

POPULAR SCIENCE

MONTHLY
MECHANICS AND HANDICRAFT 



Electric Car
for Boys—PAGE 136

25¢ September

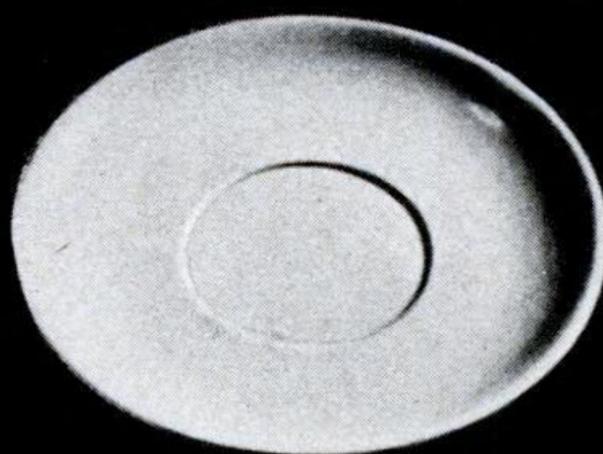
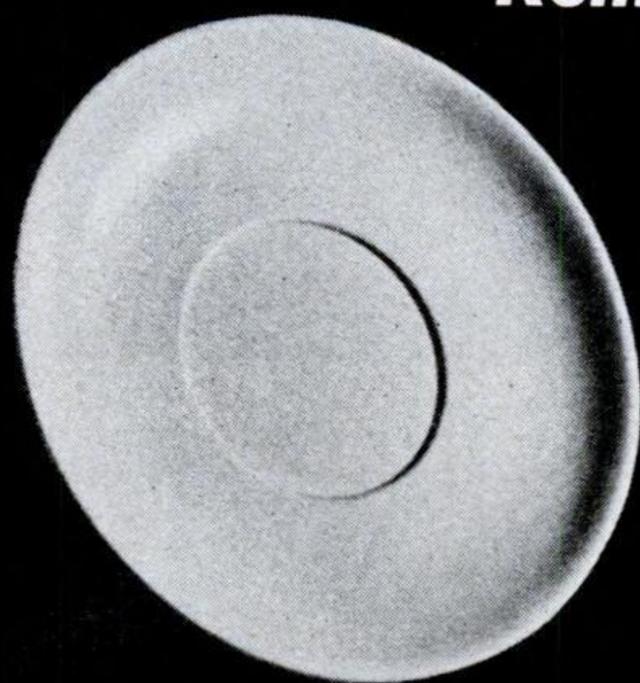
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How They've Made Hot Rods Safe PAGE 142

Kenneth Swezey Shows You

How to See Flying Saucers



Can you guess which of these kitchen saucers was farthest from Ken Swezey's camera and which nearest when he made this trick picture? Here's a tip: the photo was shot to demonstrate that unless you know the size of an

unfamiliar object outlined against the sky, you can't judge its distance, and until you know its distance you can't possibly judge its speed. After making your guess, turn to the end of the story to see the answer.

Kitchen-table tricks suggest that those strange sights in the sky may be just optical illusions—and nothing more.

YOU don't have to stay up all night sky-gazing to catch a glimpse of some flying saucers. You can see them right in your own home, using just a milk bottle filled with water, a flashlight and a few other common gadgets.

