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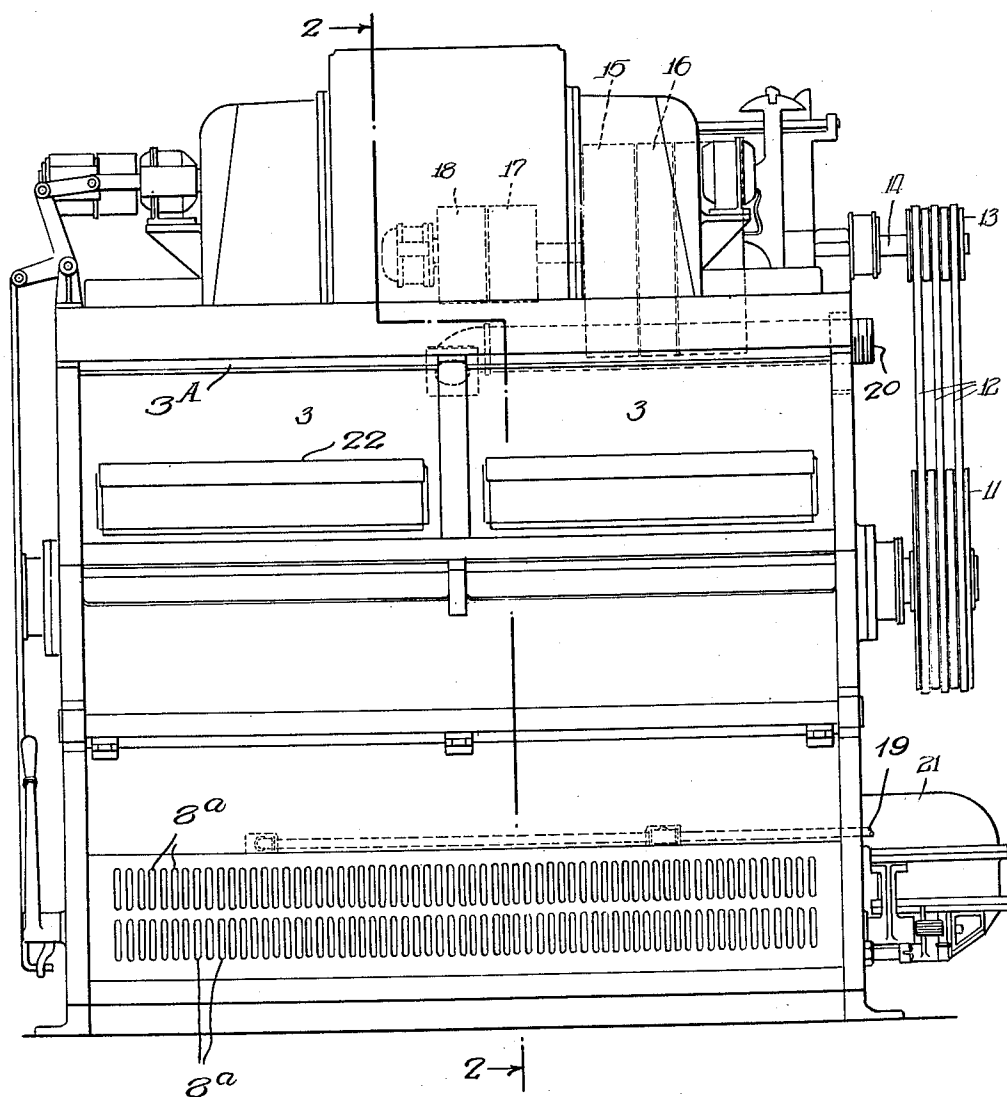
1,799,649

COMBINED WASHER, EXTRACTOR, AND DRYING TUMBLER

Filed Aug. 18, 1927

2 Sheets-Sheet 1

Fig. 1.



