UNITED STATES PATENT OFFICE.

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MATCH-HEAD COMPOSITION.

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To all whom it may concern:

Be it known that I, JOHN R. MARDICK, a citizen of the United States, and resident of the borough of Manhattan, in the city, county, and State of New York, have invented a new and useful Match-Head Composition, of which the following is a specification.

My invention relates to the manufacture of matches and match-head compositions, and has for its object to produce matches more cheaply and advantageously, and with improvement in the product. The invention is applicable to common or strike-anywhere matches and to safety matches.

The oxidizing agent generally employed in match-head compositions is potassium chlorate, which is easily broken up by ordinary rubbing friction so as to yield up its oxygen to burn the combustibles. My purpose is to provide an oxidizing agent for these compositions, which is more effective, produces a steadier burning match, (less violence or sputtering), and, all things considered, at less expense, and with greater convenience and safety in the manufacture. This is accomplished by substituting one or more perchlorate compounds in place of the usual chlorate.

The following are advantages in displacing chlorates with perchlorates in match-head compositions.

1. Chlorates have three oxygen atoms, while the perchlorates have four. As the economic value of the chlorates in matches really depends on its oxygen percentage it follows that perchlorates having more oxygen will have more economic value than the chlorates. That is to say, perchlorates, having 25% more oxygen than the chlorates, will have 25% more oxidizing value.

2. Potassium chlorate is the only salt commonly used in the match industry.

Ammonium chlorate is too unstable for use.

Sodium chlorate is too hygroscopic.

On the other hand, there are several examples of perchlorate compounds, like potassium, ammonium, sodium, and barium perchlorates which are available for the match industry.

3. In making the chlorates it requires substantial time and care to prepare pure chlorates.

On the other hand, it is commercially easy to make and purify perchlorates as compared with the chlorates. Thus, potassium, sodium, and ammonium perchlorates are easily crystallized out and separated, much more so than the corresponding chlorates.

4. In preparing oxidizing materials for matches, it is necessary to have them ground fine. In the case of chlorates, the grinding and handling is more dangerous than with the perchlorates.

5. While it requires more electric current to put on the extra oxygen in the chlorate, in order to make perchlorates, this cost item is offset by the cheapness in handling and purifying the perchlorates, and the smaller amount required.

Other advantages may be found.

In carrying out my invention, I can make use of all the known ingredients in match compositions and displace the chlorate in its entirety or in substantial proportion with perchlorate in all compositions and formulas by which common strike-anywhere and safety matches are made.

In practising this substitution or displacement of chlorates by perchlorates, I use the following proportions:

80 parts of potassium perchlorate against 100 parts potassium chlorate,

75 parts of sodium perchlorate against 100 parts potassium chlorate,

70 parts of ammonium perchlorate against 100 parts potassium chlorate.

These proportions hold good in all common match-head compositions, as well as in so-called safety matches.

In proceeding with my invention I do not confine myself to any particular formula, but I make free use of binders, such as glues and gums; flamers, such as phosphorus and sulfur compounds; oxidizers, one or more perchlorates; fillers and friction substances — powdered sand, powdered glass, chalk, gypsum, etc. For example,

Common matches (head composition).

Phosphorous sesqui-sulfid	5	to	15	parts.
Potassium perchlorate	20	"	25	"
Glue or gum arabic	20	"	35	"
Powdered sand	30	"	40	"
Sulfur, coloring matter, etc.	4	"	5	"

In the safety matches, where antimony sulfid and red phosphorus are commonly used, I simply displace the chlorate with the perchlorate, leaving all the other ingredients the same.

For a specific formula of a common match, I take the following:

Phosphorous sesqui-sulfid	6%
Ammonium perchlorate	20%
Glue	17%
Water	35%
Inert substances	22%
	100%

Safety match.

Red phosphorus	10%
Potassium perchlorate	30%
Chalk	7%
Ground sand	27%
Glue or gum arabic	16%
Magnesium silicon	10%
	100%

I find that the use of magnesium silicon, in connection with chlorates and perchlorates improves the quality of matches, gives a steadiness to the match, causing the same to burn uniformly, without spitting or spurting action, and therefore I claim the use of this ingredient as another part of my invention in the improvement of matches.

In making match compositions, while I prefer to use perchlorates, as principal oxidizing agents, I may also use chlorates and perchlorates mixed, though at least 25% perchlorate in the oxidizing part of the composition would seem necessary for any technical advantage, and 50% or more up to the total is the contemplation of the invention. Naturally, two or more perchlorates could be used in the same composition, if desired.

What I claim as new is:

1. A match-head composition containing one or more perchlorates in substantial proportion as the oxidizing agent.

2. A match the head of which contains a perchlorate in substantial proportion as the oxidizing agent.

JOHN R. MARDICK.