Nov. 29, 1949 H. R. FINK 2,489,278

METHOD OF CLEANSING CLOTHES

Filed July 16, 1948 2 Sheets-Sheet 1

Fig. 1

Fig. 2

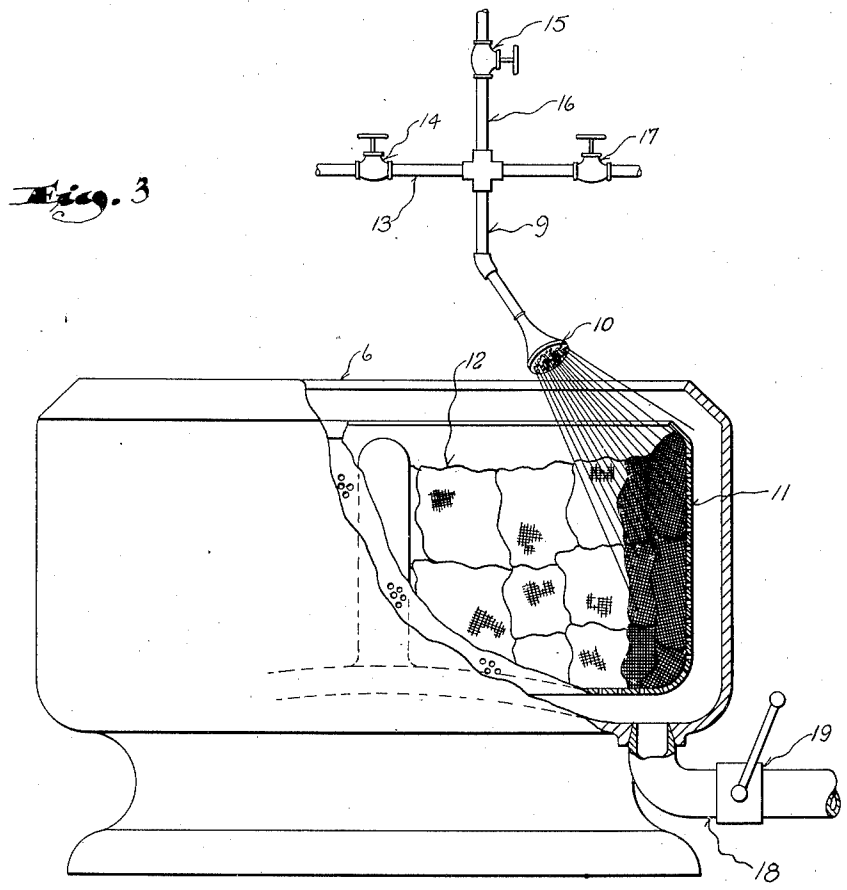
Inventor
Howard R. Fink
By Dr. Sutton Jones
Attorney

Nov. 29, 1949 H. R. FINK 2,489,278

METHOD OF CLEANSING CLOTHES

Filed July 16, 1948 2 Sheets-Sheet 2

Fig. 3



Inventor
Howard R. Fink
By Dudley Dudley Jones
Attorneys

Patented Nov. 29, 1949 2,489,278

UNITED STATES PATENT OFFICE

2,489,278

METHOD OF CLEANSING CLOTHES

Howard R. Fink, Kenosha, Wis.

Application July 16, 1948, Serial No. 39,083

12 Claims. (Cl. 8—137)

1

This invention relates to the art of laundering and has as its primary object to provide a new and improved method for cleansing and laundering clothes which is especially suited for commercial use.

This application is a continuation in part of my copending application, Serial No. 582,290, filed March 12, 1945, now abandoned.

At the present time it is conventional practice for commercial laundries to subject clothes to be washed to at least four successive washing or cleansing operations each of ten minutes duration and each with new or clean hot suds except the last which is called the "bleach run." In this last operation soap is sometimes added along with the bleach if there is insufficient carryover of soap in the clothes from the preceding washing steps.

These four ten minute washing or cleaning operations comprise a washing cycle lasting well over forty minutes when the time necessary to drain dirty suds water after each washing operation is added to that of actual washing. Many laundries, however, employ as many as five or six washing or cleansing operations and in such instances the washing alone sometimes continues for a period of an hour or more.