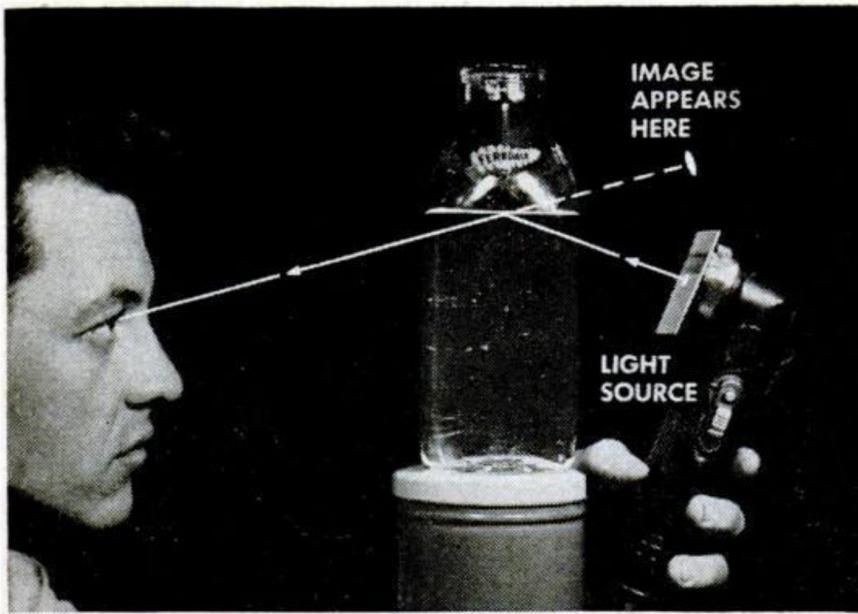
Flying saucers that cannot be accounted for as pure hoaxes or as misinterpretations of known objects are not *necessarily* spaceships or missiles from another world. Dr. Donald H. Menzel, professor of astrophysics at Harvard, declares that they may be mere optical illusions—akin to mirages and rainbows—projected into the sky by tricks of light. You can duplicate these tricks on a small scale.

In some cases, the sky phenomena may originate as automobile headlights, search-

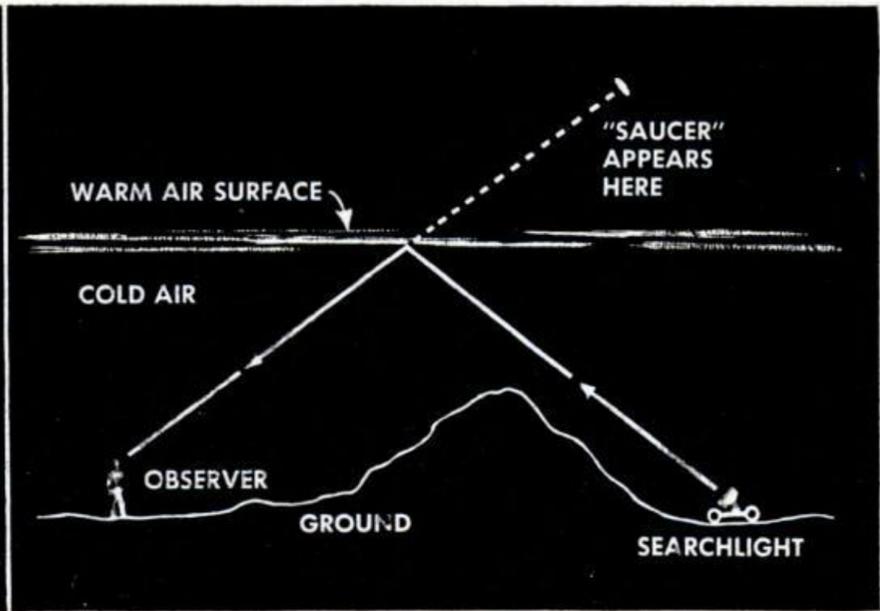
lights or distant street lights. Striking a layer of warm air above, the rays from these sources are bent downward toward the earth. To an observer on the ground, this bending of the rays makes the light source seem to be overhead.

In other cases, a pilot flying above a warm layer of air sees the light from the sun, a planet or a brightly lighted cloud bent upward. Such a light seems below him. The ghost light might seem to move if its source—or the observer or the layer of warm air—moves.

Flying saucers are probably seen most frequently over desert areas because the atmospheric conditions necessary to produce these strange mirages are most common there. During the day, the air and the



You might see flying saucers from the ground as demonstrated here. A square milk bottle containing water is supported high enough so that you can see the underside of the water surface. The beam from a $\frac{1}{4}$ " hole in cardboard covering the flashlight, aimed at the center of the water surface at an angle from below, is



bent downward to the eye of the observer. As a result, the light seems to be coming from above the surface of the water. In the same way, although less abruptly, a warm air surface above cold air could bend back a distant ground light so that from the ground it would look like a saucer in the sky.

ground get very hot. At night, and also under certain cloud conditions during the day, the ground cools rapidly by radiating its heat toward the sky. As a result, the air for a few feet up cools off by contact with the cool earth, but the air higher up stays warm.

