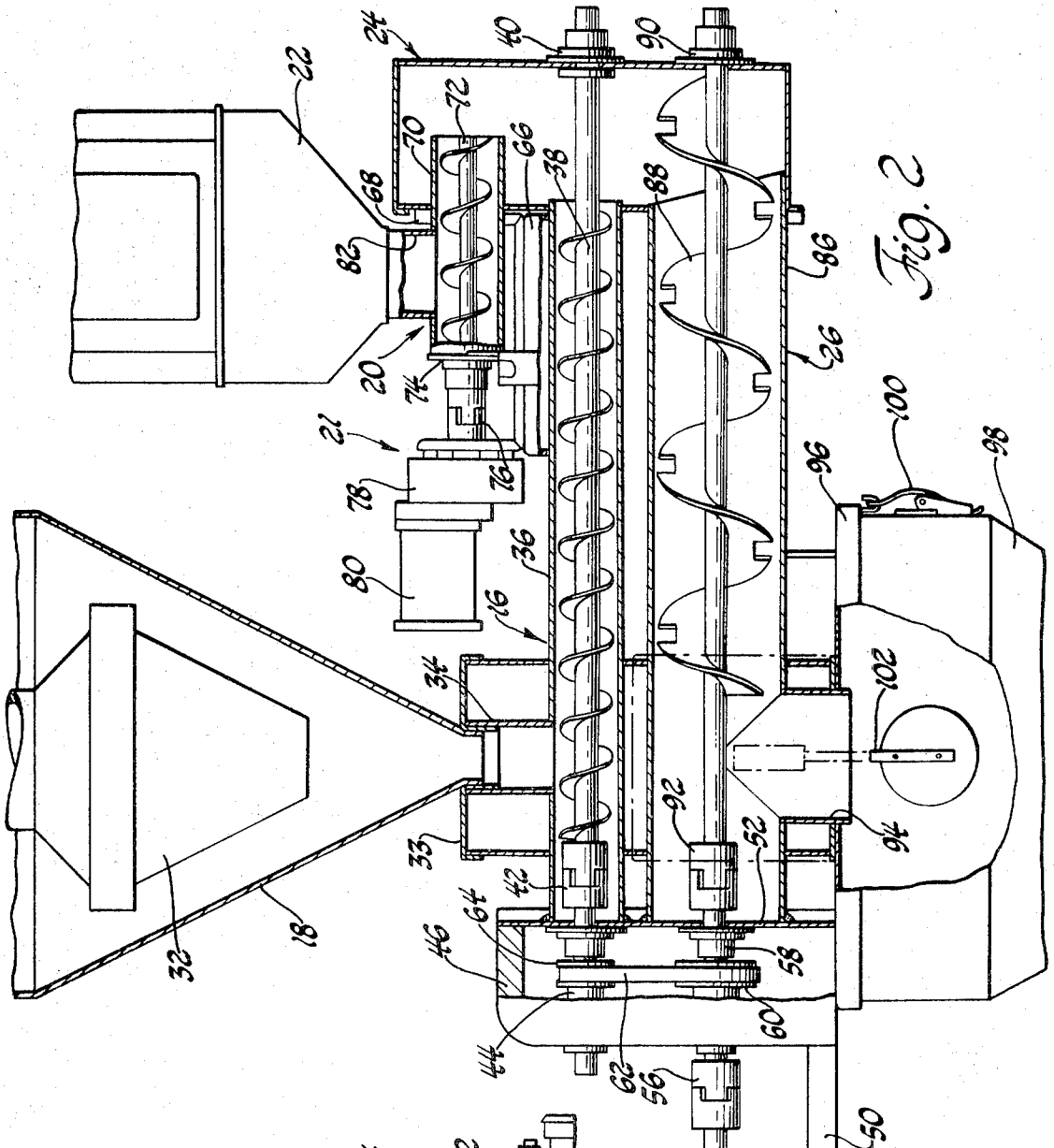


Fig. 2

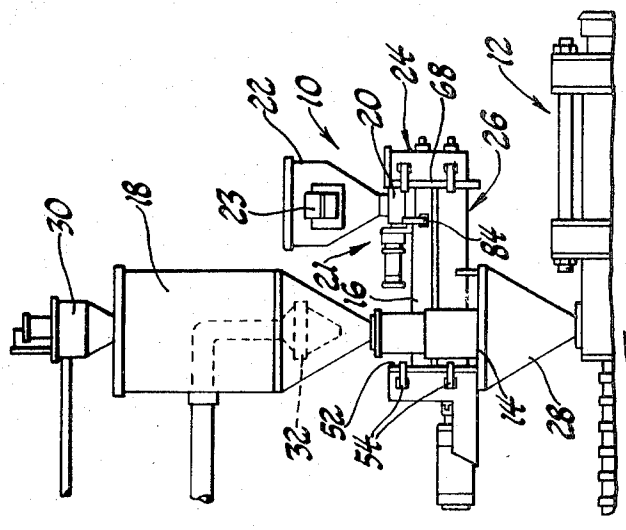


Fig. 1

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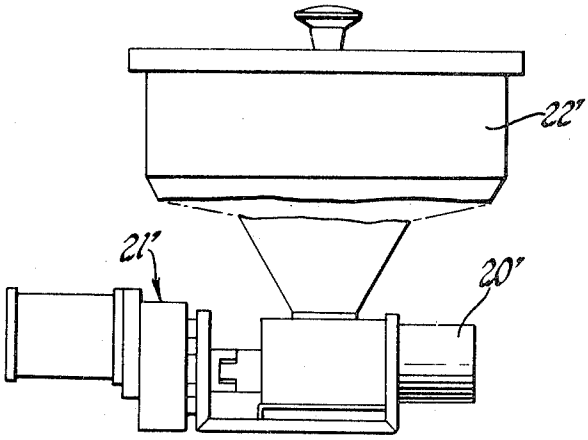


