May 21, 1935. H. L. McKINNON ET AL 2,001,973

APPARATUS FOR BLENDING SAND AND LIKE MATERIALS

Filed Dec. 5, 1931 3 Sheets-Sheet 1

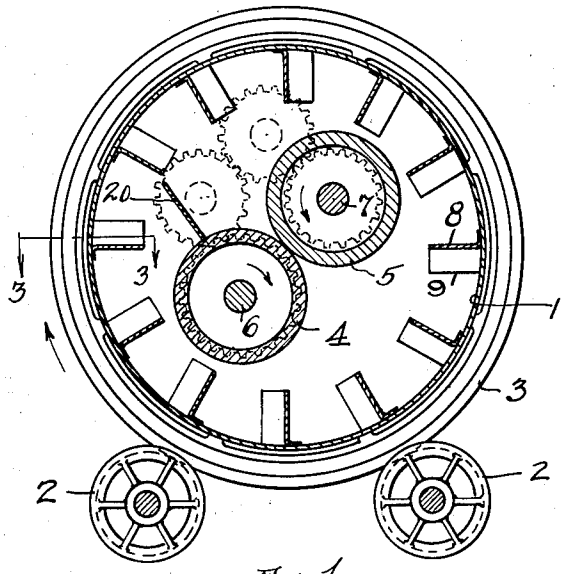


FIG. 1

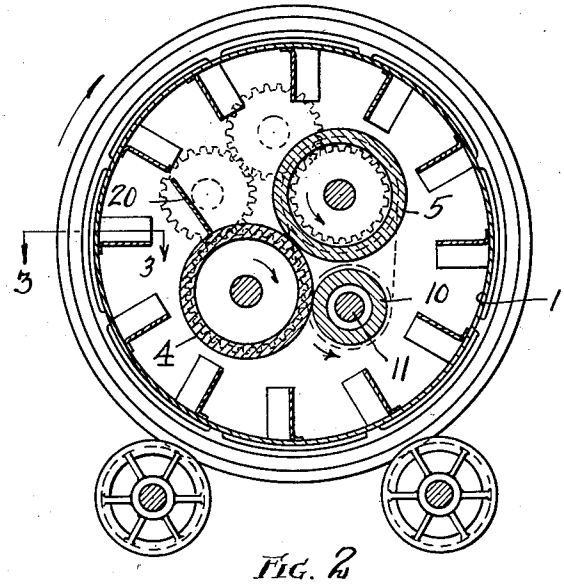


FIG. 2

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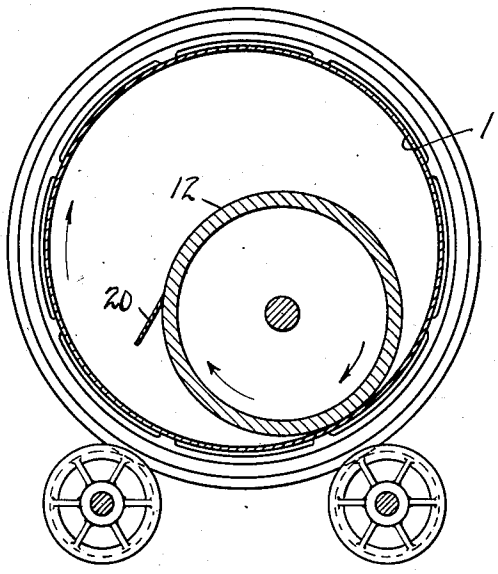


FIG. 4

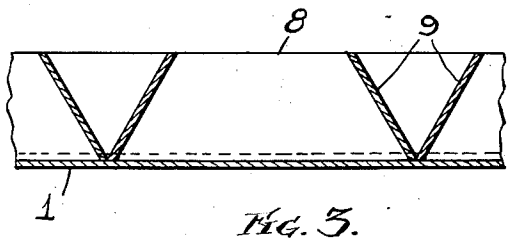


FIG. 3.

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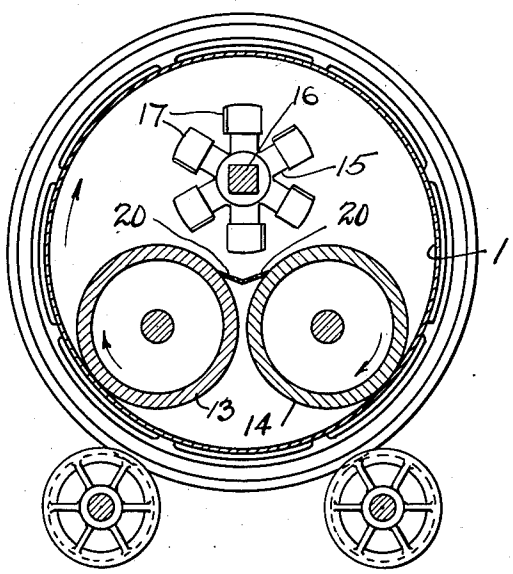