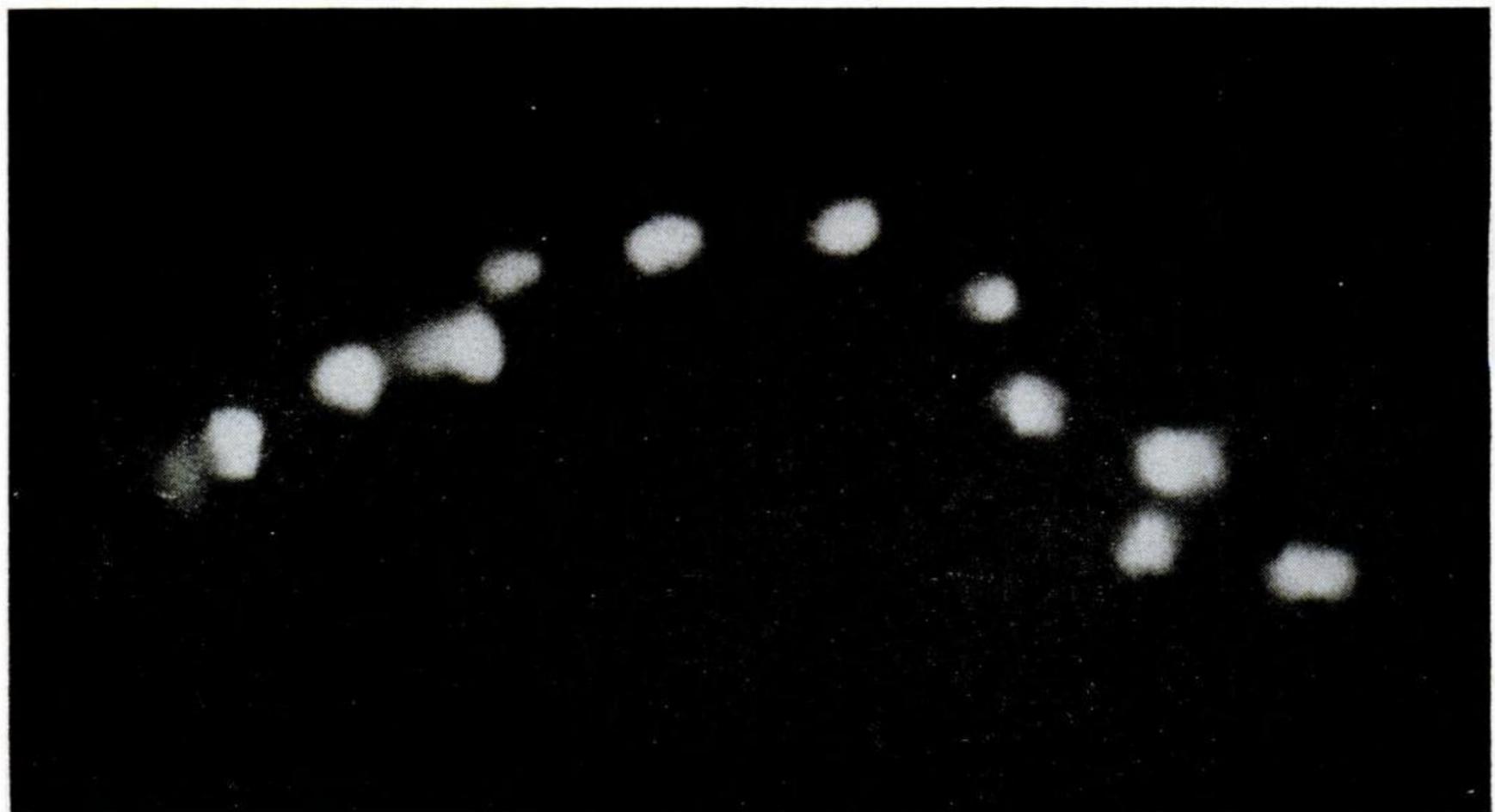
Because light rays travel faster in light warm air than they do in cold dense air,

