

UNITED STATES PATENT OFFICE.

JOSÉ J. MACHADO, OF HAVANA, CUBA.

IMPROVEMENT IN THE MANUFACTURE OF FRICTION-MATCHES.

Specification forming part of Letters Patent No. 153,004, dated July 14, 1874; application filed June 6, 1874.

To all whom it may concern:

Be it known that I, JOSÉ J. MACHADO, of Havana, Cuba, have invented a new and useful Improvement in the Manufacture of Friction-Matches, of which the following is a specification:

The object of my invention is to so improve the manufacture of friction-matches that no poisonous ingredients are used, and thereby the health of the workmen protected, and the danger of poisoning to children obviated. The matches are, furthermore, more secure, as they can only be ignited on a specially-prepared surface, by which a great source of accidents and the danger of fire are avoided, so that the rates of insurance for buildings and shipment may be reduced. The matches ignite instantly, and without throwing sparks, burning a sufficient length of time with great heat, even in a strong draft or current of air, so as to allow the lighting of cigars and the use of the matches in the open air, being also water-proof and insensitive to moisture.

The invention consists of the preparation of the matches with a composition not liable to ignition, except on a prepared surface of amorphous phosphorus, in such a manner that part of the match is covered with a slower burning composition, while the point or end is prepared with greater affinity to the surface for more rapid ignition. The combustible composition is made entirely water-proof by dipping it into a solution of alcohol and tannic acid.

The mode of applying the composition to the match-sticks corresponds to that in common use. The sticks are dipped about half an inch (more or less, from the end) into a paste composed of five parts of chlorate of potash, six parts of peroxide of manganese, one part of strong glue, and twelve parts of water, together with a small quantity—about nine-twentieths or one-half of a part—of benzoin, or some other fragrant resinous gum, which accelerates the combustion, and avoids the disagreeable smoke or smell of the gases. The extreme ends of the sticks are then dipped again into a similar but more combustible paste, which is, preferably, composed of five parts of chlorate of potash, three parts of

peroxide of manganese, one part of strong glue, fifteen parts of water, under the addition of small quantities of sulphuret of antimony, bichromate of potash, and benzoin, say, respectively, three one-hundredths, six one-hundredths, and eight one-hundredths of a part. This increases the affinity of the match-head to the prepared surface of friction, on which alone the matches will ignite, they being not liable to ignition on any other frictional surface.

The surface of ignition is produced by spreading a paste, made of ten parts of amorphous phosphorus, thirteen parts of sulphuret of antimony, four parts of strong glue, and ninety parts of water, over suitable sheets of pasteboard or other material, to be attached either to the wall or to the match-boxes in similar manner, as in the case of the well-known Swedish matches. The properties of the above compositions may be varied from in order to make the extreme end of the match more or less sensitive to the friction on the surface, so as to increase or diminish the ignition, and accelerate or retard the combustion of the rest of the composition.

For the purpose of protecting the combustible compositions against the influence of dampness and moisture, and make them perfectly water-proof, I dip them into a solution of one part of alcohol, and one one-hundredth part of tannic acid. This I consider as a most important part of my invention, as the protective quality of tannic acid renders the matches combustible under all circumstances, and enhances greatly their practical value. By the use of the more combustible composition used at the extreme ends of the sticks, without the dipping in of the same into the slower combustible composition, matches having the qualities of common matches, but with more rapidly-ignited heads, are produced, while by the use of the slowly-burning composition a match for use in the open air, which resists any current of air, but has less liability to friction, is obtained. The match composition burns a sufficient length of time to light anything therewith, igniting the wood in the usual manner.

I do not claim, broadly, a safety-match—

that is, one that can be ignited only on a specially-prepared surface, as such have been made; but .

Having fully described my invention, what I do claim is—

1. As a new article of manufacture, a match dipped to some length into a slower burning composition, not liable to be extinguished by a draft of air, and provided with a head of rapidly-combustible composition, to be only ignited on a frictional surface having chemical affinity thereto, substantially as set forth.

2. The process of water-proofing the combustible composition of match-heads by dipping the same into a solution of alcohol and tannic acid, substantially in the manner and for the purpose set forth.

JOSÉ J. MACHADO.

Witnesses:

PAUL GOEPEL,
T. B. MOSHER.