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WASHING PLANTS HAVING A PLURALITY OF INDIVIDUAL, SEPARABLY OPERABLE WASHING UNITS

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Fig.1

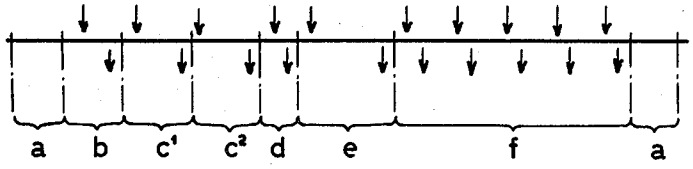


Fig.2

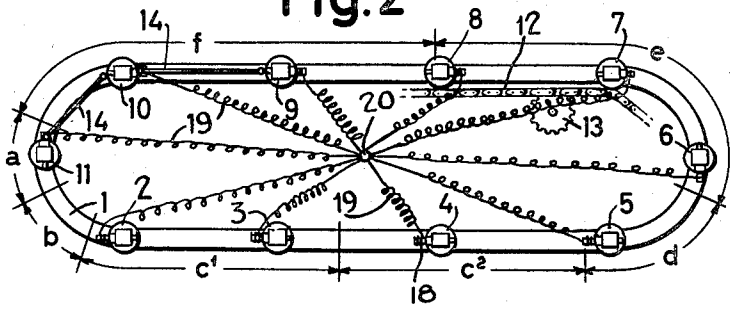
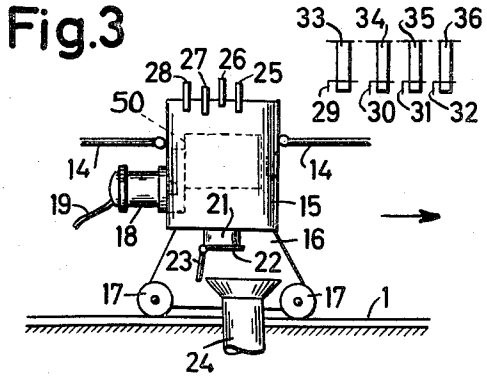


Fig.3



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WASHING PLANTS HAVING A PLURALITY OF INDIVIDUAL, SEPARABLY OPERABLE WASHING UNITS

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10 Claims. (Cl. 68—27)

In commercially operated laundries, several comparatively large, steam-heated washing machines are often used which are quite independent of each other except that they may be connected to common supply lines and discharge lines for washing and rinsing water. The washing drum proper, in such large washing machines may be divided by radial partitioning walls into eight or twelve compartments, for example so that a corresponding number of batches of washing may be treated at one and the same time without being mixed up. Thus the washing from different customers may be kept separate, but, as the washing drum offers a more or less free flow communication between the different compartments, each of the different batches of washing cannot be treated with its separate changes of liquid. This entails that a rather comprehensive sorting work must be performed according to the nature and degree of soiling of the washing. The filling of one or more of the compartments with washing that must not be boiled while at the same time the filling of other compartments with washing to be boiled cannot be permitted, and it is also inexpedient simultaneously to wash comparatively dirty washing, e.g. work-clothes, in one or a few of the compartments and comparatively clean washing in the remaining compartments of the washing drum.

Still another drawback of washing plants of this known type is that they normaly require a very great consumption of water as the different changes of washing and rinsing water cannot be re-used or regenerated unless a very extensive system of pipeliness is at disposal with numerous switching valves, which makes possible a separate collection of the different changes of washing and rinsing water.

Other washing plants are known that operate on the so-called counterflow principle. Such a washing plant consists substantially of a series of washing containers, each comprising a rotary washing drum intended for holding only one batch of washing. The different washing machines or washing containers are series-connected with each other so that water supplied to one of the containers is forced to flow through them all before draining off to the sewer, with the possible exception of a single container which is temporarily uncoupled from the series for removing the washed articles and filling it with a batch of articles to be washed. In a plant of this type, all the batches of washing can be treated only according to one and the same prescription with washings and ensuing rinsings. The individual operations may separately be divided into several stages, and at a given time during the operation of the plant, each of the different washing containers comprised by the series will be at its stage of the total treatment. The pure water is supplied to the container in which the treatment has proceeded farthest, i.e. in which the washing needs only a last rinsing. From here the liquid flows through the different containers until it leaves the plant through the container which at the particular moment starts functioning. In practice, this washing plant may be constructed as a

turntable on which ten washing containers for example are mounted along a circle so that they can successively be brought into communication with the common supply and the common discharge. During the jerky turning of the turntable, the individual washing containers pass through a number of stations, each of which corresponds to one stage during the treatment of the washing.

