With a sharp, three-cornered file make a scratch about one-third around the tube. Hold the tube between your hands, with the thumbs on the opposite side where the scratch comes, and push the thumbs outward, just as you would if you would have a pencil between your fingers, and wanted to break it in two. It will be seen that in the majority of cases, a clean, sharp cut will result.

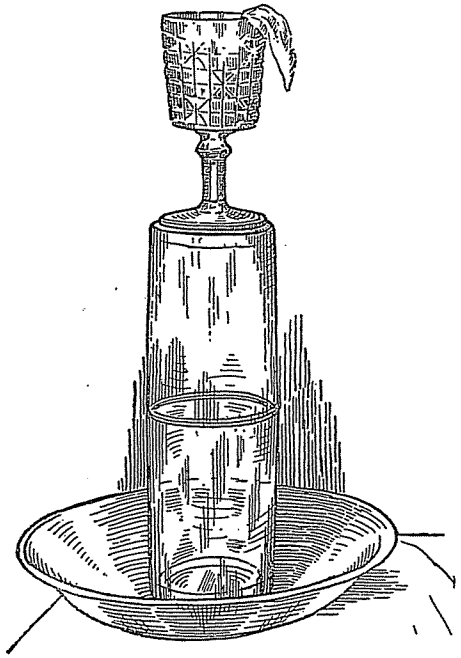


Fig. 12

## CURIOUS EXPERIMENT

The following little experiment illustrates capillary attraction, but as you have use for so many liquids in your Chemical Magic entertainment the following will be worth knowing and will certainly prove very interesting and fascinating.

Fill with water two tumblers of the same size, standing one upturned on top of the other, mouth to mouth, while full of water. (See Fig. 12.) You may do this by placing them in a basin of water, bringing their rims close together after



they are full and then remove from the basin. They are placed in the position as shown in the illustration. A third glass is placed on top of the other two which are filled with water, the water being held in position by the pressure of the air. Into the third glass you place spirits of wine into which some aniline dye, such as potassium permanganate, can be dissolved, giving it a reddish color. Note the illustration for the method of inserting a strip of cotton cloth which has been moistened in the liquid to act as a syphon. This draws the contents of the top glass away, making the liquid run down on the outside of the upturned glass, until it meets the junction of the rims. Here capillary attraction enters into action and the spirits of wine being lighter than the water rises to the top of the upturned glass, and the water which is being displaced by the lighter liquid runs out between the rims and flows down into the plate on which the glasses are standing. This action continues until the contents of the glass on top has been exhausted and the water in the lower glasses remains perfectly clear. This is a fine, little experiment.

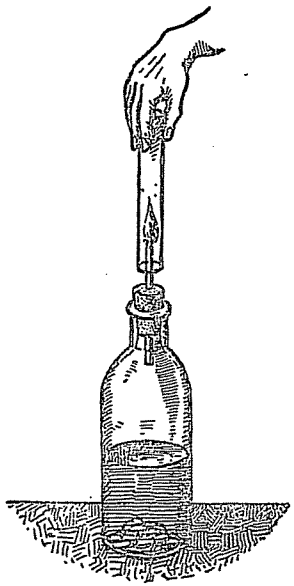


Fig. 13

## THE MUSICAL FLAME

This is a very interesting experiment; however, we do not recommend boys to handle the chemical used unless they are exceptionally careful. I should recommend, if you try this experiment, to do it under the supervision of your parents. It is too good an experiment to overlook, but a dangerous one unless great care is used.

Take a good-sized bottle and have a cork that will fit the bottle well. (See Fig. 13.) Burn a hole in the cork and into it put the stem piece of a tobacco pipe about eight inches long. Prepare the bottle contents as follows:

Put into it two or three ounces of zinc in small pieces (zinc cuttings from a zinc worker.) On top of this pour water, just enough to cover the cuttings; add to this fifteen to twenty drops of sulphuric acid; rapid effervescence will follow and then gradually subside, but the boiling continues for a period. As soon as the action becomes regular, the cork into which you have inserted the pipe can now be placed into the neck of the bottle and if a match is touched to the end of the pipe a flame will be produced which will continue to burn as long as there is any action in the bottle.

**What Has Happened in the Bottle.** Hydrogen gas has been produced as a result of the decomposition of the water by the acid and zinc. Now you take a metal pipe or glass tube, about sixteen or eighteen inches long and one-half to three-quarters in diameter. By placing the tube over the flame, allowing the pipe to be about three to five inches above the tube and holding it perfectly steady and upright, a beautiful sound will be produced, resembling an organ. This sound will vary according to the diameter of the tube.

