

May 1, 1923.

1,453,711

H. C. HOTING

COMBINED WASHER AND DRIER

Filed April 7, 1919

7 Sheets-Sheet 1

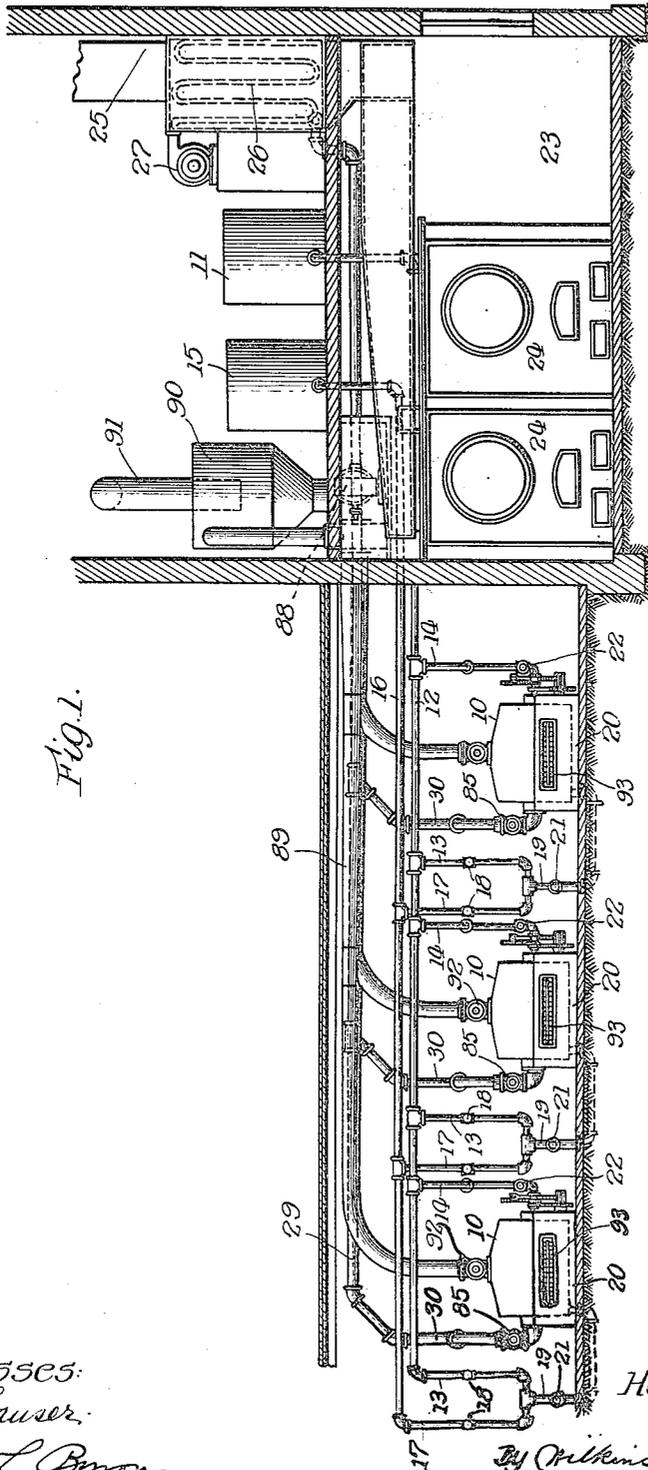


Fig. 1.

