June 14, 1955 W. F. WEBER ET AL 2,710,819

ARTICLE WASHING METHOD

Filed Dec. 16, 1949 2 Sheets-Sheet 1

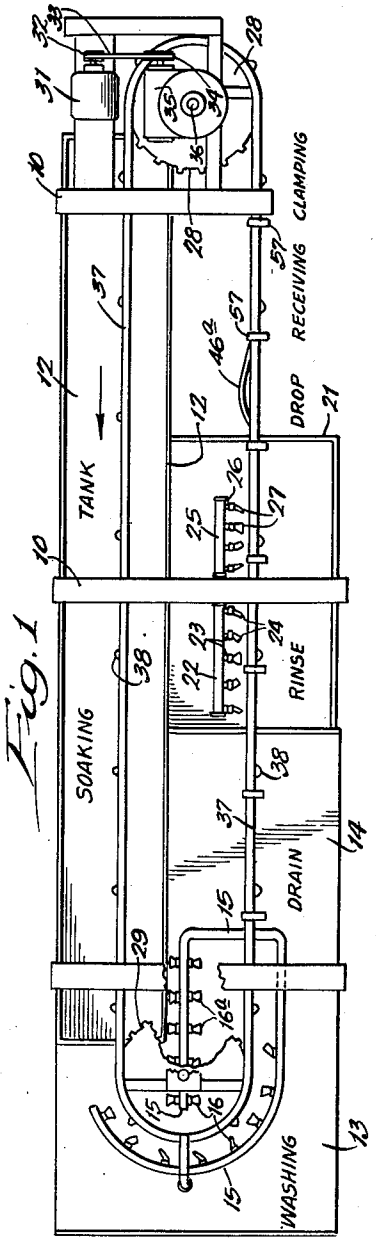


Fig. 1

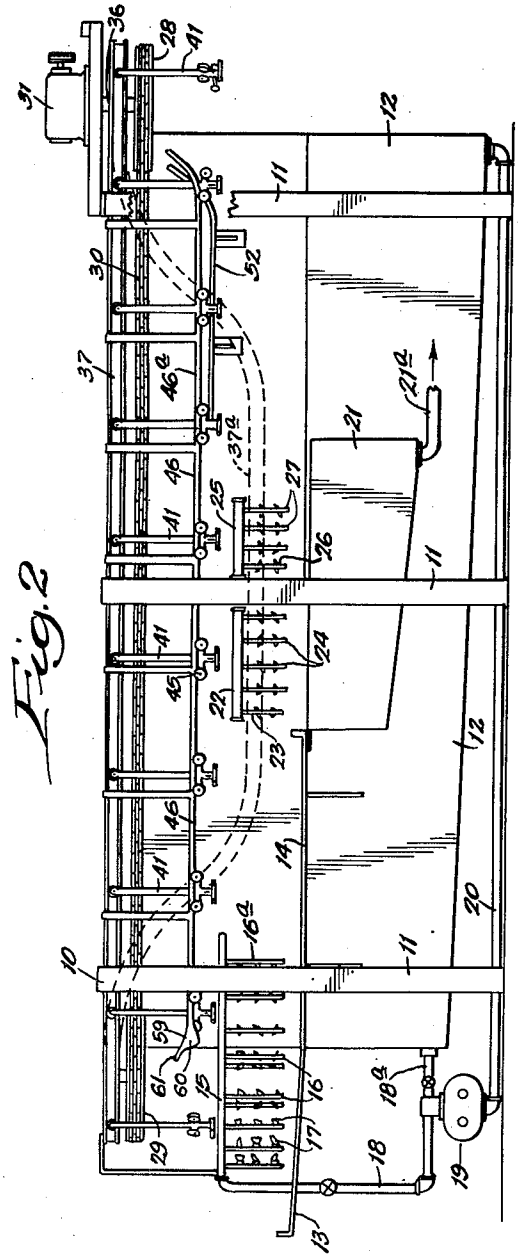


Fig. 2

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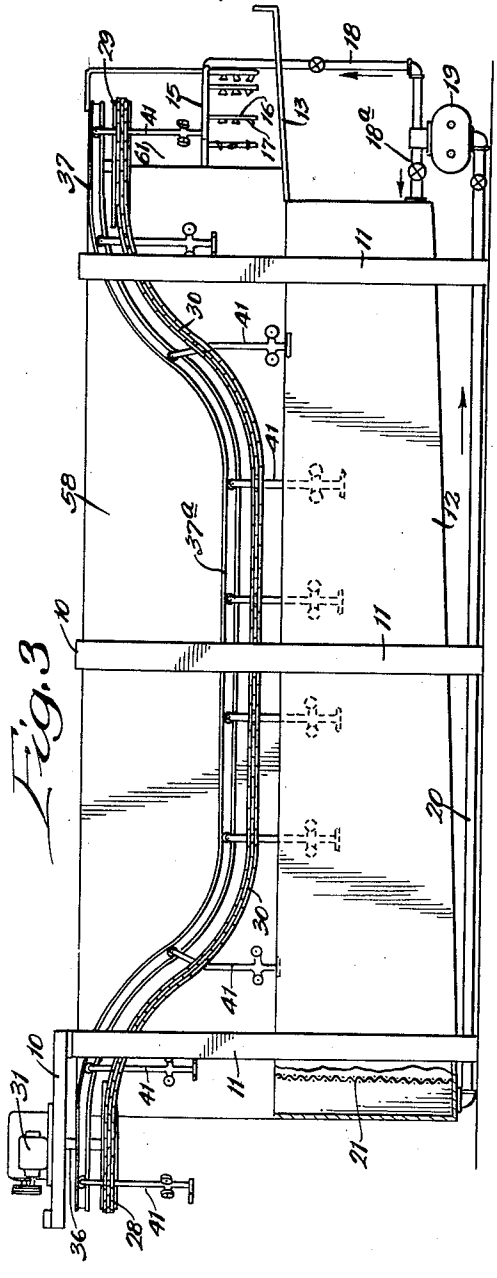


Fig. 3

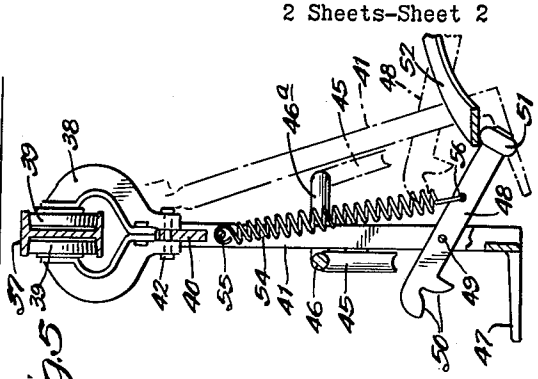


Fig. 5

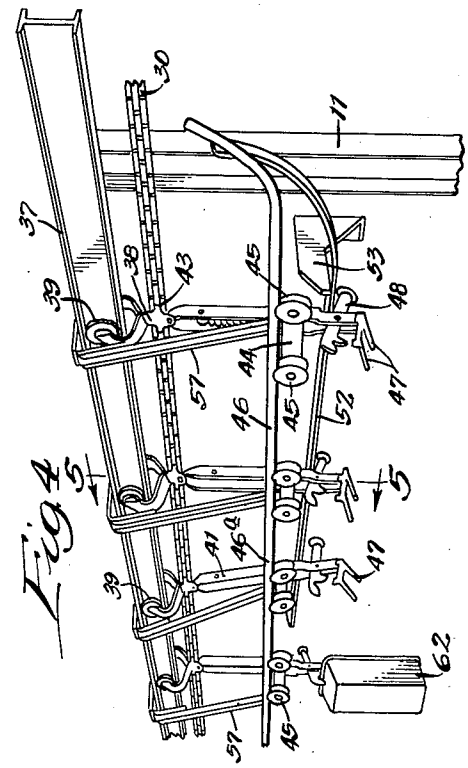


Fig. 4

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United States Patent Office

2,710,819

Patented June 14, 1955

2,710,819

ARTICLE WASHING METHOD

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Application December 16, 1949, Serial No. 133,369

6 Claims. (Cl. 134—23)

This invention relates to an article-washing method. The invention is particularly applicable to the washing of molds and pans using apparatus which automatically carries through the washing step while also automatically discharging the washed articles.

