Feb. 26, 1935. R. L. CAWOOD 1,992,290

METHOD OF GRINDING

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Fig. 1.

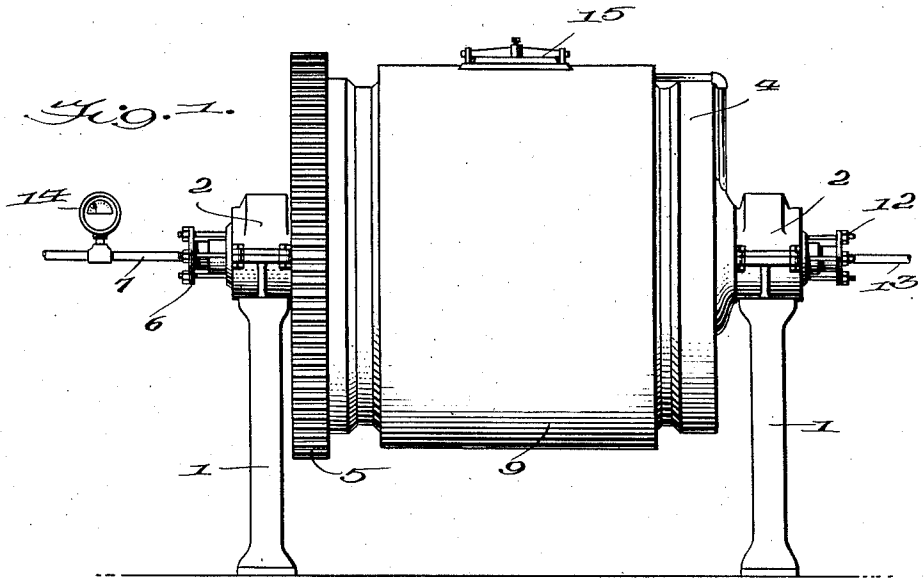
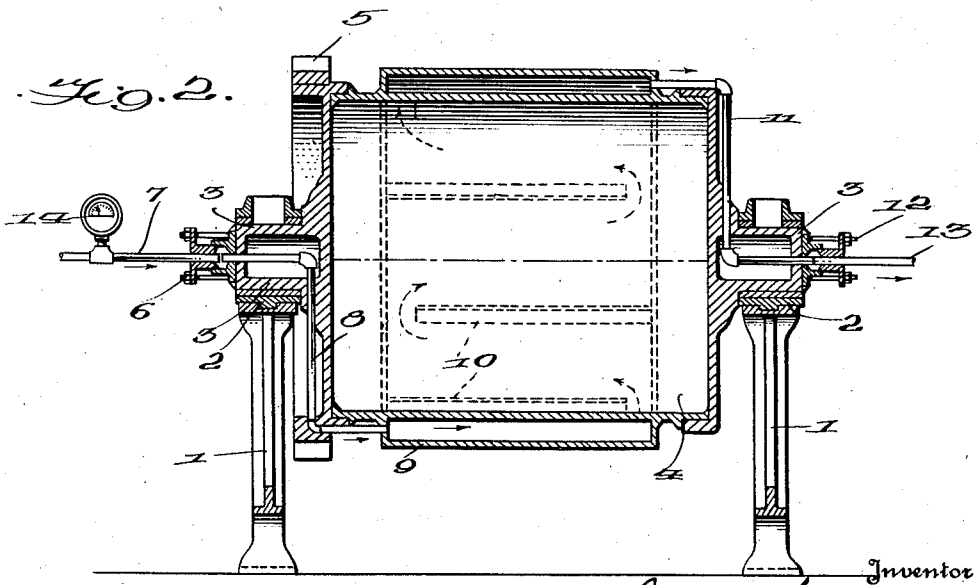


Fig. 2.



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Fig. 3.