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7 Sheets-Sheet 3

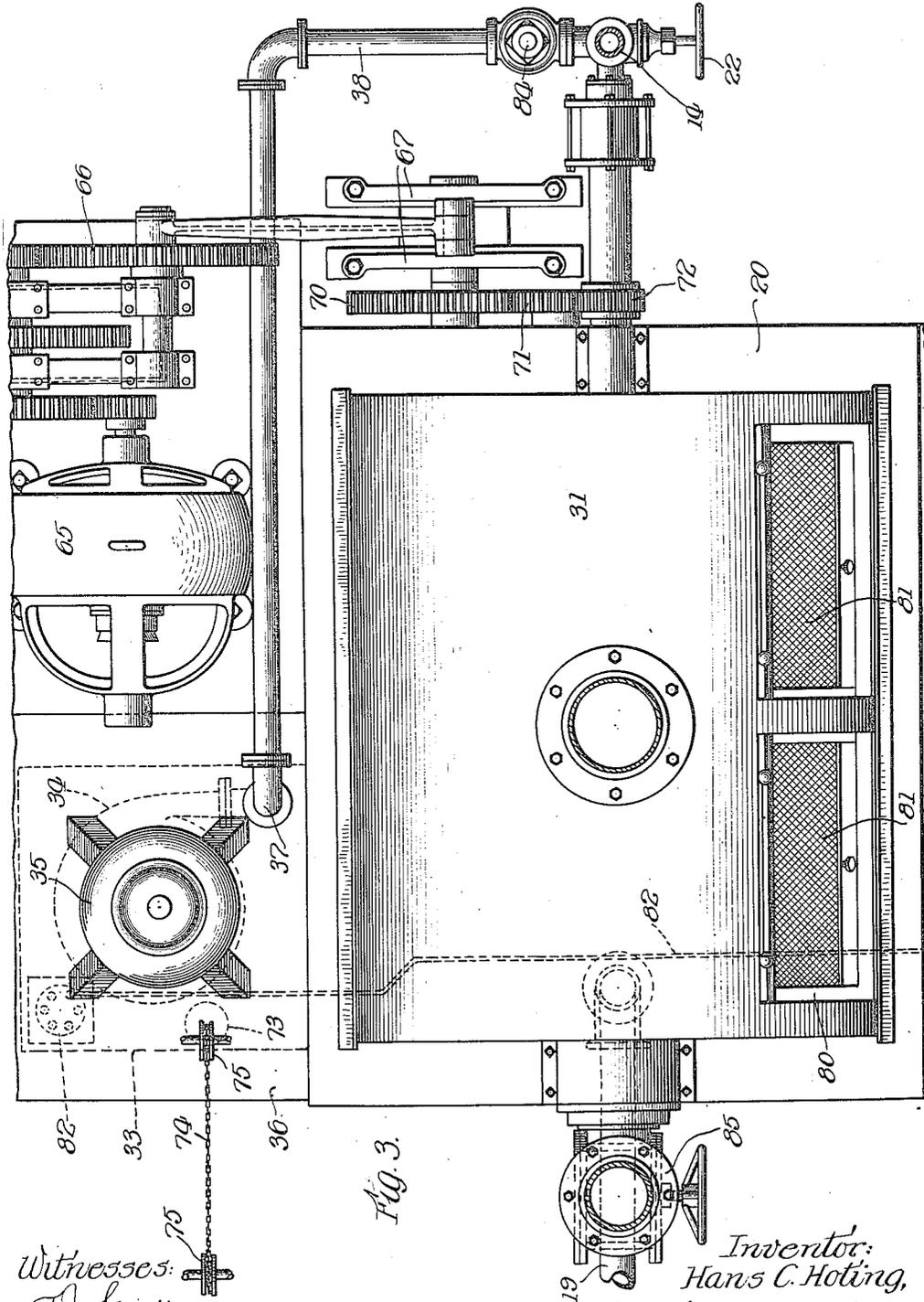


Fig. 3.