An object of our invention is to provide a method for the effective washing of articles through the employment of a novel washing step. A still further object is to provide in a washing process a sequence of steps highly effective for the removal of material from cooking and baking molds and pans, and other articles which are difficult to clean. A further object is to provide a method in which the articles to be washed are moved slowly through a soaking pool and thereafter spray-washed, the movement through the soaking pool being slow but continuous. Yet another object is to provide a method including the soaking and spray-washing of articles and the automatic discharge thereof after draining, while maintaining the article-securing means open for the receiving of additional articles to be washed. Other specific objects and advantages will appear as the specification proceeds.

Our invention is illustrated in one embodiment by the accompanying drawing, in which—

Figure 1 is a broken top plan view of the apparatus embodying our invention and with which our process may be employed; Fig. 2, a side view in elevation; Fig. 3, a broken side view in elevation, the view being taken from the side opposite that shown in Fig. 2; Fig. 4, a broken detailed perspective view on an enlarged scale of the clamp-tilting and opening mechanism; and Fig. 5, a detailed sectional view on a larger scale than that shown in Fig. 4, the section being taken as indicated at line 5—5 of Fig. 4.

In the illustration given, **10** designates a frame equipped with standards **11**. In the lower portion of the frame **10** is supported a tank **12**. A wide apron **13** extends above one end of the tank and is downwardly inclined to direct liquid into the tank **12** as shown best in Fig. 2. Similarly, a drain apron **14** extends a short distance along one side of the tank **12**, as shown best in Figs. 1 and 2, and serves to drain liquid into the tank **12**.

Over the apron **13** at the end of the machine is an arcuate spray manifold **15** equipped with depending spray pipes **16**. The spray pipes **16** are provided with apertures and deflectors **17** adjacent the apertures. The deflectors **17**, as illustrated, are turned in different directions so as to direct the washing liquid against the molds or pans or other articles from all sides and at different angles so as to traverse the entire area of the article. Similar spray pipes **16a** extend to the inner side of the chain conveyor **28**. Liquid may be supplied to the manifold **15** through the valve-controlled pipe **18**, which communicates with the outlet of the pump **19**. Fresh water may be supplied by the pump or, if desired, hot water, with detergent, may be drawn from tank **12** and passed upwardly through the pipe **18** to the spray manifold **15**. The pipe **20** connects the lower

end of tank **12** to the inlet side of pump **19**, as shown best in Figs. 2 and 3, and we prefer to equip the tank **12** near the lower end thereof adjacent the intake of pipe **20**, with a screen **21**, as shown more clearly in Fig. 3, to prevent the passage of any solid particles from tank **12** into pipe **20** leading to the pump **19**.

Over the rinse drain tank **21** is supported a rinse manifold **22** equipped with depending spray pipes **23**, and deflectors **24**, which are similar to the deflectors **17** already described. The rinse water may be drawn off separately through pipe **21a**.

A second fluid manifold **25** is provided adjacent manifold **22** and provided with depending pipes **26** having deflectors **27**. Both of the pipes **22** and **25** may be supplied with rinse water, or, if desired, steam or hot water may be supplied to the manifold **25** for the drying of the articles while pipe **22** is used to receive fresh rinsing water which is preferably heated.

We prefer to employ a continuous conveyor system of the character which will now be described. At one end of the apparatus upon frame **10** is mounted a drive sprocket **28** and at the other end of the apparatus is mounted an idler sprocket **29**. A continuous conveyor chain **30** is carried by the sprockets. A motor **31** is equipped with a drive pulley **32**, and a belt **33** connects pulley **32** to the driven pulley **34**. The pulley **34** is mounted upon a shaft which drives, through reduction gears mounted in the casing **35**, the depending shaft **36** on which is mounted the drive sprocket **28**.

