

Oct. 17, 1933.

H. G. BREWSTER

1,930,873

RUBBER REFINING MACHINE

Filed Sept. 26, 1929

2 Sheets-Sheet 1

Fig. 1.

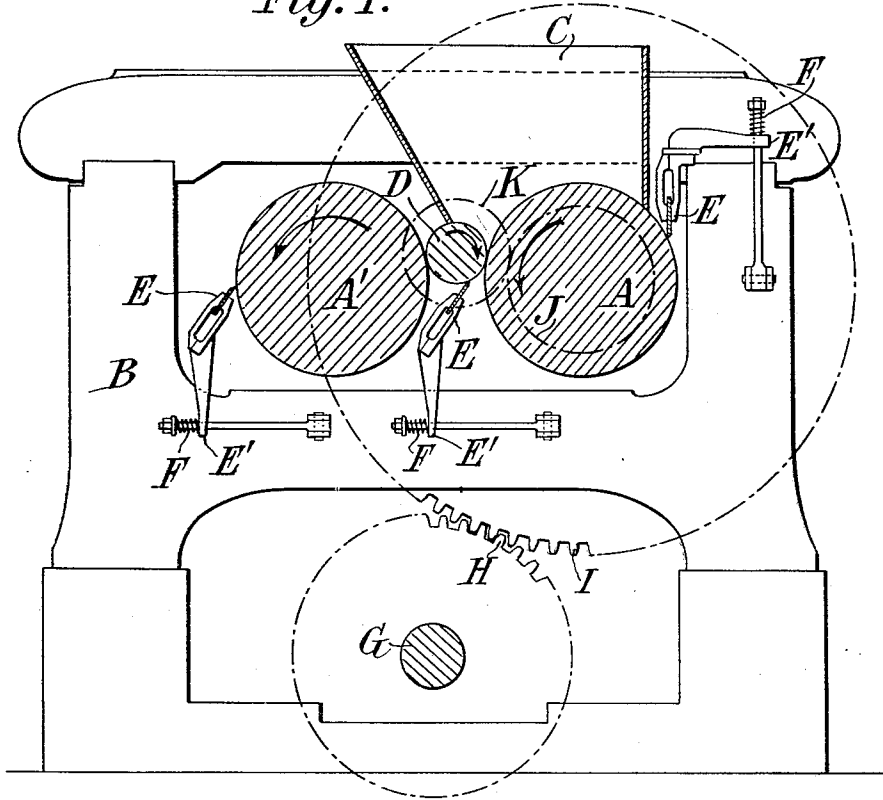


Fig. 7.

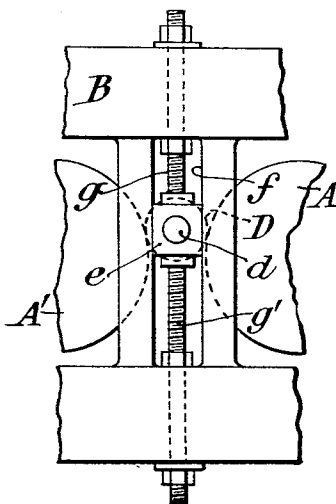


Fig. 2.

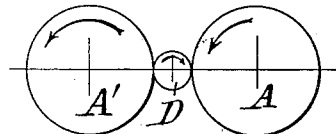
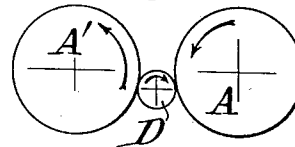


Fig. 3.



