

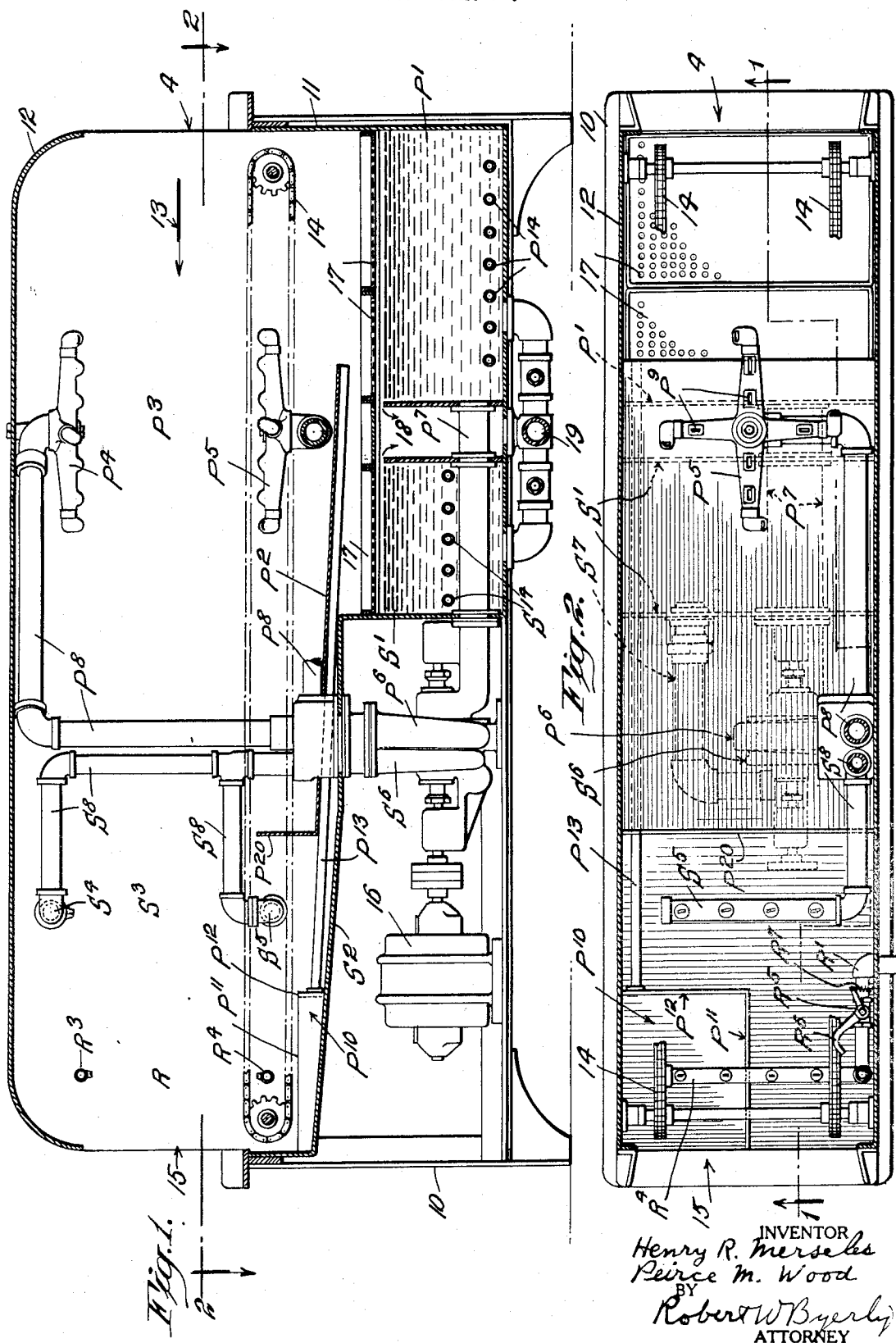
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WASHING MACHINE

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WASHING MACHINE.

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This invention relates to washing machines, and aims to provide a rapid and efficient dishwashing machine of large capacity.

5 A machine embodying the invention provides primary and secondary washes through which the dishes or other articles to be washed are passed in succession. The primary and secondary washes are drawn from
10 separate tanks, and each is returned to its own tank after passing over the articles.

