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NEW ACOUSTIC APPARATUS.

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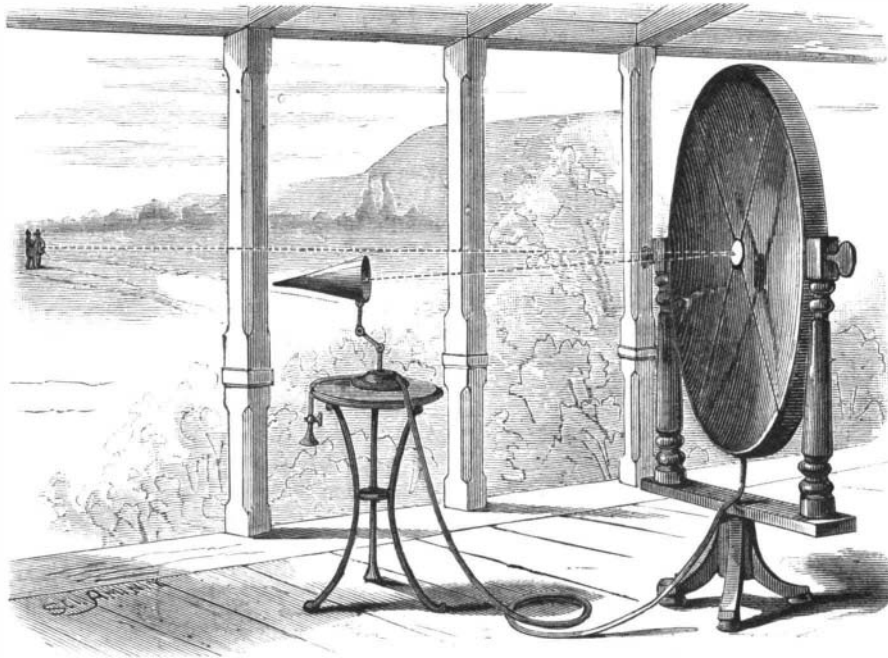
The analogy between sound and light is in many respects remarkable; they are both wave motions, governed by similar laws, and may be illustrated in the same way. Both may be reflected, refracted, condensed, or diffused by similar means. The particular action of sound to be dealt with here is that of reflection, examples of which are presented in every echo; and whispering galleries are but the exhibition of the same thing, although more rare. A few of them have a world-wide reputation.

In his article on sound in the "Encyclopædia Metropolitana," Sir John Herschel mentions the abbey church of St. Albans, where the tick of a watch may be heard from one end of the edifice to the other. In Gloucester Cathedral a whisper 75 feet across the nave. In the whispering gallery of St. Paul's the faintest sound is conveyed from one side of the dome to the other, but is not heard at any intermediate point. The dome of the capitol at Washington is an excellent whispering gallery. These effects are due to an accidental arrangement of the walls.

Sails of ships are sometimes inflated by the wind so that they act as concentrating reflectors of sound. Arnott says that in coasting off Brazil he heard the bells of San Salvador from a distance of 110 miles, by standing before the mainsail, which happened at the time to assume the form of a concave reflector, focusing at his ear.

Sounds may be received and conveyed by means of metallic parabolic reflectors, so that many times the volume of sound that naturally strikes the ear will be concentrated, rendering audible sounds that might otherwise be too distant or too faint to be heard. Such reflectors of necessity have a

fixed focus, and are available under certain conditions only. The accompanying engravings represent a form of sound reflector that may be focused as readily and directed as easily as a telescope. It is, in fact, a portable and adjustable whispering gallery, having many useful applications.



ACOUSTIC APPARATUS. Fig. 2.

