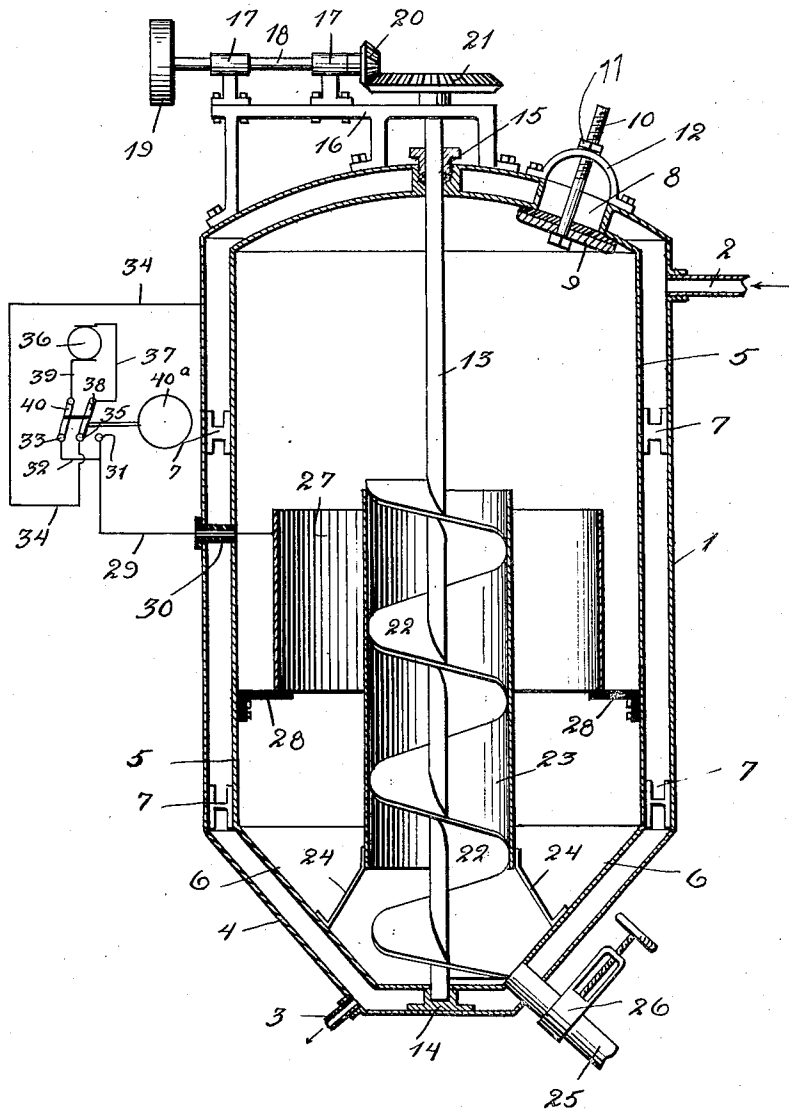


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 APPARATUS FOR USE IN RECLAIMING VULCANIZED RUBBER WASTE.
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APPARATUS FOR USE IN RECLAIMING VULCANIZED-RUBBER WASTE.

1,024,936.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, CHARLES S. HELLER, a citizen of the United States, residing at Akron, in the county of Summit and State of Ohio, have invented certain new and useful Improvements in Apparatus for Use in Reclaiming Vulcanized-Rubber Waste, of which the following is a specification.

This invention relates to apparatus for use in reclaiming rubber waste and has particular reference to certain new and useful improvements in the apparatus patented by me under date of December 13, 1910, in Patent No. 978,583.

An important object of this invention is to provide apparatus of the character mentioned which will render the process of reclaiming rubber waste, more expeditious, thorough, and continuous.

Another object of this invention is to provide novel and improved means for agitating the material under treatment.

A further object of the invention is to provide means for sending an electric current through the material under treatment, first in one direction and then in the opposite direction.