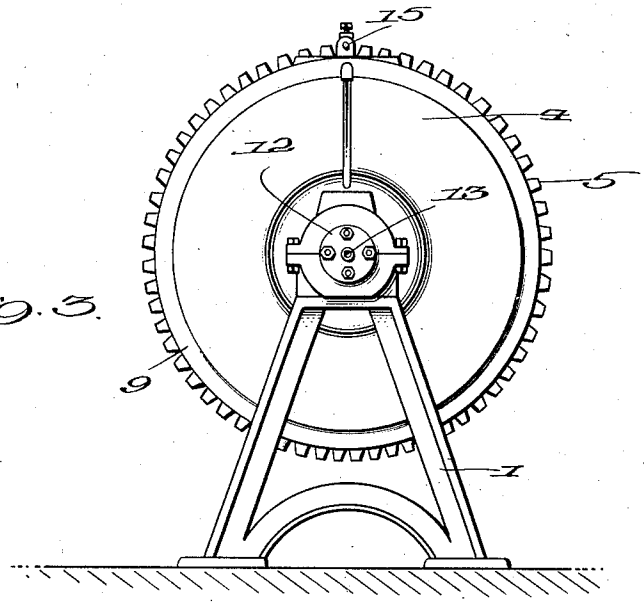
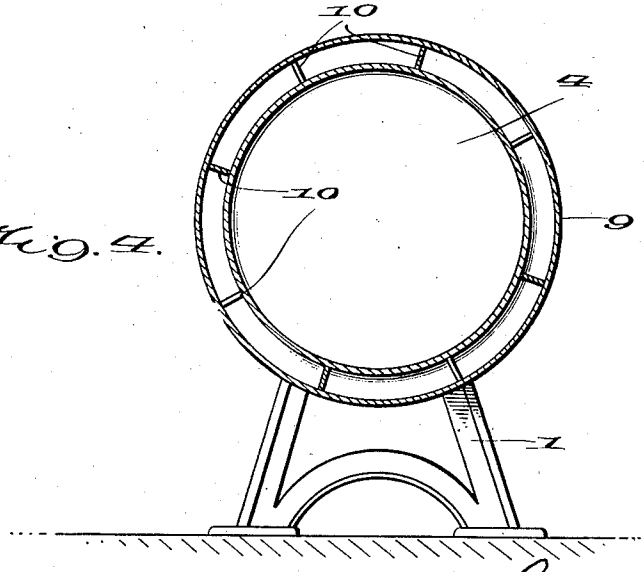


Fig. 4.



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METHOD OF GRINDING

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Application January 6, 1930, Serial No. 418,965

2 Claims. (Cl. 83—94)

This invention relates to an improvement in methods of grinding certain materials in pebble, ball or tube mills or the like.

The invention is applicable to these different types of mills, the operations of which are well understood by those familiar with the art, and although it is more particularly described and illustrated in connection with a pebble mill it will be understood that it is applicable to various types and is not restricted or limited to a pebbie mill.

In the production of products consisting of all kinds of paints, varnishes, lacquers, etc., and also with many other products such as rotogravure inks, job inks, carbon paper coatings, patent leather coatings, ointments, facial creams, and practically any substance where a solid pigment, powder or other material is to be ground into an oil, grease or similar base, it is necessary that they be of the consistency approximately that of semi-paste, or otherwise the pebbles or balls become embedded in the mass and cannot move freely, and consequently no grinding is accomplished. It is obvious therefore that the grinding of any of these materials in pebble mills at the present time is confined entirely to materials of a sufficiently light consistency to permit the grinding media to move freely and, up to this time, no practical method has been discovered by which heavy paste, such as heavy paste paints, job printing ink, rotogravure inks, ointments, cosmetics, soaps, chocolate, butter, heavy grease, etc., may be ground successfully in pebble mills, although attempts have been made to do this by changing the type of grinding media.

I have discovered that by changing the consistency of the vehicle or, in other words, by heating the vehicle or base into which the pigments or solids are ground, it is possible to make them more fluid, and in this more fluid condition it is possible to grind into this vehicle or base of thin consistency, the other ingredients comprising the mixture, and I have discovered further that it is possible to smooth lumps out of heavy paste of various kinds by the same process. For instance, lubricating grease which contains lumps may be freed of the lumps by applying heat to the pebble mill during the grinding operation, thus thinning the grease so that the grinding action of the media will smooth the lumps out of the material.

This is the object of my invention, to make it possible by heating during the grinding operation through means of a steam or hot water jacket or other heating appliance or method, the grinding in a pebble mill or the like of materials otherwise impossible to grind in this type of machine, through decreasing the viscosity during the grinding operation.