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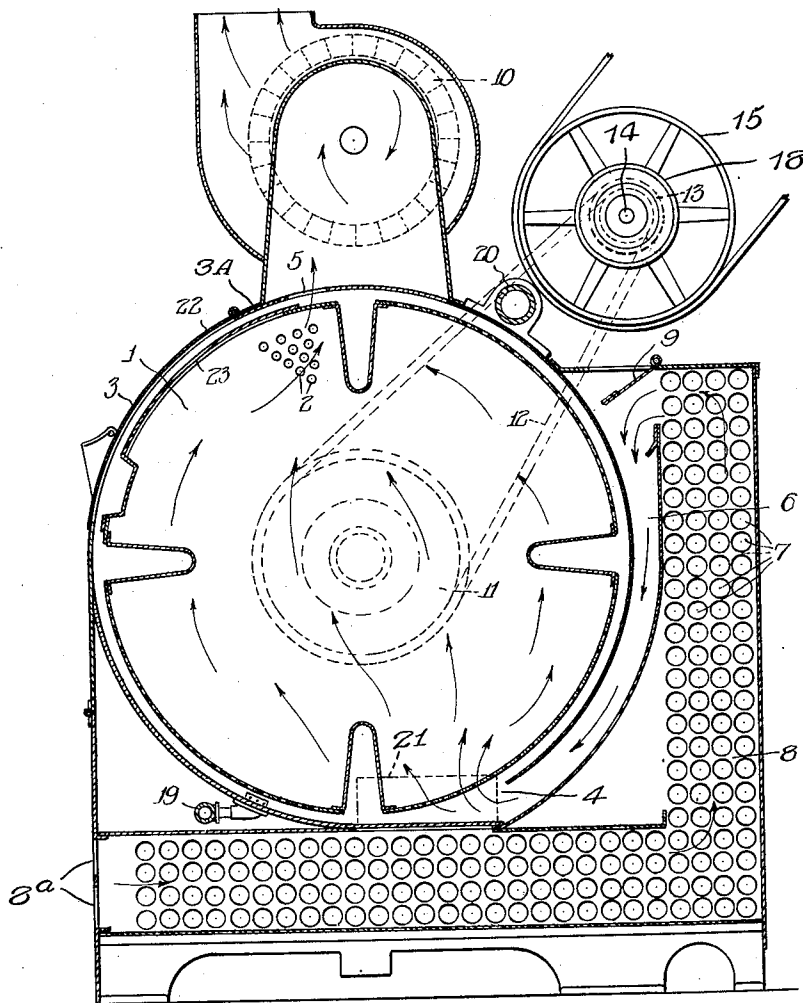
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Fig. 2.



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## UNITED STATES PATENT OFFICE

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## COMBINED WASHER, EXTRACTOR, AND DRYING TUMBLER

Application filed August 18, 1927. Serial No. 213,782.

The present invention relates to improvements in combined washers, extractors and drying tumblers.

More particularly, the present invention relates to laundry machinery of the type in which goods are washed and dried in the same mechanism.

An object of the present invention is to provide a unitary washer, extractor and drying tumbler which is well adapted to meet the needs of commercial service.

A further object is to provide a machine of the character above referred to, in which the bad effects of unbalanced loading will be reduced to a minimum.

A further object is to provide a combined washer, extractor and drying tumbler in which the complete operation of washing the goods, drying and aerating same, may be accomplished in a minimum of time.

A further object is to provide a method of operating a combined washer, extractor and drying tumbler which will minimize the bad effects of unbalanced loading and which will minimize the length of time required in washing and drying.

Further objects will appear as the description proceeds.

Referring to the drawings—

Figure 1 is a more or less diagrammatic view in front elevation of one embodiment of the present invention; and

Figure 2 is a more or less diagrammatic end view in elevation of the structure shown in Figure 1, parts being removed for purposes of clarity.

Though washers, extractors and drying tumblers as appearing upon the market at the present time are built to provide great efficiency, it is quite desirable to combine such machines in order to cut down the amount of labor in transferring the goods from one of said machines to another. Machines have been designed and are operating, which combine the function of certain of said machines, but such combined machines leave much to be desired, particularly when subjected to heavy duty.

The numeral 1 indicates a cylinder which may take the form of any well-known wash-

ing machine cylinder. The cylindrical wall of said cylinder 1 should, of course, be perforated to permit the ingress and egress of washing medium while confining the goods under treatment. Moreover, the end walls of the cylinder 1 should be perforated, the perforations in said end walls being indicated by the numerals 2. The particular advantage of perforating the end walls of the cylinder 1 will be clear as the description proceeds.