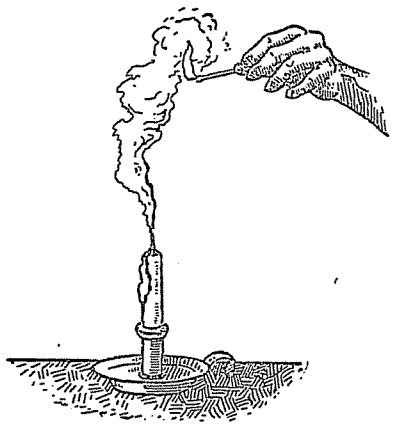


Fig. 14



## LIGHTING A CANDLE WITHOUT TOUCHING THE WICK

There are a number of times during an entertainment when you have use for a burning candle. The following little experiment can be worked as a side stunt that will be very much appreciated. After the candle has been burning, it should have a good long snuff. It should now be blown out with a sudden puff. Following this you will notice that white smoke will curl up from the hot wick. If you light a match and place a flame to the smoke at quite a little distance from the candle, say two or three inches, the flame will run down the smoke and relight the candle in a very astonishing manner. (See Fig. 14.)

**Note:** This trick should be performed in a room where there is no draught.

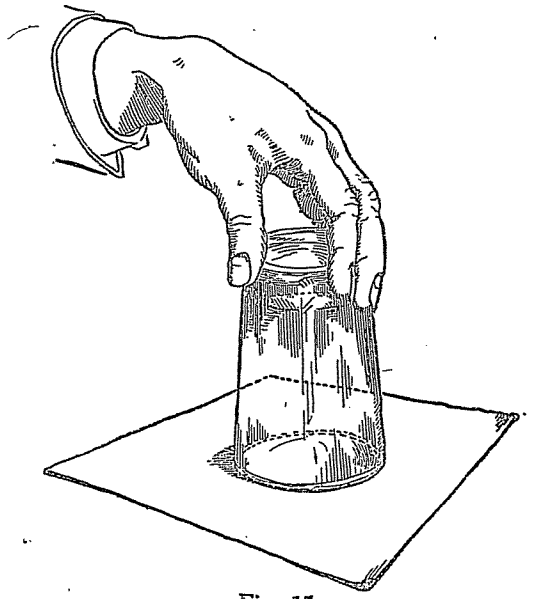


Fig. 15

## PLACING A GLASS OF WATER IN SUCH A POSITION THAT NO ONE CAN REMOVE IT WITHOUT UPSETTING THE WATER

This stunt fits well in a program of Chemical Magic. It will be readily appreciated that where so many glasses are used a little side fun can be created with an experiment of this kind.

First, make a wager that you can place a glass of water on the table in such a position that no one can remove it without upsetting the water. Fill a glass with water and place a piece of paper over the top and edge of the glass. This enables you to turn the glass upside down, putting the palm over the top when doing so. Withdraw the hand and let the top of the glass rest on the table. (See Fig. 15.) It is essential that the top of the table and also the edge of the glass be quite smooth, so that there will be no open spaces around the edge of the glass. Carefully withdraw the paper and the water still remains in the glass, because the air cannot enter. You can now ask the skeptical ones to come forward and see if they are able to remove the glass without spilling the water.

**What Keeps the Water In.** The pressure of the air keeps the water in the glass.

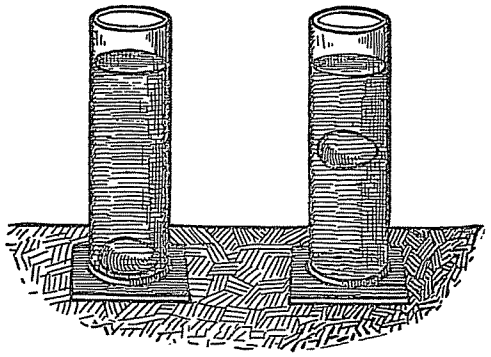


**Fig. 16**

## THE MYSTERIOUS EGG

The following is a nice little experiment, belonging to those classified as experiments in Natural Science, which can be used to produce great fun either as an experiment or a magic trick and it also harmonizes quite nicely with Chemical Magic.

**Effect.** You have standing upon the table two cylinders or tall glasses filled with ordinary clear water, which you call to the attention of your audience. You then pass two eggs for examination and ask someone in the audience to



write on one of the eggs the word "Suspend" and on the other the word "Sink." Place one egg in one glass and the other egg in the second glass. The egg marked "Sink" will drop to the bottom of the glass and the egg marked "Suspend" will be mysteriously suspended halfway down in the other glass. (See Fig. 16.)