Apart from the fact that with this system an essential economy in the consumption of water can be attained and thereby a considerable reduction in the heat consumption besides to some degree an economy in the consumption of washing agents and cleansing additions can be realized, a washing plant based on this counterflow principle has substantially the same drawbacks as the other type of plant mentioned above. The different batches of washing are thus treated successively with the same liquid, and an individual treatment of the separate batches is not possible.

The present invention relates to a washing plant which comprises a number of washing containers which are movable along an endless path with filling and emptying sections and with further sections for washing and rinsing the washing. The novel feature of the plant, according to the present invention, is that the sections of the path are provided with separate supply means and discharge means, respectively, for the several changes of washing and rinsing liquid. Hereby, a numerous series of advantages may be gained both as regards the quality of the washing and as regards the washing economy. In the washing plant, according to the present invention, the different washing containers in reality operate independently of each other, and thus there is nothing to prevent one or more of the containers from treating articles that must not be boiled, while at the same time articles to be boiled are treated in other containers. The temperature and the supply of washing agents and cleansing additions can, in fact, be adapted completely individually to the different containers, and the filling of liquid into the latter can also be adapted to the need, i.e. for example directly dependent on the weight of the batch of washing.

According to the present invention, the washing plant comprises a plurality of individual washing carriers, each carrier comprising a clothes receiving container mounted in the carrier and provided with a liquid inlet and outlet. Means is provided for moving the carriers in succession along an endless track which comprises at least one filling and emptying section, at least one washing section, and at least one rinsing section, means being provided for moving the containers relative to the individual carriers and means also being provided for supplying liquid to the said inlet and receiving liquid from the outlet from each of the carriers individually at each of the washing and rinsing sections and independent of the operation of the other containers.

For the sake of completeness it must be emphasized that the expression "washing plant" in this connection refers not only to plants of the type used in laundries proper, but also to cleansing plants in which the articles or clothes to be cleaned are subjected to a washing with special cleansing agents.

The further details necessary for understanding the invention will appear from the following description with reference to the accompanying drawing in which

Fig. 1 shows a diagram of an embodiment of the washing plant according to the invention, which diagram should be regarded as a developed picture of the endless path of the washing plant with indication of the different sections.

Fig. 2 is a top plan view, partly diagrammatic, of a plant according to the invention with ten washing containers, and

Fig. 3 is a side elevational view of a single washing container which may be supposed to be at the transition from a rinsing section to a succeeding washing section.

In Fig. 1, the horizontal line represents a developed picture of the endless path through which a number of washing containers, not shown in the figure, are movable. The arrows above the horizontal line indicate supplies of washing of rinsing water, and the arrows below the horizontal line indicate discharges of washing or rinsing water. Starting at the left of the figure, the endless path comprises first a section *a* in which neither supply nor discharge of water occurs. In this section, the washing containers (not shown) are emptied of finished washing and filled with soiled washing. From this emptying and filling section *a* the washing containers pass into the section *b*, in which a pre-rinsing of the washing can be effected during a suitable time interval and in rinsing water of a suitable temperature. The next section is a section divided into two stages c^1 and c^2 in which the first washing of the articles is effected. The necessary addition of washing agent and cleansing additions, if any, is not indicated in the diagram. From this washing zone the washing containers pass into a section *d* in which an intermediate rinsing of the washing is performed, after which follows another washing section *e*, the so-called second washing, where care must likewise be taken to add washing agent and cleansing additions if any. When this second washing has been completed, e.g. after about fifteen minutes, the washing is rinsed in a section *f*, which in the example shown is divided into five successive stages. After their passage through this section *f* the washing containers once more arrive at the emptying and filling section *a*.

Referring to Fig. 2, 1 designates an endless rail track of substantially oval shape. On this track a number of washing containers 2, 3, 4, 5, 6, 7, 8, 9, 10 and 11 are shown, preferably spaced apart the same distance. The endless track 1, which is formed by the rails is divided into sections *a*—*f* in conformity with the diagram in Fig. 1, but for the sake of clarity, the different inlets and outlets are not shown in Fig. 2. As shown at the washing containers 7 and 8, a chain 12 extends alongside the rail track 1, which chain is in permanent engagement with a driving sprocket wheel 13 and which may be permanently or releasably connected with the different washing containers 2–11 for moving them on the track. The latter may be provided with releasable catchers for catching hold of the chain 12. When the sprocket wheel 13 rotates, the total number of washing containers 2–11 will be moved around along the track 1, guided by the rails.

