April 15, 1930. E. J. CARROLL ET AL 1,754,306

ROTARY RUG WASHING AND FINISHING MACHINE

Filed Aug. 15, 1927 4 Sheets-Sheet 1

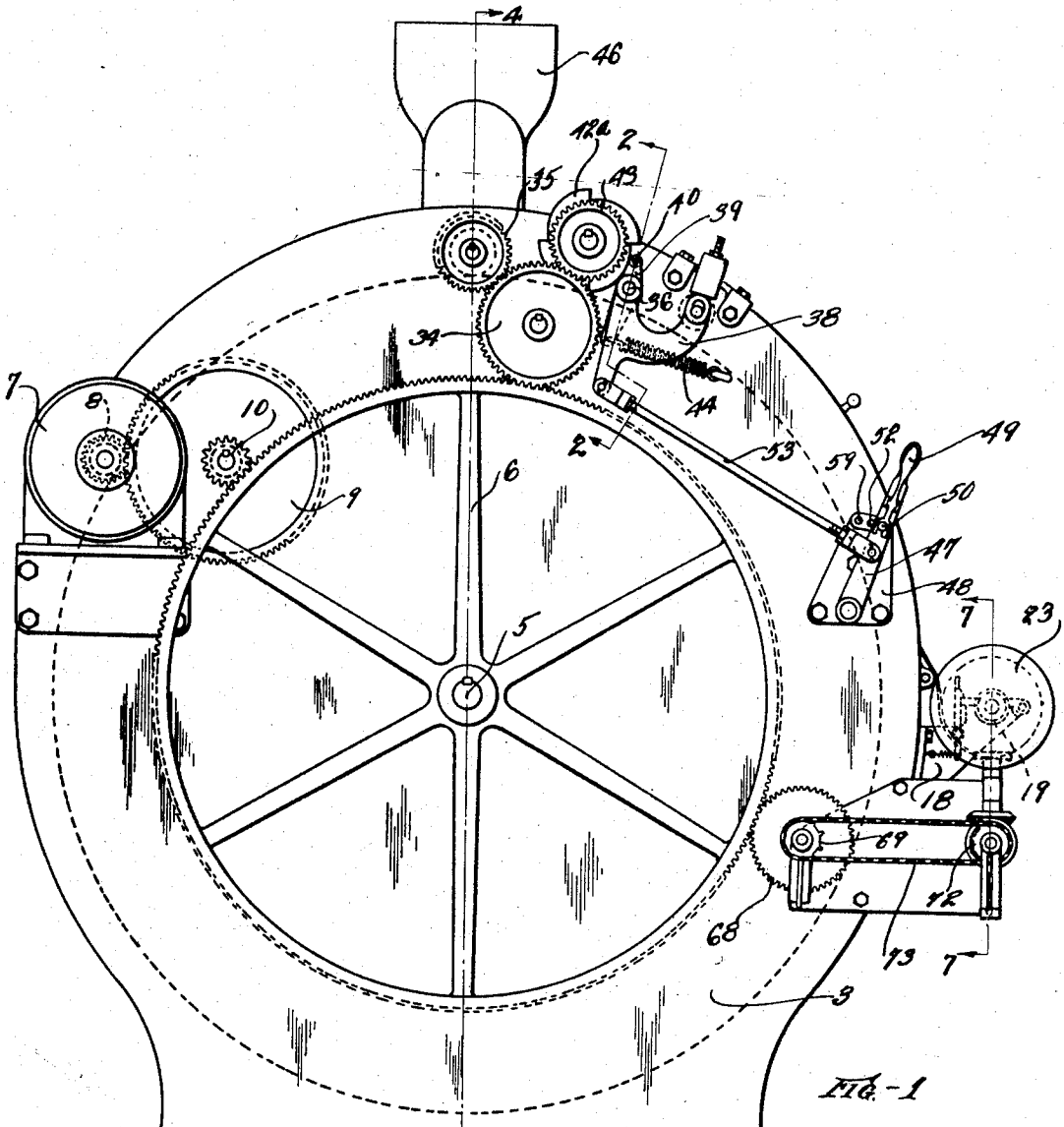


FIG. 1

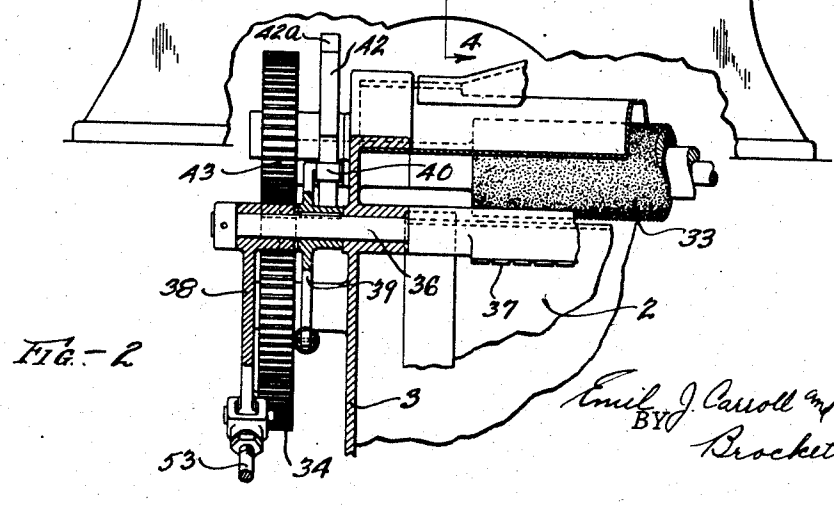