The cylinder 1 is mounted for rotation upon any suitable bearings and is enclosed within the shell 3, said shell 3 comprising a cylindrical portion 3A which is provided with an opening 4 near its bottom and an opening 5 near its top. The opening 4 in the shell 3 communicates with the passageway 6 which leads to the uppermost part of the shell 3. Said shell 3 provides a water-tight compartment suitable for maintaining the desired level of washing medium.

The numeral 7 indicates a heating coil for heating air in the passageway 8. According to the preferred embodiment of the present invention, the passageway 8 is L-shaped in cross-section, extending from the forward portion of the machine near the bottom thereof to a region rearwardly of the machine, to a region well above any level of washing medium which would ever be used in the shell 3. The forward portion of passageway 8 is open to the atmosphere through perforations 8<sup>a</sup>. The numeral 9 indicates a damper adapted in one position to close the exit from the passageway 8 and in another alternative position to close communication to the air at the upper extremity of the passageway 6.

Communicating with the opening 5 in the upper portion of the shell 3, is the fan 10 which may be driven by any preferred source of power.

The illustrated embodiment of the present invention provides pulley means for communicating rotary movement to the cylinder 1. Said cylinder 1 is driven by means of the pulley 11, which pulley 11 derives its power through belts 12—12 from the pulley 13. Said pulley 13 is fixed upon the shaft 14 which is mounted in any preferred type of bearing and which has cooperatively associated therewith

the relatively large fixed and loose pulleys 15 and 16 respectively, and the relatively small fixed and loose pulleys 17 and 18 respectively. By the use of belt shifting means of any preferred type the speed of rotation of the shaft 14 may be readily changed, which change of speed will, of course, be communicated to the cylinder 1.

The shell 3 may be provided with a steam inlet 19 and a water inlet 20. The numeral 21 indicates a discharge valve by means of which water or washing medium may be drained from the shell 3. The numeral 22 indicates a door in the shell 3 which may be opened for the purpose of permitting communication to the cylinder 1. Said cylinder 1 will be provided with one or more doors 23, which may be brought into registry with the doorway of the door 22 whereby to permit access to the interior of the cylinder 1.

A typical mode of operation of the above described embodiment of the present invention is as follows:

The machine is loaded with washing medium and the goods to be washed, the doors 23 and 22 are closed, and rotary movement is communicated to the cylinder 1 to tumble said goods about in the manner well understood in connection with washing machines. Steam may be applied to the heating coil 7 during the washing operation, whereby the washing medium may be kept at an even temperature and the fan 10 may be turned on, thereby causing heated air to pass through the washing medium and causing increased agitation and suds, contributing to washing efficiency. After the goods have been tumbled about in the washing medium, said goods are rinsed in the cylinder 1 and the rinsing water is drained off through the discharge valve 21. The speed of movement of the cylinder 1 is then increased for the purpose of extracting moisture from the goods being treated. This speeding up should be done gradually.

During the extracting operation the discharge valve 21 is of course left open to drain off the extracted water. By gradually increasing the speed of the cylinder 1, the effects of unbalanced loading, particularly those due to gravity, are minimized. By gradually increasing the cylinder speed, the goods stop tumbling very gradually and distribute themselves evenly about the inner circumferential wall of the cylinder, thereby making high speed possible. In a practical embodiment of the present invention the cylinder 1 has been driven at a speed of about 22 revolutions per minute while performing its washing functions, which speed has been gradually increased to between 150 and 250 revolutions per minute for extracting functions.

After the extracting stage has been completed, the cylinder speed is reduced to the normal tumbling speed (which may be sub-

stantially equal to the washing speed) and the damper 9 will be placed in its uppermost position to close direct communication with the atmosphere and to open communication between the hot air passageway 8 and the passageway 6. The fan 10 is also set in operation at this time and air is drawn through the perforations 8<sup>a</sup> and thence through the passageway 6, where it is heated by the coils 7 and passes through the opening 4, through the apertures in the cylinder 1, and through the opening 5, past the fan 10 to the atmosphere. As indicated by the arrows, the air delivered through the passageway 6 will pass by up draft suction through the goods as they are being tumbled about in the cylinder 1.