The washing containers, as shown in the case of the containers 9, 10 and 11 may be interconnected by coupling rods 14 which may be secured to the washing containers in a releasable manner for coupling them together in a spaced arrangement.

The washing container, shown diagrammatically in Fig. 3, comprises a casing 15 which is mounted on an underframe 16 with wheels 17 which run on the rails of the track 1. In the casing 15 there is mounted a washing drum 50 which is rotatable around a horizontal axis and which through a suitable gearing is in drive connection with an electric motor 18 mounted on the casing 15, which electric motor is connected through a lead 19 to a current supply column 20, Fig. 2, mounted centrally in the plant.

The casing 15 is provided with a bottom discharge opening 21 which is closed by means of a hinged flap 22 provided with a downwardly-directed arm 23 which, during the travel of the washing container in the direction of the arrow shown, will hit the edge of an outlet 24 located in the floor and thereby cause the flap 22 to open, so that the contents of the container can drain off through the outlet 24. If it be desired to re-use the liquid discharged, after a possible regeneration, the outlet 24 may be in communication with a suitable collection tank,

not shown on the drawing. Where needed, a section may have two separate outlets for receiving washing- or rinsing-liquids from washing that must not be boiled and washing to be boiled, respectively.

The casing 15 is furthermore shown provided with a control mechanism, in the case shown consisting of four keys 25, 26, 27, and 28 for actuating discharge valves 29, 30, 31, and 32 in stationary supply lines 33, 34, 35, 36 for cold water, hot water, washing agent, and cleansing addition, respectively. The valves will be disposed along the various sections of the plant and are shown in a group form in Figure 3, solely for the purpose of clarity. The four keys 25, 26, 27, and 28 may be adjustable in a suitable manner, e.g. vertically displaceable, and according to their setting they will by their actuation of the respective discharge valves 29, 30, 31, and 32 cause a supply of a greater or smaller quantity from the different supply lines 33, 34, 35, and 36. The setting of the be a simpler matter to increase this capacity, e.g. by an keys 25, 26, 27, and 28 occurs in the section *a* according to the quantity, nature, and degree of soiling of the washing.

It will be obvious that the number of washing containers may be reduced or increased as occasion requires within the capacity of the rail track 1. If need be, it will extension of the two rectilinear stretches with a plant of the form indicated in Fig. 2.

It will likewise be obvious that the plant is not bound to operate in accordance with the diagram shown in Fig. 1, it being possible to arrange the different inlets and outlets according to the washing program desired.

I claim:

1. A washing plant comprising a plurality of individual washing carriers each comprising a clothes receiving container mounted in a carrier provided with a liquid inlet and a liquid outlet, means for moving said units in succession along an endless path comprising at least one filling and emptying section, at least one washing section, and at least one rinsing section, means for moving said containers relative to their individual carriers, and means for supplying liquid to said inlet and receiving liquid from said outlet of each of said carriers individually at each of said washing and rinsing sections independent of the operation of the other containers.

2. A washing plant comprising a plurality of individual washing units each comprising a clothes receiving container mounted in a carriage provided with a liquid inlet and a liquid outlet, a rail track forming an endless path of travel for said carriages, said path comprising at least one filling and emptying section, at least one washing section, and at least one rinsing section, means coupling said carriages to one another in succession, a driving mechanism for moving said carriages in common along said rail track, means for moving said containers relative to their individual carriages, and means for supplying liquid to said inlet and receiving liquid from said outlet of each of said carriages individually at each of said washing and rinsing sections independent of the operation of the other containers.

3. A washing plant comprising a plurality of individual washing units each comprising a clothes receiving container mounted in a carriage provided with a liquid inlet and a liquid outlet, a rail track forming an endless path of travel for said carriages, said path comprising at least one filling and emptying section, at least one washing section, and at least one rinsing section, means for moving said containers relative to their individual carriages, a driving mechanism for moving said carriages in common along said rail track, said driving mechanism comprising a drive transmitting element extending along said rail track, means associated with each of said carriages for releasable engagement with said drive transmitting element, and means for supplying liquid to said inlet and receiving liquid from said outlet of each of said carriages individually at each of said washing and rinsing

sections independent of the operation of the other containers.

