

UNITED STATES PATENT OFFICE.

ROBERT A. PHAIR, OF ALLENDALE, NEW JERSEY, ASSIGNOR TO H. KOHNSTAMM & CO.,
INC., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

PROTECTING FABRIC.

No Drawing.

Application filed March 9, 1925. Serial No. 14,341.

When cotton and other vegetable fabrics are laundered they often come out with holes eaten through the fabrics from causes which it has been difficult to determine. I have
5 found that in some cases these holes are caused by minute quantities of sulphur compounds in the air in which the fabrics are allowed to dry. This condition is most prevalent in the neighborhood of smelters or of
10 large cities where the consumption of coal or oil for heating or other purposes is considerable. The fabric absorbs sulphur compounds as SO_2 and SO_3 from the air, while the fabric is wet. As it dries in the air the
15 oxygen and the water of the atmosphere convert the absorbed gases into sulphuric acid (H_2SO_4). In as small a quantity as one-tenth of one per cent, this injures the fabric when it comes to be ironed.

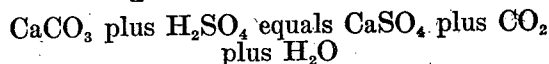
20 The ironing operation concentrates the acid in spots or rings in the fabric. When the dry fabric is sprinkled preliminary to ironing, each drop of water spreads by absorption and displaces the acid pushing it out to the edge
25 of the circle where it constitutes a ring of acid more concentrated than in the beginning. When the clothes are hung out to dry certain parts generally get the greatest exposure to air or wind and take up the greatest percentage of sulphur compounds, and these are
30 the parts which rot most quickly after ironing. In the ironing operation, the high temperature carbonizes the acid-charged rings or spots; or, with the concentration of the
35 acid, hydrolyzes the cotton or removes the water from the molecules thereof, which makes it brittle. These brittle spots are soluble in the alkali which is used in the next laundering operation. Consequently, in
40 one or two subsequent operations the fabric is destroyed at the points of concentration of the acid.

The conditions referred to arise in most domestic laundering work where the clothes
45 are hung in the atmosphere to dry and where the water is not sufficiently alkaline to neutralize the acid from the atmosphere. The same conditions occur in what are called "wet washes" where the washed goods are
50 delivered wet to the owner who then dries them in the atmosphere and irons them. And the same conditions may occur to a greater or less extent in other circumstances.

I propose to remedy the trouble by applying
55 ing to the fabric an agent capable of neutral-

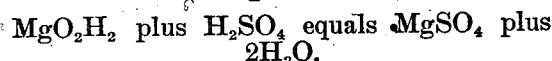
izing the acid or of altering its activity to a non-destructive character. This can be accomplished by introducing in suspension in the water used at or near the end of the washing operation a suitable neutralizing agent. 60
Example of such an agent are (1) chalk preferably in the pure precipitated form (CaCO_3), (2) calcium borate (CaBO_4) or (3) magnesium hydrate (MgO_2H_2).

In the first example, the following reaction 65
takes place when the fabric is moistened for ironing—



70 The CaSO_4 is a non-destructive compound which remains in the fabric until it is washed out in the next laundering. The CO_2 goes off as a gas. The H_2O is evaporated.

With the third of the agents referred to 75
above the following reaction takes place—



The MgSO_4 is a non-destructive salt which is 80
washed out in the next laundering.

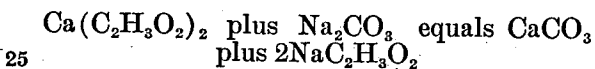
Similar reactions and results take place with other agents referred to above and with those cited below. Instead of the above protecting agents we may use a solution of a 85
soluble acetate, formate, fluoride or other salt which would cause the destructive acid to combine with the metallic end of the salt and liberate an acid which is non-destructive to the fabric. Such agents for example are (1) 90
sodium acetate ($\text{NaC}_2\text{H}_3\text{O}_2$) (2) potassium formate (KCHO_2) or (3) sodium fluoride (NaF).