Other objects and advantages of this invention will be apparent during the course of the following description.

In the accompanying drawing forming a part of this specification, the figure is a central vertical longitudinal sectional view through the apparatus.

In the drawing wherein is illustrated a preferred embodiment of my invention, the numeral 1 designates a closed outer shell or casing, preferably of sheet metal, provided near its upper end with a steam inlet pipe 2 and at its lower end with a drip pipe 3. The outer shell 1 has a lower portion 4, which tapers downwardly in inverted frusto-conical shape, as shown. Disposed concentrically within the outer shell 1 is an inner shell or casing 5, preferably of sheet metal (vertically disposed therein) and of smaller dimensions, to provide a steam chamber or jacket entirely surrounding the shell 5, as shown. The shell 5 is closed at its lower end by an inverted frusto-conical portion 6. The shells 1 and 5 are kept in their proper concentric positions by a suitable number of spacing members or ribs 7. Access is had to the interior of the shell 5 through an open-

ing 8 formed through the upper end thereof, 55 which opening is normally closed by a door 9, held in place by a screw-threaded pin 10, the upper screw-threaded portion of which engages a bracket 12 and carries a nut 11.

Disposed axially within the shell 5 is a 60 vertical rotatable shaft 13, the lower end of which extends through an opening formed in the lower portion 6 of the shell 5 and is journaled in a stationary bearing 14. The upper portion of this shaft is journaled 65 through a stuffing box 15. Rigidly mounted upon the upper end of the outer shell 1 is a horizontal support or bracket 16, upon which is rigidly mounted bearings 17, through which is journaled a horizontal rotatable shaft 18, carrying a fast pulley 19 70 at its outer end and a bevel-gear 20 at its inner end. This bevel-gear engages a larger bevel-gear 21, which is rigidly connected with the upper end of the shaft 13. Suitable 75 means (not shown) are provided for rotating the pulley 19. The shaft 13 carries upon its lower half a spiral conveyer 22, extending downwardly to operate adjacent the bottom wall of the portion 6 of the inner shell. Surrounding the greater portion of 80 the spiral conveyer 22 and spaced from the portion 6 is an open-ended cylinder or shell 23, which is held in its position by spaced stationary legs 24 attached to the lower end 85 of the shell 23 and the portion 6. A discharge pipe 25 leads from the portion 6 of the inner shell adjacent the lower end of the spiral conveyer 22, and is provided with a cut-off valve 26. 90

Disposed within the shell 5 and intermediate the ends thereof is a zinc cylinder 27, surrounding the cylinder 23 and disposed in spaced concentric relation thereto. This cylinder 27 is insulated from the inner shell 5 and is supported by brackets 28 formed of insulating material. A wire 29 is connected with the cylinder 27 and is insulated from the shells 1 and 5 by a bushing 30 formed of fiber or other suitable insulating material. 95 The wire 29 is connected with a fixed contact 31 and is also connected with a wire 32 having connection with a fixed contact 33. A lead wire 34 connected with a fixed contact 35, disposed between the contacts 31 and 100 33, is electrically connected with the outer metal shell 1 and hence electrically connected with the inner metal shell 5. 105

The numeral 36 designates a source of electrical current, as for example, a direct current dynamo of any well known or preferred type. One pole of the dynamo is
5 connected with a wire 37 which is connected with a swinging arm 38 of a switch or pole changer. The other pole of the dynamo is connected with a wire 39 having connection with a swinging contact arm 40 of the switch
10 or pole changer. The arms 38 and 40 are connected so that they move together. Means are provided for periodically throwing the switch. This means may be of any desired form or construction. Satisfactory
15 results are obtained by the use of spring wound clock mechanism 40^a, set or adjusted to throw the switch as often as desired, preferably about once every five minutes.

