

The fibre is generally slightly tapered. Below are typical measurements of two fibres, *A* and *B*, made from needles of 0.10 and 0.18 mm. diameter respectively. The distances in the table are measured from the point where the fibre was attached at the bottom end.

Distance in cm.	0	30	60	100	125
Diameter of fibre <i>A</i> in μ	0.1	0.1	0.3	0.7	1.0
Diameter of fibre <i>B</i> in μ	0.6	0.6	0.7	0.9	1.2

The diameter of the fibre depends mainly on the diameter of the needle to start with, and on chance. When trying to make fibres between 0.8 and 3μ , one is usually successful in producing a reasonably uniform fibre of about the right size seven times in ten attempts. Below 0.5μ only about two attempts in ten are successful. It is difficult to produce fibres larger than 3 or 4μ by this method. But, fortunately, Keeley's method is extremely easy for fibres between 3 and 30μ , and, if the guide *G* be removed, the apparatus may be used to make fibres by Keeley's method. The $\frac{1}{16}$ in. elastic is just as efficient as the $\frac{3}{16}$ in. used by Keeley.

A THYRATRON INFLEXION INDICATOR FOR TEACHING THE DEAF. BY T. ALPER STERNE, M.A., A.INST.P., Central Institute for the Deaf, St Louis, Mo., U.S.A. AND H. J. ZIMMERMANN, Washington University, St Louis, Mo., U.S.A.

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ABSTRACT. In an instrument designed for making pitch variations visible, sound impulses are fed to an electronic frequency meter the output of which is directly proportional to the fundamental frequency. The amplified voltage is applied to the grids of seven thyratrons, which are biased by successively greater amounts. The number of thyratrons which fire at any given signal therefore depends on the frequency of the signal. The firing of each thyatron lights a neon lamp in its plate circuit, and since these lamps are arranged in a vertical column, the effect obtained is of a column of light which rises and falls with rising and falling pitch.

The device presents visually the concept of pitch change and greatly facilitates instruction in voice control.

TEACHERS of deaf children are concerned with developing normal inflexion and emphasis as well as correct articulation in the speech of their pupils. A means of providing visible evidence of the effect of pitch change is, therefore, of considerable value. Recently, Coyne* described his "Voice Pitch Indicator" in which sound impulses are used to operate a series of electromagnetically driven tuning forks, which in turn control a series of lamps. The circuit is so arranged that only one lamp will light at a time. Hunt†, earlier, described a direct-reading frequency meter using a modified two-valve thyatron inverter and suggested that such an instrument might be of value in teaching the deaf to speak with normal intonation. Hunt's circuit was adapted by Obata and Kobayashi‡ as a direct-reading pitch recorder, an oscillograph being used to indicate the fundamental pitch level in music and speech. The purpose of this investigation was to devise a method of avoiding the problems of mechanical resonance by making use of an electronic frequency meter, and at the same time to use a series of lights to indicate pitch levels, since oscillograph patterns would be too detailed and confusing to deaf children.

In an instrument developed for use at Central Institute for the Deaf, St Louis, the

* Coyne. *Volta Review*, 40, pp. 437 and 549 (1938). *Teacher of the Deaf* (June 1938).

† Hunt. *Rev. Sci. Instr.* 6, p. 43 (Feb. 1935).

‡ Obata and Kobayashi. *J. Acoust. Soc. Amer.* 9, p. 156 (1937).

adjusted to cover the three frequency ranges. The switching arrangement, obtained by means of a triple-throw switch, is shown in the following table:

Range	90-270 cyc./sec.	120-390 cyc./sec.	230-540 cyc./sec.
S ₁	Open	Open	Closed
S ₂	Closed	Open	Open
S ₃	Closed	Open	Open
S ₄	Open	Open	Closed

In each range, the lower limit is the frequency at which the first lamp glows, the upper frequency is the cut-off of the low-pass filter. A single control adjusts the low-pass filter and also shifts the range of the thyratrons by changing the grid bias of the valves as a group.

The device is convenient to use in a class room since it is self-contained and operated from an A.C. source. Plate and bias voltages for the frequency meter and RCA 6A6 are obtained from one power supply, the transformer also supplying heater current. A separate power supply provides the grid bias and heater current for the indicating thyratrons, their plates being supplied with A.C. from an isolating transformer. Voltage regulation is not a matter for serious concern since accurate calibration is unnecessary. An initial amplifier is, of course, required to bring the microphone output up to the level required to operate the frequency meter. A permanent magnet speaker is connected across the 4 Ω impedance output terminals of the amplifier. This provides a vibrating surface on which the child may place his fingers so that he receives tactile as well as visual stimuli. The teaching of deaf children by means of the inflexion indicator has given very promising results, which will be described elsewhere.

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NEW BOOKS

The following new books have been received and unless otherwise stated have been presented by the publishers to the library of the Institute of Physics, where they may be inspected. The Institute assumes no responsibility for the statements given below, information for which has been taken from the book itself.

Pump Tests. (B.S.S. 599-1939.) Pp. 42. (London: The British Standards Institution.) Price 3s. 6d. net.

This revised specification forms part of a series of British Standards for Pump Tests. It is designed to cover the determination of the performance and efficiency of pumps when handling water at temperatures up to 85° F.

Burettes and Bulb Burettes. (B.S.S. 846-1939.) Pp. 24. (London: British Standards Institution.) Price 2s. net.

This specification furnishes detailed requirements for a range of burettes from 1 ml. to 100 ml. capacity, and for bulb burettes from 45 ml. to 105 ml. capacity. It contains particulars of the material to be used, of the dimensions and tolerances, as well as of the delivery time, jets, stopcocks and graduation marks.

It also provides for the marking and testing of the burettes of which there are two grades.

The Fundamental Theory of Arc Converters. By H. RISSIK, Hons. B.Sc. (Eng.), A.M.I.E.E., M.A.M.E.E. Pp. xv + 287. (London: Chapman & Hall, Ltd.) Price 18s. net.

This book is a theoretical study of the principles underlying the design and operation of arc converter circuits. Its purpose is to introduce the general principles of current conversion by means of arc discharge devices to the electrical engineer interested primarily in the circuit design of commercial arc converters, whether of the mercury-arc, hot-cathode, or atmospheric-arc types. Part I deals with the normal rectifier and Part II with the grid-controlled rectifier. A full bibliography of the subject is included.

The volume belongs to the publisher's series of Monographs on Electrical Engineering which are under the general editorship of H. P. Young.