After drainage of the washer at the end of the bleach run, it is customary to subject the clothes to at least four separate rinsing operations each with clean, soft water, it being understood that the rinse water is changed or drained from the washer after each operation. Obviously, it is the purpose of the four rinsing operations to largely eliminate suds, alkali, and bleach from the clothes.

Under present laundry methods of rinsing, it is impossible to completely eliminate suspended dirt, suds and other washing materials from the clothes because of incomplete rinsing. The rinsing operations merely effect progressive dilution of the washing and bleaching liquid and permit loosened dirt to remain on the clothes. Hence, it is conventional practice to follow the four rinsing operations with a five minute rinse in slightly acid water. This is commonly termed a "sour rinse" in laundry circles and is also carried out in the washing receptacle or "wheel."

It is the purpose of the five minute rinse in mild acid to effect neutralization of the alkaline washing materials still remaining in the clothes after the four previous rinsing operations with clean water.

After agitation of the clothes in the "sour rinse" for a period of five minutes, the clothes are subjected to another five minute period of agitation in water containing bluing. This step in laundry

2

circles is commonly termed the "blue rinse." Inasmuch as the preceding "sour rinse" merely neutralizes the alkaline washing materials retained by the clothes and does not remove the same, the "blue rinse" is considered necessary to cover up poor rinsing and to mask the yellowish tinge remaining in the clothes as the result of incomplete rinsing.

At the completion of the "blue rinse" the clothes are transferred to an extractor or centrifuge and spun for about ten minutes therein at high speed to extract as much of the water from the clothes as possible. This completes the laundering cycle and the clothes are then ready for drying or ironing.

It is seen, therefore, that with present laundry methods a total time of more than eighty minutes is consumed in the washing of a single batch of clothes; and that the whiteness of the clothes is not a true measure of the thoroughness with which the clothes are washed but depends to a large extent on the final rinse with blued water.

With these objections to past laundering methods in mind, it is the main object of this invention to provide an improved method for laundering clothes in which many of the conventional operations are eliminated and much of the equipment and washing materials rendered unnecessary as well as to effect a considerable saving in time required to wash the clothes without sacrificing laundering efficiency.

More specifically, it is an object of this invention to reduce the time of the laundering cycle to a minimum by the expedient of carrying out at least part of the washing or cleaning operations in an extractor or centrifuge.

Another object of this invention is to provide a method of laundering clothes in which cold rinse water having a pH of approximately 7.3 or less is continuously forced through the clothes during rinsing to effect complete removal of all traces of suds and dirt suspended therein and to flush the alkaline washing and bleaching materials from the clothes to assure thorough cleansing thereof and to render the conventional "sour" and "blue" rinses unnecessary.

A further object of this invention is to provide a method of laundering in which the steps of suds removal, rinsing and extraction of rinse water from the washed clothes are all carried out in an extractor or centrifuge of the type previously used for extraction of rinse water only.

Still another object of this invention is to provide a method of laundering in which the entire laundry cycle may be carried out in a single wash-

ing receptacle designed to enable centrifugation of the clothes therein.

Still another object of this invention resides in the provision of a method for laundering clothes in which hot soft water is used together with low titer soap and a mild alkali soap builder to effect loosening and emulsification of dirt in the clothes and in which rinsing is effected by use of cold rinse water having a pH of approximately 7.8 or less.

With the above and other objects in view which will appear as the description proceeds, this invention resides in the novel method and sequence of operations substantially as hereinafter described, and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims.

The accompanying drawings serve to illustrate several complete examples of the method of this invention propounded in accordance with the best procedure so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a diagrammatic view depicting conventional laundry practice and the time required for each step in the laundering cycle;

Figure 2 is a diagrammatic view illustrating the procedure in the laundering method of this invention using conventional laundry apparatus; and

Figure 3 is an elevational view of an extractor or centrifuge of a type suitable for practicing the method of this invention with parts thereof broken away and shown in section.

Referring now particularly to the accompanying drawings, and especially to Figure 1 which portrays conventional commercial laundry practice, the numeral 5 designates a washing machine or "wheel" of the type now in widespread use.