Fig. 3

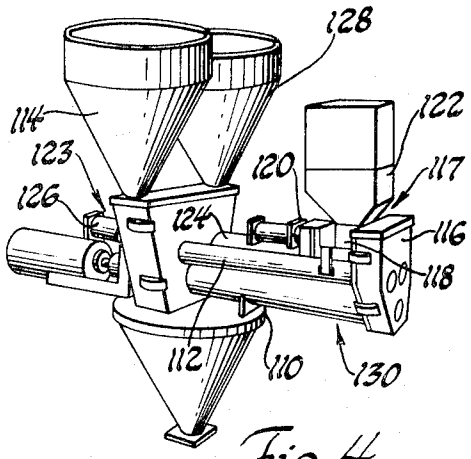


Fig. 4

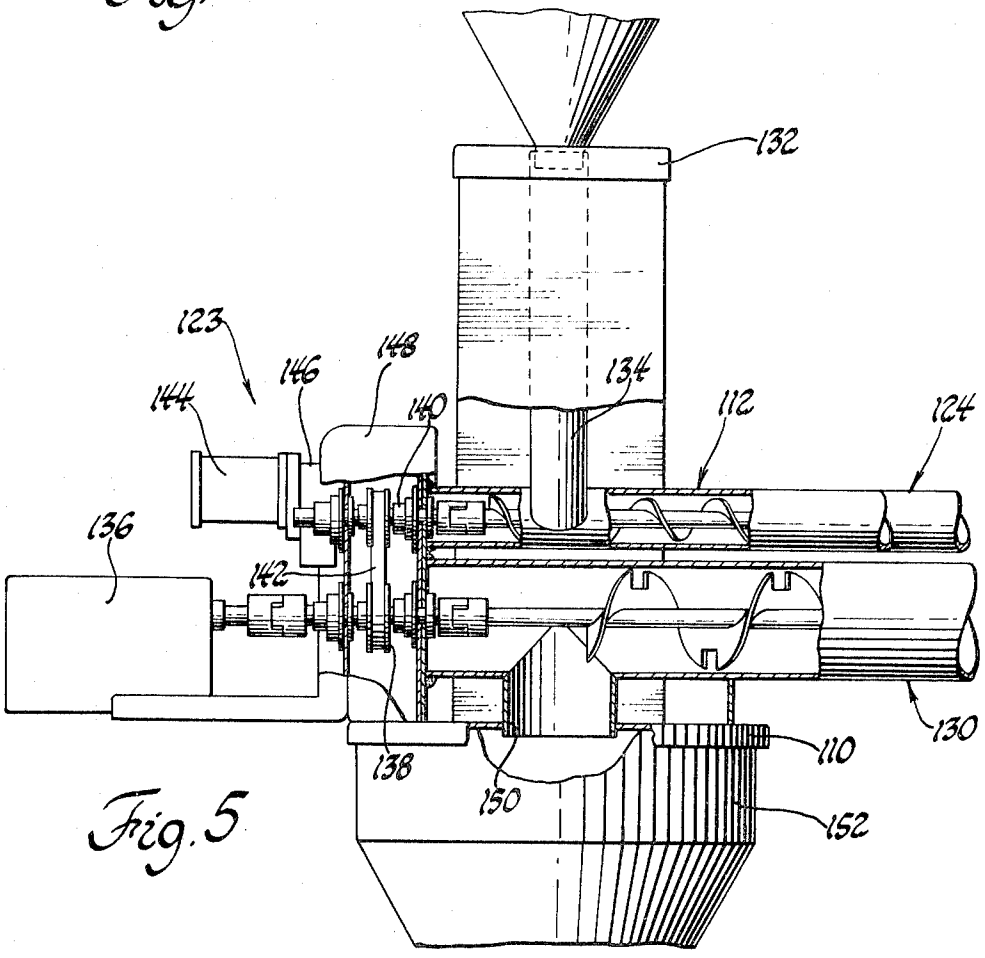


Fig. 5

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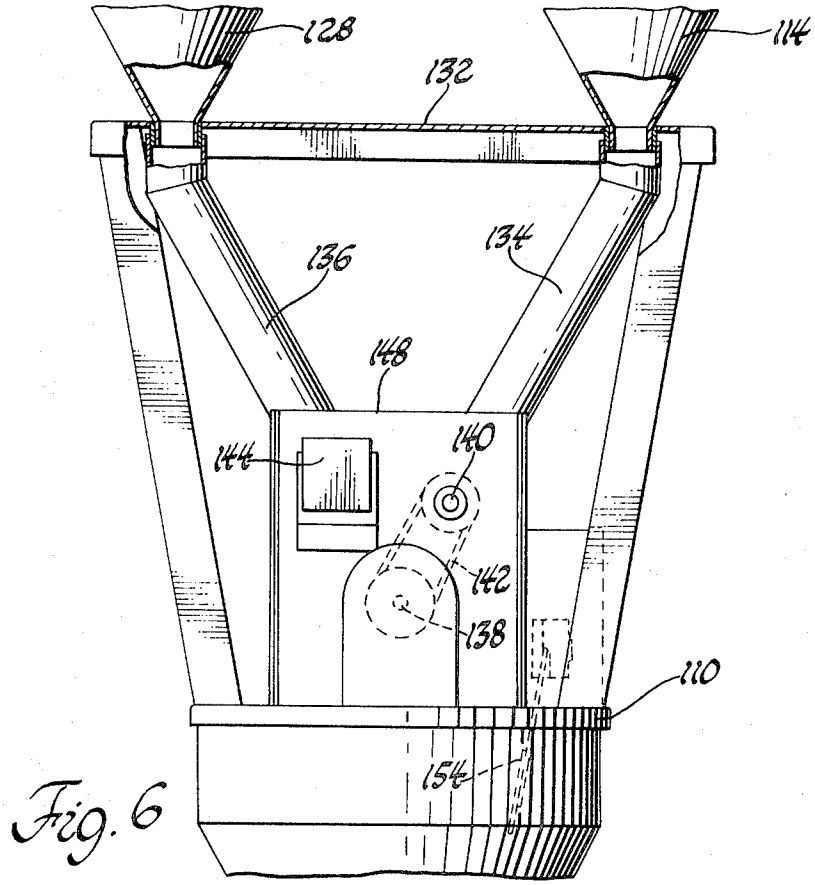


Fig. 6

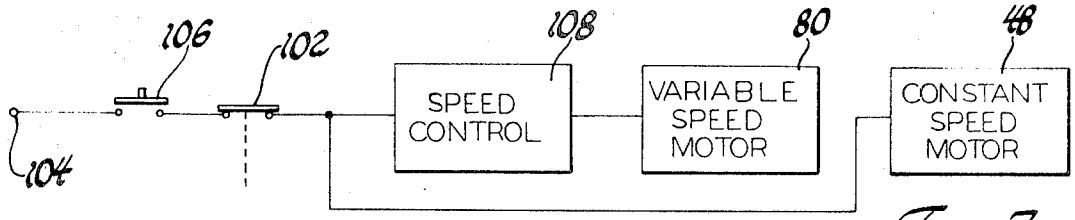


Fig. 7

