

SOME ACOUSTIC EXPERIMENTS.

BY PROF. GUSTAVE MICHAUD, COSTA RICA STATE COLLEGE.

Tyndall has shown that ordinary fabrics are permeable to sound as long as they are dry but lose that property when they are soaked with water. The quickest way to make the experiment is to submerge one-half of a bed sheet in water and then interpose it between the ear and a watch held close by, as shown in the illustration. The tick-tack is easily heard through the dry part of the sheet but the wet region intercepts the sound. If both ear and watch are placed on one and the same side of the sheet, the contrary takes place; the wet sheet reflects the sound, which becomes distinctly louder than when the watch is held close to the dry part of the fabric. Advantage may be taken of this fact to repeat, without apparatus, a classical and pretty experiment usually made with two large concave mirrors.

Two umbrellas are thoroughly moistened and laid horizontally some 15 to 20 feet apart, with the two rods in alinement. This last condition, which is essential, is easily fulfilled by laying the umbrellas as shown with the point of the rod resting on the back of a chair while the handle is loosely tied to a vertical stick stuck into the ground. The chair may be moved laterally; the handle may be run vertically along its support; the umbrella rod may thereby be set at any desired angle. A white thread is stretched between the two umbrellas, and the rods are set parallel to the thread. This is then cut and removed.

If now two experimenters (one for each umbrella) place either mouth or ear in contact with the rod and at from two to three inches from the sliding sleeve, any word uttered in a low tone, in the direction of the umbrella, will be distinctly heard in the other umbrella. The voice, however, will not seem to come from the direction of the speaker, but from the opposite side; that is, it will be perceived by the hearer as if the words were uttered in the hollow of his own umbrella by some invisible being. Moreover, a third experimenter, placed between the other two, but somewhat outside the straight line uniting the two umbrella rods, will not understand a word of the conversation thus carried on, though he is but half as far from the speaker as the hearer is.

Owing to the large size of the reflectors, the experiment is always successful; but if it lasts more than a few minutes care should be taken to sprinkle water over the umbrellas from time to time.

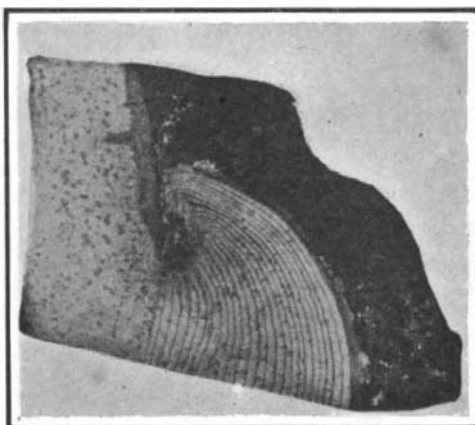
My friend, Prof. Tristán, who takes much interest in the teaching of science in common schools, has found another and still easier way of performing the same experiment. A watch is held about two inches above a common soup plate, which reflects the sound waves and decreases their divergence. Another soup plate, kept close to the ear, at an angle of 45 deg. with the direction of the sound waves, causes them to converge into the ear. The loud tick-tack does not seem to come from the watch but from the plate kept close to the ear. It ceases when the two plates are withdrawn.

At the International Congress of Applied Chemistry, held in London recently, Mr. Samuel R. Tucker presented a paper dealing with "The Relative Efficiency of the Arc and Resistance Furnace for the Manufacture of Calcium Carbide." Calcium carbide was prepared in two types of furnaces under conditions which would give the best yield. Comparison was made of the product as to its carbide content and its weight obtained per energy unit. The results showed that, for the scale on which the experiments were conducted, the resistance furnace was much superior to the arc. The best result obtained with the arc furnace was 1,170 watt-hours per 100 grammes of pure carbide, while with the resistance furnace the same quantity of pure carbide was obtained with 544 watt-hours. The best proportions of lime and coke to be used with the two types of electric furnace employed were also given.

ASKING THE TREE TO SPEAK.