**How the Trick is Worked.** Take one pint of water and dissolve in it as much salt as it will take up. This makes what is called brine. With this solution fill one of the tall glasses to the halfway mark; into the remaining half of the glass pour plain water.

**Note:** It is important that the water be poured down the side of glass or into a spoon to break its fall. This will cause the water to float on the brine as it is lighter, and the appearance is that the two liquids are the same and will pass for water.

The other tall glass is filled with pure water. Into the brine water you place the egg marked "Suspend"; into the plain water the egg marked "Sink." The egg in the brine water will suspend itself halfway down, while the other egg will sink to the bottom.

## WHICH IS THE BOILED EGG?

And now that we are on the subject of eggs, we will describe another pretty trick with them. The audience always appreciates the performer who can do various little things with the same objects. It keeps you from introducing too brusque a change in your entertainment. That is why it is always better in giving a magic entertainment to do the tricks in series, for instance, tricks with chemistry, following these with handkerchief tricks, then card tricks, etc.

For this trick you require a number of eggs on a plate, one of which is hard boiled and all the others raw. You then ask the audience if they can detect the hard boiled egg without breaking any of them. From outside appearance, this is impossible except by guess. There is only one way that this may be done and that is by spinning the eggs. Those that are raw or semi-liquid will spin with a sort of waddling motion, while the boiled or solid egg will spin like a top and even "go to sleep."

## WHAT A GLASSFUL OF WATER WILL HOLD

Fill an ordinary glass full of fine cotton wool and another glass standing beside it full of water.

Now make a statement that, contrary to what is generally understood to be true, you are going to put the contents of both of these glasses into one glass

without increasing the volume of the water; that is, without making the water spill over the brim of the glass. You now take out the cotton and very gently lay it down into the water, and to the astonishment of everyone, it will be found that the glass will hold all of the water and the cotton that before took up two glasses.

**Special Note:** To avoid any natural grease that may be adhering to the cotton it is absolutely necessary to clean it thoroughly by boiling the cotton in an alkaline solution such as soda. Then dry it out thoroughly and it will comb into its flaky form again.

### TO CHANGE THE COMPLEXION FROM WHITE TO BLACK

Prepare a tumbler containing water saturated with sulphurated hydrogen gas. If the performer's face is covered with oxide of bismuth, the chemical name for what is known as pearl white, which is commonly used to give the skin a fair appearance, and the glass containing the saturated solution of sulphurated hydrogen gas is held close to the face, a very startling effect will be produced, in that the face will turn black.

**Explanation.** The sulphurated hydrogen gas reacts on the bismuth to form bismuth sulphite, which is a black precipitate.

### DIABOLICAL ODOR

Along during the performance, while presenting some trick with eggs, a little comedy may be introduced by stating that one of the eggs doesn't smell good; in fact, it is rotten. To convince the audience that such is the case, you may have your assistants prepare, either in an adjoining room or behind the scenes, a solution composed of three "measures" of sodium bisulphate and two tablespoonfuls of water, mixed in a wineglass. The smell, resembling that of rotten eggs, will be given off by the solution by adding to it two "measures" of iron sulphide. In this reaction, hydrogen sulphide gas is formed. In fact, the hydrogen sulphide given off by rotten eggs is what gives them their fetid odor. The fumes from the solution may be thrown towards the audience by using a pair of bellows, carefully concealed.

Another way to introduce this chemical experiment is by advising the audience that you have succeeded in discovering a gas which if it had been used at the time of the great war, it would have caused a speedy defeat of the enemy, as they surely could not have withstood its mortiferous effect. To prove it, proceed with the preparation of the solution as already described. Of course, you have to make it plain that as only a small portion is used, a small quantity of gas will be produced, and no fatalities will result. A further convincing proof of the supposed fatal strength of the gas may be given by holding over the glass a clean silver coin, which will tarnish after a few seconds of exposure to the fumes. The "tarnish" is silver sulphide, which is a black precipitate formed by the action of the sulphurated fumes on the silver.

With a nice line of light, jocular "patter," this experiment may be made to do as a fine comedy stunt, which will be very much appreciated. Needless to say, the gas produced in this way, while very offensive, is not harmful.



