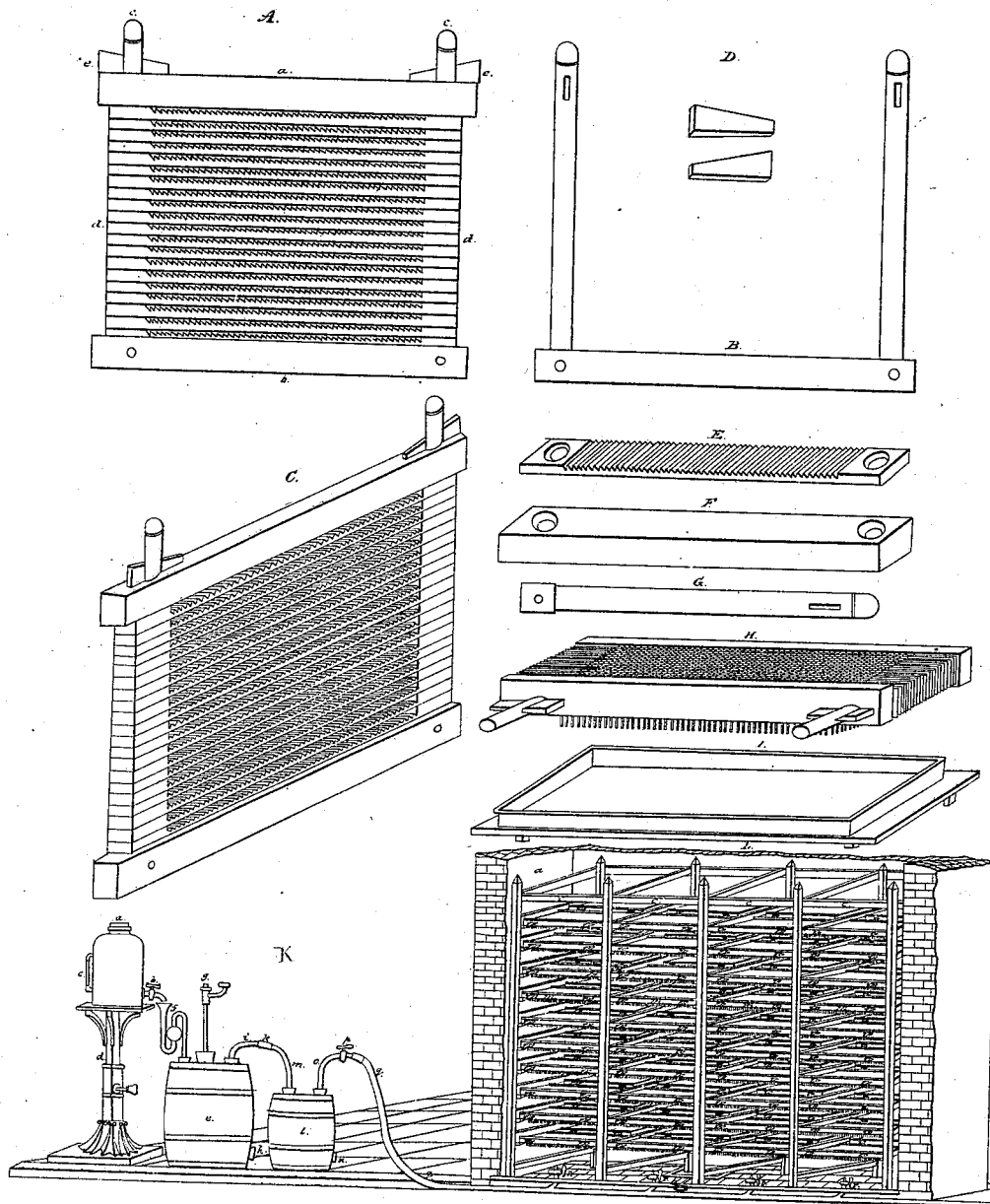


S. KRACKOWIZER.
MANUFACTURE OF FRICTION MATCHES.

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Witnesses:

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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN THE MANUFACTURE OF FRICTION-MATCHES.