A feature of the invention consists in skimming off or decanting the grease floating on the liquid in each of the tanks of a washing
15 machine by automatically supplying a slight excess of liquid to each tank during such time as dishes are being washed in the machine. The automatic arrangement is such
20 that when no dishes are passing through the machine the excess supply of liquid to each tank is cut off so that no liquid is wasted.

A further feature of the invention consists in obtaining the excess liquid for each tank from a rinse spray under which the
25 dishes are passed after they have passed through the primary and secondary washes. In accordance with this feature of the invention, the liquid from the rinse spray, after passing over the dishes, is divided into
30 two parts which are separately conducted to the primary and secondary wash tanks, respectively. The grease is, therefore, skimmed off from the liquid in both tanks without supplying any fresh water other than
35 that necessarily supplied for the final rinse.

A further feature consists in utilizing the secondary wash to provide a screen to prevent the primary wash from reaching the rinse spray.

40 These and other features of the invention may best be understood from a detailed description of a dishwashing machine embodying the invention which is shown in the accompanying drawings, in which

45 Fig. 1 is a side elevation of the machine sectioned on the line 1—1 of Fig. 2; and

Fig. 2 is a plan view of the machine sectioned on the line 2—2 of Fig. 1.

The framework 10 of the machine shown in the drawings supports a casing 11, the
50 upper portion of which forms a long hood 12 through which dishes or other articles to be washed may be moved in the direction of the arrow 13, for example, by means of a chain conveyer 14 indicated diagrammat-
55 ically in the drawings. The ends of the hood 12 contain, respectively, an entrance opening 4 for the racks and dishes and an exit opening 15. In the lower part of the casing near the entrance end of the machine
60 are two separated tanks, P¹ for the primary wash liquid and S¹ for the secondary wash liquid. The bottom of the casing at the exit end of the machine provides a long spillway S² for directing liquid into the secondary
65 wash tank S¹. A deflector P² which extends over the secondary wash tank S¹ and over part of the spillway S² and terminates in a vertical transverse flange P²⁰, serves to direct liquid into the primary wash tank
70 P¹. The flange P²⁰ lies below the upper reach of the conveyer 14 and contains openings (not shown) for the passage of the lower reach of the conveyer.

The first treatment of the dishes, the pri-
75 mary washing, takes place in the portion P³ of the hood 12 near the entrance end of the machine. In this portion of the hood are two wash projectors P⁴, P⁵ to which washing liquid is supplied from the primary
80 tank P¹ by a centrifugal pump P⁶ which draws the liquid through a conduit P⁷ communicating with the primary tank P¹ near the bottom thereof and supplies this liquid to the projectors P⁴, P⁵ through conduits P⁸.
85 The pump P⁶, which is driven by an electric motor 16, is formed to supply a large volume or flow of liquid and to deliver it at a low pressure. The projectors P⁴ and P⁵ are provided with a number of discharge open-
90 ings P⁹ of large total cross-section so that a large volume of liquid may be projected through them by the application of a comparatively low pressure. The pump P⁶ and projectors P⁴, P⁵ thus provide means for
95 deluging the dishes with a great volume of

liquid moving at a low velocity. In order to distribute this volume of liquid over the dishes most effectively, the projectors P⁴ and P⁵ are rotatably mounted and are provided
 5 with inclined end nozzles which cause them to rotate by reaction of the liquid discharged. The projectors P⁴ and P⁵ shown in the drawings are of the type described and claimed in the co-pending application of Henry R. Merseles, filed May 20, 1924, Serial No. 714,568,
 10 and are, therefore, not claimed herein.

