

Oct. 10, 1950

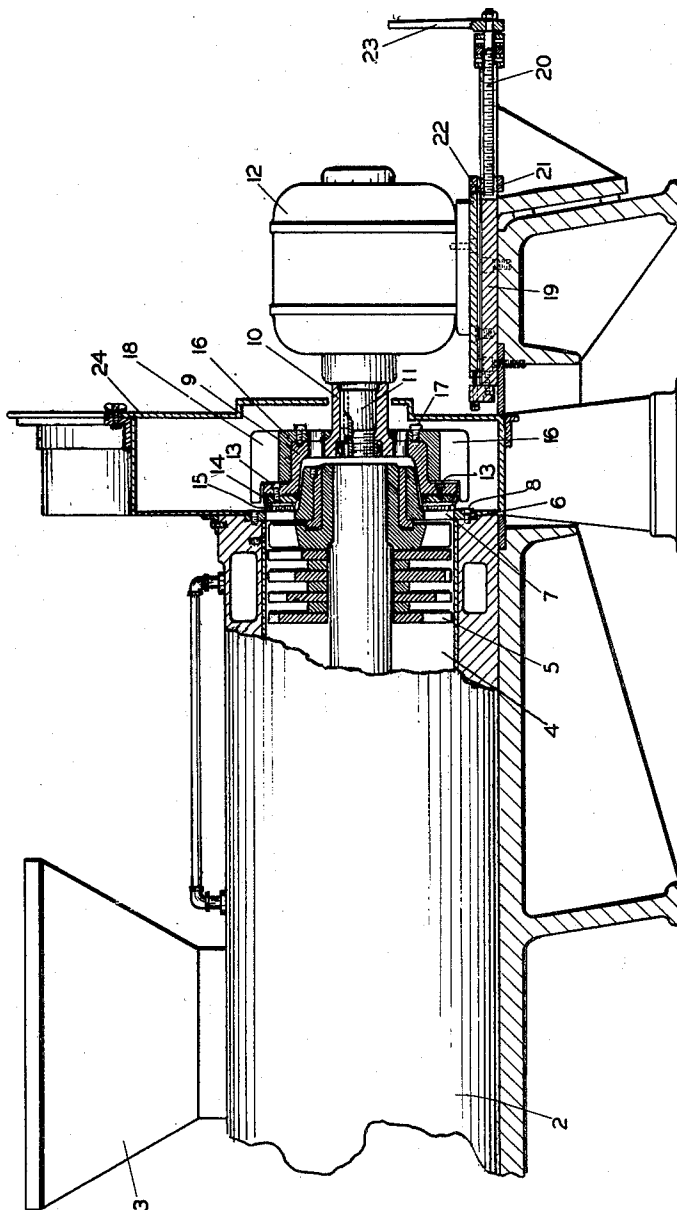
J. L. BERGER
COMMINUTING MACHINE

2,524,751

Filed Feb. 4, 1947

3 Sheets-Sheet 1

FIG. 1



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