FIG. 2

INVENTORS
Emil J. Carroll and George W. Johnson
BY
Brockett & Hyde
ATTORNEYS

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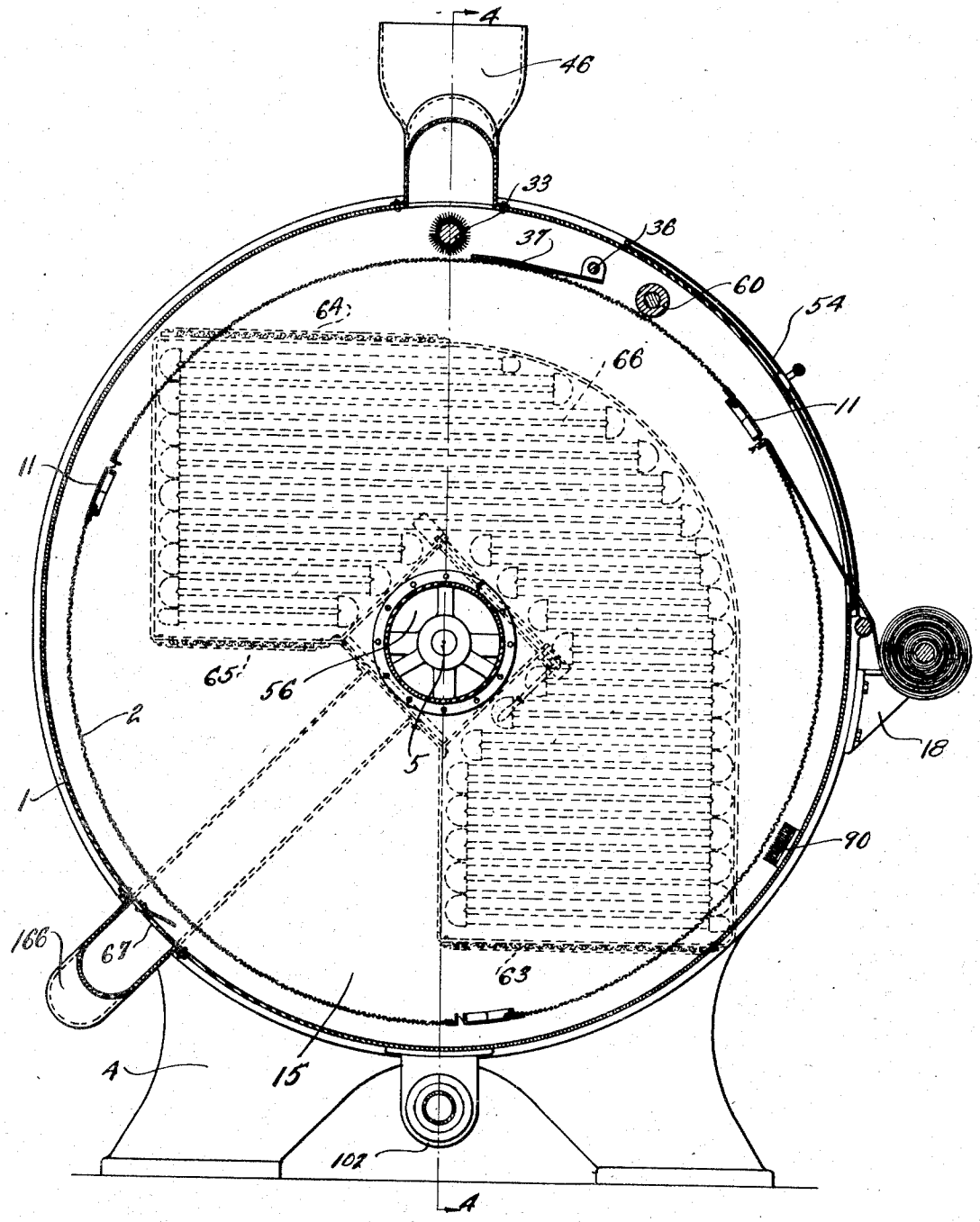


