May 10, 1932. A. B. WEBB 1,857,798

MIXING AND DRYING MACHINE

Filed Feb. 7, 1930 2 Sheets-Sheet 1

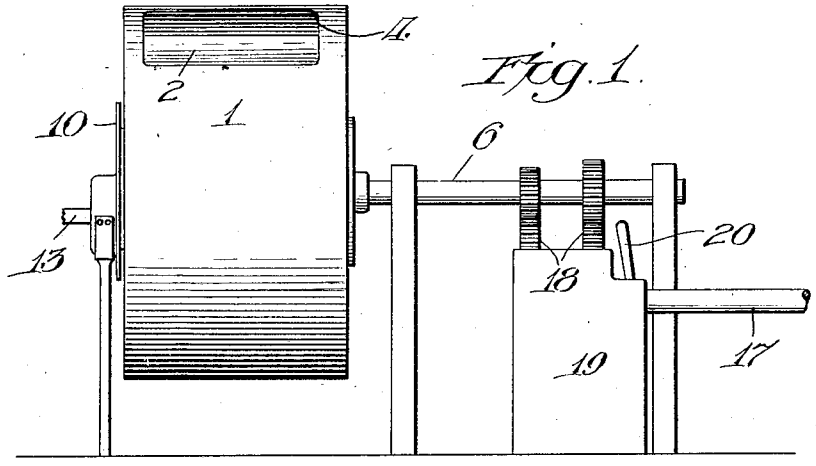

Fig. 1.

Fig. 2.

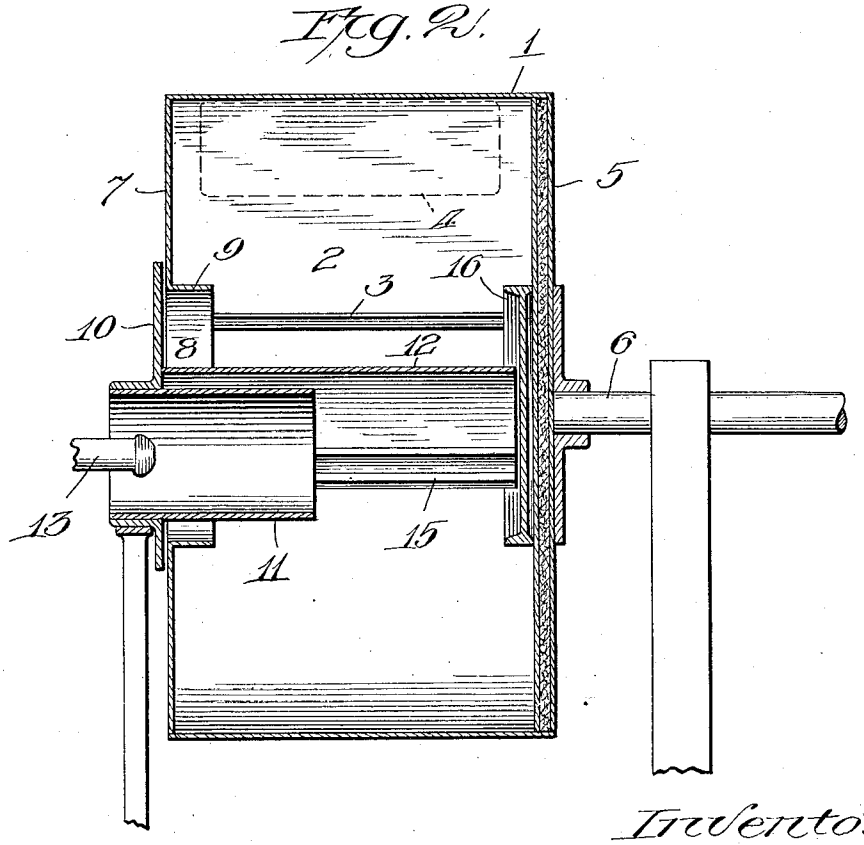

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Fig. 3.