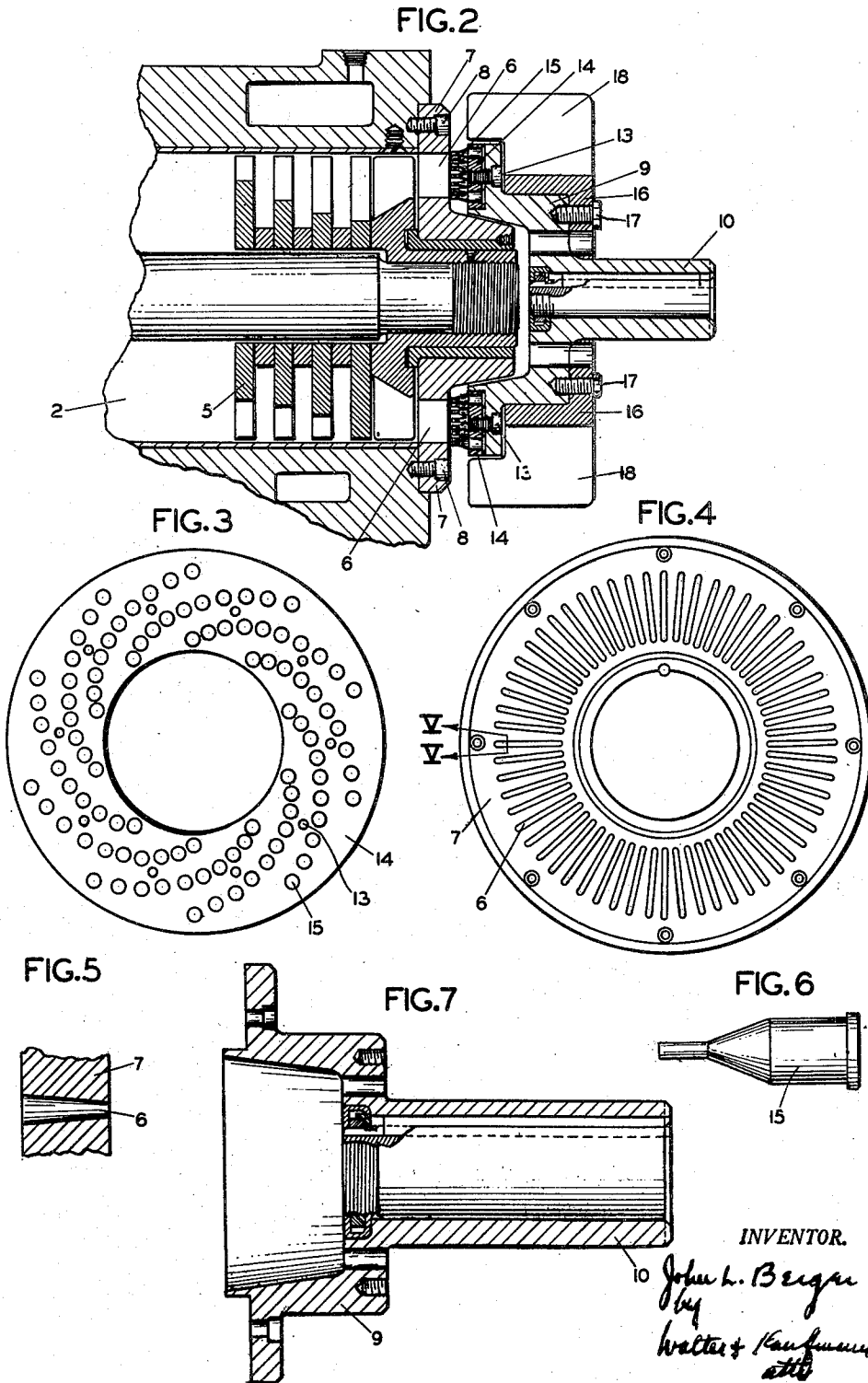
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FIG. 9

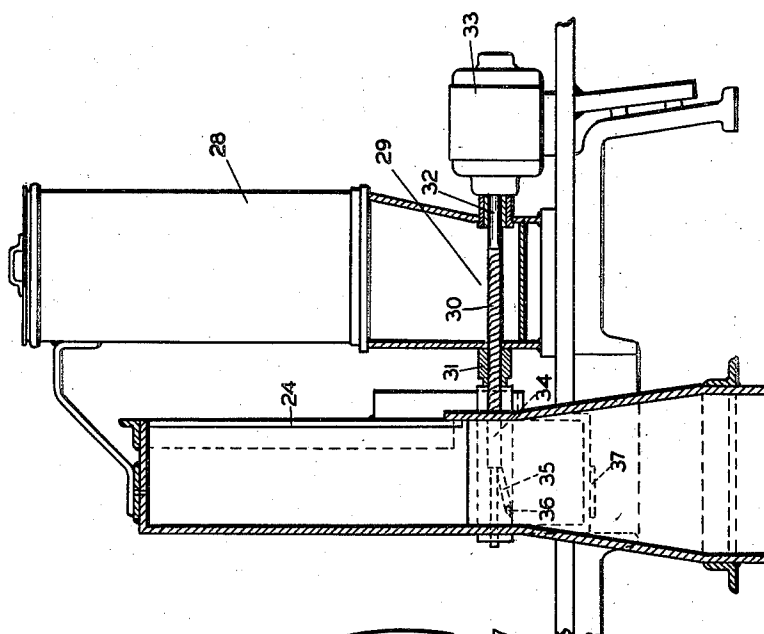
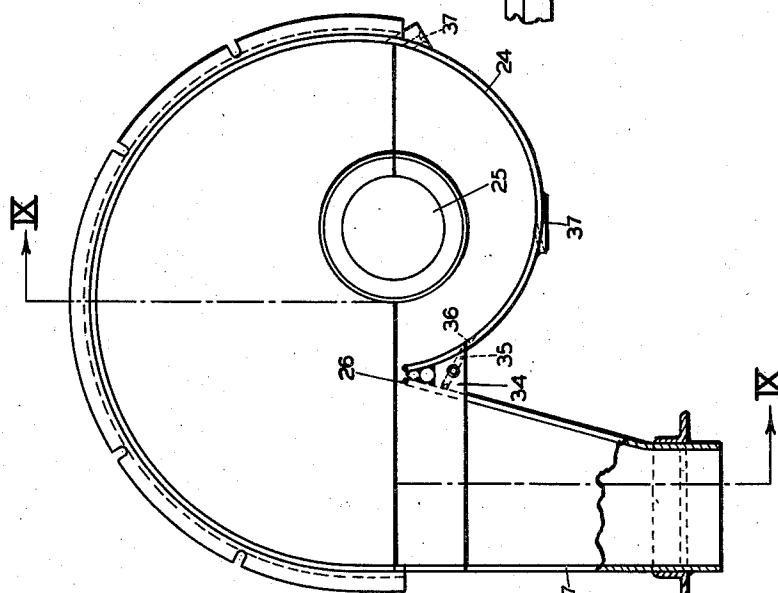