Moreover, during both the relatively high speed extracting operation and the subsequent relatively low speed drying operation, certain portions of the air delivered through the passageway 6 will enter the end walls of the cylinder 1 through the apertures 2 and will be discharged through the goods by centrifugal force, thereby materially cutting down the extracting and drying periods.

After the drying operation of the hot draft has been completed, the damper 9 will be moved to position to close the exit of passageway 8, whereby the goods in the cylinder 1 will be cooled for unloading purposes.

It will be understood, of course, that the shell 3 enclosing the cylinder 1 should be so designed that water will not be permitted to come in communication with the heating coil 7. It will be understood also that instead of using belts to communicate motion from the pulley 13 to the pulley 11, any other type of power communicating means may be employed, such for example as an electric motor. It will also be understood that the relative positions of the fan and the heating coil may be changed in a variety of ways without departing from the present invention. The cylinder should, of course, be placed at as low a level as possible, thereby reducing its vibrating or swaying tendency in case the load were not well balanced when said cylinder is being driven at the relatively high speed required during the extracting stage.

Though a preferred embodiment of the present invention has been described in detail, many modifications will occur to those skilled in the art. It is intended to cover all such modifications that fall within the scope of the appended claims.

What is claimed is—

1. A unitary washing, extracting and drying tumbler comprising a rotary washing cylinder having openings therein, a shell enclosing said cylinder, said shell having a pair of openings for communicating with said cylinder, means providing a passageway communicating with one of said pair of openings, said passageway being water-tight to a level above the normal level of the washing

medium within said cylinder, a heating coil through which air enters said passageway, and a valve for selectively providing communication to said passageway from said heating coil and the atmosphere.

2. In a unitary washing, extracting and drying tumbler, a rotary washing cylinder having apertures therein, a shell enclosing same, said shell being provided with a pair of openings, a fan for creating a current of air through one of said openings, means providing an air passageway communicating with the other of said openings, said means being water-tight to a level above the normal level of washing medium within said washing cylinder, a source of heated air connected to said passageway and a valve disposed above said normal level of said washing medium for selectively providing communication to said passageway from said source of heated air and the atmosphere.

3. In a combined washer, extractor and drying tumbler, a shell providing a heated air passageway of L-shaped cross section, a rotary apertured washing cylinder disposed in the interior of the shell within the angle of said L-shaped passageway, said cylinder being encompassed by said shell, said shell being provided with an air inlet and an air outlet for access to said cylinder, means for setting up a draft between said inlet and outlet through said cylinder, a connection between said L-shaped passageway and the interior of the shell and a valve disposed adjacent to the upper extremity of said L-shaped passageway for selectively controlling communication to said air inlet, from said L-shaped passageway and the atmosphere.

4. In a unitary washing, extracting and drying tumbler, means providing a shell and a heated air passageway, an apertured cylinder rotatably mounted within said shell, said shell having openings adjacent to the bottom and top regions of said cylinder through which air may pass to the cylinder, said shell comprising an enclosure for said cylinder and being adapted to contain liquid to a level above the normal level of washing medium within said cylinder, said heated air passageway having communication with the lower opening through an opening disposed above said normal level of washing medium, and means to draw air through said cylinder.

5. In a unitary washing, extracting and drying tumbler, an enclosing shell adapted to serve as a liquid container, there being an exhaust opening for said shell, a passageway leading to said shell, a rotary perforated washing cylinder within said shell, said shell and passageway being water tight to a level above the normal level of washing medium within said cylinder, means for setting up a draft through said passageway and said cylinder to the atmosphere, and a source of heated air communicating with said passage-

way at a level above said normal level of washing medium.

6. In a unitary washing, extracting and drying tumbler, an enclosing shell adapted to serve as a liquid container, there being an exhaust opening for said shell, a passageway leading to the lower part of said shell, a rotary perforated washing cylinder within said shell, said shell and passageway being water tight to a level above the normal level of washing medium within said cylinder, means for setting up a draft through said passageway and said cylinder to the atmosphere, a source of heated air communicating with said passageway at the level above said normal level of washing medium, and means for selectively controlling communication between said passageway and said source of heated air and the atmosphere.

Signed at East Moline, Illinois, this 11th day of August, 1927.

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