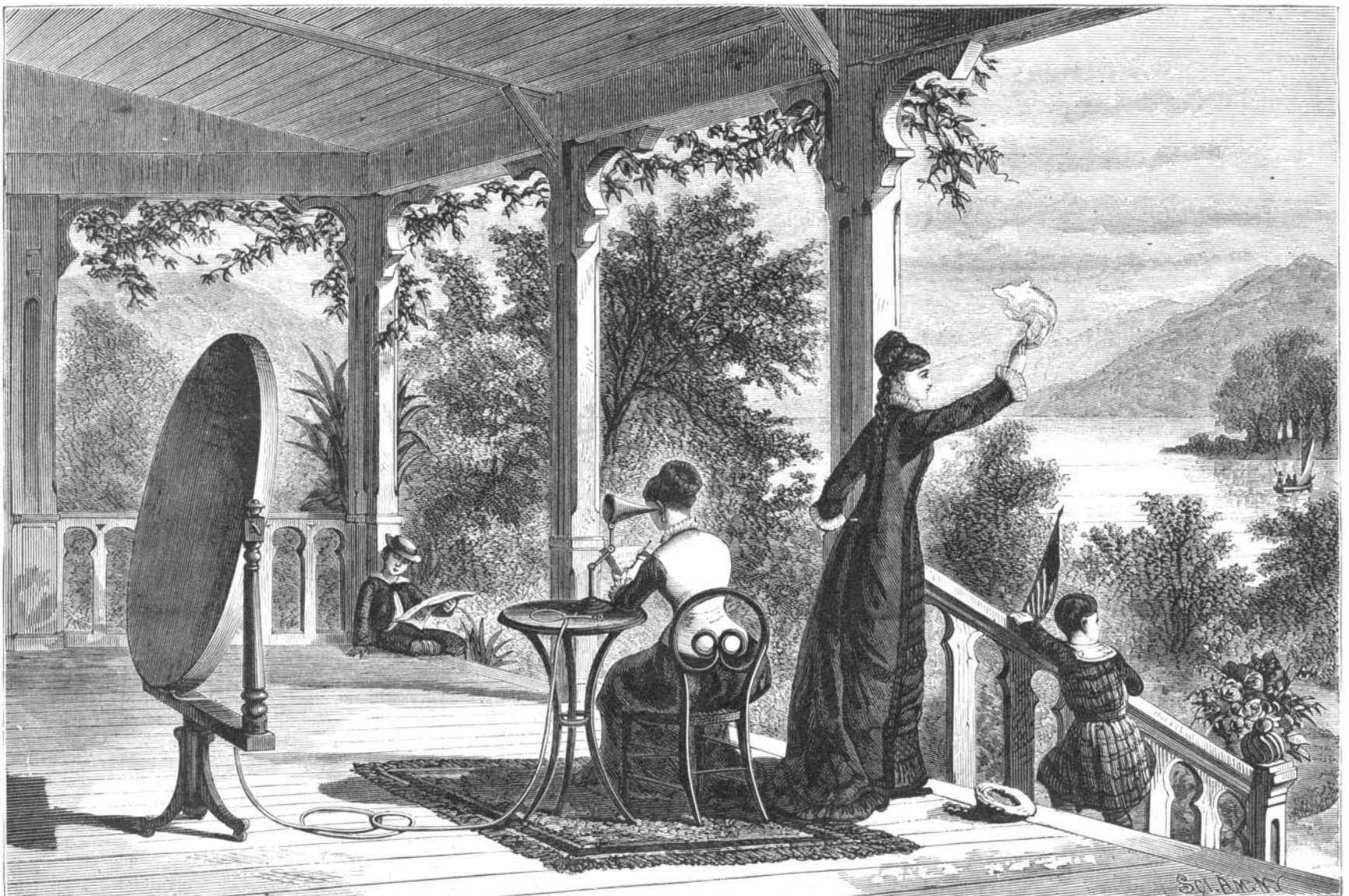
These will be hinted at further on. The instrument is very simple, consisting essentially of an airtight drum, one head of which is rigid, the other elastic. This drum, or, more properly, reflector, is mounted on pivots in a swiveled support, and is provided with a flexible tube having a mouthpiece and stop cock at its free end. Two wires are stretched across the face of the reflector at right

angles to each other, and support at their intersection a small plane mirror, the office of which is to determine the position of the reflector in relation to the direction of the sound. A small ear trumpet or funnel, which is shown on the table, is used in connection with the reflector, to increase its effect by gathering a portion of the sound that might escape the unaided ear.

The reflector is adjusted by looking through the ear trumpet toward the small plane mirror, and moving the sound reflector until the source of sound is seen in the mirror. The reflector is then focused by exhausting the air from behind the flexible head until the required degree of concavity is reached, which will be when sounds are distinctly heard in the ear trumpet. The air is readily exhausted from the reflector by applying the mouth to the mouthpiece.

The details of the construction of the apparatus will be seen in Fig. 2. The larger engraving clearly shows the manner of using. The lady sitting at the table hears in the trumpet what is said in the boat on the lake in the distance, and it is not impossible that the voyagers may hear from the sails of their boat what is said on the porch. Of course the operation of the instrument may be reversed—that is, sounds made at the focus of the reflector may be projected in parallel lines over long distances, but in practice a speaking trumpet is found to be better for this purpose. The engraving shows but one of the applications of the reflector. It would be a

simple matter to provide for a deaf person an instrument on this principle. It could hang on the walls of the parlor unnoticed, as it might take the form of a richly framed picture, and would concentrate a great volume of sound at a single point. The same device may also be applied to an auditorium to project the voice of the speaker in any required direction.



NEW INSTRUMENT FOR CONCENTRATING AND PROJECTING SOUNDS.