The invention applies to materials which decrease in viscosity as heat is applied during the grinding operation, such material being of a nature, of paint, inks, carbon paper coatings, fabric coatings, and any material having an oil, grease or other base with the proper characteristics.

In the accompanying drawings:

Fig. 1 is a side elevation of a pebble mill which may be used in carrying out the invention;

Fig. 2 is a longitudinal sectional view through the same;

Fig. 3 is an end elevation; and

Fig. 4 is a transverse section through the mill.

The machine for utilizing the process comprises standards 1 provided with journals 2, which receive trunnions 3 extending in opposite directions from the ends of a cylinder 4, for rotatably supporting this cylinder in the standards 1. A gear 5 is fixed to the circumference of the cylinder 4 at one end thereof, with which gear any suitable form of driving mechanism may be connected for rotating the drum.

A stuffing box 6 is provided at one end of the cylinder 4 and has a pipe 7 connected therewith, which may be connected with any suitable source of steam or hot water, and a second pipe 8 communicates therewith through the stuffing box 6 and with a jacket 9 which surrounds the main portion of the cylinder 4 of the machine. The jacket 9 is provided with baffles 10 therein, as shown in dotted lines in Fig. 2 and in full lines in Fig. 4, so that the steam or hot water or other heating media circulates back and forth through the jacket until it is finally discharged through pipe 11, which extends to a stuffing box 12 and through the stuffing box is connected with a discharge pipe 13.

Different materials require different temperatures to produce the required change in viscosity, and furthermore some materials require high temperatures while others relatively lower temperatures. To regulate the temperature and to maintain a constant or uniform temperature for the particular materials being treated, a thermostat 14 is provided in the supply pipe 7 which keeps the machine at any desired temperature during the grinding operation.

The cylinder 4 is provided with a closure 15, through which the material is introduced. This cylinder is filled approximately half full of flint

pebbles, porcelain balls, cast-iron balls or steel balls, or sometimes with steel slugs, iron or steel bars, and as the material revolves the tumbling action of the grinding media pulverizes the material.

By this process, various materials may be introduced into the cylinder 4 and ground, which heretofore has not been possible or practical. A suitable oil, wax or grease may be used as a base or vehicle into which the pigments or other materials in powdered form are ground or with which they are amalgamated. A heating medium is applied through the pipes and the jacket 9 and is regulated so as to be kept at a proper temperature. The heat acts to reduce the viscosity of the materials being ground from a paste to the liquid condition, which makes it possible to carry on the grinding operation. The grinding is accomplished by a rotation of the jacketed cylinder in the usual way. The heat causes the vehicle to become more liquid, thus reducing the batch to a consistency sufficiently fluid for grinding in these pebble mills or the like.

This method applies to materials which decrease in viscosity upon the application of heat during the grinding operation, which materials are of the nature of paints, inks, carbon-paper coatings, fabric coatings, and any material having an oil, grease or other base of such a character.

By reference to "grinding", I refer more particularly to the type of mill used in carrying out my process and to which it is particularly adapted, and not necessarily to a reduction in particle size of the material ground in the mill. The process applies to the uniform dispersion of one material into and throughout another, as the dispersion of the pigment throughout its vehicle. The word "grinding" is used to designate such uniform dispersion, or a more intimate incorporation of the materials.

The reference to pebbles is generic as applying to grinding media employed in pebble, ball, or similar mills.

I claim:

1. A method of dispersing solid powders into a relatively solid vehicle comprising introducing a powder and a relatively solid vehicle which decreases in viscosity upon the application of heat into a container containing pebbles, heating the material in the container to reduce the viscosity of the vehicle, subjecting the material in the container to an agitating and rubbing action of the pebbles, and continuing the heating of the material in the container during such agitating and rubbing action for uniformly dispersing the powder throughout the vehicle.

2. A method of dispersing solid powders into a relatively solid base in a pebble-mill comprising introducing a powder and a relatively solid vehicle which decreases in viscosity upon the application of heat into a container of a pebble-mill containing pebbles, heating the material in the container to reduce the viscosity of the vehicle, subjecting the material in the container to an agitating and rubbing action of the pebbles by rotation of the container, and continuing the heating of the material in the container during such agitating and rubbing action for uniformly dispersing the powder throughout the vehicle.

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