FIG. - 3

INVENTORS
Emil J. Carroll and George W. Johnson
BY
Brockett & Hyde
ATTORNEYS

April 15, 1930. E. J. CARROLL ET AL 1,754,306

ROTARY RUG WASHING AND FINISHING MACHINE

Filed Aug. 15, 1927 4 Sheets-Sheet 3

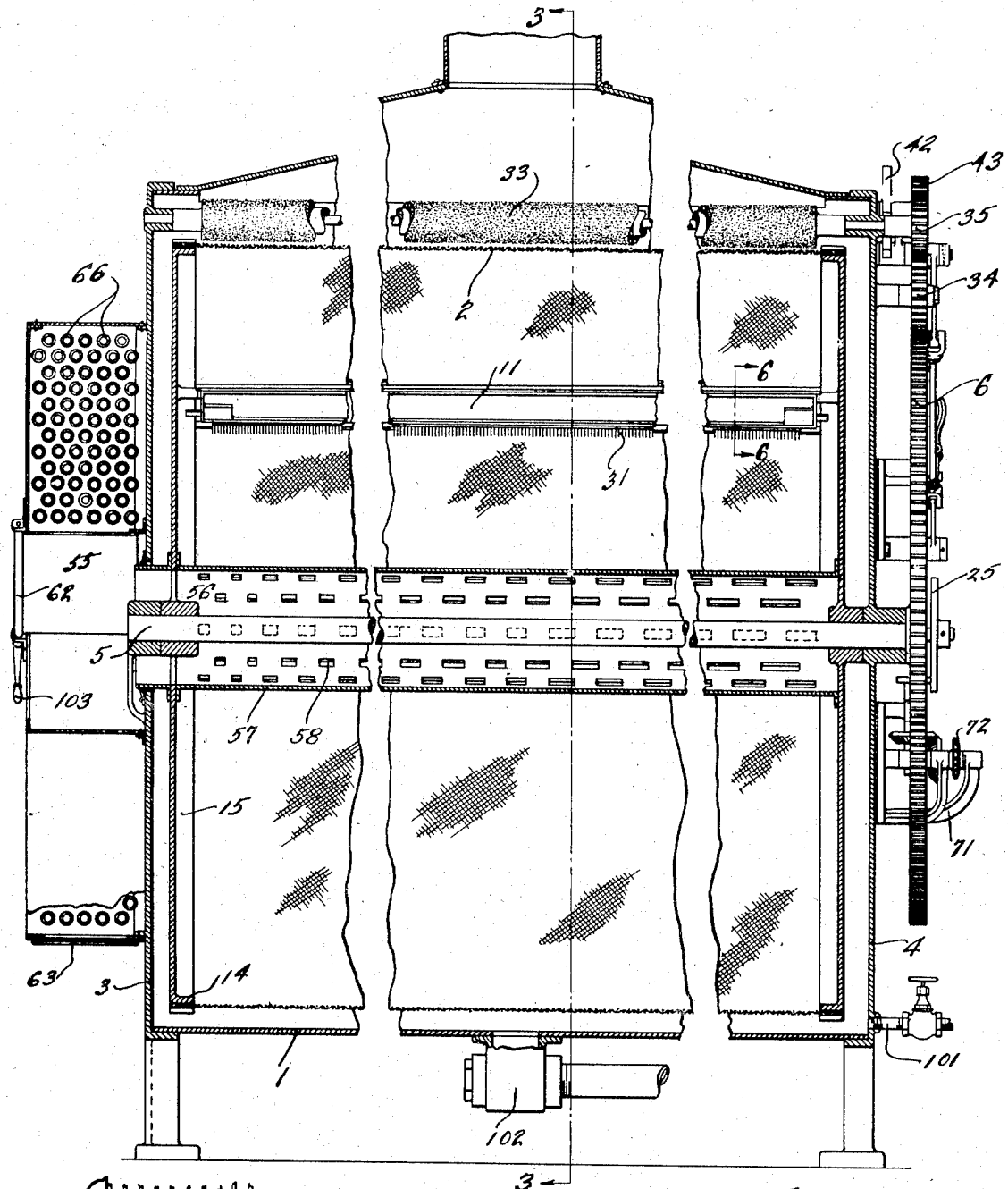


FIG. 4

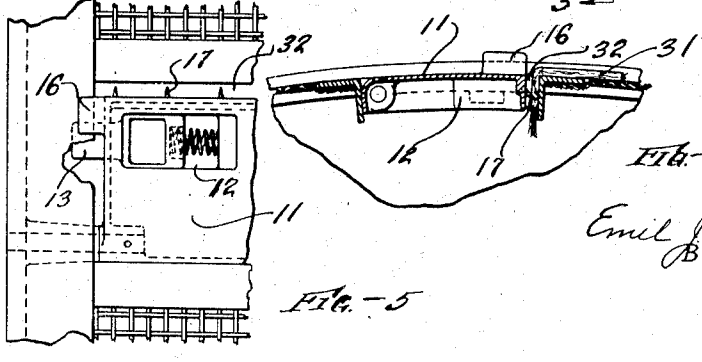