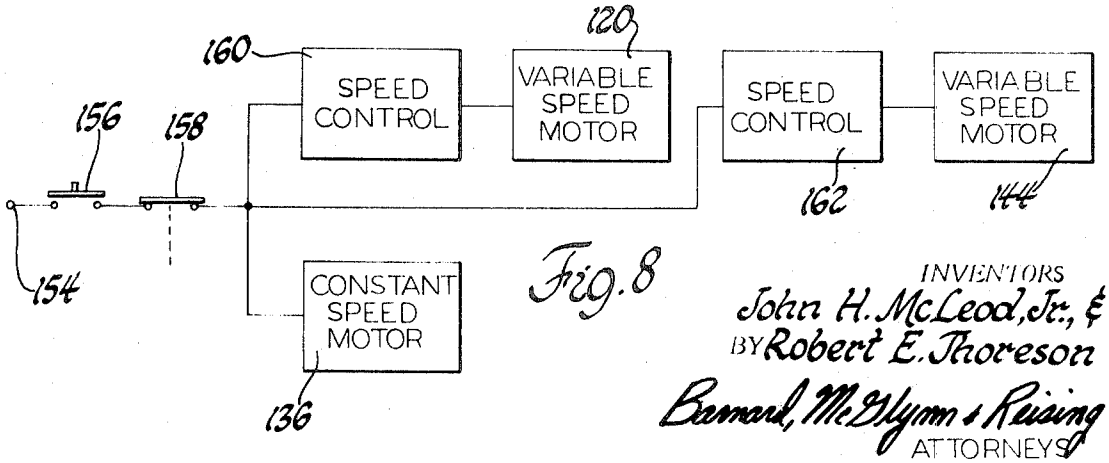


Fig. 8

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COLOR BLENDER FOR PLASTIC-PROCESSING MACHINES

This invention relates to plastic-processing machines such as molders and extruders and more particularly it relates to color blenders for such machines.

