

E. EGER.
MIXING MACHINE.
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1,427,271.

Patented Aug. 29, 1922.

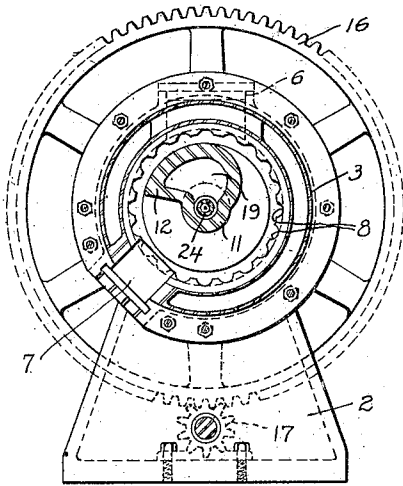


Fig. 2.

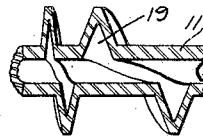


Fig. 3.

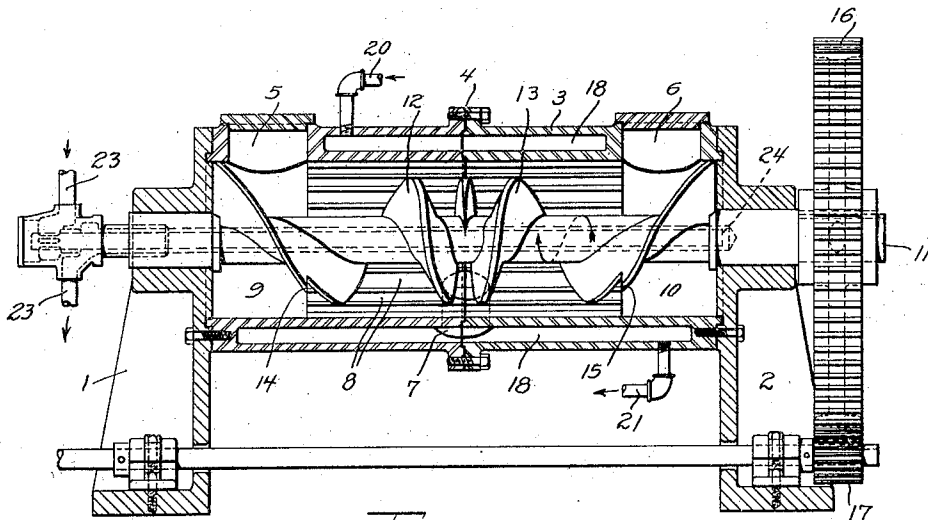


Fig. 1.

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MIXING MACHINE.

1,427,271.

Specification of Letters Patent. Patented Aug. 29, 1922.

Application filed May 13, 1921. Serial No. 469,118.

To all whom it may concern:

Be it known that I, ERNST EGER, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented a new and useful Mixing Machine, of which the following is a full, clear, and exact description.

This invention relates to mixing machines in general and those adapted for working up rubber compounds in particular. And it is a specifically different embodiment of the invention disclosed and claimed broadly in my co-pending application Serial No. 469,119 filed contemporaneously.

In the machine of my companion application, endwise thrust on the rotor is developed and thrust collars have to be provided to care for the same. The machine of this application employs opposed coiled blades whose reactions or endwise thrusts neutralize or balance one another. In the machine of the companion application also, material is carried against a solid or imperforate end wall against which it is mashed, kneaded or rolled. The machine of this application works one batch against another.

The objects of the present invention are therefore primarily, to better the mechanical efficiency and the blending effect of the type of mixture disclosed in the above machine of my companion application.

Briefly the invention consists in a cylindrical container in which revolves a rotor having oppositely inclined blades coiled thereabout which meet intermediate the length of the cylinder.

The invention is illustrated in the accompanying drawings in which:—

Fig. 1. is a vertical section longitudinally of a preferred embodiment of the invention;

Fig. 2. is a transverse section, and

Fig. 3. is a detailed cross section showing the hollow construction of a part of the bladed rotor.

In the drawings, supporting standards 1 and 2 have suitably secured or bolted between them a cylinder 3 which may, if desired, be made in halves divided as indicated at 4 and suitably bolted together. The cylinder 3 is circular in cross section throughout its extent and is preferably cylindrical. The cylinder 3 is provided with charging openings 5 and 6 adjacent its ends and with a discharging opening 7 at one

side intermediate its ends. These openings, 5, 6, and 7, may be closed in any suitable manner as by the removable plugs or caps indicated. Preferably the cylinder 3 between the charging openings 5 and 6 is rifled, corrugated or otherwise grooved, as indicated at 8, the remaining end lengths of the interior of the cylinder being left smooth as indicated at 9 and 10.

Within the cylinder 3 is a hollow bladed shaft 11, constituting a rotor of the construction shown in detail in Fig. 3. There are two bladed portions 12 and 13 which are oppositely inclined to the axis of the rotor. Preferably, but not necessarily, each of the blades 12 and 13 is varied in pitch from the end to the center of the cylinder, and likewise also diminished in diameter. And preferably also each of the blades 12 and 13 is stepped or abruptly reduced in size as indicated at 14 and 15 to clear the corrugations 8 flanking the smooth surfaces 9 and 10 of the cylinder which latter may be stripped clean by the end portions of the blades.