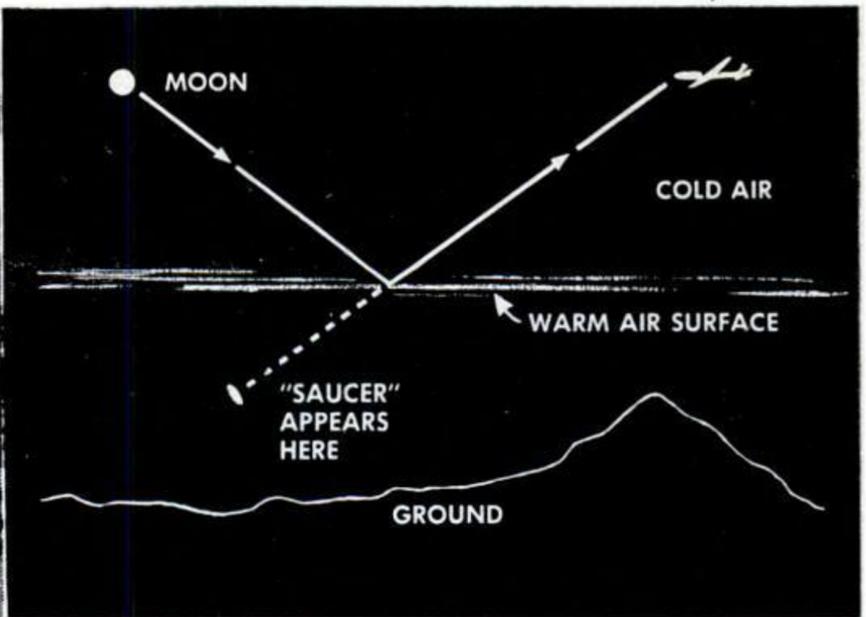
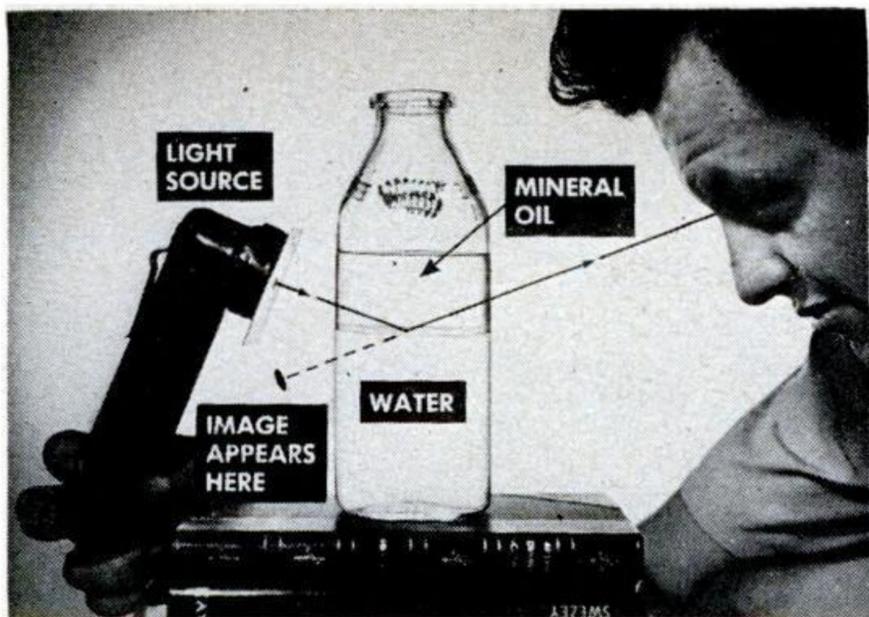
they are bent back into the cold air whenever they strike the layer of warm air at an angle.