The practice generally followed is to subject soiled clothes placed in the washer 5 to a series of washing, bleaching, and rinsing operations at the end of which the clothes are removed from the washer and placed in an extractor 6 and spun at high speed therein to remove as much as possible of the rinse water from the clothes.

Referring to column A, it is seen that with conventional laundry practice the washing or cleansing cycle comprises four ten minute periods of agitation of the clothes in the washer 5. In each of the first three ten minute periods of washing new hot soft water, soap and alkali are used. The last ten minute period consists in agitating the clothes in a "bleach run." Generally, no additional soap is added at this time unless insufficient soap is carried over in the clothes from the preceding washing operations.

Inasmuch as each of the four ten minute washing periods described is carried out at high temperature, the acceptable practice is to employ a high titer soap and strong alkali soap builder in the first three operations and to use a high alkali bleach in the last operation having a slow rate of decomposition so that its action is prolonged over the full ten minutes.

Because of the types of soap, soap builders and bleach in popular use, the washing and bleaching liquors generally have a pH of as high as 13.0 at the start of washing, with the pH decreasing slightly in the successive washing operations chiefly because less soap is added in each successive step of the washing cycle until a pH

of between 11.5 and 12.0 is attained in the "bleach run."

The accepted theory for the necessity of three ten minute washing operations in high titer soap and a strong alkaline soap builder is that all of the dirt must be emulsified or placed in suspension before the final ten minute bleach run so as to allow the bleach to act directly upon the clothes.

After the "bleach run," the clothes in the washer are next subjected to four separate rinses of five minutes duration each as shown in column B. It is to be understood, of course, that after each rinse the water is drained from the washer 5 to permit additional clean rinse water to be added thereto and that the clothes are agitated during each rinsing operation.

As in the washing operations, it is customary to carry out the rinsing operations with hot soft water. The purpose of rinsing obviously is to remove as much as possible of the loosened dirt and washing and bleaching liquor from the clothes.

While four rinsing operations have been indicated in the drawings, some laundries employ as many as five or six rinses. Also they may use additional washing operations with suds before the bleach run. Regardless of the number of washing operations and rinses employed, however, it is impossible even to approach 100% removal of dirt, washing liquors and bleach from the clothes with conventional laundry methods. The successive rinsing operations merely succeed in further diluting these washing liquors and fail to eliminate all of the loosened dirt.

For this reason the four rinses with hot soft water are followed by two final rinses, the first with a mild acid solution, and the second with bluing. Reference is had to column C, Figure 1, where these supplementary rinses are listed.

The first supplementary rinse consists in agitating the clothes in the washer for a period of five minutes with a mild acid, as stated, and this operation is commonly termed the "sour rinse" in laundry circles. The "sour" or acid rinse is necessary with conventional methods for neutralization of the alkaline washing and bleaching solutions retained by the clothes despite the previous rinses with soft clean water. This rinse water usually has a pH of from 5.0 to 5.4 and leaves the clothes in a more or less acid condition.

At the completion of the "sour rinse" the clothes are again agitated for an additional five minute period in a final rinse water containing bluing. The "blue rinse" is likewise considered a necessity inasmuch as it covers incomplete rinsing or elimination of washing liquors from the clothes and masks the yellowish tinge which ordinarily results therefrom. At the completion of the "blue rinse" the pH of the clothes is approximately 6.0 or slightly acid.

After drainage of the "blue rinse" the clothes are removed from the washer 5, placed in the extractor 6 and spun at high speed therein for a period D of about ten minutes or long enough to remove as much as possible of the rinse water from the clothes. After removal from the extractor the clothes are ready for ironing or drying and the laundry cycle is completed.

Attention is directed to the fact that with the method described, the laundry cycle comprising the successive steps listed in columns A, B, C, and D is of over eighty minutes duration. With the improved laundering method of this

invention the total laundry time is greatly reduced to effect a tremendous saving in time and materials to the laundering industry.

Referring now to Figure 2, it will be seen that the method of this invention may likewise be carried out in the conventional washer 5 and the extractor or centrifuge 6 if desired. The steps of washing and rinsing, however, are entirely different from those of conventional practice.

The normal washing cycle including the "bleach run" for instance is of only fifteen minutes duration and consists of only two washing or cleansing operations listed in column E.

