

**DANGERS AND  
CHEMISTRY OF FIRE, FOR  
GRAMMAR SCHOOLS**

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Dangers and Chemistry of Fire, for Grammar Schools by Clarence Maris

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# Dangers and Chemistry of Fire

For Grammar Schools

PREPARED UNDER THE DIRECTION OF  
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## THE TEACHING OF DANGERS FROM FIRE

The 84th General Assembly of Ohio amended the law relating to fire lessons and fire drills in schools to read as follows:

Sec. 12901. The state fire marshal and the superintendent of public instruction are hereby empowered and directed jointly to provide a course of study in fire prevention for use in the public, private or parochial schools of the state, dealing with the protection of lives and property against loss or damage as a result of preventable fire. It shall be the duty of each board of education or the board or persons in control of such schools to compel the use of such course of study in each school under their control. Whoever, being a teacher or instructor in a public, private or parochial school, wilfully neglects to devote at least fifteen minutes in each week during which such school is in session to instructing the pupils thereof as to the dangers of fire, shall be guilty of a misdemeanor and fined not less than five dollars nor more than twenty dollars.

Sec. 12902. On and after September first, one thousand nine hundred and twenty-one, it shall be the duty of each teacher in the public, private or parochial schools in the state to use such course of study in fire prevention in the classes under his control. There shall be placed in the hands of each teacher above mentioned, prior to September first, one thousand nine hundred and twenty-one, by the superintendent of public instruction, through the county superintendent of schools, a book for the purpose of the instruction of pupils provided in the next two preceding sections. Such book shall be conveniently arranged in a sufficient number of chapters or lessons to provide a different one thereof for each week of the maximum school year.

Sec. 12904. The provisions of sections 12900, 12901 and 12902, General Code, shall not apply to colleges and universities.

Sec. 12905. Boards of education having control of the schools of a rural, village or city school district shall cause a copy of sections 12900 and 12901, General Code, to be printed in the manual or handbook prepared for the guidance of teachers, where such manual is in use.

## FIRE DRILLS IN SCHOOLS REQUIRED BY LAW

Sec. 12900. Whoever, being a principal or person in charge of a public or private school or educational institution having an average daily attendance of fifty or more pupils, or the person in charge of any children's home or orphanage housing twenty or more minor persons, wilfully neglects to instruct and train such children by means of drills or rapid dismissals at least once a month while such school, institution or children's home is in operation, so that such children in a sudden emergency may leave the building in the shortest possible time and without confusion, or, in the case of schools, wilfully neglects to keep the doors and exits of such building unlocked during school hours, shall be fined not less than five dollars nor more than twenty dollars for each offense. The State Fire Marshal shall have authority to order the immediate installation of necessary fire gongs or signals in such schools, institutions or children's homes and enforce the further provisions of this section.

Ohio St. Lib.  
64.  
10-3-1923

## LESSON NO. 1.

### Carelessness With Matches.

#### BURNS BUILDINGS AND CHILDREN.

Using matches carelessly sets fire to more than 500 buildings, and burns to death as many as 30 children, in Ohio, every year.

In one building in every ten burned down the fire is started by the careless handling of matches. In large cities it is one in every seven.

The matches we have are much nicer and cheaper than those used a few years ago. Our grandfathers had for matches pine blocks an inch square and one and a half inches long, which were split part way down so a splinter could be pulled off. The free end of the splinters had been dipped in a mixture with sulphur in it. These matches when struck gave the bad, choking fumes of sulphur. On that account they were called "Lucifer" matches. Then the "parlor" match came into use. It was called the "parlor" match because it was fit for use where there was "company." The railroads will not carry parlor matches now, so not many of them are sold.

When the parlor match, which no one should use, is trod upon or otherwise lighted it sounds its own fire alarm — this is the only good thing about it. The matches now in common use are not poisonous.