From the description of the above referred to parts, it is obvious that the cylinder 27 and the shell 5 serve as electrodes for
20 subjecting the reclaiming solution and rubber waste to the action of an electric current. By swinging the contact arms 38 and 40 to the right, contact arm 38 will engage the fixed contact 31 and contact arm 40 will engage
25 contact 35, whereby the cylinder 27 and the shell 5 will be connected with the opposite poles of the source of current, or in other words the polarity of the electrodes
30 is reversed.

The pipe 25 discharges into a cleansing apparatus (not shown), which is of the construction shown and described in my Patent
35 No. 978,583.

The operation of my apparatus is as follows:—A sufficient quantity of the reclaiming solution and comminuted rubber waste is introduced into the inner shell 5 to completely cover the spiral conveyer 22 and the
40 cylinder 27. The pulley 19 is rotated so that the spiral conveyer will conduct material from the lower end of the shell 5 through the cylinder 23 and discharge such material from the upper end of the cylinder
45 23. It is thus seen that the reclaiming solution and comminuted rubber waste is constantly agitated. The reclaiming solution which I preferably use comprises for each
50 one hundred pounds by weight of comminuted rubber waste, six hundred pounds by weight of water, thirty pounds by weight of caustic alkali, such as sodium hydrate or potassium hydrate, and one-half pound by
55 weight of ferric hydroxid. This reclaiming solution in the shell 5 is kept constantly heated by live steam introduced into the steam chamber between the shells 1 and 5 from the pipe 2. I have found that the best
60 results may be obtained by keeping the contents in the shell 5 at a temperature of from 330° to 370° F., preferably about 360° F., which temperature is obtained by introducing steam into the steam chamber at a pressure
65 of from ninety-five to one-hundred-sixty

pounds. The contents of the shell 5 are kept under pressure by the heated condition of said contents. During the agitation, the reclaiming solution and the comminuted
70 rubber waste are continuously brought into immediate contact with the cylinder 27 and the shell 5. In its movement with the reclaiming solution, the rubber waste in passing between the cylinder 27 and the wall of
75 the shell 5, is subjected to the action of the electric current generated by the dynamo 36. It has been found by experience that the greater portion of rubber waste subjected to the action of the reclaiming process,
80 carries a large percentage of mineral matter, including sulfur, and that the action of an electric current in passing through the solution assists in removing the mineral matters contained therein. I have found
85 that the action of the reclaiming solution on the rubber waste is made much more effective by periodically changing the polarity of the electrodes, which may be accomplished by the proper operation of the
90 switch, preferably by automatic means. The sulfur which is removed from the rubber waste is, through the influence of the chemical solution in which it is contained, and through the influence of the electrolytic
95 action of the current, converted into a soluble combination which is carried away in solution. Without going into detailed description of the particular electrolytic action of the current passed through the solution and acting upon the rubber waste, it
100 may be stated that unusually satisfactory results have been obtained by the use of an electric current, as herein described in the elimination of the deleterious matters carried by the rubber, notably those which
105 have been incorporated therewith previous to the vulcanization of the rubber and the removal of which places the rubber as nearly as possible in its original gummy condition. By sending the current through the reclaiming
110 solution in one direction and then through such solution in a reverse direction, the above described effect of the current is effective and complete and hence gives better results.
115

After the above described process has been carried out, the reclaiming solution and the rubber waste are discharged through the pipe 25 by proper manipulation of the valve
120 26 into a closed receptacle, wherein it is treated with pure water to thoroughly wash the rubber waste and remove all trace of the reclaiming agents therefrom. Any suitable form of apparatus may be employed to wash the rubber waste, while I preferably prefer
125 using the apparatus shown and described in the said Patent No. 978,583.

I have found that the best results are obtained by employing an electric current of
130 four and six tenths volts and from seven

hundred to one thousand amperes in strength, and changing the direction of current flow from sixty times a minute to six times per hour, preferably about twelve times per hour.