The initial washing operation, or "breakdown," consists in agitating the clothes in the washer 5 with a washing liquor comprising hot soft water, low titer soap, and a mild alkaline soap builder for a period of about five minutes. The use of a low titer soap of between 20 and 30 titer is a radical departure from past practice, as previously it was believed that a high titer soap was essential for use with hot water to prevent separation of the fats from the alkali and consequently loss of detergent action. The term "hot water" as used herein means water of a temperature of at least 140° F.

The use of a low titer soap, however, has been found highly advantageous with the method of this invention because of its greater solubility and the ease with which it may be rinsed out of the clothes.

As will be more fully explained hereinafter, the use of a low titer soap is made possible by reason of a curtailed washing cycle and because part of the cleansing action is carried out in the centrifuge 6. Moreover, it has been found that the effective life of suds in the washing machine does not exceed five minutes. In the method of this invention, most of the dirt has been either emulsified or placed in suspension by the washing liquor at the end of the five minutes agitation period.

After the five minute "breakdown" period the dirty suds are drained from the washer to allow clean hot soft water and bleach to be added thereto. The clothes are again agitated in the "bleach run" for a period of ten minutes at the completion of which the washer is again drained and the clothes removed from the wheel.

It is essential for the advantageous practice of this invention that the alkalinity of the washing and bleaching liquors be carefully controlled through the use of proper quantities of soap, alkali soap builder, and bleach. The washing and bleaching liquors preferably should have a pH of between 9 and 11.0 or considerably lower than was previously the practice, as this permits of a shortened rinsing period. It should be understood, of course, that these values are not so critical that the washman cannot soon become accustomed to using the proper quantities of water, soap, soap builder and bleach to attain the desired pH without conducting tests for every batch of clothes washed.

The bleaching agent or liquor found best for the successful practice of the method of this invention is one comprising a solution of caustic soda and chlorine with these materials in the proportion of approximately four parts caustic soda to twelve parts chlorine. This type of bleaching agent is known as a 4%–12% solution and is gentle to the clothes but fast acting, the liberation of oxygen for bleaching being accelerated by the presence of considerably more loosened dirt in the clothes than was previously the case in conventional washing methods.

After completion of the bleach run the washer 5 is drained and if the clothes contained therein are to be transferred to the centrifuge 6 manually, cool water is introduced to cool the clothes. If provision is made for otherwise handling the clothes to effect their removal from the washer 5, the cooling step is unnecessary.

In either event the clothes are now placed in the centrifuge 6 and spun therein for a period of about one minute or at least until the centrifuge has attained maximum speed of rotation before rinsing begins. During initial rotation of the centrifuge some of the washing or bleaching liquors are expelled from the clothes by the action of centrifugal force.

As soon as the centrifuge comes up to speed, cold rinse water in large volume is sprayed over the clothes, the minimum requirement is approximately one gallon of water per pound of clothes per three minute period, and to preclude accumulation of the water in the bottom of the centrifuge and assure a positive flushing a flow through the clothes, the speed of the centrifuge must be fast enough to develop a centrifugal force or pull of no less than about 700 pounds at the rim of the basket. The speed of rotation of the basket obviously will vary with its diameter, but centrifuges used in commercial laundries, regardless of size, all satisfy this requirement. If through wear or slippage of driving belts the speed drops appreciably below that at which the centrifugal force is substantially less than that stated, the rinse water, even at minimum quantity and rate of supply, accumulates in the centrifuge. This adds to the load of the centrifuge and further reduces its speed. It is, therefore, essential that the speed of rotation of the centrifuge be kept fast enough to preclude such accumulation of rinse water therein. As a corollary, accumulation of rinse water supplied at the minimum quantity and rate is a reliable indication to the attendant that the centrifuge is not rotating fast enough.

The rinse water may be sprayed onto the clothes in the centrifuge by means of a pipe line 9 terminating in one or more spray nozzles 10 placed near the top of the perforated basket 11 and adjusted to direct the water issuing therefrom in the direction of basket rotation and so that a greater volume of water is supplied to the clothes at the upper portions of the basket than at the bottom thereof as shown in Figure. 3.

