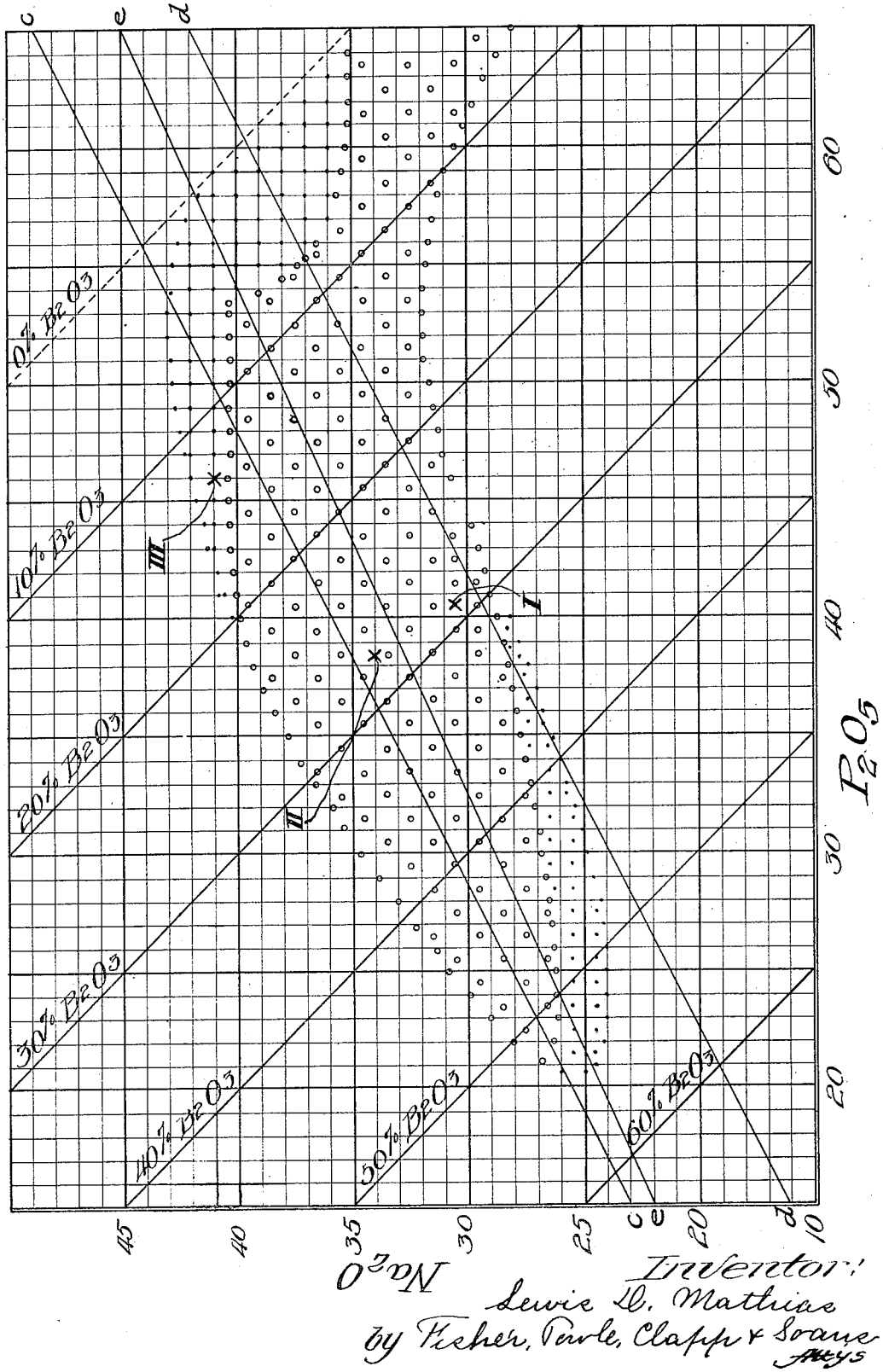
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FIRE RESISTING OR FLAMEPROOF STARCHING COMPOSITION

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FIRE-RESISTING OR FLAMEPROOF STARCHING COMPOSITION.

Application filed December 27, 1921. Serial No. 524,922.

To all whom it may concern:

Be it known that I, LEWIS D. MATHIAS, of Chicago Heights, Cook County, Illinois, have invented certain new and useful Improvements in Fire-Resisting or Flameproof Starching Compositions, of which the following is a specification.

The invention relates to compositions for starching clothing, curtains and the like and for rendering the same non-inflammable or fire resisting.