The bladed rotor is suitably journaled in the end frames 1 and 2 and may be driven in any suitable manner as for instance, by the gear 16 and pinion 17. Very desirably also, the cylinder is hollowed out as indicated at 18 and the bladed rotor as indicated at 19, to permit circulating a cooling medium, such as water, through the jackets by piping indicated at 20, 21, 22 and 23, the connection 22 being in communication with an open ended tube 24 which allows the water to flow back the full length of the rotor to the exhaust connection 23.

Operation: Material charged through the openings 5 and 6 will be compelled by the portions of the blades sweeping under it to move into the grooved or corrugated portion of the cylinder. These portions of the blades closely approaching the smooth walls of the cylinder will insure compounding of all the ingredients and leave none in the corners of the cylinder. In the corrugated part of the cylinder, the material will be conveyed axially toward the center of the cylinder. In its passage more or less shredding by the conjoint action of the blades and the rifling occurs. In the preferred construction where the pitch decreases to a minimum at the center of the cylinder, the two batches or charges will be worked

against each other and a relatively high pressure will be developed. When the pressure is sufficiently high, the material will take the path of least resistance and spread or flow into the grooves 8, or into the limited space between the sweep of the blades and the cylinder, back towards its ends in a direction opposite its advance by the respective portions 12 and 13 of the blades. As the rotor continues to revolve, the material thus worked adjacent the cylinder walls back towards its ends, will necessarily again be brought into the zone of action of the blades and be advanced axially adjacent the rotor to the center of the cylinder or chamber. Thus each of the batches will be worked in a more or less elliptical orbit whose end portions at the center of the cylinder, will insure mixture more or less of one batch with the other.

The machine has a very powerful and thorough mixing action, vigorously compressing or kneading it and mashing and spreading it, as well as tubing it through the corrugations lining the interior of the cylinder and cutting and rolling it against the ribs between the grooves 8. The mixer is entirely closed and fumes and powdered material cannot escape.

After the mixing is completed, which ordinarily takes but a few minutes, it may be extruded by tubing it out through the opening 7 whose shape may be varied as desired.

The foregoing relates to the preferred construction but more or less of the advantages of the invention can be realized with a worm of uniform diameter, provided of course the cylinder is correspondingly enlarged at the center to permit of the return movement of the material in a direction opposite its advance by the blades. Less desirably also, the pitch of the blades may be made uniform. Reference should therefore be made to the claims for an understanding of the scope of the invention.

Having thus described my invention what I claim and desire to protect by Letters Patent is:—

1. A mixing machine for compounding plastics having in combination, a chamber substantially circular in cross section throughout, means whereby it may be charged and discharged, and a rotor in said chamber, said rotor having blades coiled oppositely about its axis for working the material in contrary axial directions adjacent the rotor and in opposite directions adjacent the walls of the chamber.

2. A mixing machine having a chamber substantially circular in cross section internally, means permitting the introduction and discharge of materials, in combination with a rotor having blades coiled oppositely about its axis of a pitch insuring advance of the material to a point intermediate the length

of the chamber and adjacent the axis of the rotor, and of a diameter relative the chamber, permitting flowing of material adjacent the walls of the chamber towards its opposite ends.

3. A mixing machine for compounding plastics having in combination, a chamber substantially circular in cross section throughout, means whereby it may be charged and discharged, and a rotor in said chamber, said rotor having blades coiled oppositely about its axis for working the material in an axial direction adjacent the rotor and in the opposite direction adjacent the walls of the chamber, said chamber being provided intermediately with ribs co-operating with the blades of the rotor to shred the material, said ribs defining in pairs grooves for permitting the material to be forced from the center of the cylinder towards its opposite ends.

4. A mixing machine for compounding plastics having in combination, a chamber substantially circular in cross section throughout, means whereby it may be charged, and discharged, and a rotor in said chambers, said rotor having blades coiled oppositely about its axis for working the material in contrary axial directions adjacent the rotor and in opposite directions adjacent the walls of the chamber, and means for permitting reduction of the temperature created in the batch during the operation of the machine.

5. A machine for mixing batches of plastic composition having in combination, a container, and a rotor revoluble therein and provided with oppositely coiled blades for mushrooming two masses of the material against each other intermediate the length of the cylinder and compelling the material to travel axially of the container in opposite directions within and without respectively the sweep of the oppositely coiled blades.

6. A machine for mixing batches of plastic composition having in combination, a container, and a rotor revoluble therein and provided with oppositely coiled blades for mushrooming two masses of the material against each other intermediate the length of the cylinder and compelling the material to travel axially of the container in opposite directions within and without respectively the sweep of the oppositely coiled blades, said container being provided with an outlet and a closure therefor intermediate the length of the cylinder and adjacent the point where the two masses of material are mushroomed against one another, whereby the mixed batch of material may be discharged from the container by operation of the rotor.

Signed at Detroit, Mich., this 5th day of May, 1921.

ERNST EGER.