Approximately 75% of the rinse water should be supplied to the clothes nearest the top of the basket 11, that is, above the middle of the height of the mass of clothes, while the remaining 25% is directed over the clothes therebeneath. These percentages have been determined in actual practice, inasmuch as it has been found that the combined action of centrifugal force, gravity, and the downward inclination of the spray tends to force the water through the clothes at a downward and outward inclination.

When the proper volume of water is supplied for rinsing in this manner, a substantially uniform flushing action is achieved throughout all of the clothes in the basket 11 by which all of the dirty washing and bleaching liquors remaining in the clothes are thoroughly flushed therefrom. Consequently, it will be seen that not only are the clothes thoroughly rinsed of all washing ma-

terials, but washing is actually completed in the rinsing operation.

It is important to the success and proper practice of the method of this invention that a continuous supply of clean cold water having a pH of approximately 7.8 or less be used for rinsing. Plain tap water, if substantially neutral, or only mildly acid or alkaline, meets these requirements. Chemically softened water frequently attains a pH well above 7.8 inasmuch as its alkalinity is raised by passage thereof through a softener and is therefore unsuitable for rinsing. For the most part, therefore, chemically softened rinse water is unsuitable except where the alkalinity of such water does not appreciably exceed a pH of 7.8 after its passage through the softener.

Hence, satisfactory rinsing is achieved if the pH of the rinse water, whether softened or unsoftened or treated in any manner, is approximately 7.8 or less. It has been found that yellowing of the clothes during drying or pressing ordinarily results when the laundered clothes have a pH exceeding 7.8, but yellowing is avoided and the sour and blue rinses can be safely dispensed with when the pH of the rinse water is controlled as described. This desirable condition is made possible by reason of complete rinsing with substantially neutral water to eliminate all alkaline washing and bleaching materials from the clothes.

Suds extraction and rinsing by centrifugation is preferably continued for a total time of approximately five minutes or until all traces of washing and bleaching materials and liquors are eliminated from the clothes at which time the pH of the final rinse water issuing from the clothes and hence that of the clothes themselves is approximately the same as that of the rinse water supply. The time of rinsing will, of course, be extended if the ranges given for the types of soap, alkali and bleach are exceeded. Hence, it will be seen that such factors as the titer of the soap employed, and types of alkali and bleach as well as the pH range for the washing and bleaching liquors are critical only in that they determine the duration of the rinsing operation, and that rinsing is most readily effected when the proportions and pH ranges hereinbefore given for soap, soap builder and bleach are adhered to.

Without interrupting centrifugation, the rinse water is next extracted over a period of approximately five minutes or until substantially all of the water is removed from the clothes. The steps of suds extraction, rinsing and water extraction are listed in column F and while the time of each of these steps is not critical it should be remembered that the rinse water used should be clean substantially neutral cold water in the sense that its pH may range from a mildly acid to slightly alkaline condition (approximately 7.8 pH or less), and that it should be supplied to the clothes in the extractor in large volume.

The method described is primarily for white and light or medium colored clothes and requires slight variation when colored clothes are being washed. The only change in the method of washing colored clothes, however, is the use of luke warm water and the elimination of bleach. Also, due to less danger of discoloration by slight yellowish tinges, the top pH of the rinse water used for colored clothes is not so critical and its alkalinity may run substantially higher than pH 7.8 with safety.

The total time, therefore, of the various steps in the laundering cycle of this invention using present laundry equipment is only twenty-five minutes, whereas the total time of the more numerous, but less efficient steps of the old laundry methods is eighty minutes.

This vast reduction in time required to wash a batch of clothes moreover is not effected at the sacrifice of thorough cleansing. To the contrary, the concept of rinsing by centrifugation to complete the washing operation and to thoroughly flush out the washing materials and loose dirt assures complete cleansing.

The method described may be carried out successfully either when the clothes handled are loosely charged into the washer and centrifuge or when they are packaged in nets as shown at 12 in Figure 3.

The method of this invention can also be successfully practiced in the centrifuge alone. In this case a washing liquid consisting of hot soft water, low titer soap and a milk alkaline soap builder is introduced into the centrifuge 6 by means of a branch line 13 under the control of a valve 14 to issue from the nozzle 10 so as to be sprayed in large volume over the clothes (in the manner previously described for rinsing) while the same are being spun in the extractor.