The second treatment or secondary washing of the dishes occurs in the portion S³ of the hood 12 which each rack of dishes enters
 15 on leaving the portion P². In the portion S³ of the hood are two projectors S⁴, S⁵ to which liquid is supplied from the secondary tank S¹ by a centrifugal pump S⁶ which draws the liquid through a conduit S⁷ communicating with the secondary tank S¹ near
 20 the bottom thereof and supplies this liquid to the projectors S⁴, S⁵ through conduits S⁸. The pump S⁶ may have its rotor mounted on the same shaft as that of the pump P⁶ so
 25 that it may be driven by the same motor 16. The chamber of the pump S⁶ is, however, entirely separate from that of the pump P⁶. The pump S⁶ is formed to supply a small
 30 volume or flow of liquid and to deliver it at high pressure. The projectors S⁴ and S⁵ are provided with discharge openings of small total cross-section through which liquid
 35 supplied at high pressure may be projected at high velocity. The discharge openings of each of these projectors are positioned in a straight line extending across
 40 the hood 12. Each discharge opening has the form of a slit extending at a slight angle to the line on which the openings are positioned. The liquid is projected from each
 45 slit in a fan-shaped spray which overlaps, but does not strike or interfere with, the fan-shaped spray projected from the next slit. Consequently, the projectors S⁴ and S⁵
 50 produce descending and ascending curtains of liquid, each consisting of a number of overlapped fan-shaped sprays. The liquid thus projected strikes the dishes at high
 55 velocity and reaches all the dishes of each rack as the rack travels through the space S³, effectively scraping off any particles of dirt remaining on the dishes. The volume of liquid projected is, however, so small that
 notwithstanding the velocity at which it strikes the dishes, the liquid does not move
 them about in any way.

In the portion R of the hood 12 near its exit end the washed dishes are subjected to the rinsing and sterilizing action of clean
 60 hot water supplied from a source outside the machine through a conduit R¹ to sprayers R³, R⁴. The sprayers R³, R⁴ shown in the drawings are provided with nozzles
 65 of the form shown and claimed in the co-pending application of Henry R. Merseles,

filed July 30, 1923, Serial No. 654,520 which are consequently not claimed herein. The flow of the rinsing water through the conduit R¹ is controlled by a valve R⁵ having
 70 an operating arm R⁶ which is urged by a spring R⁷ to project into the path of travel of the dish racks moved by the conveyer 14. The valve R⁵ is opened whenever a dish rack engages the arm R⁶ and is closed when no
 75 rack is in engagement with this arm. It follows that fresh water is supplied to the rinse projectors only when a rack is actually passing between them and in this way the supply of fresh hot water is economized.

The liquid projected from the primary
 80 projectors P⁴, P⁵, after striking the dishes falls upon the deflector P² or directly into the tank P¹ and is thus returned to the tank P¹ to be pumped up again by the pump P⁶. A small portion of this liquid is sometimes
 85 carried forward into the portion S³ by splashing, but the water curtain provided by the secondary wash projectors S⁴, S⁵ effectively prevent any part of it from reaching the portion R of the hood and interfering
 90 with the final rinsing of the dishes.

The liquid from the secondary wash projectors S⁴, S⁵, after passing over the dishes, falls upon the spillway S² and is returned
 95 to the tank S¹ from which it is pumped up again by the pump S⁶.

Screens 17 located above the tanks P¹, S¹ serve to catch any solid matter removed from the dishes by the primary and secondary
 100 washes and prevent it from falling into the tanks P¹ and S¹. Owing to the re-use of the liquid in each tank, however, grease and floating impurities tend to collect upon the upper surface of the liquid in each tank. This grease is constantly removed by a small
 105 overflow from each tank into the space 18 between the two tanks. The overflow is conducted away from this space through a drain pipe 19, to which are also connected valve controlled pipes for emptying the two tanks.
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A continuous overflow of liquid from each tank when dishes are passing through the machine is caused by conducting a portion of the fresh water supplied through the rinse
 115 sprays R³, R⁴ into each of the tanks P¹ and S¹. A portion of the rinse water, after passing over the dishes, is permitted to flow over the spillway S² and into the tank S¹. Another portion of the rinse water is trapped in a receptacle P¹⁰ provided by a longitudinal wall P¹¹ and a transverse wall P¹² on
 120 the upper surface of the spillway S² under the rinse projectors and is thence conducted to the tank P¹ through a conduit P¹³.

Heating means, such as steam pipes P¹⁴
 125 and S¹⁴, are provided for keeping the primary and secondary liquids hot during the operation of the machine. In order to obtain the most rapid and effective washing, the secondary wash liquid should be main-
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tained at a temperature not far below the boiling point of water. The temperature of the primary wash liquid should be considerably less, preferably not over 140° F., in order that it may not cook or bake on food adhering to the surfaces of the dishes. Owing to the small volume of liquid discharged through the secondary projectors S⁴, S⁵ and the open space 18 between the two tanks, which prevents the conduction of heat from one tank to the other, the secondary wash liquid may be maintained at a temperature near the boiling point of water by the use of a comparatively small amount of steam or other heating medium in the heater S¹⁴.