You can't experiment with miles of atmosphere in your home, but you can show the principle by substituting water for the cold dense air and ordinary air for the warm light air, as shown by the illustrations on these pages.—*Kenneth M. Swezey.*

Duplicate of the Lubbock Lights was photographed by Swezey with the milk-bottle setup shown at top of page. In this case, a pattern of pinholes was punched in the cardboard covering on the flashlight. Dr. Menzel claims that the flying saucers photographed in the Texas city were probably ghosts of distant street lights

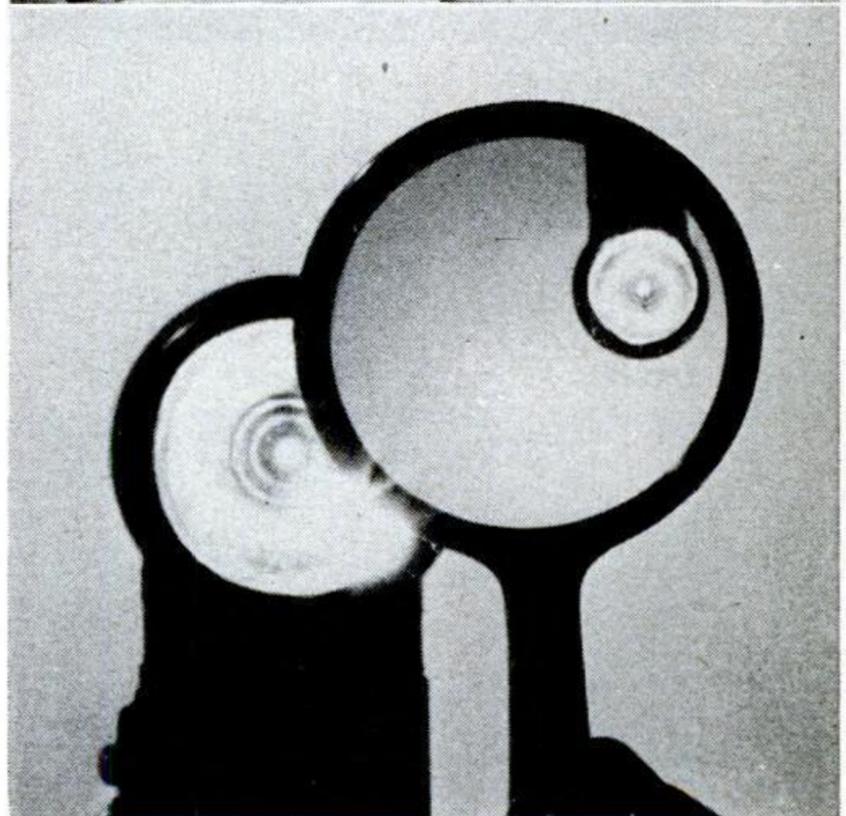
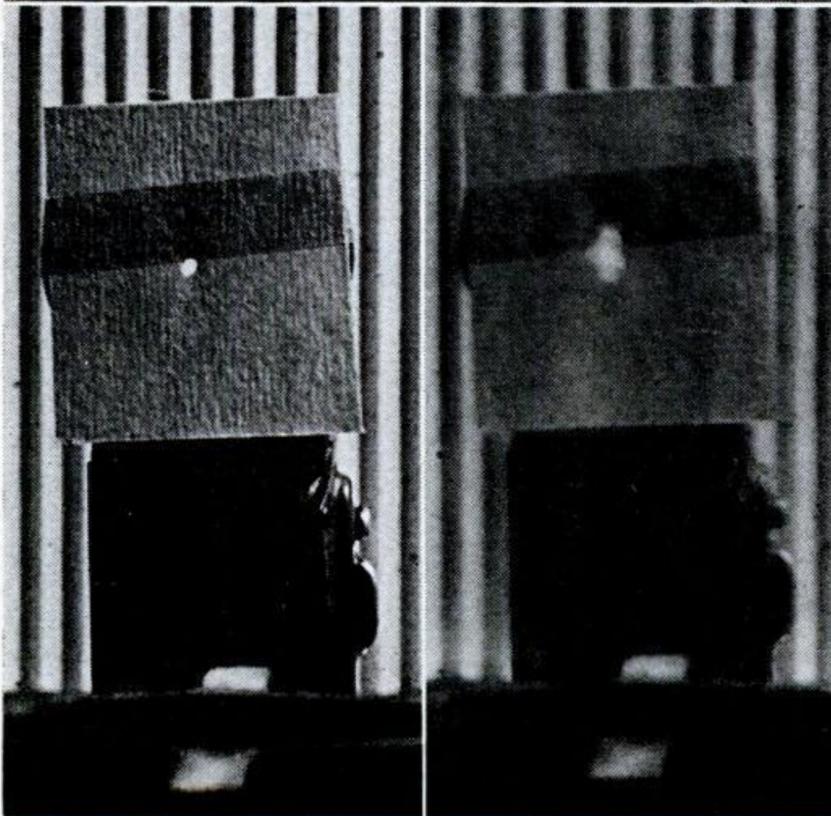
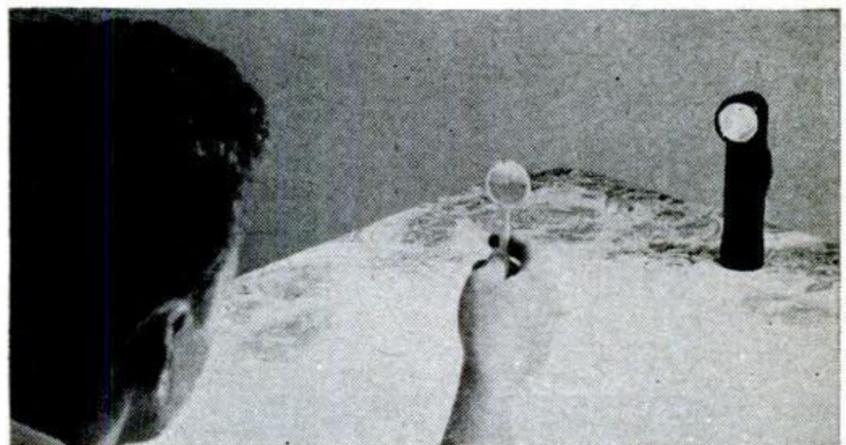
turned down by a warm air surface as explained above. Undulations in the surface made them move. Lights viewed through a milk bottle can be made to dance around by jarring the bottle. But how a mirage like this could make such lights travel across the sky has yet to be explained by the experts.