4. A washing plant comprising a plurality of individual washing units each comprising a clothes receiving container mounted in a carrier provided with a liquid inlet and a liquid outlet, means for moving said carriers on succession along an endless path comprising at least one filling and emptying section, at least one washing section, and at least one rinsing section, each of said washing and rinsing sections having at least one liquid supply line to supply liquid to said inlet of each of said carriers individually independent of the operation of the other containers, a control valve in said liquid supply line, means associated with said carriers to automatically operate said control valve, means for moving said containers relative to their individual carriers, and means for receiving liquid from said outlet of each of said carriers individually at each of said washing and rinsing sections.

5. A washing plant comprising a plurality of individual washing units each comprising a clothes receiving container mounted in a carrier provided with a liquid inlet and a liquid outlet, means for moving said carriers in succession along an endless path comprising at least one filling and emptying section, at least one washing section, and at least one rinsing section, each of said washing and rinsing sections having a plurality of supply lines to supply different fluids to said inlet of each of said carriers individually independent of the operation of the other containers, a control valve on each of said fluid supply lines, means associated with said carriers to automatically operate said control valves, means for moving said containers relative to their individual carriers, and means for receiving fluids from said outlet of each of said carriers individually at each of said washing and rinsing sections.

6. A washing plant comprising a plurality of individual washing units each comprising a clothes receiving container mounted in a carrier provided with a liquid inlet and a liquid outlet, means for moving said carriers in succession along an endless path comprising at least one filling and emptying section, at least one washing section, and at least one rinsing section, each of said washing and rinsing sections having a plurality of supply lines to supply different fluids to said inlet of each of said carriers individually independent of the operation of the other containers, a control valve in each of said fluid supply lines to control the discharge therefrom, each of said carriers having a plurality of members cooperating individually with said valves, said members having one operative and one inoperative position relative to said valves, means for moving said containers relative to their individual carriers, and means for receiving fluids from said outlet of each of said carriers individually at each of said washing and rinsing sections.

7. A washing plant comprising a plurality of individual washing units each comprising a clothes receiving container mounted in a carrier provided with a liquid inlet and a liquid outlet, means for moving said carriers in succession along an endless path comprising at least one filling and emptying section, at least one washing section, and at least one rinsing section, each of said washing and rinsing sections having at least one hot water supply line and at least one cold water supply line to supply hot and cold water to said inlet of each of said carriers individually independent of the operation of the other containers, a control valve in each of said lines, means associated with said carriers to automatically operate said control valves, means for moving said containers relative to their individual carriers, and means for receiving fluids from said outlet of each of said carriers individually at each of said washing and rinsing sections.

8. A washing plant comprising a plurality of individual washing units each comprising a clothes receiving container mounted in a carrier provided with a liquid inlet and a liquid outlet, means for moving said carriers in succession along an endless path comprising at least one filling and emptying section, at least one washing section, and at least one rinsing section, means for supplying liquid to said inlet of each of said carriers individually at each of said washing and rinsing sections independent of the operation of the other containers, means for receiving liquid from said outlet of each of said carriers individually at each of said washing and rinsing sections, a control valve in said outlet, means for moving said containers relative to their individual carriers, and means to automatically open said outlet during the travel of said carriers.

9. A washing plant comprising a plurality of individual washing units each comprising a clothes receiving container mounted in a carrier provided with a liquid inlet and a liquid outlet, means for moving said carriers in succession along an endless path comprising at least one filling and emptying section, at least one washing section, at least one rinsing section, and means for supplying liquid to said inlet and receiving liquid from said outlet of each of said carriers individually at each of said washing and rinsing sections independent of the operation of the other containers, and means mounted on said carrier for imparting motion to said containers relative to their individual carriers.

10. A washing plant comprising a plurality of individual washing units each provided with a liquid inlet and a liquid outlet, means for moving said units in succession along an endless path comprising at least one filling and emptying section, at least one washing section, and at least one rinsing section, and means for supplying liquid to said inlet and receiving liquid from said outlet of each of said units individually at each of said washing and rinsing sections independent of the operation of the other units, each of said washing units comprising a goods receiving drum movable around its axis and drivingly connected with a motion imparting element common to all of said units and extending along said path.

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