FIG. 8



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2,524,751

COMMUNITING MACHINE

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Application February 4, 1947, Serial No. 726,421

5 Claims. (Cl. 18—12)

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This invention relates to a comminuting machine, and, more particularly, to a machine in which a mass of plastic composition is reduced to fine particle size in one operation, thereby doing away with a series of operations as required by present practice.

In the manufacture of floor coverings, of the inlaid linoleum type, it has been common practice to mix the color composition in a conventional mixer, such as a German mixer, from which the composition is extruded in long rod-like pieces. These rods of color composition are then fed to a two-roll calender which forms the color composition onto a thin sheet, the sheet adhering to one of the calender rolls. A third roll, known as a scratcher roll, operates in such a manner that pins positioned on the surface thereof dig into the sheet of color composition and "scratch" or tear the sheet into particles. These particles then pass into a disintegrator which reduces them to a smaller size suitable for use in the machinery required to form the finished product.

In the manufacture of sheet material from comminuted color composition, it is usually necessary to store the comminuted material for a period of time after its initial processing. During this storage, there is a tendency for the particles to cohere to one another and form cakes of color composition which are not suitable for use in the subsequent manufacturing operations. In order to prevent this caking, it has been common practice to add a powder, such as whiting, to coat the particles and thereby prevent them from cohering. In the process used heretofore, the whiting was added at the disintegrator. Inasmuch as the use of a conventional disintegrator is eliminated in my process, I have found it advantageous to add the whiting at the time the composition is reduced to fine particle size.

With the advent of the newer type floor coverings, such as those made from vinyl chloride-vinyl acetate copolymer, it has been found that the conventional scratcher equipment described above is not effective for reduction of the mass, since the composition does not form a tight blanket on the calender roll, but instead, forms a loose, wrinkled sheet. When the pins of the scratcher roll dig into this loose, wrinkled sheet, they break off large sections of the sheet which are too large for the subsequent processing steps. Also, in the processing of vinyl chloride-vinyl acetate compositions, a higher temperature is required in mixing in order to get proper distribution of the binder composition over the filler

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particles. When operating at these higher temperatures, the particles have a tendency to cohere when they come in contact with one another upon formation and, unless their temperature is reduced to a degree at which they will not readily cohere, an unworkable mass results.

In the past, comminuting machines have been built comprising a mixer, having an extrusion die and a rotating cutter slidably engaging the exterior surface of the extrusion die. Machines of this type are not satisfactory for comminuting plastic compositions of the vinyl chloride-vinyl acetate type, since the sliding knife has a tendency to smear the plastic composition rather than shear it. In order to overcome this, I have provided a device in which the comminuting pins do not engage the surface of the extrusion die, but strike the extruded mass as it is being projected from the extrusion die.

An object of this invention is to eliminate some of the processing steps heretofore required in the processing of plastic color compositions for the production of sheet materials.

Another object of my invention is to provide a device in which the hot color composition as formed into particles is cooled to a temperature where the particles will not cohere.

A still further object of my invention is the provision of a device for reducing plastic composition to small particles in one operation, thereby eliminating many of the difficulties encountered heretofore in trying to break down the plastic compositions.