In the plastics-processing industry it has become a common practice for the users of machines such as injection molders, extruders and blow molders to purchase unpigmented or natural resin in particulate form from the materials supplier and then provide the necessary color additive as desired. Typically, the color additive is mixed with the resin in the form of a dry powder or in the form of color concentrate by a tumbler in the vicinity of the processing machine. Such a procedure, however, has proved to be uneconomical in many applications because of the separate tumbler installation and the material-handling problems in transporting the material from the tumbler to the processing machine. There has also been a problem of moisture control for the resin just prior to admission to the processing machine when the color additive and the resin are already mixed. When the color additive is in the form of dry powder colorant then the usual drying step using heated air flowing over the resin tends to blow off the powder colorant and change the color of the final material.

It has been proposed to provide color blenders combined with the processing machine and thus avoid some of the material handling problems associated with separate tumblers or other color mixers. Such equipment is sometimes referred to as an on-the-press blender and is adapted to blend the resin and color additive just prior to admission to the processing machine. While this arrangement offers many advantages there remains a need for an on-the-press blender which is well adapted to the machine mounting in terms of space requirements and yet has the required through-put capacity and which imparts the degree of mixing or blending required for uniformity of coloring. Additionally, such a blender is desired which is versatile in the number and kinds of additive material and which affords moisture control for the resin.

In accordance with this invention there is provided a color blender adapted for on-the-press mounting which is capable of blending any combination of particulate materials such as dry granular or powdered plastic material with dry powder colorant or color concentrate. Color additive and primary plastic material may be combined in a precisely controlled ratio and thoroughly mixed or blended to assure uniformity of color in the processed plastic. This is accomplished by providing means for accurate control of the feed rates for the different components of the blend and providing a mixing means which continuously blends the components over a relatively long conveyance course. The inventive blender comprises a combining chamber, a first metering conveyor which receives a supply of primary plastic material and delivers it at a constant rate to said chamber and a second metering conveyor which is driven by variable speed drive means and receives a supply of secondary material and delivers it at a preselected rate to the mixing chamber. A blending conveyor has its inlet connected with the chamber and an outlet adapted to be connected with a receiver such as a holding hopper for the processing machine. The blending conveyor is driven in synchronism with the first metering conveyor by connection thereof with a common drive means operated at constant speed. Preferably the metering conveyors and the blending conveyor are of the screw type and are arranged at different vertical levels so that the primary and secondary materials are commingled in a gravity drop to the inlet of the blending conveyor.

According to the invention the blender is also capable of mixing three or more components in accurately controlled ratios such as is often desired in blending natural resin, regrind material and a color additive. This is accomplished by a blender comprising a combining chamber, a metering conveyor for supplying the primary material thereto at a constant rate, a first variable rate-metering conveyor having an adjustable speed drive means for supplying the secondary material and a second variable rate metering conveyor with a separate variable speed drive means for supplying a tertiary material. A blending conveyor having its inlet connected with the chamber and its outlet adapted to be connected with a receiver is driven in synchronism with the constant rate conveyor by a common drive means.

Further, in accordance with the invention there is provided a blender which is capable of drying and blending on the processing machine at the same time. This is accomplished by a drying hopper for supplying the primary material to the metering conveyor. Thus, as the material is being fed into the combining chamber it is being dried just prior to being commingled with the color additive and blended therewith for admission to the processing machine.

A more complete understanding of the invention may be obtained from the detailed description which follows taken with the accompanying drawings in which:

FIG. 1 is a view in elevation of the inventive blender mounted on a processing machine;

FIG. 2 is a view partially in section of the inventive blender;

FIG. 3 shows a subassembly of a variable rate conveyor, drive means and canister for an additive material;

FIG. 4 is a perspective view of a modification of the inventive blender adapted for mounting on the processing machine;

FIG. 5 shows structural details of the blender shown in FIG. 4;

FIG. 6 shows additional structural details of the blender shown in FIG. 4;

FIG. 7 is a block diagram showing the control system for the blender of FIG. 1 and

FIG. 8 is a block diagram of the control system for the blender of FIG. 4.

Referring now to the drawings, there is shown an illustrative embodiment of the invention in a blender for plastic processing machines adapted for on-the-press mounting. The blender is designed to blend dry granular or powdered plastic materials with dry powder colorant or granular color concentrate. It will also accurately meter and blend together blowing agents inhibitors, lubricants and other additives. In general, it is capable of accurately metering and blending two or more materials in particulate form.

