TRICKS WITH SOAP BUBBLES.

BY PERCY COLLINS.

Probably most people are of the opinion that bubble blowing is a purely childish pastime. But this is a mistake. Soap bubbles may be conveniently employed to demonstrate certain physical laws. Take, for example, the matter of surface tension. If we blow a bubble upon the bowl of a clay pipe, and remove the stem of the pipe from our mouth, the bubble slowly collapses. This is because the curved outer and inner layers of thin film, being at a tension, press upon the interior air and drive it back through the stem of the pipe. Again, if we blow two bubbles from two pipes, and connect the stems of the latter by means of a rubber tube, the smaller of the two bubbles will collapse, while the larger will increase in size. The explanation of this is that the bubble of smaller radius has its surface layers more sharply curved, and therefore exerts a greater pressure on the air within than does the larger bubble.

The writer, however, proposes to deal with soap bubbles mainly as a means of entertainment, leaving the reader (if he be so minded) to work out for himself their scientific possibilities. It may be said at once that upon the solution used success in bubble blowing entirely depends. The least elaborate formula, good yellow soap properly combined with pure water, is probably the best. Much depends, however, upon the manner of mixing. Take a bowl of slightly warm water, and rub in it a piece of good soap until a strong lather is formed. Skim off every particle of the lather, with a spoon, and proceed to test the solution. First blow a bubble about six inches in diameter from the bowl of a pipe. Then dip your finger into the soap solution, and attempt to thrust the former into the center of the bubble. If it does not collapse, the solution is ready for use. If it bursts in the ordeal, more soap must be added until satisfactory.

When once made, never disturb it. Many may think that occasional stirring will render it more uniform in strength, and better, but this is a great mistake; and the amateur will soon find that any disturbance of his solution will render tricks impossible that are otherwise quite easy to perform.

For artistic blowing, a little apparatus will be necessary. A straw or two, a clay pipe, one or two funnels of different sizes, and a ring made by twisting a wire round a bottle will be needed. Moisten thoroughly with the solution every article just before it is brought into use; and for this reason it is a good plan to keep one's straws standing in a half-filled jar or tumbler of soap solution.

In a pretty trick, attempt to form a string of bubbles —blowing one with the pipe, throwing it into the air, blowing a second, catching the first upon it, and so on until the chain collapses. With practice, a chain of five or six, or even more, bubbles may be formed. The trick has the advantage of demonstrating the quality of the solution if this be in question, and it is therefore a good one to commence with. Chain making is by no means as simple as certain other tricks which, at first sight, appear far more elaborate. For instance, it is quite an easy matter to blow a number of bubbles one inside the other. First pour a thin film of solution upon a sheet of glass, then dip your straw and blow upon the glass a good-sized hemispherical bubble. Now dip the straw again, thrust it boldly through the side of the big bubble, and proceed to blow a somewhat smaller bubble inside. Repeat the process as often as possible, and a very pretty series of iridescent hemispheres will be the result. An accomplished bubble blower will sometimes form a dozen before the inevitable dissolution ends his triumph. Much depends upon the steadiness of hand and eye.

A variation of this trick takes the form of a "poached egg." First, a large bubble is blown upon the sheet of glass in the ordinary way; then a "pull" is taken at one's pipe or cigarette, the while the straw is redipped, and the second bubble within the first is inflated with smoke instead of air. The result is a beautiful white, solid-looking hemisphere within another shining with rainbow colors.

A good deal of fun at a bubble party may be secured by asking a novice to place a bubble upon a flower. He will make attempts, but without success. Then the master of the ceremonies will do it with ease, as his flower is first secretly smeared with soap solution, which provides, so to speak, a "foothold" for the bubble. Both smoke-filled and clear bubbles may be used effectively; and a number of flowers of different kinds may be adorned. If the solution be strong and good, it is quite easy to make a dozen or more "bubble flowers" before the first one bursts.