Specification forming part of Letters Patent No. 47,311, dated April 18, 1865.

To all whom it may concern:

Be it known that I, STEFAN KRACKOWIZER, of New York, N. Y., have invented a new and Improved Covering of the Friction Mass of Matches; and I do hereby declare that the following is a full and exact description thereof.

The nature of my invention consists in covering the friction-mass of matches with a shining metallic skin, which will protect it against humidity and oxidation and decomposition, prevent the evaporation of the phosphorus, and thereby preserve its good quality for years, make it less injurious to health, and give it a fine and tasteful appearance.

To enable others skilled in the art to make and use my invention, I will proceed to describe my process more fully.

I first impregnate the friction mass which I intend to employ in a thorough manner with hyperoxide of lead and nitrate of oxide of lead as bearers of oxygen. After the matches are immersed in the said mass and dried in the usual manner, I immerse them again a little over and above their heads, either in water, or, if I desire to make the metallic skin or covering thicker, in a solution of any salt of lead, to which some vegetable or animal glutinous substance may be added. I then expose them when still moist to a stream of hydrothionic acid gas, whereby—that is, from the lead in the phosphoric mass coming in contact with the hydrothionic-acid gas—a skin of a metallic luster, consisting of sulphide of lead, is formed on the surface of the phosphoric mass or heads of the matches.

It is to be observed that the stream of hydrothionic gas may be generated either directly or indirectly and may be gained from all substances yielding the same, but is produced in the simplest and cheapest way from sulphide of iron or sulphide of calcium; also, that a similar result may be obtained by immersing the phosphoric or friction mass of the heads of the matches in a solution of salts of lead instead of impregnating the whole mass with the substances above described, and that instead of hyperoxide of lead other oxides of lead may be used with more or less advantage.

Following is a description of the drawings annexed:

A is a view of a matches-machine as it is used by several manufactories for manipulation. Its use is to put up one thousand

matches of the same thickness and length in such equal distance to each other as forming with their free ends a very accurate horizontal plane, like a brush, to be prominent half an inch over the one side of the machine. (See Figure H.) In this manner it will be possible to make every manipulation quickly and without all danger—as the impregnation of the matches with molten sulphur, or stearine, paraffin, or wax, the dipping of the same with the friction mass, the moistening for the purpose of the galvanization, and lastly, the drying. The machine consists of good hard and very-well seasoned wood, and measures eighteen inches in length, ten inches in height, and one and one-half inch in depth. The constituents of it are—

a, the head part, upper part. It is a rectangular quadrangular prism, consisting of hard wood of eighteen inches length, one and one-half inch depth, and one inch height, provided with two perpendicular holes at a distance of one-half inch from the ends, for letting through the spindles *c*.

b, the lower part. It is a perpendicular quadrangular prism, of the same form as the head part, having also at a distance of one-half inch from the ends two perpendicular holes, in which are fastened the spindles in an exact perpendicular position.

c, the spindles—two cylinders of tough and hard wood, twelve inches in height and one-half inch in diameter, rounded at the top of the end, and bound a little below it with a wire. In the upper part of the end level the head part is in every one of the cylinders a slit parallel with the longitudinal diameter of the head part. It is three-fourths of an inch high and one-fourth of an inch wide. They answer the purpose to force in the wedges *e* from the outside to the inside. The lower part of the spindles is fastened perpendicularly in the end holes of the lower part of the machine *b*.

d, the receiving-boards of matches. They measure seventeen and one-half inches in length, one and one-half inch in depth, and three-eighths of an inch in height, and may be made of soft wood. On their upper surface are sunk fifty half-channels, one-eighth of an inch deep, and each one forming an oblique angle congruent with all the others. (Look at the drawings.) At a distance of one-fourth of an inch from the ends are two per-

pendicular holes. These holes are reasonably larger than the diameter of the spindles, with a view to prevent their catching when they are fitted over the spindles or lifted out again. The machine contains twenty receiving-boards for which the spindles act as guides and fasteners. The lower surface of the receiving-boards is covered with cloth, glued on, or with felt, in order to exercise a very homogeneous pressure on the matches spread on indented surface of the below succeeding board. The right hand now takes up loosely a bunch of matches between the half-bent fingers and the thumb. While the hand now passes over the roughened surface of the receiving-board from the left to the right, the matches are allowed to drop down between the thumb and the tips of fingers, while the nail of thumb, hugging closely the surface of the board, forces in each notch one simple match, and brushes off all those of larger number than fifty. If all the receiving-boards are now dressed, and piled up in layers by means of filling them on the spindles, the

e, head part is now put on top and wedged on, (wedges) *e*. In a larger manufactory at least ten thousand such machines are needed, so that the daily production amounts to ten millions of friction-matches.