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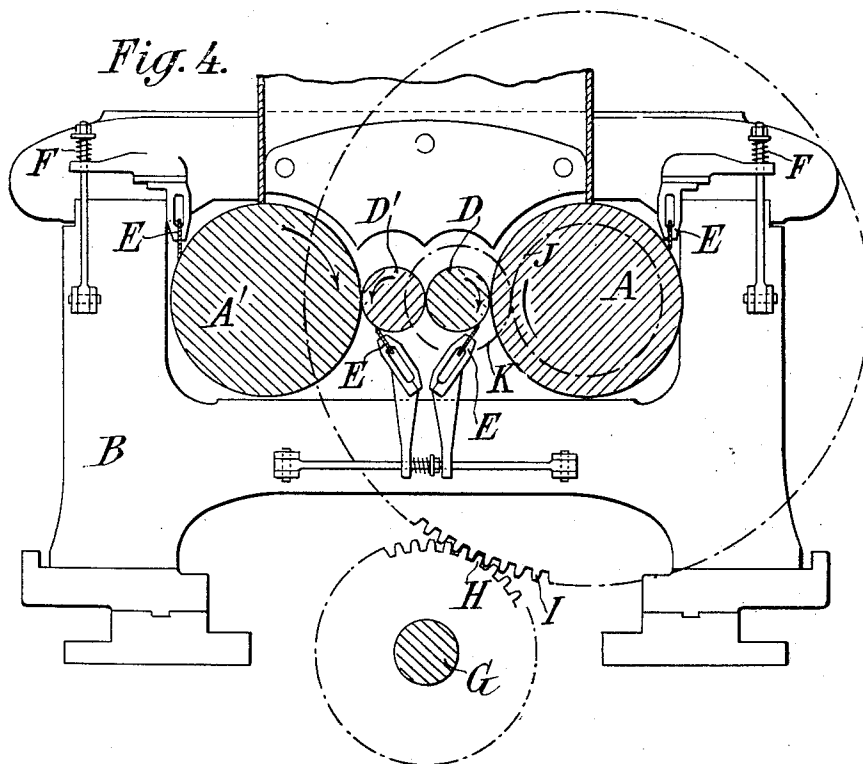
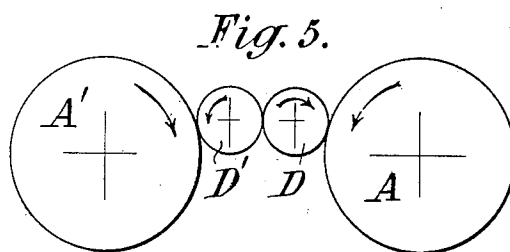
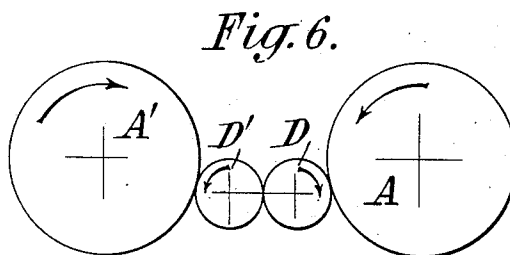
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RUBBER REFINING MACHINE

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2 Sheets-Sheet 2



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RUBBER REFINING MACHINE

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Application September 26, 1929
Serial No. 395,260

4 Claims. (Cl. 18—2)

This invention relates to rubber refining machines such as are commonly built with a pair of rolls forming the bottom of a hopper in which the rubber to be worked is placed; the two rolls revolve in contrary directions, their adjacent surfaces moving downwardly at different speeds and acting to squeeze out the rubber in a thin sheet under a graduated pressure. The present invention has for its object an improvement upon such machines.

According to the present invention the bottom of the hopper is closed by one large roll and one or two smaller rolls, the latter being backed up by a second large roll, so that the pressure stresses are carried by the two large rolls. This affords the advantage that the rubber in passing between the rolls is subjected to a pressure which is greater in proportion to the mechanical pressure exerted against the rolls, thus providing for a given run with reduced power, and also making it possible to increase the output of the machine by passing a greater quantity of rubber between the rolls in a given time.

The accompanying drawings illustrate two embodiments of the invention.

Figure 1 is a vertical transverse section of a machine employing beneath the hopper a large roll and a small roll backed up beyond the hopper by a second large roll. Figs. 2 and 3 are diagrams showing the three rolls in two different relative positions as compared with Fig. 1.

The other embodiment is shown in Figs. 4, 5 and 6.

Fig. 4 is a vertical transverse section corresponding to Fig. 1, but showing two small rolls between the large rolls, both of the latter being beneath the hopper.

Figs. 5 and 6 are diagrams showing different arrangements of the four rolls as compared with Fig. 4.

Fig. 7 is an end elevation showing an adjustable mounting for the small roll.

Referring to the drawings, the large rolls A A' are mounted at opposite ends in frames B B in the usual manner, it being deemed unnecessary to illustrate the machine in either plan or front elevation because the general construction is well understood and is not necessarily departed from according to the present invention. The bearing boxes carrying the journals of the rolls are forced toward each other by adjusting screws as usual. The hopper C is mounted between the end frames B B in the usual manner. The rolls are rotated by power in the usual or any suitable manner.

Referring to Fig. 1, there is shown a third roll D of much smaller diameter than the rolls A A', and mounted between them. In this construction the hopper rests upon the large roll A and the small roll D, and these rolls are rotated so that their adjacent faces move downwardly at different speeds. The mass of rubber in the hopper is dragged by the rotation of the rolls toward the outlet bite or gap between them, and is wiped and squeezed down through this gap, thus discharging the rubber in a sheet the thickness of which will depend upon the setting of the rolls. The rolls A, D, are pressed together with any suitable pressure exerted through the usual adjusting screws, the pressure against the roll D being exerted through the roll A', which serves as a backing roll to the roll D. To provide for the spring of the rolls incident to the pressure, they are crowned in the well understood manner. This crowning may be confined to the large rolls, in which case the roll D is a true cylinder.

For insuring the separation of the rubber from the rolls, and to remove any which may adhere to their surfaces, the usual scrapers E E are provided, consisting of plates carried in frames which are mounted to rock on pivots and constitute levers, the long arms E' of which receive the stress of springs F, as is customary.

The rolls may be driven from a shaft G through gears H, I, the latter being fast on the end journal of the roll A (this gear drive is preferably duplicated at opposite ends). The roll D is driven from the roll A through gears J, K, only the pitch lines of which are shown in Fig. 1. These pitch lines differ sufficiently from the diameters of the rolls as to drive their surfaces at sufficiently varying speeds to give the differential effect or wiping action which is required for efficient operation in such machines.