The frame **10** supports at the top of the apparatus an endless track **37** formed by an I beam. A U-shaped carrier **38** is equipped with rollers **39** which engage the lower flange of the I beam on opposite sides thereof, as shown more clearly in Fig. 5.

The carrier **38** has spaced-apart lower portions which receive the upper portion **40** of an article support **41** and a bolt **42** pivotally connects the article holder **41** to the carriage **38**. The carriage **38** is also provided with spaced arms **43** which extend into recesses of the chain **30** to secure the carriage **38** to the chain.

The article holder **41** is provided with a cross strap **44**, carrying rollers **45** at each end thereof, and such rollers at one stage are adapted to engage a guide rod **46**, as shown more clearly in Fig. 4.

The lower portion of the article support **41** is provided with forwardly-extending spaced lugs **47** upon which an article or a flange thereof is received. Above the spaced lugs **47** is a clamping member **48**. In the illustration given, the clamping member **48** extends through a slot in the holder **41** and is pivotally secured therein by pin **49**. The forward end of the clamping member **48** is provided with projections **50**, or other means for the engaging of the article to be held, and the rear end of the clamping member **48** is provided with a roller **51**. The roller **51** is adapted to engage a guide strip **52** which is spaced below guide rod **46**. The engagement of the roller **51** by the guide strip **52** serves to control the opening of the clamping member **48**. The guide strip **52** may be supported by a bracket member **53**, or by any other suitable means. A tension spring **54** has its upper end secured to a pin **55** carried by the support **41**, and its lower end extended through an opening in the clamping member **48**, as shown more clearly in Fig. 5. Thus the spring **54** normally tends to draw the clamping projections **50** against the article which is to be held upon the spaced lugs **47**.

The guide rod **46** may be supported by depending bracket arms **57** mounted upon the I beam or endless track **37**, as shown best in Fig. 4. The guide rod **46** is preferably turned inwardly as indicated best in Figs. 2 and 4, so as to tilt the support **41** inwardly to permit the article to fall off of the lugs **47**. This point of

inward-turning of the track **46** is indicated in Figs. 1, 4 and 5 by **46***a*.

In order to immerse the articles in the tank for a soaking operation, the track **37** on one side of the apparatus is turned downwardly to follow a U-shaped course as indicated by the numeral **37***a* and as shown best in Fig. 3. We prefer to separate the two track segments, i. e. the horizontal portion on one side, as shown in Fig. 2, and the U-shaped portion **37***a*, as indicated in Fig. 3, by a partition wall, as shown more clearly in Figs. 2 and 3. The U-shaped configuration of the track portion **37***a*, as shown in Fig. 3, causes the article supports **41** to bring the articles to be washed downwardly into the tank and to move them slowly forward in a soaking operation, after which the articles are lifted and after draining are subjected to spray-washing from the spray pipes **16**.

In order to guide the rollers **45** of the article support **41** into engagement with the guide rod **46**, we provide a guide member **59**, as shown more clearly in Fig. 2. The guide **59** is provided with a side wall **60** and with a downwardly-inclined top wall **61**. As the rollers **45** meet the downwardly-inclined wall **61** and the side wall **60** which is on the outer side of the rollers **45**, the rollers are directed against the lower surface of the guide rod **46** and proceed in engagement therewith for the subsequent draining, rinsing, steaming, discharging and loading operations, as will be later described.

Molds or pans **62**, or other articles which are to be washed, are suspended upon the spaced lugs **47** and the clamp **48** maintains the article thereon during the soaking, washing, draining, and final treating steps which will be described.

While our new process may be carried on through the use of the apparatus disclosed herein, it will be understood that other apparatus may be used, if desired, for the carrying out of the steps employed.