In order that my invention may be more readily understood, it will be described in connection with the attached drawings, in which:

Figure 1 is an elevational view partly in cross section, showing the device of my invention,

Figure 2 is an enlarged cross-sectional view showing the discharge end of a mixer with the comminuting device in position for operation,

Figure 3 is a plan view of the backing plate to which the comminuting pins are secured, showing the arrangement of the holes in which the pins are secured,

Figure 4 is a plan view of the discharge end of the mixer, showing the extrusion orifices,

Figure 5 is a cross-sectional view on the line V—V of Figure 4, showing the sectional shape of the orifices in the discharge plate,

Figure 6 is an enlarged plan view of one of the comminuting pins,

Figure 7 is an enlarged cross-sectional view of the bell-shaped housing to which the backing plate shown in Figure 3 is attached,

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Figure 8 is a side elevational view of the hood surrounding the device of my invention, and

Figure 9 is a cross-sectional view taken on the line IX—IX of Figure 8, showing the hopper, motor, and conveyor for supplying powder to the hood.

Referring to Figure 1, there is shown a conventional German mixer 2, having an intake hopper 3, through which the charge is fed into the mixing chamber 4, wherein the charge is processed by mixing blades, several of which are shown at 5. It will be understood that mixing blades similar to those shown at 5 are provided throughout the entire mixing chamber 4. After the ingredients have been thoroughly mixed into a homogeneous mass, the mix is extruded through the elongated orifices 6 in the tail plate 7, which is secured to the mixer by means of studs 8. This tail plate is more clearly shown in the enlarged view illustrated in Figures 2 and 4.

Figures 1, 2, and 7, show a bell-shaped casting 9 positioned adjacent the extruding end of the mixer. The bell 9 is mounted by means of its hub 10 on the shaft 11 of a motor 12, or other suitable source of motive power. Secured to the bell 9 by means of studs 13 is a circular plate or disc 14 having a plurality of pins 15 rigidly affixed thereto. These pins 15 are of a diameter smaller than the width, but not necessarily smaller than the thickness of the mass being extruded through the orifices 6 in the tail plate 7. In addition to the circular plate 14, the bell 9 also has a casting 16 secured to it by means of studs 17. This casting 16 carries a series of fan blades 18.

It will be obvious from an examination of Figures 3 and 4 that the arrangement of the pins in plate 14 is such that their projected surface will cover the entire area of the orifices 6 during each rotation of the disc 14.

It will be noted from Figure 1 that the motor and bell assembly are slidably mounted on the support 19 to permit lateral or axial movement of this assembly with respect to the mixer 2. This slidable mounting makes it possible to accurately adjust the clearance between the tail plate 7 and the comminuting pins 15. This is accomplished by means of the screw 20 on the support 19 which threadedly engages the shoulder 21 on the slidable mounting 22. It will be clear from this disclosure that the motor and bell assembly may be moved laterally with respect to the mixer by merely turning the crank 23. The preferred clearance between the comminuting pins and the tail plate is .010"; however, satisfactory results are obtained with clearances ranging from .005" to .020", or greater, depending upon the size of the particles desired, the physical characteristics of the material being operated upon, and other variable factors.

I have found that satisfactory results are obtained when the bell 9 is rotated at 3600 R. P. M.

It will be readily understood that when operating at this speed, the comminuting pins impart considerable centrifugal force to the small particles of composition as they are broken off the extruded mass. To direct and collect these particles, I provide a spiral-shaped collector hood 24, shown in Figures 8 and 9.

Referring to Figure 8, it will be understood that the longitudinal axis of the bell is in the center of the circular housing offset 25, and during the operation of the device the small particles are thrown off in arcs tangential to the circular housing offset 25. Particles traveling

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through arcs which clear the dividing point 26 will travel down the chute 27 into a suitable sieve (not shown). Particles travelling through arcs which fall short of the point 26 will continue around the inner circumference of the hood 24 by means of the air blast created by the fan blades 18 secured to the rotating bell, and pass down through chute 27.

In order to supply whiting or other powder suitable for preventing the particles from cohering to one another, I provide a hopper 28 (Figure 9) having a trough-shaped bottom portion at 29, in which is positioned a screw conveyor 30, operating in a tube 31 and driven through a shaft 32 by motor 33. It will be understood, of course, that this screw conveyor can be driven by the motor 12 used to rotate the bell 9; however, in the embodiment illustrated, I use a separate motor 33. The screw conveyor 30 carries the whiting horizontally into a chamber 34 positioned between the discharge tube 27 and the hood 24. When the powder is in the chamber 34, it is in the path of a compressed air blast directed through tube 35. This compressed air blast forces the powder out of the chamber 34 through tube 35 and discharges it into the area surrounded by the hood at point 36, which is in substantially the same vertical plane as the free ends of the comminuting pins 15. This powder is carried around with the air blast caused by the blades 18.