FIG. 5

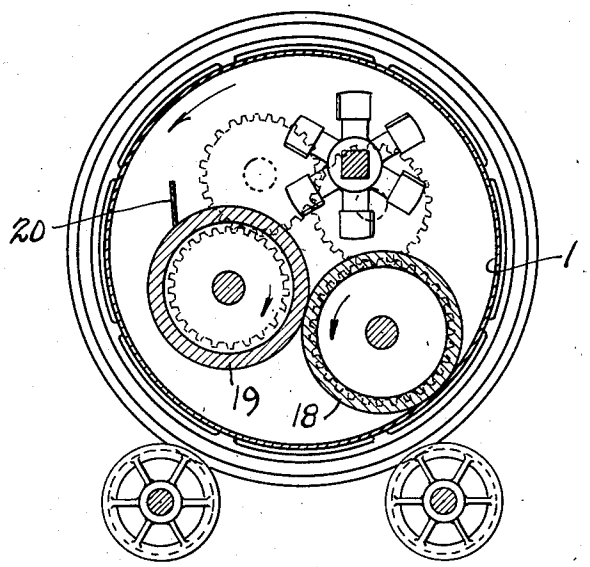


FIG. 6.

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APPARATUS FOR BLENDING SAND AND LIKE MATERIALS

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Application December 5, 1931, Serial No. 579,250

8 Claims. (Cl. 259—84)

This invention relates in general to a novel method of and apparatus for blending granular and powdered materials, but more particularly to apparatus of this type which is especially adapted to accomplish a uniform blending of silica sands and other materials used in foundries.

The primary object of the invention is to provide apparatus of this type capable of receiving various granular or powdered materials, such for example, as different grades of silica sand, and other powdered materials, and accomplishing a more uniform and intimate blending thereof than has been heretofore attained with existing machines or apparatus of this type.

To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims; the annexed drawings and following description setting forth in detail certain means and one mode of carrying out the invention, such disclosed means and mode illustrating, however, but one of the various ways in which the principle of the invention may be used.

In said annexed drawings:—

Figs. 1, 2, 4, 5 and 6 are cross-sectional views through cylindrical drums embodying various modifications of material blending devices made in accordance with the present invention; and Fig. 3 is a fragmentary cross-section, taken on the line 3—3 of Figs. 1 and 2.

In each modification, the apparatus includes a cylindrical drum 1, the axis of which is normally inclined so that materials fed into the drum at one end, as through a chute communicating with an opening in the upper end of the drum, may gradually traverse the drum by gravity and be discharged from the drum through an opening or chute communicating with the drum at its other end. The drum may be continuously rotated in any desired manner, but is prevented from moving in the direction of its axis by means of freely rotatable flanged wheels 2, which engage rings 3 fixed to the drum at longitudinally spaced points. It will be understood that other means, such for example as thrust rollers, can be employed instead of flanged wheels for rotatably supporting the drum.

The apparatus also includes one or more blending rolls, which are positioned for rotation within the cylindrical drums, and the axes of which are parallel with the axis of the drum.

In Fig. 1, the blending rolls 4 and 5 are hollow and are mounted on shafts 6 and 7, respectively, which are journalled in suitable bearings outside the drum. The blending rolls may, if desired, be solid instead of hollow. By means of suitable gearing, as shown in dotted lines, the rolls 4 and 5 may be rotated in the direction indicated by arrows. Lifting bars 8, having pairs of plates 9 secured thereto at spaced intervals, are secured to the interior surface of the drum and extend lengthwise thereof. If desired, the bearings supporting either or both shafts 6 and 7 may be arranged to slide in guides, so as to permit the upper roll to move relatively to the lower roll as the sand passes between such rolls, and spring means, such for example, as shown in Fig. 4 of the patent to Boughton No. 957,646 may be employed to force the rolls together. It will be noted that rolls 4 and 5 lie in an inclined plane, with the axis of the roll 5 lying at a higher position in said plane than the axis of roll 4, and that the weight of the roll 5 is therefore utilized to bring pressure to bear on the material passing between the rolls to supplement the action of springs which may be provided, as stated. It will also be noted that the roll 4 is driven at a slower peripheral speed than the roll 5, so that a slip occurs between the surfaces of the rolls, which aids in the blending action.