Referring now to FIG. 1, there is shown the inventive color blender 10 mounted upon a plastic processing machine such as an injection molder 12. The blender comprises, in general, a base member 14 for mounting purposes, a constant rate conveyor 16 adapted to receive a primary material from a supply hopper 18 and a variable rate conveyor 20 adapted to receive an additive material from a hopper or canister 22. The conveyors 16 and 20 extend into a combining chamber 24 wherein the primary and additive materials are commingled. A mixing or blending conveyor 26 extends from the combining chamber to an outlet at the base 14 which is mounted upon a receiver or holding hopper 28, the outlet of which is connected to the throat of the processing machine 12. The blender illustrated in FIG. 1 has the supply hopper 18 automatically loaded with primary plastic or natural resin in pellet form by a vacuum hopper loader 30 of a conventional design. The canister 22 is filled with dry powder colorant and is provided with a vibrator 23 to assure continuous flow. The blender provides a preselected ratio of these two components to combining chamber 24 and a thoroughly blended mix thereto to the holding hopper 28 for use in the processing machine.

Referring now to FIG. 2, the blender is shown in greater detail. The supply hopper 18 is provided with a drying means in the form of a sparger 32 which is suitably connected to a source of hot air as indicated in FIG. 1 to dry the resin pellets in the hopper 18. The hopper 18 is mounted on a support frame 33 and connected with an inlet fitting 34 of the conveyor 16 which extends to the combining chamber 24. The conveyor 16 is of the screw type and includes a tubular conduit 36 and a rotatable auger 38 which includes a shaft and a helical flighting thereon. The auger is disposed in the conduit 36 and the shaft thereof is rotatably supported in a bearing 40

which in turn is supported on the end wall of the chamber **24**. The other end of the shaft of auger **38** is connected through a disconnect coupling **42** to a driving countershaft **44** which is in turn rotatably mounted in a drive train housing **46**. The auger **38** is rotatably driven at a constant speed by a drive means including an electric motor **48** mounted on a support plate **50** which in turn supports the drive train housing **46** and which is connected to a vertical support plate **52** by a set of toggle connectors **54** as shown in FIG. **1**. The motor **48** has its output shaft connected through a coupling **56** to a drive shaft **58** mounted for rotation in the drive train housing **46**. The drive shaft **58** carries a drive pulley **60** which is connected by a gear belt **62** to a driven pulley **64** on the countershaft **44**.

In order to supply the color additive to the combining chamber **24**, the metering conveyor **20** is mounted on the constant rate conveyor **16** through the intermediary of a horizontal support plate **66** and a vertical support plate **68**. The conveyor **20** comprises a tubular conduit **70** and an auger **72** which includes a shaft and a helical flighting thereon. The auger shaft is rotatably mounted in an end plate **74** and connected through a coupling **76** to a variable speed drive means **21** including an enclosed gearset **78** to a variable speed electric motor **80**. The supply canister **22** is provided as a source of the color additive and has its outlet connected to a fitting **82** in the conduit **70** at the inlet of the auger **72**.

It is to be noted that the metering conduit **20**, the supply canister **22** and the variable speed drive means **21** constitute a variable rate supply unit or subassembly which is removably mounted upon the horizontal support plate **66** and connected thereto by a set of toggle connectors **84** in engagement with the vertical support plate **68**. Thus, the metering conduit **20**, variable speed drive means **21** and the supply canister **22** may be removed as a unit from the remainder of the blender for servicing, cleaning or replacement by another such unit as will be described with reference to FIG. **3**.

The mixing or blending conveyor **26** comprises a tubular conduit **86** which extends from the lowermost portion of the combining chamber **24** to the drive train housing **46**. The conveyor is also of the screw type and comprises an auger **88** including a shaft and interrupted helical flighting thereon to provide for thorough mixing of the particulate matter conveyed through the conduit **86**. The auger shaft is rotatably mounted at one end in a bearing **90** on the end wall of the combining chamber **24** and at the other end it is connected through a coupling **92** to the drive shaft **58** in the drive train housing. The conduit **86** of the conveyor **26** is provided with an outlet by a fitting **94** extending downwardly therefrom and adapted to be connected through a cover plate **96** with the receiver or holding hopper **98**. The holding hopper **98** is detachably connected to the cover plate **96** by means of toggle connectors **100**.

In order to provide automatic control for the blender and assure supply of the blended material at the processing machine, a control system is provided including a level sensing switch **102** which is disposed in the holding hopper **98**. The level-sensing switch may take the form of a conventional microswitch with an operating arm and paddle depending into the hopper **98** so that the switch is operated to an open position by the particulate material in the hopper when it reaches the level of the paddle. The control system will be described in more detail subsequently.