The wire ring may now be brought into play with somewhat astonishing results. An ordinary hemispherical bubble may be blown upon the sheet of glass, and then drawn up with the ring to form a cylinder. Of course, the ring must be first dipped in solution, when it will be found to adhere tenaciously to the outer surface of the bubble.

By blowing a bubble with the pipe, throwing it into the air, and then catching it with two rings of soaped wire, the bubble may be pulled into a barrel shape.

An elliptical bubble is made by first dipping a wire ring into the solution, so that a film stretches across the opening; then, with a straw, blowing a bubble upon this film. Two bubbles are actually formed in close contact, the result resembling an old-fashioned lens, as shown in the accompanying engraving.

Another very effective trick may be described as the opening and closing flower. A five-pointed corolla should be cut out of rather thin white paper, mounted with a pin point upon the cork of a small bottle, and well smeared with soap solution. Upon this a good-sized bubble is to be mounted. If the bubble does not of itself pick up the rays of the corolla, they may be quite easily adjusted as pictured. When these preparations are complete, it is an easy matter to make the flower open or close by thrusting the straw into the bubble, and either sucking out air, or blowing it in.

We may wish to blow a bubble over a flower or any other object. Begin by placing the flower upon the sheet of soapy glass, or in a shallow saucer containing a little solution. Over the flower put a funnel of suitable size, and start to blow gently down the tube, the while you cautiously raise the funnel. Continue to blow until a sufficiently large bubble is formed. Then disengage it from the funnel by turning the latter carefully at right angles, the finger being applied to the opening of the tube. To accomplish this feat (shown in the illustration) calls for a little practice; but the novice will generally succeed after three or four attempts.

One may vary it by blowing a bubble over a small statuette or ornament, previously preparing the same by fixing a tiny circle of paper well damped with soap solution upon its summit by means of an atom of cobbler's wax. Then, upon this platform, a little smoke-filled bubble may be blown, as shown in the photograph.

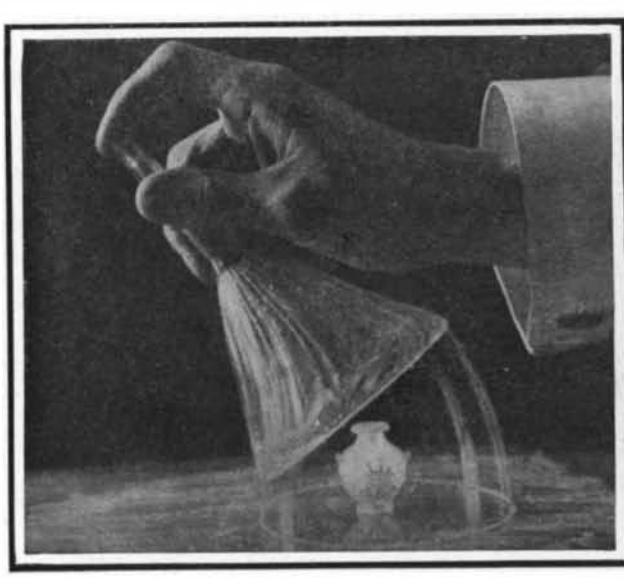
A bubble may be blown over a little pinwheel, made from paper, a small cork being used as a support. The wheel may be set in rapid motion within the bubble by a current of air blown through the ever-useful straw, the bubble increasing in size as long as the wheel is kept spinning.

The foregoing hints by no means exhaust the possibilities of the art.