FIG. 5

FIG. 6

INVENTORS
Emil J. Carroll and George W. Johnson
BY
Brackett & Hyde
ATTORNEYS

April 15, 1930. E. J. CARROLL ET AL 1,754,306

ROTARY RUG WASHING AND FINISHING MACHINE

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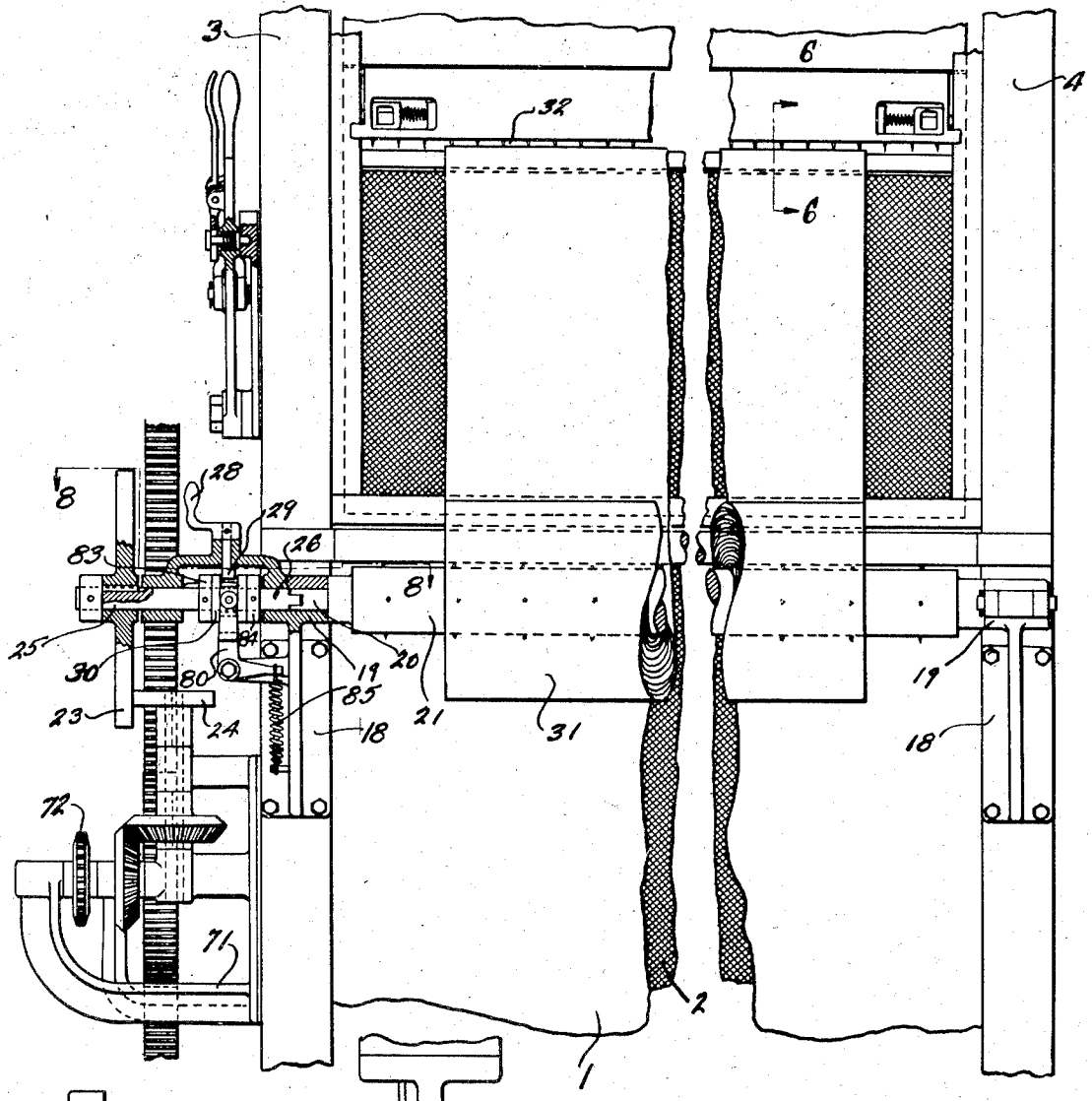