### MAGIC WRITING

A very interesting experiment in natural magic is made by exhibiting an ordinary plain piece of glass, calling attention to the fact that it has no lines or markings of any kind. It may be examined very closely, in fact, minutely. By simply breathing upon it, a multiplicity of lines running in all directions and forming all sorts of fantastic figures immediately appear and they likewise disappear as soon as the moisture from the breath evaporates from the glass. The committee may wash the glass thoroughly, but the experiment still works.

**How It Is Done.** A plain piece of glass is prepared with hydroflouric acid, which, by the way, is an acid that can be prepared by dissolving some powdered flourspar in ordinary sulphuric acid. Then by dipping a pen into the acid, draw images or pictures or designs on the glass and allow the writing to dry. The glass may then be thoroughly washed and dried and when breathed upon the designs will appear.

**What Happens.** The acid eats into the glass, and if left too long it will eat too deep and the trick will not be effective.

**Another Way.** A very simple experiment can be accomplished by the use of French chalk, writing with it on ordinary looking glass.

After writing on the glass in this way, the glass is polished with a silk handkerchief which has the effect of making the writing disappear, yet if the glass is breathed upon as in the above experiment, the writing will re-appear. It may be polished and the experiment repeated.

### THE MAGIC OF SUPERFICIAL TENSION

**Effect.** In a bowl of water arrange some matches around the center, forming a pointed star. Now, take a piece of soap which you have sharpened at one end and place it in the center, when something mysterious will take place. The

matches will apparently take fright at the soap and will scatter to the outside edge of the water.

Some nice "patter" can be worked up in conjunction with this by saying that matches are like human beins—they abhor soap—and to prove further that they are like human beings, they can be enticed back to the center of the bowl again if you will offer them a little sugar. Simply take a lump of sugar and dipping it into the center of the water, the matches will gladly journey back toward it.

**Why Is This So?** Soap diminishes the elasticity of the surface, creating a disturbance in what is known as "superficial tension," whereas the introduction of sugar into the water by capillary action produces a current which brings the matches back to their starting point.

## THE MAGIC FLAGS

On a sheet of white paper, draw the American flag with faint pencil lines, and with a soft brush paint the parts to be blue with a solution made of one "measure" of sodium ferrocyanide in two tablespoonfuls of water. The parts to be red paint with a solution made by dissolving one "measure" of sodium sulphocyanate and four tablespoonfuls of water. On another sheet, outline the flag of France. Paint the parts to be blue with sodium cyanate solution. After the sheets are dry, if you rub a wad of cotton soaked in a solution made of one "measure" of ferric ammonium sulphate in two tablespoonfuls of water, the blue and red of the flags will be brought out with a very pretty effect.

## MAGIC SUGAR

**Effect.** A glass of water is handed to a spectator and he is asked to drop into it a lump of sugar. As would be expected, the sugar will sink to the bottom of the glass, but to the surprise of everyone it comes up again to the surface and majestically floats about.

**How It Is Done.** Take some ordinary lumps of sugar and dip them into some collodion. Do not hold it in for any length of time, but, by means of a candy prong, simply dip each lump in and take it out quickly. Then place it over a radiator or some dry place all day and night. This gives the ether time to evaporate.

**Warning.** Do not put the sugar where it is too hot because all that you want to accomplish is to evaporate the collodion.

After the drying, the sugar will have the appearance of ordinary sugar and no one will detect that the lumps are prepared.

**What Takes Place.** As you may suspect, the sugar has dissolved and what is left is the framework of collodion that entered the pores of the sugar when you were preparing it. When the sugar was still intact the specific gravity was enough to take it to the bottom, but when the sugar was dissolved, the specific gravity was lessened and the loaf comes to the top, because collodion floats, its specific gravity being less than that of water.



## THE CAMPHOR SCORPION

This is an old and familiar trick in natural magic, but it still fascinates those who see it done.

**Effect.** You fill an ordinary tumbler with water and get some lumps of camphor of different sizes. This can be purchased for a few cents at a drug store. Arrange the floating lumps of camphor in the form of a scorpion. In a comparatively short time, the imitation scorpion will begin to take life and he will go swimming about wagging his tail and limbs in the most life-like manner.

**Why Does This Happen?** Speaking in the terms of physics, the explanation is that camphor has the same specific gravity as water, and also that camphor does not dissolve in water.

It will be noted that the camphor lumps cling to one another as though they were chained together. This is explained by the physical property of cohesion. According to the physicist, the many movements that our animal goes through are accounted for by the force known as superficial tension. The chemists say this force is due to the giving off of vapor by the camphor in the water, which causes elasticity.