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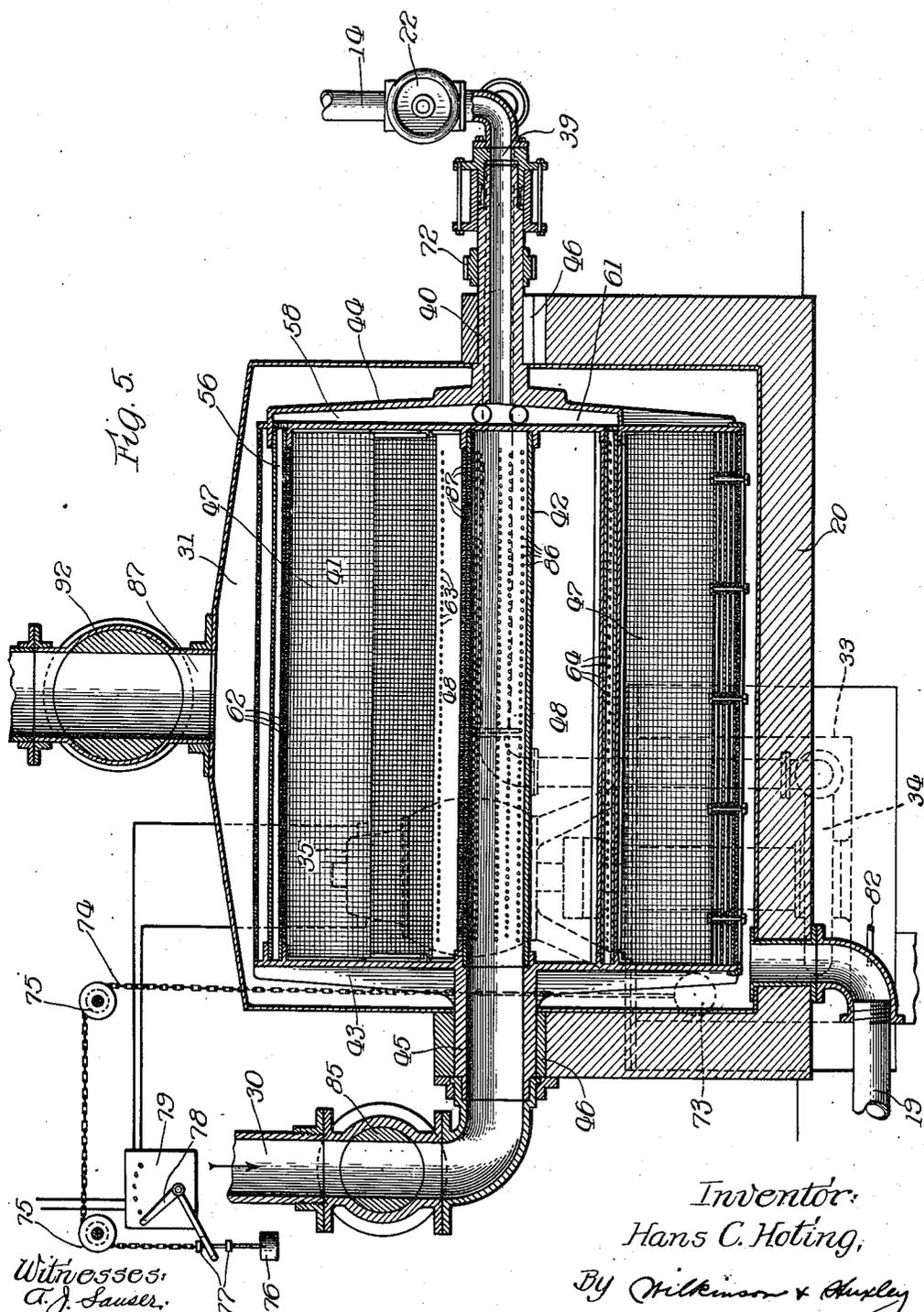
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7 Sheets-Sheet 7

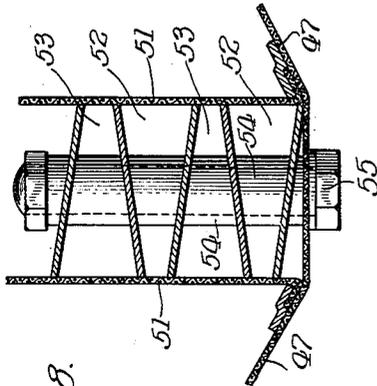


Fig. 8.

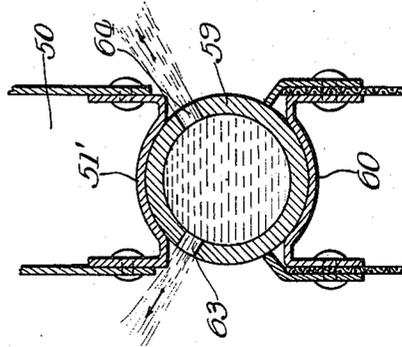


Fig. 9.