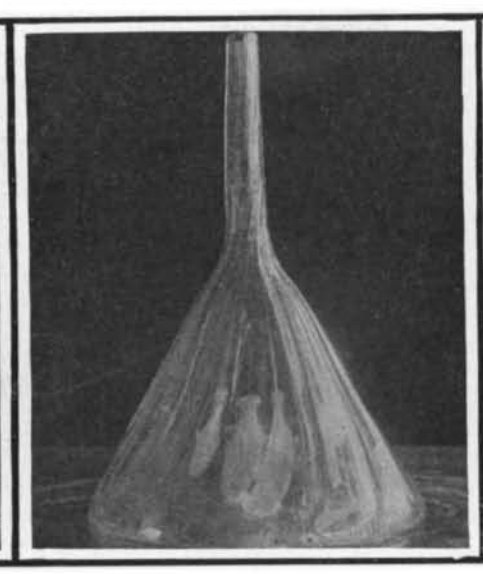
But pipes, funnels, straws—everything, in fine, that a bubble is to be blown from, or is to touch—must be thoroughly anointed. For if one tries to blow a bubble from a dry pipe or funnel, or to transfer a bubble when blown to a dry surface, that bubble will certainly burst. This fact need not be divulged at the outset to onlookers. Indeed, a vast deal of fun may be derived from the failures of novices to imitate the tricks which the accomplished blower performs with much ease.

Bubble parties have proved a great success. Their nature should be indicated upon the cards of invitation, and preparations made before the hour of meeting. A large table is necessary; and should it have a polished surface likely to be damaged by the soapy water, a mackintosh sheet should be spread. Each guest must be provided with a chair and the materials. Two or three glass funnels are sufficient and these should be carefully tested, as the rim of each must be quite true. A glass funnel enables one to get the object in the center over which the bubble is to be blown.

Pretty bowls and saucers, and dainty little ornaments, add greatly to the beauty of a bubble "set piece," such as some of those shown herewith. A bubble may just as readily be blown in a dainty saucer or other piece of china, by means of a funnel, as upon a flat sheet of glass, while the result will be infinitely superior.

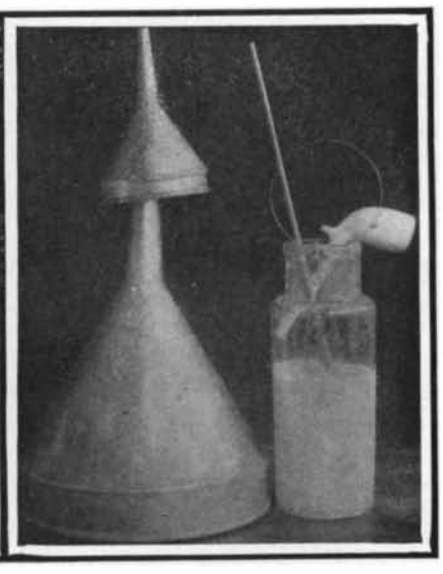


Raising funnel to complete bubble over object.



Blowing bubble over object by aid of funnel.

Blowing a chain of bubbles.



Apparatus for blowing bubbles.

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The Tanbark Oak of California.

As the supply of oak in the Eastern States is being exhausted rapidly, the United States Forest Department has entered upon a careful examination of the tanbark oak of California, in which State it is estimated that there are a billion feet of tanbark oak standing and available for commercial uses. Hitherto the only use made of tanbark oak has been in tanning, the felled tree, after the bark had been stripped off, being cut into firewood. Experts believe that the wood can be used for flooring, construction, interior finish, and other purposes; and a systematic series of experiments is now being made to determine whether tanbark oak will be a satisfactory substitute for the oak lumber of the Eastern States. Tanbark oak is found from the southern part of Oregon to Monterey County, California, but reaches its maturity and highest condition in Mendocino County, California.

Why is the Sea Salt?

Sea water contains about 3½ per cent of sodium chloride and other salts. The evaporation of all the oceans would leave a mass of salt sufficient to cover the entire globe to the depth of 200 feet, and equal to the bulk, above sea level, of North and South America, or one-fourth that of the whole earth.

The theory that this enormous quantity of salt has been dissolved from continental rocks, and carried down to the sea by streams, is not tenable, because the salts found in solution in river water contain 80 per cent of carbonate of lime and only 7 per cent of chlorides, while common salt, or sodium chloride, constitutes 89 per cent of the salts of sea water. Moreover, the evaporation of inland seas which has taken place in central Asia has left saline deposits very different in composition from the salts of the ocean.