I wish it understood that the form of my invention herewith shown and described is to be taken as a preferred example of the same and that certain changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described my invention, I claim:—

1. In apparatus of the character described, a normally closed receptacle for holding a reclaiming solution and rubber waste, means for conducting a heating medium in proximity to said receptacle, and means for sending an electric current through said reclaiming solution in one direction and then sending said current through the same in a reverse direction.

2. In apparatus of the character described, a normally closed receptacle for holding a reclaiming solution and rubber waste, means for conducting a heating medium in proximity to said receptacle, means for agitating the reclaiming solution and rubber waste, a source of electrical energy, means connecting said receptacle with one pole of said source of electrical energy, a metallic member disposed within the receptacle and insulated therefrom, means electrically connecting said metallic member and said source of current, and means for changing the polarity of said receptacle and metallic member whereby a current is sent through the reclaiming solution in one direction and then through the same in a reverse direction.

3. In apparatus of the character described, a normally closed receptacle for holding a reclaiming solution and rubber waste, and means for sending a current through the reclaiming solution in one direction and then sending said current through the same in a reverse direction.

4. In apparatus of the character described, a normally closed receptacle for holding a reclaiming solution and rubber waste, electrodes having connection with a source of current to send an electrical current through the reclaiming solution, and means for changing the polarity of said electrodes whereby the current is sent through the reclaiming solution in a reverse direction.

5. In apparatus of the character described, a normally closed receptacle for holding a reclaiming solution and rubber waste, means for conducting a heating medium in proximity to said receptacle, means for agitating the reclaiming solution, means including electrodes for sending a current through the

reclaiming solution, and means for changing the polarity of said electrodes whereby the current is sent through the reclaiming solution in a reverse direction.

6. In apparatus of the character described, a normally closed receptacle for holding a reclaiming solution and rubber waste, means for conducting a heating medium in proximity to said receptacle, means for agitating the reclaiming solution, means including electrodes for sending a current through the reclaiming solution, means for changing the polarity of said electrodes, and a cleansing apparatus to receive the reclaiming solution and rubber waste and including means for washing said rubber waste for removing the reclaiming solution from the same.

7. In apparatus of the character described, a normally closed receptacle for holding a reclaiming solution and rubber waste in the presence of pressure exceeding atmospheric pressure, means for conducting a heating medium in proximity to said receptacle, a shell having both ends open and disposed entirely within said receptacle and extending longitudinally of the same, a rotatable shaft extending longitudinally of the receptacle and operating said open-ended shell, a conveyer carried by said rotatable shaft, means to rotate said shaft, and means to send an electrical current through the reclaiming solution in reverse direction.

8. In apparatus of the character described, a normally closed substantially vertically disposed receptacle for holding a reclaiming solution and rubber waste in the presence of pressure exceeding atmospheric pressure, means for conducting a heating medium in proximity to said receptacle, an open-ended shell disposed entirely within said receptacle and extending axially of the same, a rotatable shaft extending axially of the receptacle and operating in said open-ended shell, means carried by the rotatable shaft to cause material to travel through said open-ended shell, means including electrodes for sending a current through the reclaiming solution, and means to change the polarity of the electrodes whereby the current is sent through the reclaiming solution in a reverse direction.

9. In apparatus of the character described, a receptacle for holding a reclaiming solution and rubber waste in the presence of pressure exceeding atmospheric pressure, means for heating said receptacle, means for sending an electrical current through the reclaiming solution comprising electrodes, and means to change the polarity of said electrodes.

10. In apparatus of the character described, a receptacle for holding a reclaiming solution and rubber waste, means for sending an electrical current through the reclaiming solution, and means for periodi-

cally reversing the direction of the flow of the current.

11. In apparatus of the character described, a receptacle for holding a reclaiming solution and rubber waste, means for conducting a heating medium in proximity to the receptacle, means for sending a current through the reclaiming solution including electrodes, means including a switch for

changing the polarity of the electrodes, and means to periodically operate the switch. 10

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES S. HELLER.

Witnesses:

JOHN C. FRANK,
ETHEL F. CROY.