In FIG. **3** there is shown the construction of a variable rate supply unit for color concentrate which may be used to replace the unit shown in FIG. **1**. This variable rate supply unit comprises a screw conveyor **20'**, a variable speed drive means **21'** and a supply canister **22'** adapted to contain a supply of color concentrate in the form of small pellets. The construction is the same as the variable speed supply unit described with reference to FIG. **2** except that the variable speed drive means and the auger of the conveyor are designed to feed the color concentrate at a rate which ranges from zero to 10 percent of the primary material as compared to a rate variable from zero to 3 percent for the dry powder colorant. It will be appreciated that the detachable mounting for the variable rate supply units enables the removal thereof from the blender and replacement by another unit containing a different color of the same type of additive or a different type of color additive.

The blender as described above is provided with an automatic control system which may be readily adjusted by the operator to establish a predetermined ratio of color additive to the primary material to thereby obtain accurate color control. This control system is illustrated in FIG. **7** by a single line block diagram. The supply voltage is provided by the power supply lines to a terminal **104** which is connected to a manually operated on-off switch **106** and through the level control switch **102** to the constant speed motor **48** and also through a speed control unit **108** to the variable speed motor **80**. The speed control **108** preferably takes the form of a conventional speed control device for AC motors using a silicon-controlled rectifier.

In operation of the system just described, it is assumed that the supply hopper **18** is filled by vacuum loader **30** with a primary material such as a virgin resin and the resin is dried in the supply hopper by a hot air supply through the sparger **32**. With the supply canister **22** containing dry powder colorant forming part of the blender the blender is in readiness for operation. Assuming that the receiver or holding hopper **98** is empty, the paddle switch or level switch **102** will be closed. The speed control **108** will be adjusted, as by a control knob calibrated in percent, to select the desired ratio of color additive to the primary or uncolored virgin material. This in turn establishes the ratio of the feed rate of the variable rate supply unit to the feed rate of constant rate metering unit. Thus, when the manual on-off switch **106** is closed the constant speed motor **48** is energized and drives the blending conveyor **26** through the shaft **58** and drives the constant rate conveyor **16** in synchronism therewith through the countershaft **64**. At the same time the variable speed motor is energized through the speed control unit **108** and drives the variable speed conveyor **20** through the gear reduction unit **78**. Thus, the dried primary material from the hopper **18** is supplied at a constant rate by the metering conveyor to the combining chamber **24** and the color additive supplied at a preselected rate through the metering conveyor **20** to the combining chamber. Since the metering conveyors **16** and **20** and the blending conveyor **26** are disposed at different vertical levels the color additive from the conveyor **20** at the uppermost level and the primary material from the conveyor **16** at the intermediate level are commingled in the gravity drop to the inlet of the blending conveyor at the lowermost level. The blending conveyor is effective through the action of the interrupted flighting on the auger **88** to thoroughly admix the components of the blend in the course of conveyance between the combining chamber **24** and the discharge or outlet fitting **94**. When the holding hopper **98** is filled to the desired level switch **102** will be opened by actuation of the paddle and the power supply circuit to the motor **48** and the speed control unit **108** will be interrupted thereby stopping operation of the blender. When the material level in the holding hopper **98** falls below the desired level, the level switch will be reclosed and the cycle just described will be repeated.

A modification of the inventive blender is illustrated in FIGS. **4**, **5**, **6** and **8** and provides for the blending of three different components in particulate form. Such a blender is useful in those operations wherein more than one additive is desired for combination with the primary material. For example, it is often desired to blend the primary material, a color additive and a regrind material which, for example, may be reclaimed scrap of the colored primary material.

As can be seen in FIG. **4** the three component color blender is similar to the two component blender of FIG. **1** and the details of construction which are in common will not be repeated here. Note that the blender is mounted upon a support plate **110** and includes a constant rate conveyor **112** connected between a supply hopper **114** and a combining chamber **116**. The blender also includes a variable rate supply

unit 117 comprising the variable rate conveyor 118, a variable speed drive means 120 and a supply canister 122 with the variable rate conveyor extending into the combining chamber 116. Additionally, for the third component the blender comprises a second variable rate supply unit 123 which includes a variable rate conveyor 124, a variable speed drive means 126 and a supply canister or hopper 128 with the variable rate conveyor 124 extending into the combining chamber 116. It is noted that the conveyors 112 and 124 extend parallel to each other at approximately the same level and that the variable rate conveyor 118 extends in the same direction and enters the combining chamber 116 at the uppermost level. A blending conveyor 130 has its inlet at the lowermost level of the combining chamber and extends parallel to the other conveyors.

The manner in which the supply hoppers and the holding hopper are interconnected with their respective conveyors is illustrated in FIGS. 5 and 6. The supply hoppers 114 and 128 are mounted on a support frame 132 and are connected respectively through downwardly extending conduits 134 and 136 to the respective inlets of the constant rate conveyor 112 and the variable rate conveyor 124. Both of these conveyors are of the screw-type as is illustrated for conveyor 112 in FIG. 5. The auger of conveyor 112 is driven from the constant speed motor 136, drive shaft 138 and countershaft 140 through a gear belt 142 by a drive train similar to that described with reference to FIG. 2. The variable rate supply unit 123 is mounted on the gear train housing 148 as shown in FIG. 5 and FIG. 6. The variable rate supply unit 117 is mounted relative to the combining chamber 116 as described with reference to FIG. 2. The blending conveyor 130 is of the same construction as described with reference to FIG. 2 and is driven by the motor 136 through the shaft 138 in synchronism with the constant rate conveyor 112. The blending conveyor 130 has an outlet through a downwardly extending fitting 150 which extends through the support plate 110 into the receiver or holding hopper 152 which is adapted to be mounted on the processing machine. To provide for automatic control a level switch 154, as shown in FIG. 6, is mounted on the plate 110 and has a paddle extending into the hopper 152.

