

discovery. To quote his own words: "The field is wide and completely unexplored, and at every step a new truth is gleaned, a novel fact observed." G.

WAVE-MOTION MODEL.

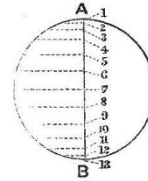
AS a teacher of Physics I have always experienced considerable difficulty in giving to elementary students of Sound a clear conception of the motion of the air in organ-pipes when sounding. In Weinhold's "Physics" a method is shown in which a series of sinuous lines, drawn on a sheet of paper, exhibit this motion when drawn across a narrow slit, but the difficulty attending the drawing of these lines has, I imagine, pre-

cluded its general adoption for class purposes. It struck me that it ought to be possible to draw a series of eccentric circles upon a disk in such a way that, when rotated, the motion of the intercepted lines, as seen through a narrow radial slit, should correctly represent this motion. This, of course, is done for *progressive* waves by Crova's disk. After spending some thought upon the matter I succeeded in producing such a disk, a copy of which I inclose. It has given such satisfaction that I have been advised by several scientific friends to send a description of the method to you for publication, for the benefit of teachers and students generally.

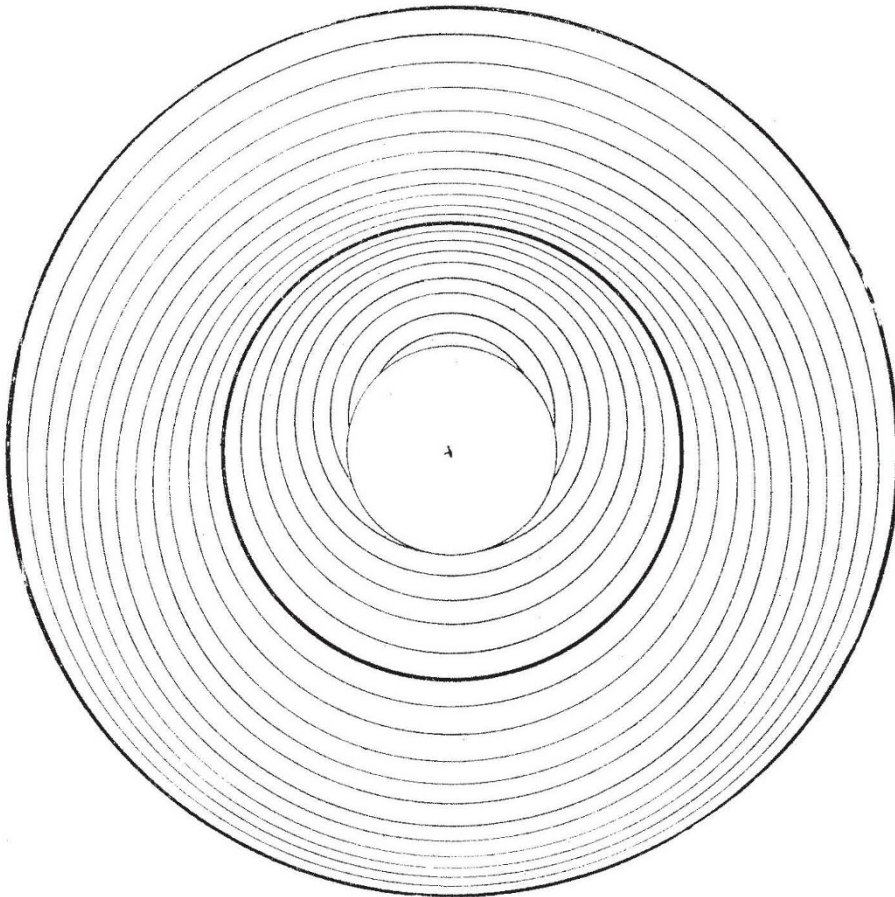
In the following description I have given the dimensions which I myself employ in describing these disks, but they can of course be varied at will:—

A piece of stout cardboard should be taken about a

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foot square. A line AB, $\frac{3}{4}$ inch in length should then be drawn near the centre and a circle described about it, half of which should then be divided as shown into 12 equal parts. Perpendiculars should then be dropped upon the line AB, which is thus divided in harmonical progression in the points 1, 2, 3 . . . 13. With the



points 1, 2, 3 . . . 13, 12, 11, 10, 9, 8, 7 successively as centres, a series of circles should then be drawn beginning with a radius of $1\frac{1}{4}$ inch, and increasing it each time by $\frac{3}{16}$ inch. The last circle therefore, described with the point 7 as centre, has a radius of $4\frac{5}{8}$ inch. The two circles described with the point 7 as centre, since they represent nodes, should be drawn rather thicker than the others to distinguish them.

The disk is now complete. It should be cut circular in shape and mounted to rotate upon a pin struck through the point 7. If it now be examined by means of a narrow radial slit extending across the marked portion of the disk, the short lines intercepted will, by their pendulum-like motions, represent the motion of the air particles in a closed organ pipe giving its first overtone. When the slit is shortened so as to show only the portion of the

disk between the two nodal lines, the vibration of a rod clamped at both ends will be represented; whilst the outer half of the latter length of slit will represent similarly a closed organ pipe giving its fundamental note. In this way by restricting the slit to various parts of the disk, various vibrating rods of metal and organ-pipes can be represented.

The disks thus produced I have had very satisfactorily lithographed for students' use.

Should any of your readers be desirous of obtaining further information I shall be happy to oblige them.

F. CHESHIRE.

P.S.—In the drawing of the disk given the centre has been filled up by broken circles. As thus drawn the inner circle may with advantage be blackened over.