FIG. 7

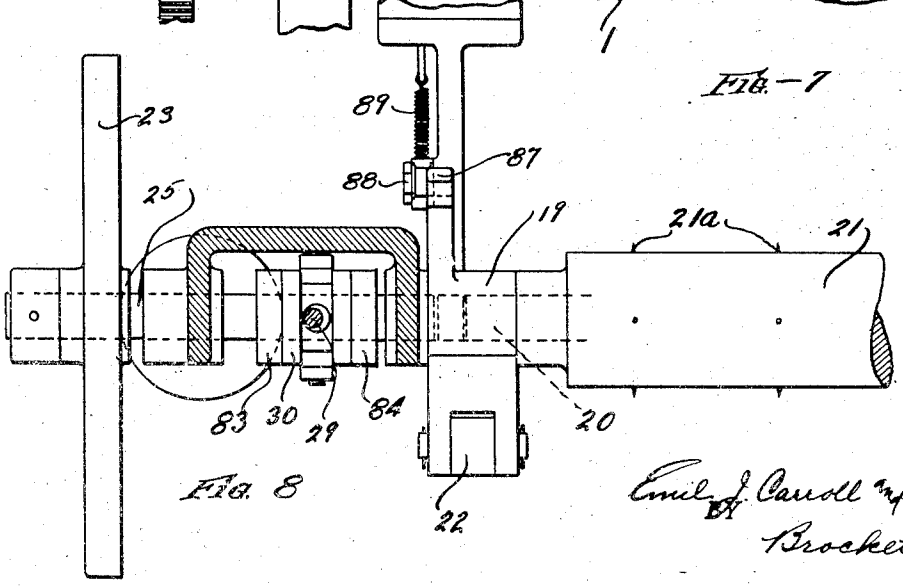


FIG. 8

INVENTORS
Emil J. Carroll and George W. Johnson
BY
Brockett & Hyde
ATTORNEYS

Patented Apr. 15, 1930 1,754,306

UNITED STATES PATENT OFFICE

EMIL J. CARROLL, OF NORWOOD, AND GEORGE W. JOHNSON, OF BOND HILL, OHIO, ASSIGNORS TO THE AMERICAN LAUNDRY MACHINERY COMPANY, OF NORWOOD STATION, CINCINNATI, OHIO, A CORPORATION OF OHIO

ROTARY RUG WASHING AND FINISHING MACHINE

Application filed August 15, 1927. Serial No. 213,076.

This invention relates to rug washing machines of rotary type and having means for beating, brushing, scouring, rinsing, wringing, and if desired, drying, rugs; the arrangement being such that a rug or number of rugs after being placed in the machine may receive all of the treatments above referred to before removal from the machine.

The earliest process of rug washing, known as the Armenian method has been practiced for thousands of years and comprises saturating the rug in a stream of running water, scouring the rug with soap, and thoroughly rinsing in the stream. By saturating the rug thoroughly and scouring, a good portion of the dirt in the pile as well as the nap of the rug is removed.

Perhaps the most widely employed modern method of rug cleaning as practiced in this country is known as the shampoo method. A plant for this method consists of beating room, shampooing room and drying room, and requires a total floor space of around 12,000 square feet. According to the shampoo method, the soiled rug is first beaten, removing a great amount of the dirt and loosening the encrusted dirt in the nap. The rug is next taken to the shampooing room where it is tacked on the floor and a soap solution poured on the rug by means of pails. A portable scouring machine of the rotary brush type is next run over the rug, followed by a vacuum device for removing the soap solution. There is no attempt to rinse the rug, the vacuum device being relied upon to remove the soap solution, which in most cases has not penetrated into the pile of the rug sufficiently to have appreciable cleansing effect thereon. The rug is next taken into the dry room, hung on a bar and elevated to the ceiling. The dry room is heated and has a fan for circulating the air in the room.

Some attempts have been made to build a machine in which are incorporated beaters, scouring, rinsing, and drying means under which the rug is passed by a horizontal conveyor, but such machines are very slow in their operation, require a great amount of floor space and the working mechanism is so complicated that the price prohibits their general use.

An object of the present invention is to provide a machine having means capable of thoroughly cleansing a rug with the advantages of the methods above described, but without the disadvantages thereof. More specifically it is an object of our invention to provide a machine of relatively small dimensions, capable of handling more than one rug at once, and of thoroughly cleansing both the nap and pile thereof and including mechanically freeing the same of dirt while dry, and subjecting the same to a wet-washing operation, rinsing and drying before removal, all being accomplished in the shortest time possible, and practically without operator effort.

Another object of the invention is to provide novel means of loading the machine with rugs to be cleansed and of removing the same therefrom.

A further object of our invention is to provide such a machine adapted to employ as a detergent or cleansing agent either the usual soap solution, or if desired, gasoline, benzine, carbon tetrachloride, trichlorethylene or the like as well.