From a plane flying in cold air above a layer of warm air, you might see saucers below you this way. In this case, less water is put into the bottle and a layer of mineral oil is then

carefully poured on it. Mineral oil bends light more than water does. When the flashlight beam is viewed as shown in the photo it seems lower than the reflecting surface.



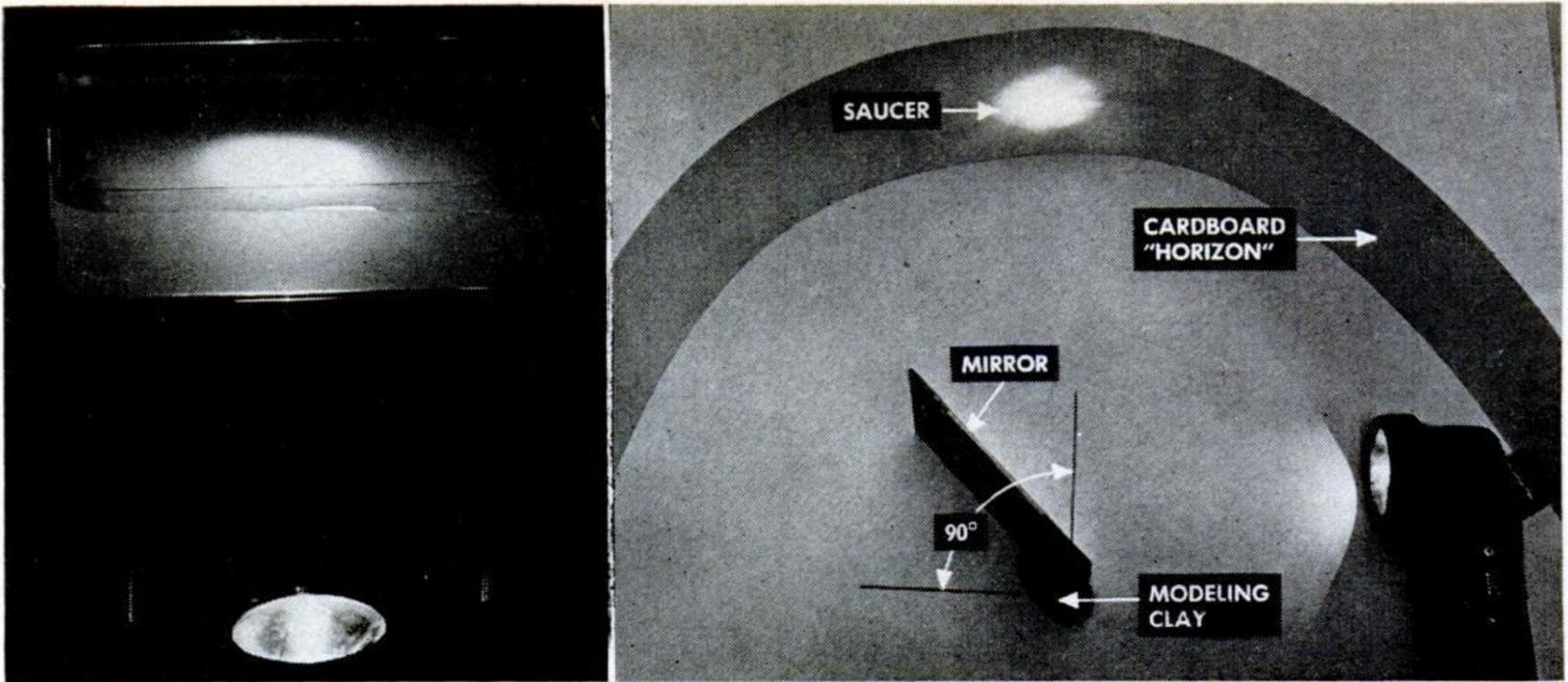
Fluctuations in air density distort light waves. To see this, stand your masked flashlight on one side of a gas range and sight across the unlighted burners as the top photo shows. The lighted hole and background will be sharp and clear, as at lower left. When you light the gas, the waves of irregularly heated air bend the light waves, distorting them as at the right and causing the light to seem to blink on and off and move around.

Rapid fluctuations in a warm air surface could also explain why "saucers" seem to dart about. Moreover, irregularities in the reflecting surface might produce extra images from a single source of light.

A lens theory may explain saucers seen darting around at great heights after launching of weather balloons. This theory pre-supposes a layer of warm air sandwiched between two cold layers. Rising balloon punches hole through warm layer, allowing cold air from above to flow into hole and forming a sort of imperfect lens. By holding a small magnifying glass at arm's length toward flashlight, you can see what then happens. Through the glass you see a small image of the light. In the balloon case, the air lens also forms image of balloon. Being smaller, it seems much farther away than the balloon. Changes in the lens shape could cause image to dart around.

Please turn the page for more on saucers.

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A searchlight beam lights up clouds and dust layers because they reflect and scatter the light. The beam itself will be invisible if the air between earth and clouds is clear and dust free. You can see this effect by shining flashlight through bottom of a glass dish containing water to which a little milk has been added (left above). In some cases, what appears to be a flying saucer might be merely a searchlight or headlamp beam sweeping across a cloud layer at night or a reflection of sun by a mirror or

other polished object on layer by layer. In both cases, the light could cross sky in a fraction of second. A mirror or other reflecting surface could send a beam through the whole journey by moving only half as much as the original light source. The above setup shows how this would work. The "horizon" is a semicircular strip of cardboard set on edge. By rotating the mirror through only 90° you can cause the reflected light to move from horizon to horizon—or a full 180°.

How trick photo was made. To get the picture on page 167, Swezey enlarged a negative of a saucer various amounts, and mounted these enlargements on the ends of wires. He then photographed the photos. The largest, which seems the closest, was actually the farthest away. Since there is no yardstick to judge speed and distance of flying saucers, speeds attributed to them can be no more than guesswork.