THE SCIENCE MUSEUM AND GALLERY OF BRITISH ART AT SOUTH KENSINGTON.

MOST people were under the impression that they had heard the last of the absurd proposal that the site in South Kensington, which had already been set apart for scientific purposes, should be appropriated for the British Art Gallery. After all, however, the scheme has not, it seems, been definitely abandoned. Mr. Tate is said to have decided that if this particular piece of land is not granted he will withdraw the offer of his pictures and of the money he is willing to give for the erection of a suitable building. Men of science, like other people, would be sorry if the nation lost the advantages which Mr. Tate wishes to confer upon it; but they are bound to protest strenuously against the notion that it is either right or expedient to try to promote the interests of art at the expense of those of science. The South Kensington site is urgently wanted for the purposes for which it has been promised. Careful investigation has shown that every foot of the land will be needed for an adequate Science Museum and for laboratories; and if Mr. Tate's idea is acted upon, irreparable injury will be done, not only to the Royal College of Science, but to the entire system of scientific training in England. It has been asserted that the land "was bought for science and art," and that, consequently, science has "no monopoly in it." The land was not bought for "science and art." It was bought for "science and the arts," by which were meant the industrial arts, the development of which directly depends on science. The whole difficulty is due to the haphazard way in which all that relates to science is treated by public authorities in this country. If England had possessed a Minister of Education, with powers corresponding to those which belong to the French or the Prussian Minister of Education, he would never have permitted this question to be even opened; and Mr. Tate would probably have obtained long ago a proper site elsewhere. Of course nothing that can be done to prevent an act of utter folly and injustice will be left undone in Parliament by the scientific members.

The following letter on the subject appeared in the *Pall Mall Gazette* on Wednesday, February 10:—

SIR,—Before Parliament and the public agree to the somewhat exacting terms which Mr. Tate appears to make a condition of his munificent donation, I would beg your leave to submit the following questions for their consideration:—

1. Why should he not be satisfied with the plot of ground, somewhat higher up the Exhibition Road, which is much larger than his contribution of £80,000 will cover with a decently-constructed building? The situation of that plot is in every respect better than the one he covets. It is adjacent to the East and West Galleries, which are already connected by a cross gallery. These galleries are, in the opinion of the most eminent artists in the country, the best galleries for the exhibition of pictures yet constructed in England, and in them the overflow from Mr. Tate's gallery might in future time find a home.

2. Why should the site which he asks for be cleared of the

Physical Laboratory and other portions of the College of Science already housed on it to interpolate an English Luxembourg between two portions of the Science School and Science Museum, relegating the latter to the aforesaid admirable picture galleries, which then for all time can never be annexed to the Tate Gallery, or even put in connection with it? Why, in fact, should the science instruction of the country be sacrificed to this collection of pictures, which is not of sufficient value to be accepted by the National Gallery? We hear a good deal of the French Luxembourg, but would any munificent donor of modern French pictures be allowed to have a slice out of the middle of the Ecole Polytechnique, or of the Ecole Centrale, or of the Conservatoire des Arts et Métiers, if, peradventure, that was the Naboth's vineyard which his heart craved for?

3. Why should the Government or the public suppose that if Mr. Tate's collection of pictures were inserted like a seton into the tissue of the College of Science it would have the effect of drawing a shower of gifts and bequests away from the rival establishment across the Exhibition Road, and only separated from it by a part of the College of Science? That rival establishment contains the Sheepshanks collection, given under stringent conditions to found, and accepted by the Government to found, a National Gallery of British Art. Other collections have been added—even since the Tate Gallery was in the air—on the same conditions. Intrinsically and artistically they are worth probably ten times as much as the Tate collection. From the recent competition which has been held it is evident that the Government propose to spend a large sum of money in completing the South Kensington Museum, which will then be in a position to properly exhibit these and other bequests. It is well known that they cannot be sent to the Tate Gallery. They would be lost to the nation if an attempt were made to do so, the pious donors having taken ample precautions against such tricks being played with their gifts. Whatever pranks the Royal Academy may play with the Chantrey Bequest, there is no reason to suppose that the British Museum or National Gallery pictures can be sent to increase the importance of this new establishment under an irresponsible management, which is not supported by a single artist of eminence, as far as I am aware.

4. Why should Government emulate the antics of the celebrated cow who kicked over the pail of milk she had just filled, and, having done more than any previous Government for technical instruction, make itself superbly ridiculous by dealing an irremediable blow to the advance of that instruction for the sake of Mr. Tate's £80,000? It must be remembered that there is no institution for the advancement of scientific instruction in the country similar to the College of Science with the Science Museum which it is now proposed to dismember for the sake of that £80,000.—I am, Sir, yours obediently,
London, February 9. Y.

NOTES.

THE late Prince Louis Lucien Bonaparte has left to the Nation his valuable collection of metals, which is now in course of arrangement at the Science Museum, South Kensington. The collection is rich in specimens of the rarer metals. This bequest is the result of a promise made to Prof. Roberts-Austen, the Prince having been much interested in the Percy collection at South Kensington. The Prince's early papers, which were mainly chemical, comprised an account of a method of separating cerium from didymium; and he used to refer with pride to his having won admission to the ranks of the Legion of Honour by chemical research.

IN order to afford increased and improved accommodation for the departments of physics and mechanical and electrical engineering, the Council of University College, London, have decided to enter without delay upon a considerable extension of the College buildings. The addition to the College will form an important block opposite the east end of University Street, with an extension for some distance along the Gower Street front of the College grounds. It is to contain separate laboratories and lecture-rooms for mechanical engineering and electrical engineering, with rooms for engineering drawing, a