The control system for the embodiment of the invention shown in FIGS. 4, 5 and 6 is illustrated in FIG. 8 by a single line block diagram. The power supply line is connected to a terminal 154 which in turn is connected to a manually controlled on-off switch 156 and to the level control switch 158 to the constant speed motor 136. The supply voltage is also supplied to the speed control unit 160 and thence to the variable speed motor 120, and to the speed control unit 162 and thence to the variable speed motor 144.

The operation of the embodiment just described is similar to that of FIG. 1. The desired ratios of the blend are established by adjustment of the speed control unit 160 as by a calibrated knob, for the color additive and by the adjustment of the speed control unit 162 as by a calibrated knob, for the percentage of regrind material. With the supply hoppers 114 and 128 and the supply canister 122 filled with the respective materials, the blender is in readiness for operation. Assuming that the holding hopper 98 is empty the level switch 154 will be closed and closure of the manual on-off switch will energize constant speed motor 136 and the variable speed motors 120 and 144 at their respective speeds. The components of the blend will be supplied at the preselected rates and when the holding hopper is filled to the desired level the level switch 154 will be opened and the motors will be deenergized.

Although the description of this invention has been given with respect to particular embodiments thereof, it is not to be construed in a limiting sense. Many variations and modifications will now occur to those skilled in the art.

For a definition of the invention, reference is made to the appended claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A blender for plastic-processing machines comprising a combining chamber, a first metering screw conveyor having an inlet adapted to receive a continuous supply of primary plastic material in particulate form and having an outlet opening into said chamber, a constant speed drive means connected with said first metering conveyor whereby the material is delivered to said chamber at a constant rate, a second metering conveyor having an inlet adapted to receive a continuous supply of secondary material in particulate form and having an outlet opening into said chamber, adjustable speed drive means connected with said second metering conveyor whereby the secondary material is delivered to the chamber at a preselected rate, a mixing conveyor having an inlet connected with the chamber and an outlet adapted to be connected with a receiving means, said mixing conveyor being connected with said fixed speed drive means for displacement in synchronism with the first metering conveyor, said conveyors being screw type conveyors extending in parallel overlapping relationship, the first and second metering conveyors having their discharge ends extending into the combining chamber adjacent each other, and the mixing conveyor and the first metering conveyor being connected to the constant speed drive means at one end thereof and extending into the combining chamber at the other end thereof.

2. The invention as defined in claim 1 wherein said conveyors are disposed in different horizontal planes with the mixing conveyor being at the lowermost level and the metering conveyors are at the intermediate and uppermost levels whereby the primary and secondary materials are commingled in the gravity drop to said mixing conveyor within said combining chamber.

3. The invention as defined in claim 1 wherein said receiving means comprises a holding container and a level control means operatively connected with said container and both of said drive means for stopping all of said conveyors when the container is filled to a predetermined level.

4. The invention as defined in claim 1 including a supply hopper having its outlet connected to the inlet of the first metering conveyor and drying means connected with said hopper for drying said primary material.

5. A color blender for supplying colored plastic in particulate form to the throat of a plastic-processing machine with a holding hopper on the processing machine adapted to receive a charge of said plastic, said blender comprising a first metering screw conveyor having an inlet adjacent one end thereof adapted to receive a supply hopper containing a supply of uncolored plastic in particulate form, a second metering screw conveyor having an inlet adapted to receive a canister containing a supply of color additive material, a combining chamber disposed at the outlet ends of said metering conveyors, a mixing screw conveyor extending from the bottom of said combining chamber to the inlet of said holding hopper, a constant speed drive means connected with said first metering conveyor whereby the uncolored plastic is delivered to said chamber at a constant rate, an adjustable speed drive means connected with said second metering conveyor whereby the color additive is delivered to the chamber at a preselected rate, said mixing conveyor being connected with said constant speed drive means for displacement in synchronism with the first metering conveyor whereby the colored plastic delivered to said holding hopper is a mixture of uncolored plastic and said color additive in a ratio equal to the ratio of the constant feed rate of the first metering conveyor and the preselected feed rate of the second metering conveyor, said mixing conveyor and the first metering conveyor extending in a parallel and overlapping relationship with said constant speed drive means connected thereto at one end, said second metering conveyor extending in parallel overlapping relationship with said first metering conveyor into said combining chamber and being connected thereby to the inlet of said mixing conveyor.