BY CHARLES E. COOKE.

Under our system of land surveys, the country is being divided into square miles. These divisions are known as sections, and along the lines marking them are established corners at half-mile intervals. The method of marking these section lines varies slightly accord-



A SECTION CHOPPED FROM PINE TREE.

Showing original blaze and twenty-five years' growth since.

ing to the nature of the country over which the survey is made, but in a majority of cases a rock of the dimensions prescribed by law is placed in the ground at each corner and is known as a corner stone. When these section lines are surveyed through timber, it is required also that trees in close proximity to the corner should be marked, giving the township, range, and section which that particular corner represents. These are termed bearing trees, and are to aid in the subsequent relocation of the corner stone in the event that it is ever destroyed or removed. Furthermore, it is required that trees along the line of survey should be marked. This is accomplished by chopping off a small portion of the bark on two sides of such trees as are close to the line. This is known as the blazed line, and if well marked can be easily followed even many

years after the original work is done. Once in this line, the task of finding the corner stone is simplified; and unless every vestige of it has disappeared, together with the bearing trees relating to it, one is pretty sure to find it. However, in a great many instances these blazed lines are hard to identify. So many years have elapsed since the blazing was done that the bark has completely grown over, or forest fires may have so injured the trees that only here and there one remains to show where the ax has been. Then, again, nearby lines that have been blazed for other purposes are confusing, and oftentimes one follows them up, only to find them terminating at some point in which he has no interest.

The accompanying illustration shows how, in this latter contingency, the line one is looking for may be distinguished from others, provided the year in which the survey was made is known. It represents a section chopped from a pine tree, and shows the original blaze and the growth of the tree since.

During the past year, while hunting for section corners in Colorado, which had been established in 1883, great difficulty was encountered in locating the proper lines, owing to the presence of numerous other blazed lines to mining claim corners, prospects, etc. In order to determine whether or not a certain line was the correct one, a section would be chopped out of one of the blazes, and the rings appearing in it counted between the blazed scar and the bark. Allowing one year's growth of the tree for each ring found, it was readily determined whether or not the years which had elapsed since the blazing had been done corresponded with the number of years since the survey looked for had been made. In this way it was possible to locate the section lines, and once on them, little trouble was experienced in finding the corners.

The section seen in the illustration was cut from a tree along the line of survey sought, and shows twenty-five rings, which growth identifies the work as having been executed in 1883.

The Visibility of Stars in Daylight.

The blue light of the sky, which prevents us from seeing the stars in the day time, is strongly polarized. According to the experiments of Cornu, the proportion of polarized light may amount to eighty per cent when the air is very clear. The light of the stars, on the other hand, is not polarized. If the polarized light of the sky is cut off by a Nicol prism, it is evident that the apparent brightness of the star will be increased in respect to the brightness of the sky. Hence the star will become more visible, and an ordinarily invisible star may be seen.

This method would be particularly advantageous for the observation of circumpolar stars. These stars are situated at an average angular distance of 90 degrees from the sun and are, therefore, in the best conditions for observation, as the proportion of polarized light is a maximum at this angular distance. Furthermore, one of the two meridian passages always occurs in daytime, and the observation of both passages is of great astronomical importance. It is singular that this very simple method, which has been suggested by Salet, is not employed in these observations. Salet shows that, by this use of the Nicol, the power of a telescope may sometimes be made equal to that of an instrument of twice its aperture without a Nicol. Consequently, the value of meridian observations, especially in determining latitude, may be greatly increased. Long ago, Arago proposed to use a tourmaline in order to perceive reefs in a calm sea amid the glare of reflected light, by which they are masked. Hagenbach suggested a similar process for eliminating the bluish haze which veils objects near the horizon. Salet, who recalls these facts in the Bulletin Astronomique, states that the employment of the Nicol prism in astronomical observations by daylight has not hitherto been practised or even proposed.—Cosmos.



Soup plates as sound reflectors.



The wet cloth intercepts the sound.



The man between the talkers cannot hear the conversation.

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