It appears, therefore, that salinity must be regarded as an original property of the ocean. Suess has advanced the theory that the salts now found in the sea have been ejected by volcanoes in early stages of the earth's formation. Even now every eruption increases the quantity of water vapor, carbonic acid, and com-

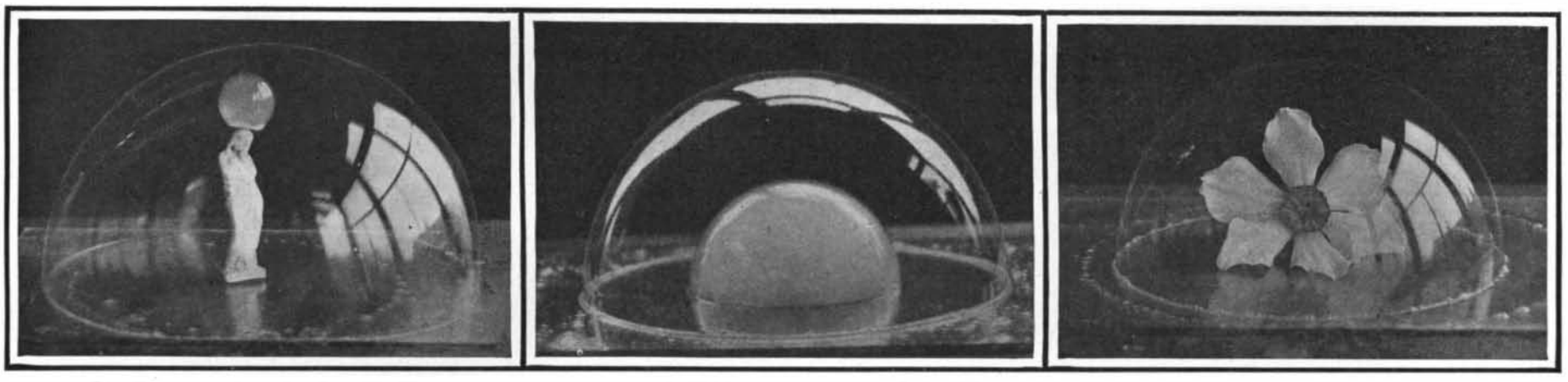
pounds of chlorine and sulphur in the atmosphere, and these substances ultimately find their way to the ocean. After every eruption of Vesuvius the crater is covered with a gleaming white layer of common salt, and the volcanoes of South America eject enormous quantities of hydrochloric acid—estimated as 30 tons daily for the volcano of Puracé, in Colombia.

This volcanic activity, now restricted to a few points of the earth's surface, must have been general in remote ages, before life appeared on the globe. The gases confined within the thin solid crust burst their bounds and found their way to the surface, bringing with them the millions of tons of chlorides which we find to-day in the oceans. Yet the transfer of these millions of tons is a relatively insignificant change, for on a terrestrial globe of a diameter equal to the average height of man (66½ inches), 1/16 inch would represent the greatest depth of the ocean, and the waters of the ocean contain only 3½ per cent of solids. —Cosmos.