While the exact sizes and proportions of the parts may be varied without departing from the invention, we may note, by way of example, that in a large capacity machine embodying the invention we found it satisfactory to form the pump P₂ to circulate 600 gallons of liquid per minute at a head of 6 feet, to make the total effective cross-sectional area of the discharge openings of the primary projectors P⁴ and P⁵ about 10 square inches, to form the secondary pump S⁶ to provide a circulation of 60 gallons per minute at a head of 25 feet, and to make the total effective cross-sectional area of the nozzles of the secondary projectors S⁴, S⁵ about 0.7 square inches.

In a machine of these proportions, the volume of liquid discharged by the primary projectors in a given length of time is about 10 times the volume discharged by the secondary projectors, while the pressure of the secondary liquid at the discharge nozzles, and consequently the velocity with which this liquid strikes the dishes, is about 4 times the pressure at the nozzles of the primary projectors and the velocity with which the primary liquid strikes the dishes.

While in the above specification the three treatments to which the articles are subjected have been termed the primary wash, the secondary wash and the rinse because it is believed that these terms most accurately describe the function of the three treatments, it may be noted that, as the secondary rinse has the effect of removing any of the primary washing liquid which may be left on the articles, the secondary wash may be, and frequently is, termed a rinsing operation; and that the final rinsing with hot clean water has the effect of sterilizing as well as rinsing the articles and is, therefore, not infrequently referred to as sterilizing. The three terms primary rinse, secondary wash, and rinse, as used in the claims that follow, and the corresponding terms applied to the elements by which these operations are performed, are to be understood to cover the three operations of the general character described in the specification regardless of

the particular terms which may be used to define these three operations in any particular machine.

Certain features of the machine described and illustrated form a part of the subject matter of the copending application of Henry R. Merseles, filed January 26, 1923, Serial No. 614,960, and are, therefore, not claimed herein.

What we claim is:—

1. A dish-washing machine having a casing providing a long hood, means for guiding the articles to be washed through said hood, a rotary liquid distributor located in said hood near its entrance end, a rinse spray located in said hood near its exit end, and a fixed projector extending transversely across the hood between the rotary projector and the rinse spray and arranged to project across the hood a curtain of liquid which screens the rinse spray from the liquid discharged by the rotary distributor.

2. In a dish-washing machine, the combination with a casing, means for guiding racks containing the articles to be washed through the casing, two tanks in the casing, means for supplying excess liquid to each of said tanks so as to cause the liquid therein to overflow, of a normally closed valve controlling the supply of excess liquid, and means actuated by the passage of racks through the casing to open said valve.

3. A dish-washing machine comprising a casing, means for guiding racks containing articles to be washed through the casing, two tanks in the casing, means for circulating liquid contained in each of said tanks over the articles to be washed and returning it to its tank, a rinse spray in the casing, a conduit for supplying liquid to the rinse spray, a normally closed valve in said conduit, means actuated by the passage of racks through the casing to open said valve, and guiding means for directing a portion of the liquid from the rinse spray into each of said tanks so as to cause an overflow from each of them.

4. In a washing machine having a primary tank and washing mechanism associated therewith and a secondary tank and washing mechanism associated therewith, the combination of a plurality of spray devices located beyond the secondary tank and directing rinsing liquid against the washed articles, a receptacle located under some of said spray devices to receive liquid from them after it is passed over the articles, means, including a pipe extending from said receptacle, for directing the liquid caught in said receptacle into the primary tank, and a spillway extending under others of said spray devices for directing liquid therefrom into the secondary tank.

5. In a washing machine, a casing providing a long hood, a conveyer for carrying the

articles to be washed through said hood, and a liquid projector extending transversely across the hood and having a plurality of discharge slits spaced end from end along in a straight line and each extending at a small angle to said line so that they project a sheet of liquid consisting of a plurality of overlapping non-interfering fan-shaped sprays through which all the articles to be washed are carried by the movement of the conveyer. 10

In testimony whereof we have hereunto set our hands.

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