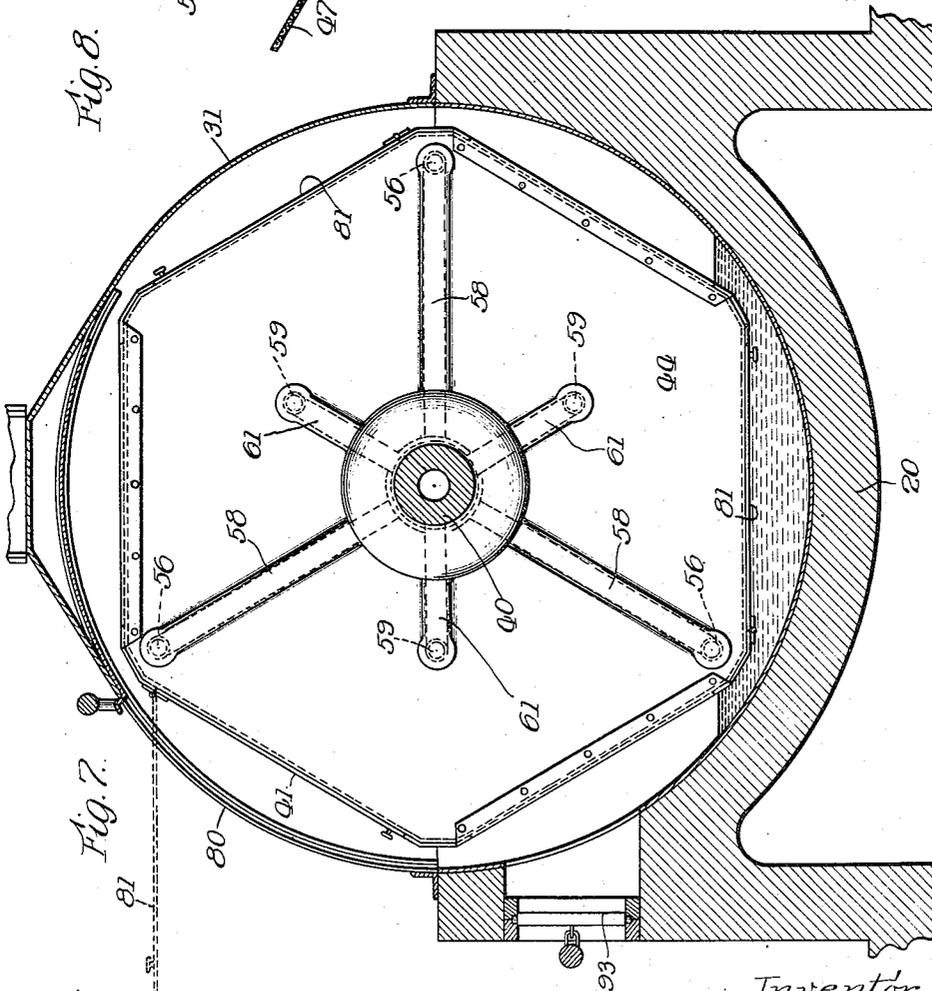


Fig. 7.

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UNITED STATES PATENT OFFICE.

HANS C. HOTING, OF CHICAGO, ILLINOIS, ASSIGNOR TO TROY LAUNDRY MACHINERY CO., LTD., OF CHICAGO, ILLINOIS, A CORPORATION OF NEW YORK.

COMBINED WASHER AND DRIER.

Application filed April 7, 1919. Serial No. 288,112.

To all whom it may concern:

Be it known that I, HANS C. HOTING, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Combined Washers and Driers, of which the following is a specification.

This invention relates to a combined washer and drier.

Laundries as run today are provided with washing machines, extractors for extracting some of the water from the washed goods, and drying machines. These separate machines for performing their particular functions, when considered collectively, among other things, cost considerable money, occupy considerable space, and require much handling and moving of the goods.

Accordingly, one object of my invention is to overcome the objections hereinabove set forth and to provide a single machine in which clothes may be washed, thoroughly rinsed, dried and cooled before being removed from the machine.

Another object is to provide a combined washer and drier of relatively large capacity, occupying a minimum amount of space and adapted to meet all of the requirements of successful commercial use.

A still further object is to provide a washing machine, together with a spraying system, through which fluids of various kinds may be delivered against the clothes being treated so that the action of the fluids may have a cleansing action on the clothes.