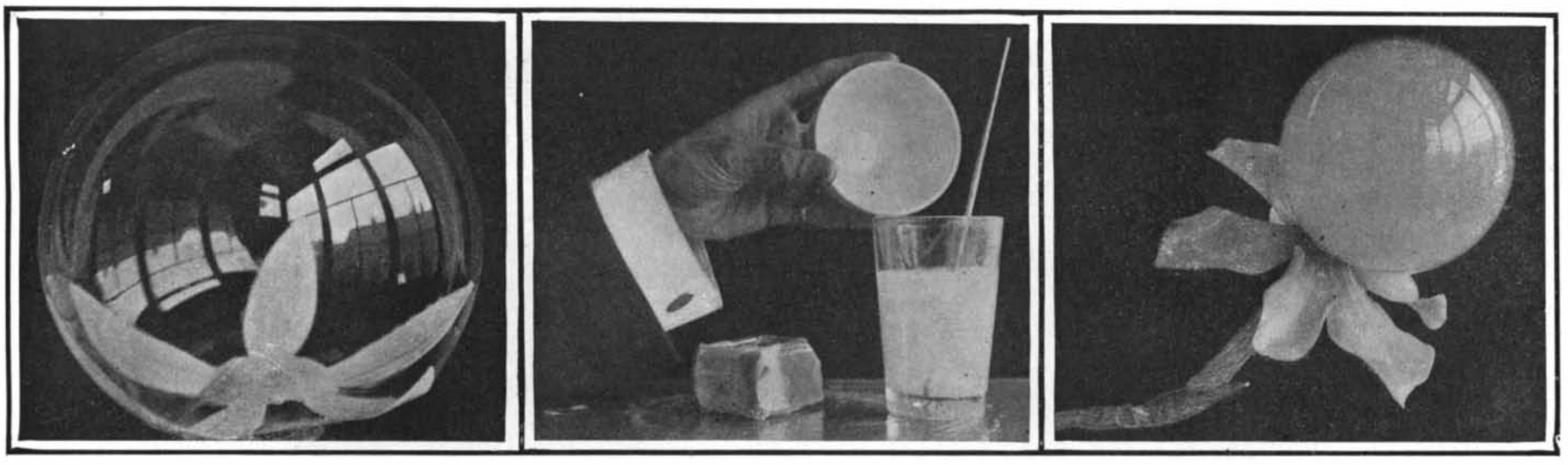
Japanese Petroleum.

The rational production of petroleum is a new thing in Japan. When the Japanese government recognized the wealth of the country in mineral oil it took the initiative in exploiting the deposits but regarded the aid of private capital as indispensable, so that to-day a large amount of American capital is invested in the Japanese petroleum industry.

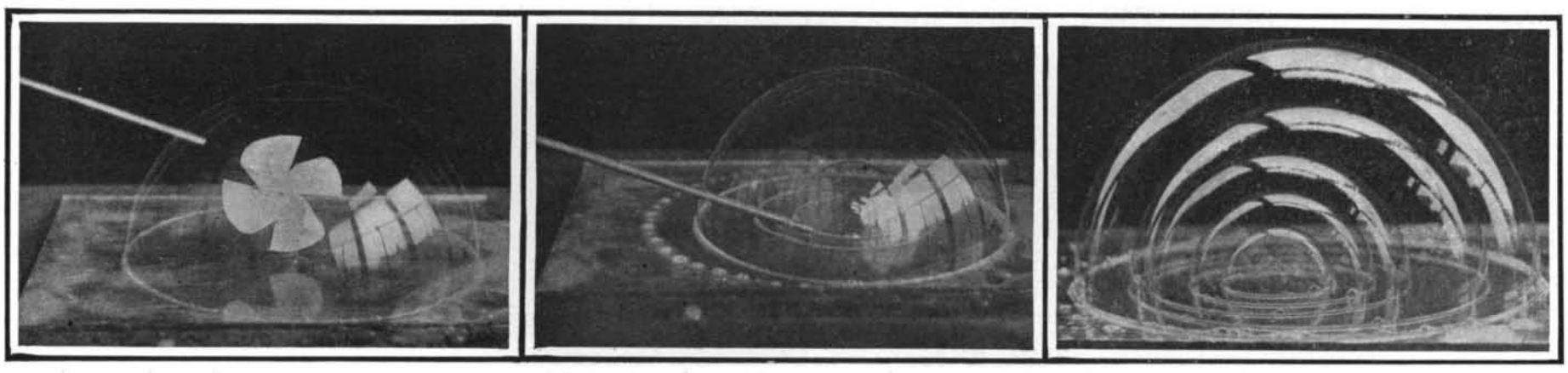
The oil is derived chiefly from the upper tertiary strata, though smaller quantities are found in diluvial and alluvial strata. The oil occurs in shale and sandstone, between impermeable strata and under pressures which cause many wells to spout with great violence. The wells now worked are from 300 to 2,000 feet deep. According to a Japanese authority the oil resembles Russian and Californian, rather than Pennsylvanian petroleum. It is composed chiefly of naphthalenes, with some hydrocarbons of the aromatic or benzol series. Of the paraffin or fatty series (C_nH_{2n} + 2) it contains only 1 or 2 per cent of the higher members, or solid paraffins. It contains 0.06 to 0.83 per cent of sulphur, 0.3 to 1.8 per cent of oxygen, and 0.35 to 1.34 per cent of nitrogen. The composition of Japanese petroleum is very variable, but it is usually assumed to yield about 50 per cent of lamp and fuel oil. The heavy crude petroleum has a density of 0.922 and a very dark color. It yields about one-third per cent of crude benzine, 19 per cent of crude kerosene, 26 per cent of heavy fuel oil, and 54 per cent of lubricating oil. Under a law passed in 1905 the right to operate mines or oil wells can be acquired only by government officials, so that in future no foreigner can appear directly as an oil producer.