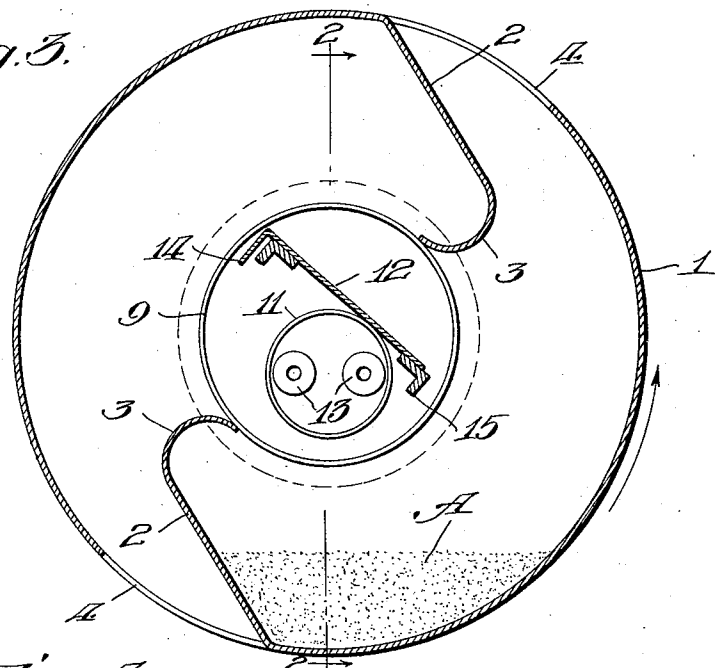


Fig. 4.

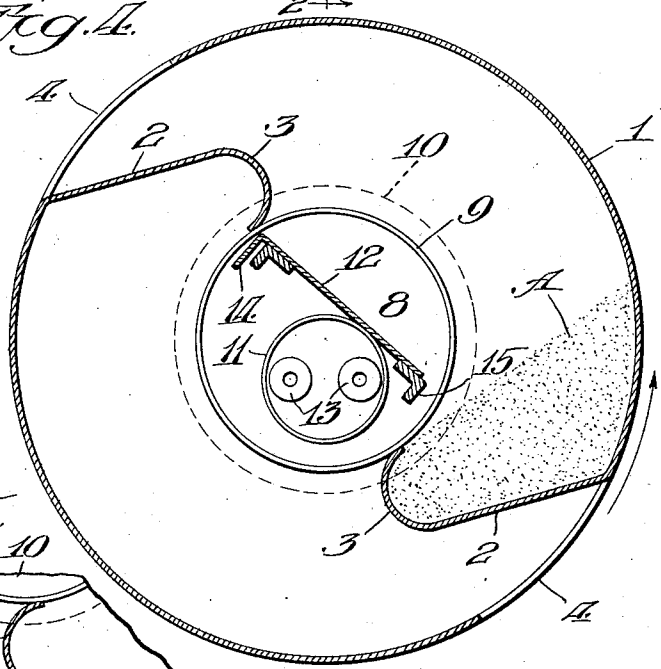
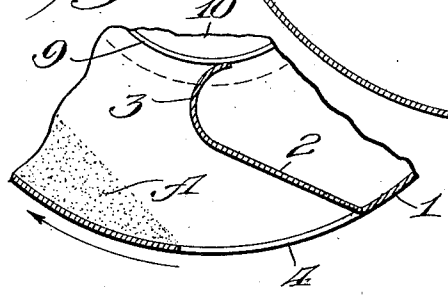


Fig. 5.



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UNITED STATES PATENT OFFICE

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MIXING AND DRYING MACHINE

Application filed February 7, 1930. Serial No. 426,453.

In preparing a mixture for bituminous concrete, the various solid aggregates must be thoroughly mixed and dried. The drying cannot be rapidly and economically effected unless the watery vapors can be readily freed from the mass and be quickly withdrawn or allowed to escape.

Viewed in a specific aspect, the present invention may be said to have for its object to produce a simple and novel means for rapidly and effectively mixing aggregates or the like and rapidly and economically drying the same.

Since my improved machine both mixes and dries, it may be viewed, in one of its aspects, as constituting simply a novel mixing machine, where a drying action is not required.

In carrying out my invention I employ a horizontal, rotatable drum having in the peripheral wall a combined inlet and outlet opening or openings, the interior of the drum being provided with one or more buckets so formed and so disposed that, when the drum is turned to bring the opening or one of the openings toward the top, a charge may be delivered through such opening and be retained in the drum; the rotation of the drum in one direction, thereafter, causing the charge to be alternately lifted and spilled across the interior of the drum; and the rotation of the drum in the opposite direction permitting the charge to flow out of the drum through the opening or any one of them, if there be more than one, when it is brought to the underside of the drum.

Therefore, viewed in one of its aspects, the present invention may be said to have for its object to produce a simple and novel doorless mixing drum into which a charge may simply be poured, in which it will be thoroughly mixed, and from which the charge will run by gravity, through the mere angular positioning of the drum and the rotation thereof first in one direction and then the other.