## PHARAOH'S SERPENTS

Place in a little heap on a tin can lid a mixture composed of four "measures" of granulated sugar, two "measures" of sulphur, and two "measures" of cobalt chloride. Place the lid over a candle flame or an alcohol lamp, holding the lid in such a way so that there will be no danger of your burning your fingers. In a little while the mixture will become moist and will start to burn, swelling up and shooting out in all directions until it will become many times as big as the original heap.

## THE IMPROVISED HORSE CHESTNUT FLOATING TORCH

Here is something new in the way of making use of the horse chestnut, and one which you have probably never heard of.

Select a large horse chestnut, the more irregular in shape the better. Then place the chestnut in a tumbler half full of water and let it float on top, noting

allowing it to dry, upon the match being ignited, it will immediately go out, as the painting done with water glass will make the wood fireproof. You can have quite a little fun with a box of matches prepared in this way, handing it to someone who may wish to make a light, as it is quite comical to watch his expression of disgust and disappointment at his futile efforts to get a light after striking match after match.

### TRICK MATCHES

Dip the heads of ordinary wooden matches in water glass or sodium silicate, and before this is dry, sprinkle the water glass with sulphur, seeing that as much sulphur attaches itself to the water glass as possible. After the matches are dry, upon striking them they will sputter and smoke, but will not light readily.

### THE ICE FACTORY

We believe you would like to know how to make artificial ice, as it is a little bit of knowledge which is not only interesting but it may prove very useful to you some sultry summer afternoon when a cool refreshment would be acceptable and the ice-man had failed to make his accustomed visit.

Select a medium-sized mixing bowl and set in this either a smaller bowl or a small, empty cocoa tin can; into the smaller bowl or can, put the clean water you would like to see made into ice. Cover the bowl or can and in the larger bowl put sulphate of soda (Glauber's salt), and hydrochloric acid (spirits of salts), in the proportion of eight parts of the sulphate to five parts of the acid. Throw over the bowl a clean piece of burlap folded two or three times, or any other kind of cloth. Within fifteen or twenty minutes you will notice that the water in the smaller receptacle has become frozen solid.

**Explanation of What Has Taken Place.** Ice, water or steam are the same substance but in different degrees of density, and this is determined by the more or less quantity of heat which it may contain.

The action of the acid on the sulphate produces an intense cold fifteen to seventeen degrees below zero, which, of course, is enough to freeze the water contained in the smaller vessel. The latent heat contained in the water is driven off and its appearance is changed to ice, which is just water robbed of its latent heat.

Equal parts of nitrate of ammonia and water will have the same effect.

Even ice or snow mixed with common salt in equal parts will produce a temperature around eighteen to twenty degrees below zero.

These combinations are termed in chemistry—frigorific mixtures.



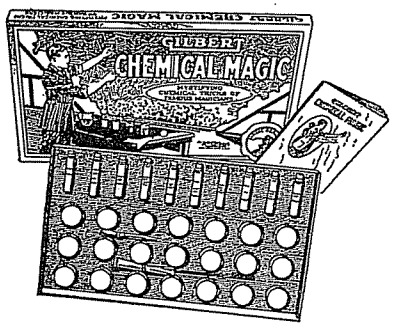
While chemicals are mixed to produce the intense cold, it is clearly seen that the experiment of making ice is accomplished through a mechanical law, that is to say, we drive the heat off the water without any chemical change taking place in it.

Artificial ice, is, of course, identical in every respect to natural ice, differing only in the manner in which the latent heat from the water has been driven off.

The large plants of artificial ice produce this article in much the same manner as it is here explained, although, of course, in a more elaborate form.

**Chemical Explanation.** The mixture of the chemicals produces a negative heat of solution; that is to say, much heat is absorbed by the mixture. While the mixture itself rises in temperature, it does so on account of the heat it takes away from surrounding bodies.

# *How to give a Chemical Magic Entertainment*

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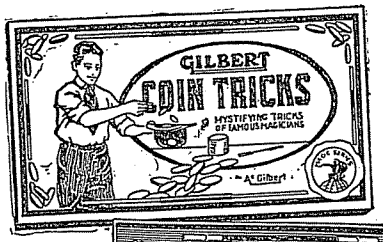


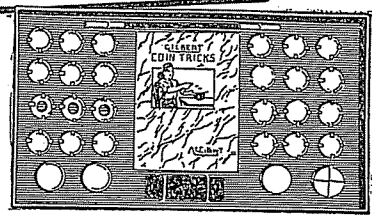


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