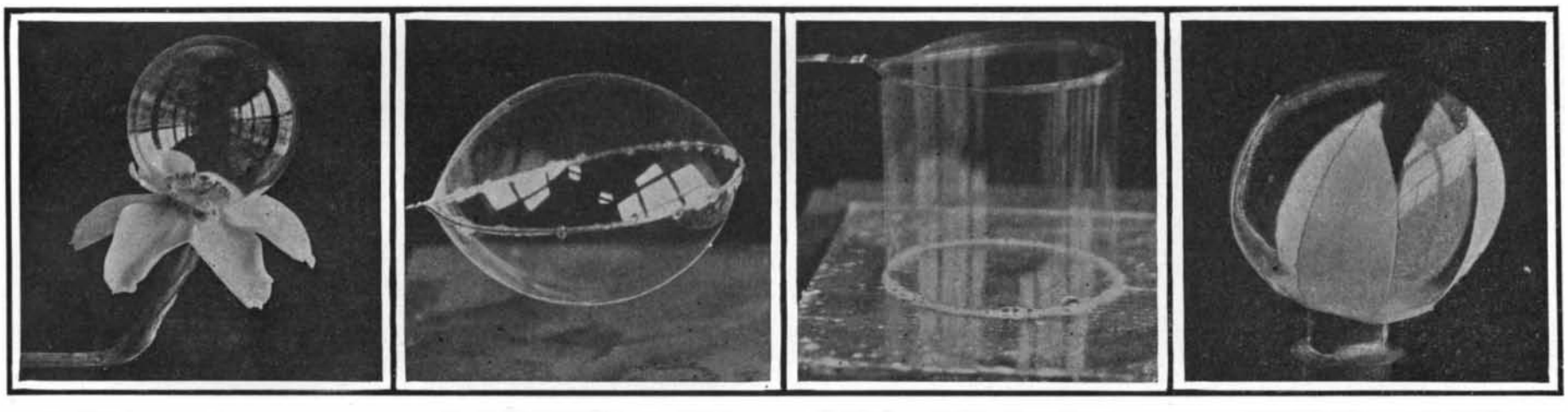
Small statuette inside a hemisphere. Smoke-inflated hemisphere inside rainbow-colored one. Flower shown after disengagement from funnel.



Bubble mounted on rays of flower. Straw kept in solution ready for bubble blowing. Smoke bubble adorning a flower.



Hemisphere blown over pinwheel. Large bubble pierced for blowing a series of smaller ones. Many hemispheres may be formed before dissolution.



Bubble adorning flower. A dozen may be added. An elliptical bubble made by aid of wire ring. Hemisphere drawn up with a ring to form cylinder. Rays of flower closing in the bubble.

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