Further objects and advantages of our invention will be apparent from the following description and claims taken in connection with the following drawings in which Fig. 1 is a left hand end elevation of a machine exemplifying our invention; Fig. 2 is a detail section in the plane of line 2 of Fig. 1; Fig. 3 is a typical section of the machine as in the plane of line 3—3, Fig. 4; Fig. 4 is a vertical longitudinal section of the machine, in the plane of line 4—4 Figs. 1 and 3; Fig. 5 is a detail of an end of the clamping mechanism employed for securing one end of the rug; Fig. 6 is a detail section of the clamping mechanism in the plane of line 6—6 of Figs. 4, 5 and 7; Fig. 7 is a broken front elevation of the machine with parts appearing in section in the plane of line 7, Fig. 1; and Fig. 8 is a detail section in the plane of line 8, of Fig. 7.

In the drawings 1 indicates a cylindrical outer casing or tub having supporting end frames 3 and 4. A cylinder having a periph-

eral rug-receiving wall 2 such as of the heavy wire mesh screen indicated, is secured for rotation with the shaft 5, which is journalled in suitable bearings in the end frames, by the circular transmitters 15 flanged as at 14 to receive the cylinder. One end of the shaft 5 extends beyond its bearing in the end frame 4 and carries a driving gear 6 by which the cylinder 2 may be rotated. A motor 7 is arranged to drive the gear 6 in a counter clockwise direction, Figs. 1 and 3, through pinion 8, intermediate gear 9 and pinion 10.

Longitudinally extending and spaced about the periphery of the cylinder, are hinged plates 11, three being shown, mounted in the transmitters 15 for swinging motion into and out of a position substantially in continuation of the surface of the cylinder, inward motion of the hinged plates being limited by overlying end portions or lugs 16. At each end of each of the hinged plates 11 is a latch box 12 having a spring pressed bolt 13 adapted to engage beneath the rim 14 of the adjacent transmitter 15. The free edge of each hinged plate 11 is turned inwards and provided with a number of impaling pins 17 extending slightly downwards and arranged to slightly clear in the space 32 the opposite edge of the portion of the cylinder interrupted by the hinged plate.

Mounted on the front of the machine are brackets 18 having bearings 19 for the gudgeons 20 of the bar or roll 21. The upper half of each bearing 19 is hinged as at 22 to swing upwardly and forwardly to permit the insertion and removal by lifting movement of the roll 21, and is arranged to be maintained closed by engagement of its free end latch 87, the latch pivoting on stud 88 and urged to latching position by spring 89.

23 is a friction disc adapted to be driven by a friction pinion 24. The pinion 24 is adapted to be continuously driven in the bracket 71 by the gear 6 through a gear 68 and a driving connection through sprockets 69 and 72 and chain 73. The gudgeon 20 of the roll 21 is slotted as indicated, Fig. 7, for driving connection with the toothed end 26 of the shaft 25 which carries the friction disc 23. Engagement of the disc 23 with the pinion 24, and hence rotation of the roll 21, is controlled by a flanged collar 30 loosely mounted on the shaft 25 between fixed collars 83 and 84. A forked bell crank lever 80 is mounted on the bracket 18 and has connection with the tension spring 85 whereby the driving connection of the roll may be maintained. A handle 28 mounted in the bracket 18 and having an eccentric portion 29 extending in the groove of the collar 30 is arranged to shift the disc 23 against the action of the spring 85 to disengage the drive of the roll 21.

Mounted for rotation in the end frames 3 and 4 immediately above the cylinder is a brushing and scouring roll 33, carrying a driving gear 35 driven through the idler gear 34 by the gear 6.

Mounted in the end frames parallel with the roll 33 is a shaft 36 carrying a number of beaters 37. An end of the shaft 36 carries a lever 39, one end of which is provided with a roller 40, the other end having connection with a tension spring 44. Driven by the gear 34 through the gear 43 is a member 42 having cams 42^a movable in the plane of the roller 40 which may be maintained in engagement therewith by the spring 44. Carried by the shaft 36 and adapted for limited rotary motion relative thereto is a lever 38 connecting through a rod 53 with a handled lever 47 by which the shaft 36 may be rotated sufficiently to control engagement of the roller 40 with the cams 42^a. A similar lever 38 is provided upon each end of the shaft 36, each of the levers 38 having a rearwardly extending arm carrying a shaft on which is supported a wringer roll 60.

The lever 47 is mounted for movement on the bracket 48 between three positions and is provided with a pin 50 controlled by clutch lever 49 by which the lever 47 may be maintained in any of these positions. In the forward position of the lever as shown in Fig. 1 the wringer roll is clear of the cylinder 2, and the roller 40 is maintained in engagement with the member 42 which rotates in a counter-clockwise direction to rapidly actuate beaters 37. Movement of the lever 47 to engagement of the pin 50 with the intermediate notch 52 will rotate the shaft 36 sufficiently to move the roller 40 out of the path of the cams 42^a. Further rearward motion of the lever 47 to the notch 59 will move the wringer roll 60 toward the cylinder.