The operation

In the operation of the process and the specific apparatus illustrated, the operator preferably stands near the station which is designated in Fig. 1 as receiving, and at that point places a mold **62**, or other article upon the spaced lugs **47**. As the chain **30** moves toward the drive sprocket **28**, as shown in Fig. 1, the roller **51** of the clamp **48** leaves the guide strip **52** and the spring **54** causes the clamping jaws **50** to engage the article. The article is then carried around the drive sprocket **28** and downwardly by the track segment **37** into the soaking tank **12**. In the soaking tank, the article is moved slowly in a forward direction, this movement causing new portions of the liquid to contact the article as it is moved forward. Finally, the article is raised out of the tank, as illustrated in Fig. 3, and the liquid drips therefrom onto apron **13**. In the soaking step, we prefer to have the soaking water heated to a relatively high temperature and preferably in the neighborhood of 180° F. and to employ in the tank a detergent.

The article after being lifted from the soaking tank is brought into contact with the arcuate series of spray pipes **16** and inner spray pipes **16***a*, and the deflectors **17** thereof direct the wash water against the article from all directions. The deflectors direct water against the outside and the inside of the article and also against the bottom and top thereof so that every portion of the article is traversed by the washing stream.

The wash water may be supplied from any source, but in the specific operation shown it is drawn by pump **19** from the end of the tank equipped with screen **21** and the strained water is forced by the pump upwardly and into the manifold **15**. If desired, a portion of the water may be recycled into the tank **12** through the valve-controlled pipe **18***a* for the purpose of agitating the solution in tank **12**. In order to get the maximum benefit from the soaking operation it is desirable that there be substantial turbulence in the solution in tank **12**, and such recycling through pipe **18***a* brings this about.

The water from the washing operation falls upon the wide apron **13** and is directed back into the tank **12**. The article, after leaving the washing manifold **15**, is carried along the apron **14** for some distance for draining, and the wash water dripping therefrom flows back into the tank **12**. As the article is carried further, it is subjected to the action of rinse water from the manifold **22**. It may further be subjected to rinse water from the manifold **25**, or, if desired, to the action of steam or hot air, for drying the pan. Just beyond the station **25**, the guide rod **46** is turned inwardly to provide the inwardly-turned segment **46***a*. This draws the support **41** inwardly so as to tilt downwardly the lower end thereof with the spaced lugs **47**. At the same time, the clamp **48** is opened by the engagement of its roller **41** with the downwardly-inclined strip **52**. The article upon being released slides off of the inclined lugs **47** onto a receiving platform below. At the same time, the clamping member **48** is maintained in open position so that the operator may place another pan or mold, etc., upon the lugs **47**.

It will be seen from the foregoing description that the article supports **41** are thus carried in an endless path, first through a prolonged soaking operation in which, however, the article is moved constantly to bring it in contact with fresh portions of the soaking liquid. After the soaking, the article is allowed to drain slightly and then is subjected to pressure-spraying to remove the particles clinging to the article. There is then a draining of the wash liquid back into the tank and the rinsing completes the cleaning operation. Rinsing with hot water may produce a sufficient drying of the article, or, if desired, the drying may be effected by steam or hot air. Since the discharge of the washed pan or article is accomplished at the point adjacent the clamping station, a single operator may receive the discharged articles and attach new articles to the article supports.

We have found that the soaking operation, in which the articles are not merely dipped but are moved forward slowly so as constantly to meet new portions of the fluid, is extremely effective when followed immediately by the pressure-spray washing step. Further, by arranging the washing nozzles in a semi-circular path and through the use of the deflectors employed, the article is traversed by pressure-spray from all sides and the particles, whose grip upon the article has been weakened by prolonged soaking, are readily dislodged and removed.

The supports **41** hang freely upon the track **37** and chain **30** during most of the travel about the apparatus, but immediately after leaving the washing station the supports are brought into contact with the rod **46** so as to firmly hold the support during the following draining and rinsing steps. After leaving the rinsing station, the supports engage the guide strap **52**, which, together with the arcuate portion **46***a* of the guide rod **46**, cause the articles carried by the supports to be dropped at the unloading station.