The agents of a third group can be used, being solutions of an alkali or salt having an 95
alkaline reaction, such, for example, as (1) trisodium phosphate (Na_3PO_4), (2) bicarbonate of sodium (NaHCO_3) or (3) calcium hydrate (CaO_2H_2).

Instead of introducing the agent directly 100
into the wash or rinse water there can be introduced agents which will combine in such water to form a protecting agent. For example, the fabric may be subjected first to a solution of a salt or base and afterwards to 105
another solution containing another salt or base which will form with the first a compound in the fabric which is relatively insoluble and of such nature as to neutralize the destructive acid either by changing its acid 110

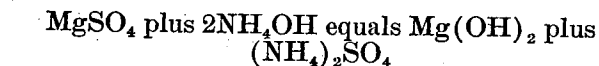
quality or by changing it to an acidity of a non-destructive nature. For example, we may introduce into one of the rinse waters calcium acetate ($\text{CaC}_2\text{H}_3\text{O}_2$); and into the next 5 rinse water, sodium carbonate (Na_2CO_3). Or we may introduce into successive waters magnesium sulphate (MgSO_4) and ammonium hydrate (NH_4OH). Where two agents are used to combine and form the protecting agent desired, the two combining 10 agents may be introduced in inverse order to that stated above. Or they may be introduced into earlier waters than the last two. In fact, various agents may be introduced 15 in various ways, the essential thing being to operate in such a way as to have some of the protecting agent remain in the goods after they have passed through all the washing and rinsing waters.

20 In the generation of the protective agent by these methods reaction in the first case will be as follows:—



25 The CaCO_3 thus produced is an insoluble salt. The $\text{NaC}_2\text{H}_3\text{O}_2$ is the sodium acetate which serves as the protecting agent.

In the second case the reaction is as follows:—



35 In this case the $\text{Mg}(\text{OH})_2$ is the protective agent and the $(\text{NH}_4)_2\text{SO}_4$ is a harmless salt.

The quantity of the protecting agent to be introduced is very slight, though it will depend to a great extent on the degree of acidity of the atmosphere. The protecting agent 40 may be such as to combine with the acid chiefly in the air or chiefly when the fabric is dampened and heated by the iron, or equally under both conditions.

45 Animal fabrics are not generally affected greatly by an acid atmosphere, though some of the colors used therewith may be. Therefore the invention is particularly important in connection with cotton and other vegetable fabrics.

The protective agent does not have to be insoluble in the direct sense. It must be of such a composition and applied in such a way and at such time that it will remain in the goods to protect them from the destructive 55 action of the acid vapors or from the formation of destructive acids in the goods. The desired protection may be obtained either by neutralizing the acidity or by transforming the composition having the destructive acidity to a composition having a non-destructive 60 character such as a salt or another acid which is not destructive. And while the agents used are designed particularly to protect the fabric against sulphuric acid, they will serve also to protect it against other destructive 65 acids to which the fabric may be exposed.

Though I have described with great particularity of detail certain embodiments of my invention, yet it is not to be understood therefrom that the invention is restricted to 70 the particular embodiments disclosed. Various modifications may be made by those skilled in the art without departure from the invention as defined in the following claims.

What I claim is:—

1. The method of laundering textile fabrics which consists in washing them as usual and thereafter applying thereto in rinse water a protective agent adapted to remain 80 in the goods to prevent the destructive action of acid vapors and the formation of destructive acids in the fabrics.

2. The method of claim 1, the protective agent being adapted to transform any composition in the fabric having a destructive 85 acidity to a composition having a non-destructive character.

3. The method of claim 1, the protective agent being adapted to prevent destructive action by sulphuric acid. 90

4. The method of claim 1, the protective agent being adapted to transform sulphuric acid compounds to compounds having a non-destructive character.

In witness whereof I have hereunto signed 95 my name.

ROBERT A. PHAIR.