After a maximum treatment of five minutes in this manner the valve 14 is closed to shut off the supply of washing liquid and the valve 15 in a bleaching solution supply branch 16 opened to introduce a bleaching solution into the centrifuge through the distributing nozzle 10 for a predetermined short interval. If desired, the bleaching solution may be mixed with the washing liquor and introduced simultaneously through the nozzle 10.

In any event, however, after bleaching is terminated the valve 15 is closed and the supply valve 17 in the pipe line 9 controlling the supply of rinse water opened to initiate rinsing in the manner hereinbefore described.

After a five minute maximum rinsing period a rinse water extraction period of another five minutes follows to complete the washing operation, it being understood that all of these operations are carried out successively under continued centrifugation of the clothes in the extractor 6. Attention is directed to the fact that none of the liquids is recirculated but instead they are discharged from the extractor through a drain line 18. The same control of alkalinity is, of course, exercised as previously brought out.

Due to the effectiveness of washing under centrifugation, it may be desirable to introduce plain tap or softened water into the centrifuge in the initial washing operation before the introduction of detergents. It has been found in actual practice that a three minute period of centrifugation while clean water is sprayed onto the clothes effects the removal of as much as 75 to 80 percent of the soil contained in the clothes when water in sufficient volume is supplied. This initial cleansing operation, of course, is followed by the spraying of detergents over the clothes and finally substantially neutral rinse water under continued centrifugation but for considerably less time due to the little dirt and soil remaining in the clothes.

Another variation of the method of this invention comprises soaking the clothes in the centrifuge 6 in hot soft water, low titer soap, and a mild alkaline soap builder for an interval of five or ten minutes before initiating rinsing. This is readily accomplished by the incorporation of a valve 19 in the drain line 18 of the ex-

tractor which allows retaining a quantity of cleansing liquor therein for soaking.

After soaking in this manner the valve 19 is opened to drain the liquor from the centrifuge and centrifugation and rinsing initiated. Again, rinsing would commence upon attainment of maximum speed in the centrifuge and would continue for a total period including suds extraction of approximately five minutes followed by a five minute period of water extraction. In this case, the actual washing out of all dirt in the clothes is accomplished by rinsing.

Throughout all of the variations of the method of this invention it is desirable that the alkalinity of the washing and bleaching liquors be held to between 9 and 11.0 pH and that cold substantially neutral water having a pH range from mildly acid to slightly alkaline (approximately 7.8 pH or less) be used in large volume for rinsing. The use of low alkaline washing and bleaching solutions enables the reduction of rinsing time as will be apparent, and as stated, the use of cold substantially neutral water for rinsing in the manner described eliminates the sour and blue rinses and results in a wash having a minimum alkalinity and therefore safe for ironing without yellowing.

It is realized that it has been proposed in the past to wash clothes under centrifugation thereof as shown and described in any one of the following United States patents:

Nos. 111,176, Churchman; 235,797, Muchin; 849,635, Obermaier; 935,570, Whitcomb; 1,077,330, Clarke; 1,165,136, Shoreman; 1,234,498, Seymour; 1,436,701, Eliel; 1,496,644, Karasinski; 1,892,441, Wales et al.; 2,101,634, Aldridge; 2,187,770, Chamberlin et al.; 2,195,615, Chamberlin et al.; 2,225,407, Bassett; 2,230,345, Bradbury; 2,264,831, Dunham; 2,267,785, Chamberlin et al.; 2,272,510, Chamberlin et al.; 2,279,656, Chamberlin et al.; 2,297,694, Dunham; 2,313,928, Dyer; and Re. 22,375, Chamberlin et al.

Of these patents those to Whitcomb No. 935,570, Aldridge No. 2,101,634, Dunham No. 2,264,831 and 2,297,694 and Dyer No. 2,313,928 are the most pertinent.

All of these patentees, however, were more concerned with the provision of a compact laundry or washing apparatus for home use and hence have ignored such highly important factors as the selection of soaps, soap builders, bleaches, and water for the purpose of controlling alkalinity.