In order to effect a substantial reduction in the temperature of the particles immediately after they are formed to prevent them from cohering, I provide air intake openings 37 to which may be attached flexible hose or other conduits from sources outside the machine, for supplying air to the interior of the hood. If necessary, refrigerated air can be supplied to the hood.

In the operation of my comminuting machine, the ingredients to be mixed to form the final comminuted composition are fed through the hopper 3 into the mixing chamber 4 where they are thoroughly mixed by the blades 5. After the ingredients are thoroughly mixed, the homogeneous mass is extruded through the oblong orifices 6 in the tail plate 7 attached to the mixer. As the homogeneous mass is extruded through the orifices 6, the comminuting pins 15 secured to the bell 9 which rotates about an axis the same as the horizontal axis of the tail plate 7, strike the extruded mass and break it into small particles. The arrangement of the comminuting pins 15 on the plate 14 is such that their projected surface covers the entire area of the orifices 6 during each rotation of the disc. The size of the particles may be controlled by the speed of rotation of the bell, by the number of comminuting pins in the plate 14, or by the clearance between the tail plate 7 and the comminuting pins 15.

The particles travel in arcs tangential to the circular path of the comminuting pins as they are broken off by these pins, and the particles are confined and directed by a spiral-shaped hood 24 which surrounds the rotating bell. All particles which are not thrown directly into the discharge chute 27 are carried around the hood by means of the air blast created by the fan blades 18. A powder such as whiting is forced into the hood 24 through tube 30, the discharge end of which is in the same vertical plane as the free ends of the comminuting pins 15. The purpose of this powder is to coat the particles to prevent them from cohering to one another. Air

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is supplied to the hood from the outside through the air intake openings 37 in the hood 24.

It will be clear from the above description that I have provided a machine in which the comminuting operation, the cooling operation, and the particle coating operation, are carried out in one processing step, thereby eliminating the processing chain used heretofore in the mixing and disintegrating of plastic color composition used in the manufacture of sheet material.

While I have illustrated and described certain preferred embodiments of my invention, it will be understood that the same is not limited thereto, but may be otherwise embodied and practiced within the scope of the following claims.

I claim:

1. A comminuting machine comprising a device for extruding plastic composition through a plurality of oblong orifices in an extrusion die, a disc carrying a plurality of comminuting pins positioned adjacent the extruding end of the extruding device, said pins intersecting the path of the extruded material and being so arranged that their projected surface covers the entire area of the orifices, said extruding die and said disc carrying the comminuting pins being on the same longitudinal axis, means for rotating said disc, and means for adjusting the clearance between the comminuting pins and the extruding die.

2. A comminuting machine comprising a device for extruding plastic composition through a plurality of orifices in an extrusion die, a disc carrying a plurality of comminuting pins positioned adjacent the extruding end of said extruding device, said pins intersecting the path of the extruded material and being spaced from the extruding die and facing in a direction opposed to the direction of travel of the extruded mass, the arrangement of said pins being such that their projected surface covers the entire area of the orifices, said extruding die and said disc carrying the comminuting pins being on the same longitudinal axis, means for rotating said disc, and means for adjusting the clearance between the comminuting pins and the extruding die.

3. A comminuting machine comprising a device for extruding plastic composition through a plurality of oblong orifices in an extrusion die, a disc carrying a plurality of comminuting pins positioned adjacent the extruding end of the ex-

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truding device, said pins being of a diameter less than the width of the individual orifices and being arranged so that their projected surface covers the entire area of the orifices, said extruding die and said disc carrying the comminuting pins being on the same longitudinal axis, means for rotating said disc and means for adjusting the clearance between the comminuting pins and extruding die.

4. A comminuting machine comprising a device for extruding plastic composition through a plurality of oblong orifices in an extrusion die, a disc carrying a plurality of comminuting pins positioned adjacent the extruding end of the extruding device, said pins being of a diameter less than the width of the individual orifices and having flat tips of reduced cross-sectional area, said pins being spaced apart at their working surface and being so arranged that their projected area covers substantially the entire area of the extrusion orifices, said extruding die and said disc carrying the comminuting pins being on the same longitudinal axis, means for rotating said disc and means for adjusting the clearance between the comminuting pins and the extruding die.

5. A comminuting machine comprising a device for extruding a plastic composition through a plurality of orifices in an extrusion die, a disc carrying a plurality of comminuting pins positioned adjacent the extruding end of the extruding device, said pins intersecting the path of the extruded material and being so arranged that their projected surface covers the entire area of the orifices, said extruding die and said disc carrying the comminuting pins being on the same longitudinal axis, and means for rotating said disc.

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