These and other objects are accomplished by means of the mechanism shown on the accompanying sheets of drawings, in which—

Figure 1 is a side elevation of a laundry equipment including three of my combined washers and driers;

Figure 2 is a plan view of the same laundry equipment;

Figure 3 is a plan view, on an enlarged scale, of one of the washers and driers, together with auxiliary apparatus;

Figure 4 is an end view of one of the washer and drier units, showing driving mechanism therefor;

Figure 5 is a longitudinal vertical sectional view of one of my combined washers and driers;

Figure 6 is a transverse sectional view of

the same combined washer and drier, showing associated auxiliary apparatus in side elevation;

Figure 7 is another transverse sectional view of one of the units showing one end of the rotary member in elevation;

Figure 8 is an enlarged detail view of a portion of a partition between two adjacent compartments of the rotary member shown in Figure 6; and

Figure 9 is a detail sectional view of a portion of the partition between adjacent compartments of the rotary member, showing a pipe provided with apertures through which washing and rinsing water is passed.

The various novel features of my invention will be apparent from the following description and drawings, and will be particularly pointed out in the appended claims.

Referring first to Figures 1 and 2 of the drawings, it will be noted that I have shown a laundry equipment including three of my combined washers and driers 10, which are supplied with cold water from a cold water supply tank 11, the cold water being fed through a feeder pipe 12, from which branches 13 and 14 extend to each machine. Hot water is supplied to each of the combined units 10 from a hot water supply tank 15, which supplies hot water to a feeder pipe 16 from which branches 17 lead to each of the combined units. Each of the branches 13 and 17 is provided with a valve 18, by means of which the temperature of the water passing through the connecting pipe 19 may be controlled, said connecting pipe 19 leading to the base 20, preferably of concrete, of each machine. The connecting pipe 19, in each case, likewise is provided with a valve 21. Each of the branch pipes 14 is provided with a valve 22 for controlling the supply of cold rinsing water to each of the units 10. As stated above, not only are the clothes washed and rinsed in each of the units 10, but the clothes are dried and cooled in each of said units before being withdrawn therefrom. In this connection I have shown the boiler room 23 having boilers 24 provided with a common smoke-stack 25, in the enlarged portion of which is an air economizer 26, connected to the pipes of which is a fan 27 for drawing air from the outside through a pipe 28, forcing same through the economizer 26 and through a main feed pipe 29 and through branch pipes

30 into each machine, as will be pointed out more particularly hereinafter.

Referring now to the other figures of the drawings, it will be noted that each one of the combined washer and drier units includes an outer stationary casing 31, which is mounted in the concrete base 20, into the bottom of which the combined hot and cold washing water is led through the pipe 19. This base is provided with an inclined exit opening 32, through which the water may pass into a pit 33 in which is mounted a centrifugal pump 34 directly connected to and driven by an electric motor 35 mounted on a cover 36 over the pit 33. The pump 34 is provided with a supply pipe 37, which is connected to and feeds a pipe 38 (see Figures 2, 3 and 4), which joins its associated cold water rinsing pipe 14 in a common pipe 39 (see Figure 5), which extends through a journal 40 at one end of the rotary member 41 of the combined washer and drier. The operation and functions of the parts will be referred to more in particular hereinafter.

The rotary member 41 of the combined washer and drier includes a central hollow shaft 42, upon which are mounted end heads 43 and 44, the outer ends of which are provided with journals 45 and 40 respectively, which are mounted in bearings 46 of the base 20. The rotary member 41 preferably is hexagonal in shape, each of the six sides being in the form of wire mesh 47, said wire mesh spanning the distance between the end heads 43 and 44 and being supported by suitable frame members. The rotary member 41 preferably is divided into three compartments by three longitudinally and radially extending partitions 48, the inner ends of which are formed by a spider-like construction having a hub portion 49 surrounding the shaft 42 and having hollow arms 50 (see Figure 9), the outer ends of which are closed by plates 51' for a purpose to be referred to hereinafter. The outer portion of each of these partitions 48 comprises spaced screens 51 occurring in pairs. Between the screens 51 (see Figure 8) of each pair there are mounted a plurality of funnels 52 and 53, which are held in position by spacers 54 and a bolt 55 passing therethrough. These funnel members 52 which occupy the outer extreme portion of the partitions 48, not only permit the passage of water from one compartment to the other, but give the water a jet-like action for forcing the water through the goods with greater force for cleaning and rinsing purposes, the funnels 52 being particularly effective when the rotary member is rotated in one direction and the other funnel members 53 being particularly effective when the rotary member is rotated in the opposite direction.