The backing roll A' does not require to be driven, but may be geared to the roll D so that the two turn at the same surface speeds.

In Fig. 1 the roll D is shown mounted with its axis higher than the axes of the rolls A, A', which for most purposes is deemed preferable. It is, however, within the invention to mount the roll D with its axis on the same level as the rolls A, A', as shown in Fig. 2; or to drop it to a lower level, as shown in Fig. 3. It is proposed to construct the machine so that these three positions, or any intermediate adjustments, may be afforded by setting the bearings for the end journals of the roll D up or down, as may be desired. This may be done in the manner shown in Fig. 7, where d shows an end journal of the roll D

mounted to turn in a bearing block *e* movable up or down in a slideway *f* formed vertically in the end frame B, and so that the bearing block *e* may be set up or down by turning adjusting screws *g* and *g'*, which may be set fast by set nuts as usual. All the bearing blocks *e* at opposite ends may be set up or down in any of the other ways which are usual in machines of this character, such as by means of shims or blocks of varying thicknesses introduced above and below the bearing blocks.

The construction thus described has certain marked advantages over the ordinary machine using two large rolls (such as A, A') which come together beneath the hopper. With such a two-roll machine the pressure required for proper working of the rubber is very heavy for each lineal inch of the length of the rolls, so that as the rolls are elongated to increase the capacity, the increased pressure at their end journals involves serious difficulty in the bearings and housings, and the added spring of such longer rolls requires greater crowning. To strengthen the rolls by enlarging their diameter involves further difficulty in that the pressure per lineal inch is correspondingly increased, which in turn intensifies the difficulty of carrying the thrust at the end bearings and in constructing the housings to carry this heavier stress. These difficulties are greatly diminished by the present invention, which enables a given pressure per square inch between the bite of the rolls to be attained with a smaller aggregate pressure per lineal inch because of the greater intensity of pressure at the bite between a little roll and a large one, with a given pressure exerted to force the rolls together. This enables the capacity to be increased by elongating the rolls without increasing their diameter. It is believed, also, that practical experience will demonstrate that an increased output of rubber passed through the machine is attained by the use of the intermediate smaller roll.

The machine shown in Fig. 4 differs from the one already described only in that a second intermediate small roll D' is introduced between the roll D and the backing roll A', and the hopper is made wider so that it bridges between the two rolls A, A'. The drive by this construction is best imparted to both rolls A and A' to turn them in opposite directions at the same speed; the rolls D, D', are driven from the rolls A, A', through differential gearing adapted to cause them to rotate at different surface speeds from the large rolls, it being most convenient to have their speeds slower than the large rolls, as indicated by the gear pitch lines J, K, at the right in Fig. 4, similar gears being applied for driving the roll D' from the roll A'. In this case four scrapers E are applied to the four rolls, as shown. The rolls D, D', come into close contact with each other,

and since their surface movement is upwardly, no rubber passes down between them, so that they serve each as a backing roll for the other. The bites through which the rubber passes by the downward movement of the roller surfaces are between the large roll A and small roll D, and between the large roll A' and small roll D'. This construction has the important advantage of practically doubling the output of the machine, since there are two discharge passages formed by the bites between the rolls, instead of one as heretofore.

Under some circumstances there exists a tendency for the two small rolls D, D', to "float" or move together to right or left, whereby the bites between them and the large rolls A, A', will not be uniform in thickness. This tendency may be controlled by setting the rolls higher or lower, of which three examples are shown in Figs. 4, 5, and 6. It may be otherwise controlled if found necessary, by introducing means for limiting the displacement of the rolls D, D', to right or left at their journal ends.

It will be understood that the invention may be otherwise embodied, and that it is susceptible of a reasonable degree of variance or modification according to the results desired and the judgment of the constructor. While it is preferable if the rolls A, A', be of equal size, and the rolls D, D', be of equal size, yet this is not necessary as reasonable variations may be made in the diameters of the respective rolls.

What I claim is:

1. A rubber refining machine comprising revolving rolls, one of such rolls being of relatively large and the other of relatively small diameter, and rotating means for backing the small roll against the thrusts of operation.

2. A rubber refining machine comprising revolving rolls, one of such rolls being of relatively large and the other of relatively small diameter, with a backing roll of relatively large diameter receiving the thrust of the smaller roll.

3. A rubber refining machine comprising a hopper and revolving rolls beneath the hopper, one of such rolls being of relatively large and the other of relatively small diameter, and a second roll of such relatively small diameter, the two smaller rolls turning in contact with each other, and a second larger roll receiving the thrust of the second smaller roll.

4. A rubber refining machine comprising a hopper and revolving rolls beneath the hopper, such rolls including two relatively small rolls close together and two relatively large rolls located on opposite sides of the smaller rolls, whereby to afford two discharge gaps between respective pairs of rolls for the descent of the material from the hopper.

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