As set forth in a companion application of Launcelot W. Andrews and myself, filed in the United States Patent Office July 5, 1919, Serial No. 308,781, I have found that fire-proofing solutions of salts containing the oxide of a fixed alkali metal, such as sodium oxide (Na_2O), phosphoric oxide (P_2O_5) and boric oxide (B_2O_3) can be so proportioned that they are non-crystallizing, under ordinary atmospheric conditions, non-dusting and substantially neutral (or slightly acid or alkaline as desired) and can be employed for fireproofing fabrics without injuring or discoloring the same and without destroying their pliability. The suitable proportions are indicated in the accompanying diagram in which the verticals, horizontals and diagonals represent respectively different percentages of sodium oxide, phosphoric oxide and boric oxide as compared with the total amount of these ingredients. As noted on the diagram, the area dotted with circles indicates non-crystallizing mixtures and that dotted in points, difficultly crystallizing mixtures. The zone between the lines *c—c* and *d—d* indicates substantially neutral mixtures, those above the line *c—c* being alkaline, and those below the line *d—d* being acid, and those lying on the line *e—e* being strictly neutral. Also, as set forth in the application referred to, the mixtures can be formed in different ways, but preferably various sodium phosphates, borax and boric acid are employed.

I have found further that these mixtures, and particularly those which are substantially neutral or only slightly acid or alkaline, can be combined with starch and satisfactorily employed in the ordinary laundering process for starching and, at the same time, fireproofing fabrics such as curtains, children's dresses and other articles which are customarily treated with starch. For articles which are ironed, the mixtures should also contain a suitable lubricant, such as powedered talc.

While various materials, for example the hydrated forms of the oxides specified may be employed in forming mixtures having the desired proportions of the essential fireproofing ingredients, preferably, however mono-sodium phosphate, since readily soluble, is employed in admixture with sufficient borax to render the composition neutral or substantially so, or, if desired, slightly alkaline or slightly acid, and these ingredients are mixed in dry powdered form with starch and powdered talc. In place of the mono-sodium phosphate and borax, use could be made of di-sodium phosphate and boric acid, or mono- and di-sodium phosphates with either borax or boric acid, or both, could be employed.

The materials and parts by weight may be as follows:

Example I.

Mono-sodium phosphate (NaH_2PO_4)	9.3
Borax ($Na_2B_4O_7.10H_2O$)	10.7
Starch	3.
Talc	3.

Example II.

Di-sodium phosphate ($Na_2HPO_4.12H_2O$)	27.7
Boric acid (H_3BO_3)	6.94
Starch	3.
Talc	3.

Example III.

Di-sodium phosphate ($Na_2HPO_4.12H_2O$)	23.18
Borax ($Na_2B_4O_7.10H_2O$)	.56
Boric acid (H_3BO_3)	1.97
Starch	3.
Talc	3.

The ingredients in each case are preferably mixed and placed upon the market in dry powdered form. In use, about two and one-half pounds of the material is added to a gallon of water. Preferably, the material is first mixed with a small amount of cold water. The full amount of water, boiling hot, is then added and, if necessary, the mixture is heated until the salts are dissolved. It is then applied to the articles of clothing or the like in the manner usually employed with an ordinary starch mixture. The powdered talc acts as a lubricant in facilitating

he subsequent ironing of the treated fabics. While talc is preferred for this purpose, two or three per cent of common salt could be used instead.

The relative percentages of the sodium oxide, phosphoric oxide and boric oxide, as compared with the total amount of these ingredients in the examples above given are as follows:

Example I, P_2O_5 40.6%, Na_2O 30.5%, B_2O_3, 28.9%; Example II, P_2O_5 38.4%, Na_2O 34%, B_2O_3 27.6%; and Example III, P_2O_6 46%; Na_2O 41%, B_2O_3 13%; and they are indicated on the diagram at points I, II and III respectively. The proportions of these ingredients may be varied within the limits indicated by the dotted area in the diagram and the mixtures may be made strictly or substantially neutral or slightly acid or alkaline as desired, without destroying the peculiar non-crystallizing quality of the composition. So, also, the proportion of starch and talc can be varied to suit different conditions.

I claim as my invention:

1. A fireproofing and starching composition containing as its essential ingredients a fixed alkali metal oxide, phosphoric oxide, boric oxide and starch.

2. A fireproofing and starching composition containing as its essential ingredients a fixed alkali metal oxide, phosphoric oxide, boric oxide, starch and a suitable lubricant.

3. A fireproofing and starching composition containing as its essential ingredients a fixed alkali metal oxide, phosphoric oxide and boric oxide in proportions to form a difficultly crystallizing or non-crystallizing solution, and starch.

4. A fireproofing and starching composition containing as its essential ingredients a fixed alkali metal oxide, phosphoric oxide, and boric oxide in proportions to form a non-crystallizing, substantially neutral solution, starch and powdered talc.

5. A fireproofing and starching composition comprising alkali metal phosphate, a borate and starch in substantially the proportions specified.

6. A fireproofing and starching composition comprising alkali metal phosphate, a borate starch and powdered talc in substantially the proportions specified.

7. A fireproofing and starching composition comprising mono-sodium phosphate and borax in proportions to form a substantially neutral, non-crystallizing solution, and starch.

8. A fireproofing and starching composition comprising mono-sodium phosphate, borax, starch and powdered talc in substantially the proportions specified.

9. A fireproofing and starching composition comprising an alkali metal phosphate and borate, in proportions to form an aqueous solution non-crystallizing under ordinary atmospheric conditions, and starch.

LEWIS D. MATHIAS.