Where there is a heating and a drying of the charge, the uncovered opening or openings in the periphery of the drum permits the free escape of the vapors and consequently an effective ventilation of the drum. Therefore, viewed in one of its aspects, the present invention may be said to have for its object to produce a simple and novel drying drum so constructed that during the greater part of the time, at least, when the drum is rotating, there will be a large open vent or vents in the drum; whereby the vapors may escape freely as through a chimney, whereas the charge will be retained until it is desired to dump the same.

The various features of novelty whereby my invention is characterized will hereinafter be pointed out with particularity in the claims; but, for a full understanding of my invention and of its objects and advantages, reference may be had to the following detailed description taken in connection with the accompanying drawings, wherein:—

Figure 1 is an elevation of a machine embodying the present invention in one of its forms; Fig. 2 is a vertical section, on a larger scale, taken approximately on line 2—2 of Fig. 3; Figs. 3 and 4 are sections through the drum, at right angles to the long axis thereof, on the same scale as Fig. 2, the drum being in two different angular positions; and Fig. 5 is a view similar to Figs. 3 and 4, showing only a fragment at the bottom of the drum and illustrating the manner of dumping the charge.

Referring to the drawings, 1 represents a suitable horizontal drum closed at the ends. In its broad sense, the structure is completed by providing the drum with an internal bucket that may be a mere vane extending inwardly from the peripheral wall, and forming in said wall a large open window or opening properly located with respect to the bucket. In the arrangement illustrated and to which the detailed description will be confined, there are two buckets and two openings or windows. Each bucket may conveniently be in the form of a plate 2 extending inwardly from the peripheral wall of the drum and from one end of the drum to the other; the free marginal portion of each plate being bent laterally into the shape of a trough 3 lying on one side of the plate. The buckets are symmetrically disposed with respect to

a plane extending between them and containing the axis of rotation of the drum, the partition-like portions of the plates making an acute angle with such plane. The plane in question may be regarded as being represented by line 2—2 on Fig. 3. In the peripheral wall of the drum, preferably adjacent to each bucket and on the side of the latter opposite that on which the trough is situated, is a comparatively wide window or opening 4 extending approximately throughout the length of the drum.

When the drum stands in the position shown in Fig. 3, the loose material A constituting the charge may be poured or otherwise delivered into the drum through the uppermost opening or window 4. The charge drops into the bottom of the drum, but is prevented from flowing out of the lowermost opening or window by the lower bucket which lies between the charge and the latter opening. If now the drum is rotated in the direction of the arrow in Fig. 3, the lowermost bucket will be carried around underneath the charge which will fill the bucket and be lifted by the latter as indicated in Fig. 4.

It will be seen that as the drum continues to revolve so as to carry the filled bucket upwardly from the position indicated in Fig. 4, the charge will begin to spill over the edge of the trough and will drop down into the bottom of the drum. However, before the material begins to spill from the bucket, the latter has reached a position in which it forms a roof or canopy over the adjacent opening or window, so that the overflowing material will not escape through the window. By the time the drum has been turned through an angle of 180°, so that the buckets have changed positions with each other and the lower bucket in Fig. 3 has become the upper bucket, the greater part of the charge will have been spilled out of the previously filled bucket and been deposited in the bottom of the drum. Further rotation of the drum, in the same direction, will cause the small quantity of material in the trough of the upper bucket to be emptied and the entire charge now in the bottom of the drum to be picked up by the second bucket. As the drum makes one revolution after another, the charge is picked up and spilled back into the drum first by one bucket and then by the other.

When it is desired to dump the charge, the drum is simply turned in the clockwise direction as viewed in Figs. 3 and 4, namely in the direction of the arrow in Fig. 5. The buckets now do not act as lifters for the charge, but drop away from the same and permit it to gravitate into the bottom of the drum. When one of the windows or openings reaches the bottom, as it is about to do in Fig. 5, the charge flows out through the same. In short, to fill the drum, it is turned to bring one of the openings at the top and, in order to empty the drum, it is turned in the clockwise direction to bring one of the windows to the bottom.

When the material that is handled by the drum is to be dried, heat may be applied in any suitable way. As the material is spilled from the buckets it spreads out in a thin layer or stream so as to leave the surface of each particle or piece exposed and thus permit the vapors to escape freely. The windows or openings in the periphery of the drum constitute large vents or chimneys through which the vapors can freely leave the drum. It will be seen that excepting only during a small part of the angular movement of the drum there will be one of the windows or openings in the upper half of the drum, so that the vapors need only rise in order to find an exit.