As a specific example of the process, the following may be set out:

A series of dirty molds and pans were suspended upon the projections **47** of supports **41** and clamped thereon and then passed through the soaking tank. The soaking tank contained a solution consisting of one part soap powder (5 pounds), plus ten parts of trisodium phosphate (50 pounds), in two hundred eighty parts of water (1400 pounds, or 168 gallons). The temperature of the soaking water was 170–180° F. The pans were moved slowly through the soaking liquid and then raised upwardly and spray-washed with a solution pumped from the soaking tank. The spray-washing liquid was maintained under pressure of about 90 pounds. The wash water dripped down into the apron or pan and flowed back into the soaking tank. After spray-washing, the molds traveled over a portion of the drain pan for about three feet and the washing solution drained therefrom back into the

soaking tank. After draining, the molds were spray-rinsed with hot water and after rinsing were thoroughly steamed. After release from the clamps, it was found that the molds and pans were clean and dry, and ready for use again in cooking operations.

While in the foregoing specification, we have set forth specific steps and structures in considerable detail for the purpose of illustrating our invention, it will be understood that such details may be varied widely by those skilled in the art without departing from the spirit of our invention.

We claim:

1. In a process for cleansing a receptacle open on one side, the steps of moving the receptacle while in a vertical position slowly through an elongated soaking bath of hot liquid, removing the soaked receptacle from the bath for draining, discharging under pressure a solution of detergent against the removed receptacle from different directions, draining the sprayed receptacle, and rinsing the receptacle.

2. In a process for cleansing a receptacle open on one side, the steps of moving the receptacle while in vertical position slowly through an elongated soaking bath of a solution of hot water and a detergent, removing the soaked receptacle from the bath for draining, discharging under pressure a solution of detergent against the removed receptacle from different directions to thoroughly wash the same, draining the sprayed receptacle, rinsing the receptacle with hot water, and discharging a drying medium against the receptacle to dry it.

3. In a process for cleansing a receptacle open on one side, the steps of slowly moving the receptacle while in a vertical position and with the open side thereof generally parallel with the line of movement through an elongated soaking bath of a solution of hot water and a detergent, removing the soaked receptacle from the bath for draining, discharging under pressure a solution of a detergent against the removed receptacle from different directions to remove particles stuck thereto and to thoroughly wash the receptacle, draining the sprayed receptacle, rinsing the receptacle with hot water, and discharging a drying medium against the receptacle to dry it.

4. In a process for cleansing a cooking receptacle having a relatively wide opening, the steps of maintaining an elongated pool of a solution of hot water and detergent, moving the receptacle slowly and while maintaining it in a vertical position and with the opening thereof disposed in a generally parallel plane with the line of movement through the pool to soak the receptacle, removing the soaked receptacle for draining, withdrawing strained liquid from the pool and discharging it under pressure against the receptacle from all sides, and rinsing the receptacle throughout with hot water.

5. In a process for cleansing articles, the steps of maintaining an elongated pool of a solution of hot water and detergent, clamping an article to maintain it in a vertical position and then moving the article for soaking and while clamped in the vertical position slowly through the elongated pool, withdrawing the article from the pool for draining, spraying a solution of hot water and detergent under pressure upon all portions of the article, draining the article, rinsing the article with a hot water spray, tilting the article laterally so that the bottom thereof faces in a generally downward direction, and releasing the clamp.

6. In a process for cleansing pans and the like, the steps of maintaining an elongated pool of a solution of hot water and detergent, clamping a pan to maintain it in a vertical position and then moving the pan while clamped in the vertical position slowly through the elongated pool for soaking, withdrawing the pan from the pool and tilting it for draining, returning the pan to the vertical position and then spraying a solution of hot water and detergent under pressure upon all portions of the pan, draining the pan, rinsing the pan with a hot water spray, tilting the pan so that the bottom side thereof faces generally downwardly, and then releasing the pan whereby it drops free from the clamp.

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