Mounted within the rotary member 41 are a plurality of pipes 56 supported within pockets 57, said pipes 56 extending longitudinally between the end heads 43 and 44, it being noted that the end head 44 is provided with a plurality of passageways 58 which communicate with the pipes 56 located near the periphery of the rotary member, said passageways in the head 44 being in direct communication with the water supply pipe 39. Mounted within the partitions 48, and particularly in the middle part of each of said partitions, is another water pipe 59, which is properly supported between the plates 51' and 60, and which pipes 59 extend between the end heads 43 and 44, said pipes 59 being in open communication with passageways 61 in the end head 44, which passageways are in direct communication with the water supply connection 39.

Each of the water pipes 56 is provided with a longitudinally extending series of apertures 62 for directing a stream of water radially inwardly toward the shaft 42 and toward the center of its particular associated compartment. Each of the water pipes 59 is provided with two series of longitudinally extending apertures 63 and 64, the apertures 63 directing streams of water toward the center of its associated compartment and the other series of apertures 64 likewise directing streams of water to the center of its associated compartment. As a result thereof, these six perforated pipes 56 and 59 direct three streams of water toward each other in substantially a 180° relationship toward substantially the center of each of the three compartments of the rotary washing and drying device. In this way a better washing and rinsing action is made possible.

It will be understood that during the washing, rinsing, drying and cooling operations, the rotary member 41 will be actuated. For this purpose, an electric motor 65 is provided for each unit, said rotary member 41 being driven by said motor through a train of gearing 66, to be described in greater detail in another application; said train of gearing including a rocker arm 67 (see Figure 4) yieldably connected to a toothed segment 68 meshing with a gear 69 mounted on the same shaft with a relatively large gear 70 meshing with an idler gear 71, which in turn meshes with a gear 72 mounted upon the journal 40.

In the operation of this system, water of the proper temperature in the first instance is supplied in each case to the base 20 through the pipe 19, the water gradually rising in the base 20 and in the associated pit 33 until the desired level of the water shown has been reached, whereupon the water may be turned off either automatically or manually by means of the valves 18 and

21. As the water is supplied to the base 20 and pit 33 and approaches its predetermined height, it causes a float 73 (see Figure 6) to rise, said float being operatively connected to a chain 74 (see Figure 5) which passes over sheaves 75, and to the free end of which chain a weight 76 is connected, said chain 75 being provided with collars 77 for operating the handle 78 of an electric controller 79 for controlling the electric motor 35 which is connected to and drives its associated water pump 34. Let it be assumed that each compartment of the rotary clothes container 41 has been provided with clothes to be cleaned, the goods being passed through a door 80 in the outer casing and doors 81 in each of the three compartments of the rotary member 41, and that the rotary container 41 has been set into operation, and that the washing water has reached its predetermined level in the base 20 and the pit 33, whereupon the motor 35 is automatically set into operation through the movement of the float 73 and the effect of weight 76. The centrifugal pump therefor, being driven by the motor 35, draws water from the pit 33 and forces the water through the pipes 37, 38 and 39, through the passageways 58 and 61 in the end head 44 into pipes 56 and 59 and out through the apertures 62, 63 and 64, from which the water squirts in a jet-like manner, as shown in Figure 6 of the drawings, these jets or streams of water playing upon the clothes being washed; it being understood that the washing water is provided with the suitable amount of soap.

As the jets of water are playing upon the clothes being washed, the rotary member 41 is given a rotary action, preferably a certain number of revolutions in one direction and then a certain number of revolutions in another direction. As the rotary member is rotated, the clothes, in addition to being worked on by the jets of water, fall from an elevated position down into the corners of the diagonal-shaped compartments, causing a compressive action to be given to the clothes being washed; it being noted also that the lower corners of the diagonal-shaped compartments are under water at the time and that jets of water passing through the funnel members 52 or 53 also play upon the clothes being washed. This washing action may take place any desired length of time; whereupon a drain valve 80' in the bottom of the pit 33 may be opened through a lever 81' and connection 82 between the lever and valve. As soon as the drain valve is opened, the water in the base 20 of that particular machine and in the pit 33 drains therefrom, the float 73 descending and thereby shutting off the pump motor 35. After the water has drained out of the pit 33, cold rinsing water is supplied through the branch pipes 14 by