B shows the lower part of the machine, with the upright and perpendicularly-fastened spindles in the front view.

C shows the view of the before described machine, situated in the perspective.

D shows the two wedges of the machine, viewed in half-perspective.

E shows a receiving-board horizontally situated, viewed in half-perspective.

F shows the head part of the machine, viewed in half-perspective.

G shows one of the spindles of the machine in a horizontal position, presented in the front view.

H shows a machine in all its parts in horizontal position, dressed with one thousand matches.

I shows a tin tub horizontally on a table, viewed in the perspective. It measures twenty-six inches in the length, fourteen inches in the width, and three fourths inch in the height. It is used to moisten the matches with water or with a solution of salt of lead when they are to be galvanized.

K, apparatus by which I produce the hydrothionic gas. It shows the front view, and consists of (*a*) a vessel of lead, filled with acid sulfuric and provided with (*b*) a leaden faucet at the bottom; further, (*c*) a gage of glass to control the quantities of the drawn-off acid and the contents of the vessel; (*d*) a table by which the vessel can be placed higher and lower, farther off; (*e*) an oaken barrel of corresponding size, in order to produce the gas either with sulphuret of iron or sulphuret of

calcium; (*f*) a Velters funnel of porcelain, (look at the drawings); (*g*) the twisting-stick, made from very good lined copper, in order to stir up the mixture generating the gas; (*h*), the bung-hole to draw off the residuum; (*i*) a tin pipe of proper dimension to lead off the gas to the apparatus of gathering the gas; (*k*) the connection of india-rubber, connecting the pipes of the two barrels; (*l*) another barrel of oak (apparatus of gathering the gas) of responding size with (*m*) the receiving gas-tube; (*n*) the bung-hole to draw off the water, when necessary; (*o*) the distributing gas-pipe, of tin, and of proper dimensions. On its end is (*p*) the stop-cock, of tin, in order to regulate the stream of the gas; farther the (*q*) tube of india-rubber leading in the galvanization-room provided with (*r*) stop-cocks to regulate the stream of gas to the galvanization-room.

L, the room for galvanization and drying, consisting of (*a*) the inclosing brick-work, very thoroughly ventilated by a chimney. The front part may be imagined closed by brick-work, and furnished with two small doors, through which the workman enters who puts the machines on the drying-stands. Each door is opposite two drying-stands, *c*, farther off (*b*) the register to regulate the hot air coming from the heater, which is below the room of galvanization, in order to dry the galvanized matches. Finally, (*c*) the drying-stands of wood. They have four equal partitions. Each partition has about ten slides of sufficient depth to receive each two machines—one behind the other—in a distance of six inches from each other; (*d*) the view of the above-described galvanization and drying room is presented in half a perspective, and shows the number of eighty machines resting in the slides, behind each other, in a horizontal position, and containing eighty thousand matches ready to be galvanized.

The drawings before described I do not pretend to be an integral of my invention, but only made and explained in order to represent in a tangible form all parts of its procedure.

The chemical process, however, by which the friction mass is to be covered with a shining skin of sulphuret of lead, by the aid of hydrothionic gas and the denoted preparats of lead, and which I name "galvanization or metallization," I declare to be the invention of mine, for which I request to obtain a patent of the United States.

What I claim as my invention, and desire to secure by Letters Patent, is—

The formation of a metallic skin around the friction or phosphoric mass of matches, consisting of sulphide of lead, substantially in the manner above described.

STEFAN KRACKOWIZER.

In presence of—

AARON FRANK,
WM. M. HOLT.