The tub is piped for entrance of cleaning agents as at 101, and is provided with a drain 102.

Upon the end frame 3 is mounted a series of heating coils 66 suitably encased as indicated and having screened openings 63, 64, 65 into the room. The heating coil chamber communicates with tube 57 which extends axially of the cylinder and is provided with perforations 58. A damper 55 controlled by the lever 103 is provided whereby the heating coils may be by-passed by cold air entering the tube 57 through the cold air inlet 62 directly from the room, the damper being adapted to close from the tube 57 either the heating coil chamber as in the position indicated, Figs. 3 and 4 or the opening 62.

An air outlet 46 is provided at the top of the tub and connects with a suction fan, not shown.

Arranged near the bottom of the tub above the liquid level thereof is a squeezing brush 90.

The operation of the machine will be as follows, a rug 31 to be cleaned having been previously rolled upon the roller 21. The upper half of the bearings 19 are opened by

releasing the latches 87 and the roll placed in proper position on the bearings 19, the gudgeon 20 thereof engaging properly with the shaft 26, and the handle 28 being turned to relieve the driving mechanism for the roll.

The free end of the rug is now secured in one of the openings 32 by a plate 11 being closed and latched, the impaling pins 17 engaging the end of the rug to firmly secure it to the periphery of the cylinder.

The motor 7 is now started driving the cylinder counter-clock-wise, Figs. 1 and 3—unwinding the rug from the roll 21, and onto the cylinder. As the rug passes off the roll the motor is stopped, the roll replaced with another upon which another rug has been rolled and the end of this second rug is secured in the next opening 32 on the cylinder and the rug unwound thereupon as before. Since the cylinder rotates only in one direction, it is necessary to secure only one end of each rug.

After the cylinder has been loaded with as many rugs as it will hold without overlap or as many as desired, the door 54 is closed, damper 55 opened, and the suction fan started, causing a circulation of cold air through the passage 56, the perforation 58 of the tube 57 and out through the outlet 46, some of the air passing through the rug which happens to be upper-most and some along the under surface and out at the edges thereof. As the cylinder starts to move so does the brush 33, the bristles of the brush passing over the nap of the rug in an opposite direction to the movement of the rug thereunder.

The lever 47 is moved to the forward position as in Fig. 1 whereby the beaters 37 rapidly operate on the rugs passing therebeneath, breaking up the encrusted dirt which is immediately thereafter liberated by the brush 33 and drawn up through the air outlet 46.

When the beating process has been completed, the handle 47 is moved to its center position, terminating the action of the beaters.

The fan is now stopped and a detergent solution is introduced into the tub to a level a few inches above the bottom of the cylinder. Where a soap solution is to be used water is introduced until the rugs are thoroughly saturated, before introduction of a soap solution.

After introduction of the detergent the scouring brush 33 thoroughly scours the nap of the rug and as the cylinder continues the rug is carried down through the solution in the bottom of the tub rinsing off and replacing the dirty solution with a relatively clean amount of the solution with which the operation is repeated. At intervals during the scouring operation the handle 47 may be moved rearwardly to bring the wringer roll 60 in contact with the surface of the rug and force out the dirty solution, whereby an alternate submersion and wringing action upon the rug is had.

After the rug has been thoroughly washed, the detergent solution is drained from the machine and if desired a rinsing liquid introduced, the wringer 60 being retained in operative position. During the rinsing operation the rug will receive a brushing action by brush 33 as well as wringer action.

After rinsing has been completed the handle 47 is moved to its center or neutral position so that neither the beaters nor the wringer are operative upon the rugs, and the suction fan is started, the damper 55 being moved to a position to close the cold air inlet 62, and open the hot air inlet.

The fan now draws in hot air which is distributed by the perforations of tube 57 passing through and around the rugs on the cylinder, and out through the outlet 46. Some hot air is also drawn through the pipe 166 and through the opening 67 and upwards between the casing and the cylinder, over the nap of the rug. During the drying process the brush 33 continues in operation raising the nap of the rug.

At the completion of the drying operation the motor is stopped with one of the plates 11 opposite the door of the tub, the door is opened and the near secured rug end released by disengagement of the latches 13 of the corresponding plate. The rug end being started around the empty roll 21 which is in position on the bearings 19, the handle 28 is turned to engage the friction drive described, and the motor 7 started, whereupon the rug will be unwound from the cylinder and onto the roll 21.

As soon as this operation is completed the motor is stopped, the bearings 19 opened and the roll removed and replaced by an empty roll upon which the next rug is unwound from the cylinder as before, the operation being repeated until the machine is empty.