proper operation of the valves 22 in said pipes, the cold rinsing water passing through the pipe 39, passageways 58 and 61 in the head 44, and through the same system of pipes 56 and 59 from which the rinsing water passes through the apertures 62, 63 and 64 for thoroughly rinsing the washed clothes, it being understood that the drain valve 80 is maintained in an open position to permit the rinsing water to drain off. During this rinsing operation, the rotary member 41 is maintained in operation and continued in operation any desired length of time, the rinsing operation also being continued the desired length of time. In connection with the supply of rinsing water through the pipes 14 and 39, the pipe 38, through which the washing water is pumped, is provided with a check valve 84 for preventing the rinsing water escaping toward the pump 34. After the goods are thoroughly rinsed, they are dried.

In connection with the drying operation, air, preferably at 180° Fahrenheit under a two-ounce pressure, is supplied by the blower 27 through the economizer 26, feed pipe 29 and branch pipes 30 (see Figures 1 and 2). Referring now to Figure 5, it will be noted that the branch 30 in each case is provided with a valve 85 for controlling the supply of the hot air through the hollow journal 45 which is in open communication with the hollow shaft 42. This hollow shaft (see Figures 5 and 6) is provided with a plurality of series of apertures 86 registering with corresponding apertures 87 in the spider hub 49, whereby hot air is shot radially outward from the hollow shaft 42 to play upon the washed and rinsed clothes. After a predetermined length of time, it being understood that the rotary member 41 is in operation, the clothes will become dry not only as a result of the hot air jets playing upon the wet clothes, but also as a result, especially in the first part of the drying action, of the clothes falling down into the wedge-like corners of each compartment, causing a natural wedging or squeezing action upon the clothes for forcing some of the water therefrom.

After a predetermined length of time, the goods will be completely dried. Not only is the hot drying air forced into the compartment of the rotary member or container 41 under pressure, but the moisture laden air is drawn out of the casing 31 through an exhaust 87 in the upper end of the casing by a suction action created by a motor driven centrifugal pump 88 which is connected to each of the exhaust pipes 87 by a pipe 89 common to all, said moisture laden air being forced into a cyclone 90, from which it passes into the atmosphere through a pipe 91, the lint in the moisture laden air being deposited in the cyclone 90 and therefore prevented

from passing outwardly through pipe 91. The exhaust pipe 87 in each case is provided with a valve 92 mounted in said pipe.

After the goods have been dried by the hot air, the supply of hot air is shut off. However, the dried clothes at this time are too hot to handle. Accordingly, I have provided means for cooling the clothes before they are withdrawn from the machine. In this connection it will be noted that the base 20 of the machine is provided with a ventilator 93, which may be in the form of a shutter arrangement, cold air being drawn through the ventilator 93 through the dried clothes and out through the exhaust pipe 87, through which a suction extends as a result of the suction pump 88, the valve 92 at this time being opened and the valve 85 in pipe 30 being closed. When the dry clothes are sufficiently cooled, the rotary container may be stopped and the cleansed and dried clothes removed.

By means of this combined machine, the clothes not only are thoroughly washed, rinsed, dried and cooled in a single unit, but at the same time this single combined unit is efficient in its operation and occupies a minimum amount of space.

There may be various modifications of the invention herein shown and described, and it is my intention to cover all such modifications which do not depart from the spirit and scope of the invention as set forth in the following claims.

I claim:

1. In a washer, a rotatable clothes container, radially extending longitudinal perforated partitions mounted therein for dividing said container into compartments, longitudinal perforated pipes for directing a plurality of streams of washing medium toward a common region in each of said compartments, said region being spaced from the longitudinal walls of said compartment, and means forming a receptacle for holding a quantity of washing medium with which said compartments are adapted to communicate successively.

2. In a washer, a rotatable clothes container, radially extending longitudinal perforated partitions mounted therein for dividing said container into compartments, longitudinal perforated pipes for directing a plurality of streams of washing medium toward a common region in each of said compartments, said region being spaced from the longitudinal walls of said compartment, and means forming a receptacle for holding a quantity of washing medium with which said compartments are adapted to communicate successively, said partitions being provided with means for setting up a jet-like action in said quantity of washing medium.