#### KEEPING FIRE.

Our grandfathers' grandfathers had no matches. They kept fire from day to day and week to week through the year in the open fireplaces by covering live coals or brands with ashes. If the coals died, as they sometimes did, the children were sent to a neighbor's to get some. If there were no neighbor near the father would spread some flaxen tow on the hearth and pour a little powder over it from his hunter's horn. Then he would take a piece of flint and strike it with a piece of steel while holding both over the tow. A spark from the flint would explode the powder and that would light the tow. The flint commonly used was an Indian arrow-head.

#### THE AFTER-GLOW.

The dangers from carelessness with the matches we use are many. When scratched the stick may break and the flaming head fly. When these heads fall they often set fire to waste paper, sweepings, lace curtains and the clothing of women and children. The smoker, and often the mother, too, after using a match gives it a toss without looking to see if it is still blazing, or where it may fall.

No box of matches should be bought that has not printed on it the words "Impregnated" or "Treated to prevent after-glow." This means that the stick has been dipped in a liquid which keeps it from remaining a live coal after the match is used. The stick if not so dipped will be a red hot coal which will start a fire if thrown upon anything easily lighted. Look at the words on the box!

All good matches are double tipped and impregnated.

#### WICKED CARELESSNESS.

Careless persons leave matches lying about although one of them may be lighted by the sun's rays coming through a bubble in window glass, a fish globe or through a water bottle, a round paper weight or grandma's spectacles. Loose in drawers or on desks they may take fire from rubbing or a blow. On the mantel they may be ignited by the heat from the grate or stove.

Many fires which destroy buildings start from flying heads dropping into trash.

More fires caused by carelessness with matches start in the cellar than in any other part of the house. But, never a week passes in Ohio, without a house burning by the use of a match, for a moment, to light a closet. Many fires are started by flying, burning match heads getting on bed covers, lace curtains, carpets and clothing.

#### THE HEAD OF THE MATCH.

The head of a match contains phosphorus, chlorate of potash, rosin, whiting and powdered glass held together by glue. It takes but little heat to start a fire in phosphorus. The heat caused by rubbing the particles of glass, or flint, in the head when it is struck, fires the phosphorus compound. The chlorate lets go of the oxygen in it with sputtering and great heat. This fires the rosin in the head and the paraffin with which the stick has been soaked. Then the stick begins to burn.

#### THE DOUBLE TIPPED MATCH.

This is the kind of match used most. The ends of the sticks are dipped in a soft mixture made up of sulphide of antimony, chlorate of potash, whiting, glue and a powder to give it color. Then, after drying, it is dipped a little way into a mixture that has phosphorus in it and is of another color. The phosphorus compound does not have to be rubbed hard to make it burn. So this match is easy to light. A short scratch of the tip on cloth will set it afire. This makes the smokers, who use most of the matches, like it.

When rubbed lightly by things that are moved over them or by a foot on the floor they do not light because the "tip" is not touched. But if the head of one of these matches is crushed under a foot it takes fire.



The houses burned in a year in Ohio by the careless use of matches cost more than half a million dollars. But this loss is not so bad as the loss of lives from it.

In many countries of Europe the use of these matches is forbidden by law.

At Flushing, Ohio, a five year old child burned to death, and three houses, valued at \$9,000, were destroyed by fire, which was started by children playing with matches. Two men were injured in rescue work.

Children, do not carry matches in your pockets.

If you are careless you may lose dear little brother, or sister and maybe papa or mama, or the home you love so much.

## LESSON NO 2.

### The "Safety" Match.

#### AND THE MATCH MACHINE.

The "Strike-on-the-Box" match which can be lighted only on the box in which it is sold is the only match now known which is fit to have in a home.

It is made from the same wood and with the same match machinery as the double tip match. The paste into which it is dipped to form the head is the same except that phosphorus is left out and a salt of lead put in. The important things in both are chlorate of potash, rosin, whiting and powdered flint or glass. The phosphorus needed to light this match is mixed with peroxide of lead, fine sand and gum arabic and spread upon the box.

#### RUBBED UPON THE BOX.

When the match tip is rubbed upon the surface the red phosphorus starts the chlorate and rosin to burning, although the phosphorus itself does not take fire. Its head is not poisonous.