6. The invention as defined in claim 5 wherein said screw conveyors are disposed at different horizontal levels with the mixing conveyor at the lowermost level, the first metering

conveyor at the intermediate level and the second metering conveyor at the uppermost level whereby said uncolored resin and the color additive are commingled in the gravity drop to the inlet of said mixing conveyor.

7. A color blender for supplying colored plastic in particulate form to the throat of a plastic-processing machine with a holding hopper on the processing machine adapted to receive a charge of said plastic, said blender comprising a first metering screw conveyor having an inlet adjacent one end thereof adapted to receive a supply hopper containing a supply of uncolored plastic in particulate form, a second metering screw conveyor having an inlet adapted to receive a canister containing a supply of color additive material, a combining chamber disposed at the outlet ends of said metering conveyors, a mixing screw conveyor extending from the bottom of said combining chamber to the inlet of said holding hopper, a constant speed drive means connected with said first metering conveyor whereby the uncolored plastic is delivered to said chamber at a constant rate, an adjustable speed drive means connected with said second metering conveyor whereby the color additive is delivered to the chamber at a preselected rate, said mixing conveyor being connected with said constant speed drive means for displacement in synchronism with the first metering conveyor whereby the colored plastic delivered to said holding hopper is a mixture of uncolored plastic and said color additive in a ratio equal to the ratio of the constant feed rate of the first metering conveyor and the preselected feed rate of the second metering conveyor, said second metering conveyor, said adjustable speed drive means, and said canister are interconnected to form an operative variable rate supply unit for supplying said color additive to the combining chamber, means for detachably mounting said variable rate supply unit on said first metering conveyor with said second metering conveyor extending into said chamber whereby said variable rate supply unit may be readily removed from the color blender and replaced thereon by a variable rate supply unit of similar structure having a different color additive in its canister.

8. A blender for plastic-processing machines comprising a combining chamber, a constant-rate-metering conveyor having an inlet adapted to receive a continuous supply of primary plastic material in particulate form and having an outlet opening into said chamber for delivering the primary plastic material into said chamber at a constant rate, a first variable rate metering conveyor having an inlet adapted to receive a continuous supply of secondary material in particulate form and having an outlet opening into said chamber, a first variable speed drive means connected with said variable-speed-metering conveyor whereby the secondary material is delivered to the chamber at a preselected rate, a second variable-speed-metering conveyor having an inlet adapted to receive a continuous supply of tertiary material in particulate form and having an outlet opening into said chamber, a second variable speed drive means connected with the second variable-rate-metering conveyor whereby the tertiary material is delivered to the chamber at a preselected rate, a mixing conveyor having an inlet connected with said chamber and an outlet adapted to be connected with a receiving means a constant speed drive means connected with said constant-rate-metering conveyor and with said mixing conveyor for displacement thereof in synchronism with each other, said mixing conveyor and said constant-rate-metering conveyor being screw-type conveyors extending in parallel overlapping relationship and connected to the constant speed drive means at one end thereof and extending into the combining chamber at the other end thereof, said variable rate metering conveyors being screw-type conveyors and extending in parallel overlapping relationship with the constant rate metering conveyor and having discharge ends extending into the combining chamber adjacent the discharge end of the first metering conveyor.

9. The invention as defined in claim 8 wherein said conveyors are disposed in different horizontal planes with the mixing conveyor being at the lowermost level and the metering conveyors are at intermediate and uppermost levels whereby the materials are commingled in the gravity drop to said mixing conveyor within said combining chamber.

10. A color blender for supplying colored plastic in particulate form to the throat of a plastic-processing machine with a holding hopper on the processing machine adapted to receive a charge of said plastic, said blender comprising a first metering screw conveyor having an inlet adjacent one end thereof adapted to receive a supply hopper containing a supply of uncolored plastic in particulate form, a second metering screw conveyor having an inlet adapted to receive a canister containing a supply of color additive material, a combining chamber disposed at the outlet ends of said metering conveyors, a mixing screw conveyor extending from the bottom of said combining chamber to the inlet of said holding hopper, a constant speed drive means connected with said first metering conveyor whereby the uncolored plastic is delivered to said chamber at a constant rate, an adjustable speed drive means connected with said second metering conveyor whereby the color additive is delivered to the chamber at a preselected rate, said mixing conveyor being connected with said constant speed drive means for displacement in synchronism with the first metering conveyor whereby the colored plastic delivered to said holding hopper is a mixture of uncolored plastic and said color additive in a ratio equal to the ratio of the constant feed rate of the first metering conveyor and the preselected feed rate of the second metering conveyor, level control means operatively connected with said holding hopper and both of said drive means for stopping all of said conveyors when the holding hopper is filled to a predetermined level, and drying means in said supply hopper whereby the uncolored plastic may be dried and colored immediately prior to admission to the processing machine.

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