During rotation of the drum in the direction indicated by the arrow, material which has entered the drum and has fallen to the bottom of the upper end of the drum, is carried up by the bars 8 and fed between the rolls 4 and 5, falling thence to the bottom of the drum, but further along than its entrance position on account of the inclination of the drum and rolls. The bars carry it again to the upper side and feed it between the rolls, and this operation is repeated many times until the material, now thoroughly mixed and blended together, finally flows out of the rearward and lower end of the drum.

In Fig. 2, an auxiliary roll 10 mounted on a shaft 11, is provided, which may be driven by a link belt or other means by the shaft 7. The roll 10 rotates in the same direction as the roll 5 and bears against the roll 4 to thereby provide additional blending action.

In Fig. 4, a single roll 12 is provided, which in this case is freely rotated by contact with the inner surface of the drum. The roll 12 may be driven, if desired. In this form of the invention, the lifting bars are necessarily omitted.

In Fig. 5, two freely rotatable rolls 13 and 14 are provided which preferably contact the drum at circumferentially spaced points along the bottom of the drum. A mixing device may also be provided consisting of spider wheels 15 mounted at

spaced points along a rotatable shaft 16. To the ends of the arms of these spider wheels are secured angle pieces 17 which assist the mixing action in the drum.

In Fig. 6, the roll 18 is freely rotatable, and is driven by contact with the inner surface of the drum. By means of suitable gearing, as shown in dotted lines, the roll 18 drives the roll 19, which is in contact therewith, and here again a wiping or blending action takes place, due to the difference in peripheral speed of the rolls 18 and 19.

For the purpose of cleaning or scraping adhering particles from the rolls, scrapers 20 may be employed in connection with either one or both rolls, and provision may be made for relatively adjusting the rolls and scrapers.

Various other modifications of one or more parts of the apparatus may be used. Where the axes of the rolls are horizontal, a coniform drum may be used instead of a cylindrical drum, so that the material will be fed through the drum due to the slope of the wall thereof, or a drum having a polygonal cross-section may be employed. These modified types of drums may be used in connection with any desired arrangement of rolls.

Other modes of applying the principle of our invention may be employed instead of the one explained, change being made as regards the means and the steps herein disclosed, provided those stated by any of the following claims or the equivalent of such stated means be employed.

We therefore particularly point out and distinctly claim as our invention:—

1. In a mixing apparatus, the combination of means having parallel axes and coacting continuous blending surfaces traveling at different speeds, one of said means bearing by gravity against the other.

2. In a mixing apparatus, the combination of coacting blending rolls having parallel axes and continuous surfaces traveling at different peripheral speeds, one of said rolls bearing by gravity against the other.

3. In a mixing apparatus, the combination of rotatable elements having coacting surfaces traveling at different peripheral speeds adapted to blend material fed therebetween, the axes of said elements lying in an inclined plane with the axis of one of said elements lying at a higher position in said plane than the axis of the other element, said higher element bearing by gravity against the other element.

4. In a mixing apparatus, the combination of rotatable rolls having coacting peripheral surfaces traveling at different speeds adapted to blend material fed therebetween, the axes of said rolls lying in an inclined plane with the axis of one of said rolls lying at a higher position in said plane than the axis of the other roll, said higher roll bearing by gravity against the lower roll.

5. In a mixing apparatus, the combination of a rotatable drum, rolls within said drum and having coacting continuous peripheral surfaces traveling at different peripheral speeds and adapted to blend material fed therebetween, one of said rolls bearing by gravity against the other roll, said drum provided on its inner surface with circumferentially-spaced lifting elements adapted to carry the material to be blended upwardly to a position wherein it may fall by gravity between said blending rolls.

6. In a mixing apparatus, the combination of a rotatable drum, rolls within said drum for blending material fed into the drum, and a mixing device above said rolls comprising a rotatable shaft, a spider secured to said shaft and mixing blades secured to the arms of said spider.

7. In a blending apparatus, the combination of a rotatable drum, blending rolls within said drum and having coacting external peripheral blending surfaces, one of said rolls being so disposed with relation to the other roll that the weight of the former is utilized to assist the blending action of the rolls, said drum provided on its inner surface with circumferentially-spaced lifting elements adapted to carry the material to be blended upwardly to a position wherein it may fall by gravity between said blending rolls.

8. In a mixing apparatus, the combination of a rotatable drum and a pair of rotatable blending rolls within said drum having coacting continuous surfaces travelling at different peripheral speeds and adapted to receive therebetween material to be blended, one of said rolls bearing by gravity against the other roll, said drum provided on its inner surface with circumferentially spaced lifting elements adapted to carry the material to be blended upwardly to a position wherein it may fall by gravity between said blending rolls.

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