Because they have no phosphorus in them safety matches are never lighted by a blow or crush. They do not light from any common heat. Being useless without the box they are not left lying about for children to play with. If a rat takes one home, as he sometimes does, to file down his rapidly growing eye teeth on the powdered flint or glass in it, he cannot set it afire.

The strike-on-the-box matches are called "safety matches" but they are not safe. They are called so by the makers because they are less dangerous than other kinds. Mothers thinking the boxes safe are not so careful to keep them away from little folk as they should be.

They can be lighted by a long stroke on any hard, smooth surface.

On some of the boxes the phosphorus paint is smeared over the end so the matches may be fired when the box is first opened. The worst matches of this kind are those from Japan.

Children try to do everything they see men or women do. A toddler will get a box of safety matches and sitting down will try to strike them on the box while holding it on his cotton dress, or, getting a double tipped match, he will strike it on the floor. Many children a year and a half to three years old have been burned to death by firing their clothes in this way.

Boys four or five years old often carry matches. If they knew the danger from it they would not do so.

Matches that can be struck anywhere should be kept in iron or stone boxes kept near the place at which they are to be used so one will not pick out several and carry them to the stove or gas jet, use one, and lay the others down near by.

The 107 million people in America use as many matches as the 800 million in the rest of the world. They light 500,000 every minute and any one of them might burn a house or cost a life.

#### RATS AND MICE WITH MATCHES.

There is danger in leaving "strike-anywhere" matches where rats can get them.

Some time ago the manager of a big match factory kept several rats in a cage with plenty of matches to eat until they were nearly starved to death but no match-head was eaten.

It is most likely that the fires that have been seen starting in the nests of mice and rats have been caused by grease from their food taking fire, for lard or butter, when spread on fine material such as nests are made from, may take fire itself. Match heads have been found in nests mice have made from finely split match sticks.

#### THE MATCH MACHINE.

The machine is a frame 63 feet long by 15 feet high, in which moves an endless belt nearly two feet wide, made up of steel slats which travel around 24 wheels arranged in two rows one above the other. These slats are four inches wide and in them are holes into which the upper ends of the matches are driven as they are cut from the block of wood. The blocks of white pine wood are carried under the belt and a row of dies

descends, cutting off a row of 48 matches. The cutters are big tape needles the eyes of which have sharp edges which cut the match. A plate rising below drives the upper end of each stick one-twelfth of an inch into a hole in the belt directly over it. This makes the collar seen at the naked end of each match. So, the matches sticking down from the belt close together make it look like a traveling hair brush.

The ends of the sticks traveling in the slowly moving belt pass through the liquid to prevent after-glow, then through paraffin which makes the stick take fire easily; then the mixture which adds the bulb and last the phosphorus tip is put on. Between each dipping the traveling matches are dried by electrical fans. At the end of an hour they are punched out of the plates and fall into the match boxes. The machine makes from four to seven million matches a day. Any one of these matches used carelessly may take a life or burn a building.

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### LESSON NO. 3.

#### **Death From Playing With Matches.**

##### IGNITING COTTON CLOTHING.

About forty women and children are burned to death in Ohio each year by having their clothing set afire by matches.

Of these, who suffer death in this its most horrible form, thirty are children playing with matches which had been left lying about, and six are women whose clothing has been fired by flying match heads.

Several mothers die each year from having their clothing set afire while trying to save the lives of their burning children.

In one year, in Ohio, the number of buildings fired by children playing with matches was 204. While thinking of the suffering and death of so many children who played with matches, the loss of the buildings seems hardly worth speaking of. But a large number of persons will have to do a lot of hard work to rebuild the houses which the children changed to smoke and ashes.

Every year at least 100 children in Ohio are dangerously burned and many of them disfigured for life by these playthings.

Never play with a match!

##### TYPICAL STORIES OF DEATHS.

Here are stories from newspapers: "Rose Teleck died yesterday from burns. The child found some matches while her mother was away and in playing with them set her dress afire."