In the particular form of my invention illustrated I have provided means for heating the drum from the inside. To this end, the drum is supported from one head 5 which is fixed upon the end of a suitable, horizontal, rotatable shaft 6. The other head 7 of the drum has a large central opening 8 bounded by an annular flange 9 extending a short distance into the drum. This opening is substantially closed by means of a stationary disc or plate 10 held close to the drum outside of the head. This plate carries an open-ended sleeve or shell 11 of considerable diameter extending through the plate and into the drum, preferably eccentrically of the drum so as to be positioned in the lower half of the latter. Fixed to the plate 10 and to the sleeve or shell 11, and lying above the sleeve or shell, is a baffle plate 12 extending from one end of the drum to the other and downwardly inclined in such a direction that when the material is spilled from the buckets during the mixing and drying operation, the material falls on this baffle plate and slides down over the latter before dropping into the bottom of the drum. A suitable burner or burners 13, projecting into the outer end of the sleeve or shell 11 and adapted to throw a flame into the interior of the drum, may be employed as the heating means. The baffle plate may be made sufficiently wide so that the buckets will just clear the same during the rotation of the drum. Furthermore there may be at the long edges of the baffle plate downwardly-extending flanges 14 and 15 that will act as deflectors for the flame and combustion gases and prevent them from shooting up directly past the edges of the baffle plate.

The head 5 of the drum may be provided with a central internal flame deflector 16 that will prevent the flame from striking directly against the head as it leaves the burners.

My improved machine, whether it be used simply as a mixing machine or as a mixing and drying machine, may be driven in any suitable way, depending upon the nature of the work. In the arrangement shown, the

drum is adapted to be driven from a suitable driving shaft 17, through gearing 18 forming part of a suitable reversing mechanism 19; the drum being caused to turn in one direction or the other, or to be brought to rest by means of a control handle 20. Such drives are old and well known and I therefore have intended to give only a conventional illustration thereof.

While I have illustrated and described with particularity only a single preferred form of my invention, I do not desire to be limited to the exact structural details thus illustrated and described; but intend to cover all forms and arrangements which come within the definitions of my invention constituting the appended claims.

I claim:—

1. In a machine of the character described, a horizontal rotatable drum, buckets fixed in the drum and comprising members extending inwardly from the peripheral wall of the drum and each having at its inner end on the side that is in advance when the drum is turned in one direction, a trough extending lengthwise of the drum, and there being combined inlet and outlet openings in the said wall on the sides of said members opposite those on which the troughs are located, the said wall being continuous except where said openings occur.

2. In a machine of the character described, a horizontal rotatable drum having a continuous peripheral wall, a bucket fixed in the drum and comprising a member extending inwardly from the peripheral wall of the drum and having at its inner end on the side that is in advance when the drum is turned in one direction, a trough extending lengthwise of the drum, and there being a combined inlet and outlet opening in the said wall on the side of said member opposite that on which the trough is located.

3. In a machine of the character described, a horizontal rotatable drum having a continuous peripheral wall, bucket members fixed within the drum in spaced relation to each other and constructed and arranged to cause a charge in the drum to be alternately raised and spilled back into the drum when the drum is rotated in one direction, there being combined inlet and outlet openings in the periphery of the drum, each opening being adjacent to one of the buckets on the side that is the trailing side when the drum is rotated in the aforesaid direction.

4. In a machine of the character described, a horizontal rotatable drum having a continuous peripheral wall, bucket members fixed within the drum in spaced relation to each other and constructed and arranged to cause a charge in the drum to be alternately raised and spilled back into the drum when the drum is rotated in one direction, there being combined inlet and outlet openings in the periphery of the drum, each opening being adjacent to one of the buckets on the side that is the trailing side when the drum is rotated in the aforesaid direction, and means for heating the drum internally.

5. In a machine of the character described, a horizontal rotatable drum having a continuous peripheral wall, two diametrically opposed buckets extending inwardly from the peripheral wall of the drum adapted to lift loose material in the drum above the axis of the latter and then spill it when the drum is rotated in one direction and act simply as more or less radial partitions when the drum is rotated in the other direction, and there being combined inlet and outlet openings in said wall adjacent to said buckets and on the sides thereof that are the trailing sides when the drum is rotated in the first mentioned direction.

6. In a machine of the character described, a horizontal rotatable drum having a continuous peripheral wall, two diametrically opposed buckets extending inwardly from the peripheral wall of the drum adapted to lift loose material in the drum above the axis of the latter and then spill it when the drum is rotated in one direction and act simply as more or less radial partitions when the drum is rotated in the other direction, and there being combined inlet and outlet openings in said wall adjacent to said buckets and on the sides thereof that are the trailing sides when the drum is rotated in the first mentioned direction, and means to heat the drum internally.

In testimony whereof, I sign this specification.

ARTHUR B. WEBB.