3. In a washer, a rotatable clothes con-

tainer, radially extending longitudinal perforated partitions mounted therein for dividing said container into compartments, said partitions being provided with longitudinally extending perforated pipes, and said container being also provided, adjacent to the periphery thereof midway between said partitions, with longitudinally extending perforated pipes, said pipes being adapted to direct a plurality of streams of washing medium toward a common region in each of said compartments, said region being spaced from the longitudinal walls of said compartment and means forming a receptacle for holding a quantity of washing medium with which said compartments are adapted to communicate successively.

4. In a washer, a rotatable clothes container having a hollow shaft, radially extending longitudinal perforated partitions mounted therein for dividing said container into compartments, said partitions being provided with longitudinally extending perforated pipes, and said container being also provided, adjacent to the periphery thereof midway between said partitions, with longitudinally extending perforated pipes, said pipes being adapted to direct a plurality of streams of washing medium toward a common region in each of said compartments, said region being spaced from the longitudinal walls of said compartment, and means forming a receptacle for holding a quantity of washing medium with which said compartments are adapted to communicate successively, said hollow shaft being provided with apertures communicating with some of said compartments whereby air may be projected through said hollow shaft into said compartments.

5. In a washer, a rotatable clothes container having a hollow shaft, radially extending longitudinal perforated partitions mounted therein for dividing said container into compartments, said partitions being provided with longitudinally extending perforated pipes, and said container being also provided, adjacent to the periphery thereof midway between said partitions, with longitudinally extending perforated pipes, said pipes being adapted to direct a plurality of streams of washing medium toward a common region in each of said compartments, said region being spaced from the longitudinal walls of said compartment, and means forming a receptacle for holding a quantity of washing medium with which said compartments are adapted to communicate successively, said hollow shaft having apertures communicating with and adapted to project air from said hollow shaft into some of said compartments, said container having a polygonal contour forming wedge-like corners in each compartment.

6. In a washer, a rotatable clothes con-

- tainer, radially extending longitudinal perforated partitions mounted therein for dividing said container into compartments, longitudinally extending perforated pipes for directing a plurality of streams of washing medium toward a common region in each of said compartments, said region being spaced from the longitudinal walls of said compartment.
7. In a combined washer and drier, including in combination, a cylinder for receiving the clothes, said cylinder having its interior partitioned to provide a plurality of compartments, and pipes extending through said partitions parallel to the axis of the cylinder and having openings into the compartments on each side of the several partitions, and means for discharging a washing medium through the openings in said pipes into said compartments.
8. In a combined washer and drier, in combination, a cylinder for receiving the clothes, said cylinder having its interior partitioned to provide a plurality of compartments, pipes extending through said partitions parallel to the axis of the cylinder and having openings into the compartments on each side of the several partitions, and means for spraying sheets of water into said compartments in such manner that the several sheets sprayed into a compartment meet in a zone centrally of the walls of the compartment for acting on the materials therein contained.
9. In a combined washer and drier, the combination of a movable clothes container having its interior divided into compartments by means of partitions, and funnel-shaped means carried by the partitions for conveying a washing fluid from one compartment to another in a jet-like form.
10. In a washing machine of the class described, including a horizontally mounted rotatable washing cylinder hexagonal in cross section, said cylinder having its interior arranged in compartments by radially extending partitions, the partitions having funnel means at the outer ends thereof for conveying a washing medium from one compartment to the next in a jet-like form.
11. In a combined washer and drier, including a horizontally disposed washing cylinder having a central hollow shaft, cylinder heads mounted thereon, a plurality of longitudinally and radially extending partitions within said cylinder forming a plurality of compartments within the interior thereof, pipes extending longitudinally through said partitions and provided with rows of openings for directing the discharge of fluid toward the center of each of the compartments of which said partitions form a wall, the cylinder heads having a plurality of passage-ways therein communicating with the hollow central shaft and the several partition pipes whereby a fluid may be delivered to the partition pipes for discharge into the compartments of the container.

Signed at Chicago, Illinois, this 1st day of April, 1919.

HANS C. HOTING.