These patentees likewise failed to appreciate that in order to rinse by centrifugation of the clothes, the cleansing or rinsing fluid must be supplied to the spinning clothes in very large volume and the speed of rotation must be high enough to produce a centrifugal force or pull of sufficient strength to achieve a flushing action of the fluid uniformly through the fabrics. Merely spraying the clothes without attaining this condition results only in a progressive dampening of parts of the clothes and the loosened dirt cannot be removed or flushed therefrom.

The neglect of these details undoubtedly is responsible for the failure of all of these past attempts to improve upon cleansing methods.

Undoubtedly the greatest factors responsible for the success of the method of this invention are the control of alkalinity by careful selection of soap and bleach throughout the various washing steps, and the supply of sufficient volume of rinsing or cleansing fluid and the maintenance of a sufficiently high speed of rotation for the centrifuge to assure a centrifugal force strong enough to achieve a flushing action of the fluid uniformly through the clothes, and as will be apparent, these are the distinguishing features between the method of this invention and previous methods.

From the foregoing description, taken in connection with the accompanying drawings, it will be readily apparent to those skilled in the art that the laundry method of this invention secures many advantages, chief among which are:

1. A tremendous saving in time required to wash a batch of clothes and consequently a great reduction in laundering labor costs.

2. Savings of large quantities of rinse water and fuel necessary to heat the water, only 15% of the hot water formerly required being necessary.

3. Tremendously increased production.

4. Reduction of production space and maintenance costs to a minimum.

5. Elimination of much of the equipment formerly required to accomplish same amount of work.

6. Savings of over 50% of the soap formerly required and complete elimination of "sour" and "blue" rinses.

7. Extension of the life of the clothes; and

8. Minimization of fading of colored clothes because of shortened washing cycle and consequently less separation or classification of clothes.

What I claim as my invention is:

1. In the art of cleansing fabrics the characterizing steps of: spraying onto the fabrics an aqueous cleansing liquid at a rate of at least one gallon of liquid per pound of fabrics per three minute period while spinning the fabrics in a centrifuge rotating fast enough to maintain a centrifugal force sufficent to preclude accumulation of the liquid in the centrifuge and thereby assure that all of the liquid sprayed onto the fabrics will flow therethrough with a positive flushing action; and continuing said spraying and centrifuging until the soil is flushed out of the fabrics.

2. The hereindescribed method of cleansing fabrics which comprises: emulsifying and loosening the soil in the fabrics by agitating them in a fast acting cleansing liquor comprising hot water and low titer soap; and removing the emulsified and loosened soil from the fabrics by spraying onto the fabrics an aqueous cleansing liquid at a rate of at least one gallon of liquid per pound of fabrics per three minute period while spinning the fabrics in a centrifuge rotating fast enough to maintain a centrifugal force sufficient to preclude accumulation of the liquid in the centrifuge and thereby assure that all of the liquid sprayed onto the fabrics will flow therethrough with a positive flushing action; and continuing said spraying and centrifuging until the soil is flushed out of the fabrics.

3. The hereindescribed method of cleaning fabrics which comprises: subjecting the fabrics to a washing operation characterized by the use of a fast acting cleansing liquor comprising hot water and low titer soap to thereby quickly effect emulsification and loosening of soil in the fabrics; and thereafter removing substantially all such soil in the fabrics together with the washing liquor by spraying onto the fabrics clean cold rinse water at a rate of at least one gallon per pound of fabrics per three minute period while the fabrics are subjected to centrifugation at a speed high enough to maintain a centrifugal force of not less than about 700 pounds at the rim of

the mass being centrifuged to thereby establish a positive flushing flow of rinse water through the clothes, said spraying and centrifuging being continued until the soil and washing liquor is flushed out of the fabrics.

4. The method set forth in claim 3 further characterized by the fact that centrifugation is about a vertical axis and the major portion of the rinse water is sprayed onto the fabrics near the top of the mass being centrifuged while the minor portion of the rinse water is sprayed onto the fabrics near the bottom of the mass.