Attention is called to the importance of the structure of the rug-receiving wall of the cylinder. The back side of a rug is very closely woven and while not impervious to water is sufficiently so to resist substantially all liquid flow in the direction of spread of the liquid. It is for this reason that a flat though perforated rug-receiving wall will not serve to allow sufficiently free liquid exit from the back of the rug. The wire mesh screen, on the other hand, serves to present to the back of the rug closely spaced minute upstanding portions and clearances surrounding these portions whereby a rug on the cylinder may be supported on said portions and liquid may find free exit from the back of the rug by way of the clearances.

What we claim is:

1. In a machine of the class described, a

tub, a cylinder mounted for rotation therein and having a foraminated peripheral surface, means for securing a rug on said surface, means for rotating said cylinder, means for wetting said rug with a washing fluid, and means for wringing said fluid from said rug and comprising a wringer roller mounted in said tub for movement to pressure applying position against said rug during rotation of said cylinder.

2. In a machine of the class described, a tub, a cylinder mounted for rotation therein and having a foraminated peripheral surface, means for securing a rug on said surface, means for rotating said cylinder, means for beating said rug as said cylinder is rotated, means for wetting said rug with a washing fluid, means for wringing said fluid from said rug, said beating means and said wringer means being connected with a common control means movable to alternate positions for selective operation of said beating or said wringer means.

3. In a machine of the class described, a tub, a cylinder mounted for rotation therein and having a foraminated peripheral surface, means for securing a rug on said surface, means for rotating said cylinder, means for loosening dirt in said rug as said cylinder is rotated, means for freeing from said rug dirt loosened by said loosening means, and means for removing from the tub dirt freed from said rug, said dirt removing means comprising distributing means in said tub and means for passing air into said tub, through said distributing means and out of said tub.

4. In a machine of the class described, a tub, a cylinder mounted for rotation therein and having a foraminated peripheral surface, means for securing a rug on said surface, means for rotating said cylinder, means for loosening dirt in said rug as said cylinder is rotated, means for freeing from said rug dirt loosened by said loosening means, and means for removing from the tub dirt freed from said rug, said dirt removing means comprising means for directing air from within said cylinder toward rug portions thereon, said tub having an air inlet communicating with said directing means, said tub having an air outlet and means for causing a flow of air from said inlet to said outlet.

5. In a machine of the class described, a tub, a cylinder mounted for rotation therein and having a foraminated peripheral surface, means for securing a rug on said surface, means for drying said rug comprising means for rotating said cylinder, distributing means extending within said cylinder, said tub having an outlet, and means causing a flow of air from said distributing means to said outlet.

6. In a machine of the class described, a tub, a cylinder mounted by rotation therein and having a foraminated peripheral surface, means for securing a rug on said surface, means for rotating said cylinder, means between said tub and said cylinder for performing different cleaning operations upon said rug as said cylinder is rotated, and drying means for said rug including a heating device, an air distributing means arranged in said tub in axial relation to said cylinder, an air outlet for said tub, and means for causing a flow of air from said heating device through said distributing means to said outlet.

7. In a machine of the class described, a tub, a cylinder mounted for rotation therein and having a peripheral rug-receiving wall characterized by a plurality of closely spaced minute upstanding portions and clearances surrounding said portions whereby a rug on said cylinder may be supported on said portions with its back to said cylinder and liquid may find free exit from the back of the rug by way of said clearances, means for wetting said rug, and rolling means arranged to press said rug against said wall to squeeze liquid therefrom as the cylinder is rotated.

8. A machine as set forth in claim 7 wherein the rug-receiving wall of the cylinder is a wire mesh screen.

9. In a machine of the class described, a tub adapted to receive a cleaning liquid, a cylinder mounted for rotation in said tub and having a peripheral foraminated rug-receiving wall adapted to pass through said liquid, and rolling means arranged in the tub above said liquid to press said rug against said wall to squeeze liquid therefrom, whereby said rug may be repeatedly subjected to alternate submersion and wringing action by continued rotation of said cylinder.

10. In a machine of the class described, a tub, a rug-receiving cylinder mounted for rotation in said tub, means for loosening dirt in said rug as the cylinder is rotated, means for freeing from said rug the dirt loosened by said loosening means, said tub being arranged to receive a cleaning liquid to a level above that of the lower extremity of said cylinder, rolling means arranged in said tub above said liquid level to bear against a rug on said cylinder to squeeze liquid therefrom whereby said rug may be repeatedly subjected to alternate submersion and wringing action by continued rotation of said cylinder, means for draining said liquid from said cylinder, and means for passing a drying medium through said tub, whereby a rug on said cylinder may be mechanically freed of dirt while dry, may be subjected to a wet-washing operation and may be dried before removal from the cylinder.

In testimony whereof we hereby affix our signatures.

EMIL J. CARROLL.
GEORGE W. JOHNSON.