5. A three part fabric washing method which comprises: subjecting the fabrics to be washed to an initial breakdown washing operation in which the fabrics are agitated in a cleansing liquor comprising hot water and low titer soap, the duration of said breakdown operation being approximately five minutes; subjecting the fabrics to a second washing operation in which the fabrics are agitated in an aqueous cleansing liquor containing bleach for a period of approximately ten minutes; and thereafter completing the washing cycle by subjecting the fabrics to centrifugation at a speed sufficient to maintain a centrifugal force of not less than about 700 pounds at the rim of the mass of fabrics being centrifuged and spraying clean cold rinse water onto the fabrics at a rate of at least one gallon of water per pound of fabrics per three minute period to thus establish a positive flushing flow of rinse water through the fabrics, and maintaining said positive flow until all remaining cleansing liquor and loosened soil is thoroughly flushed out of the fabrics.

6. The hereindescribed method of cleansing fabrics which is characterized by the spraying onto the fabrics of an aqueous cleansing liquid at a rate of at least one gallon of the liquid per pound of fabrics per three minute period while the fabrics are subjected to centrifugal force of not less than about 700 pounds at the rim of the mass being centrifuged to thereby establish a positive flow of the cleansing liquid through the fabrics.

7. The method set forth in claim 6 further characterized by the fact that centrifugation is about a vertical axis and the major portion of the cleansing liquid is sprayed onto the fabrics near the top of the mass being centrifuged while the minor portion of the cleansing liquid is sprayed onto the fabrics near the bottom of the mass.

8. The hereindescribed method of cleansing fabrics which comprises: emusifying and loosening the soil in the fabrics; thereafter subjecting the fabrics to centrifugation at a speed high enough to produce a centrifugal force of not less than about 700 pounds at the rim of the mass of fabrics being centrifuged; and when said speed is attained spraying onto the fabrics clean rinse water at the rate of at least one gallon of water per pound of fabrics per three minute period and for a length of time sufficient to flush the loosened soil from the fabrics.

9. The method set forth in claim 8 further characterized by the fact that centrifugation is about a vertical axis and that approximately 75% of the rinse water is sprayed onto the fabrics lying above the middle of the height of the mass being centrifuged.

10. The method set forth in claim 8 further characterized by the fact that the water is sprayed onto the fabrics in the direction of rotation of the mass.

11. The method set forth in claim 8 further characterized by the fact that emulsification and loosening of the dirt is effected by washing the fabrics in a fast acting cleansing liquor comprising hot water and low titer soap.

12. The method set forth in claim 11 additionally characterized by the inclusion of a bleach directly in the fast acting aqueous cleansing liquor.

HOWARD R. FINK.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
Re. 22,375	Chamberlin et al.	Sept. 14, 1943
111,176	Churchman	Jan. 28, 1871
235,797	Muchin	Dec. 21, 1880
849,635	Obermaier	Apr. 9, 1907
935,570	Whitcomb	Sept. 28, 1909
1,077,330	Clarke	Nov. 4, 1913
1,165,136	Shoreman	Dec. 21, 1915
1,234,498	Seymour	July 24, 1917
1,436,701	Eliel	Nov. 28, 1922
1,496,644	Karasinski	June 3, 1924
1,892,441	Wales et al.	Dec. 27, 1932
2,101,634	Aldridge	Dec. 7, 1937
2,143,307	Ekstrom	Jan. 10, 1939
2,187,770	Chamberlin et al.	Jan. 23, 1940
2,195,615	Chamberlin et al.	Apr. 2, 1940
2,225,407	Bassett	Dec. 17, 1940
2,230,345	Bradbury	Feb. 4, 1941
2,264,831	Dunham	Dec. 2, 1941
2,267,785	Chamberlin et al.	Dec. 30, 1941
2,272,510	Chamberlin et al.	Feb. 10, 1942
2,279,656	Chamberlin et al.	Apr. 14, 1942
2,297,694	Dunham	Oct. 6, 1942
2,313,928	Dyer	Mar. 16, 1943
2,357,909	Ridge	June 1, 1944

OTHER REFERENCES

Jackman, Chem. of Laundry Matls., Longmans, Green & Co., N. Y. C., 1931, pages 62–65, 73. (Copy in Div. 64.)

Procter & Gamble, "Better Laundering," 1942, pages 46–48, 67, 75–79, 131–135.

"Home Laundering," Farmers' Bull. No. 1497, U. S. Dept. of Agriculture, 1940, pages 20, 21. (Copy in Div. 43.)