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An Electric Pressure Sound for
the Direct Vibration of the
Membrana Tympani.

BY

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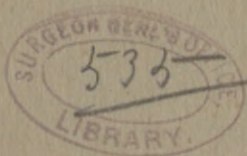
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THE value of vibratory massage in the treatment of diseases, especially the atrophic, of the upper air-passages, has been fully attested by many careful observers of recent date. Dr. Michael Braun,† of Triest, in a paper read before the International Medical Congress at Berlin, was the first to call attention to the value of massage in diseases of the nasopharynx.

Dr. Carl Laker‡ has also written an exhaustive monograph on the same subject, in which he enthusiastically

* A rough model of this instrument, which the writer intended to have had presented to the Section in Otolology of the American Medical Association, at Washington, in 1894, arrived too late for such presentation.

† *Verhandlungen des 10. internat. med. Cong.*, Berlin, 1890.

‡ *Die Heil-Erfolge der inneren Schleimhautmassage*, Graz, 1892.

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indorses this method of treatment. To Dr. W. Freudenthal,* of New York city, perhaps more than to any other, is due the honor of having devised an electrical instrument for massage in diseases of the nose and throat. More recently Dr. G. Melville Black, † of Denver, calls attention to the value of *lateral vibratory massage* in diseases of the nasal mucous membrane. Possibly the inspiration of all these writers on the value of massage in naso-pharyngeal diseases was received from an investigator no less distinguished in another field—Dr. August Lucae. ‡ In an article on A New Method for the Mechanical Treatment of Chronic Diseases of Motion in the Conducting Apparatus of the Acoustic Organ, Lucae first described an instrument for direct mechanical vibration of the membrana tympani. Lucae's device consisted essentially of a steel sound carrying at its end a hollow cone, which is controlled by a handle composed of a small tube and an adjustable spiral spring. The cup-shaped extremity of the sound is applied to the short process of the malleus, and, being manipulated by the hand of the operator, must necessarily be limited as to degree, extent, and number of impulses.

The fact that so simple and crude a mechanical device has led to marked therapeutical results in certain forms of middle-ear disease, as has been certified to by its author and other eminent aurists, sufficiently excuses the writer for presenting the following illustrations and description of an instrument which has proved more than satisfactory in those cases of impaired hearing and tinnitus which are directly traceable to some defect in the conducting apparatus of the ear.

* Internal Massage in Diseases of the Nose and Throat. *Medical Record*, vol. xlviii, No. 4.

† New Instrument for Vibratory Massage of the Nasal Mucous Membrane. *N. Y. Med. Jour.*, vol. lx, No. 25.

‡ *Archiv für Ohrenheilkunde*, Band xxi, 1884.

In the first illustration (Fig. 1) the instrument is shown in position. As will be seen, the head of the patient is turned slightly toward the opposite side as for an ordinary examination of the middle ear, and firmly fixed in this po-



FIG. 1.—Motor and pressure sound in position.

sition. An ordinary round ear speculum is introduced, and the canal illuminated in the usual manner. The speculum is omitted from the illustration in order to show more clearly the position of the sound as it enters the external auditory canal. The motor with pressure sound attached is shown in Fig. 2. The right hand grasps the handle of motor, with the thumb resting on the button of

the contact spring. The corrugated handle B (Fig. 3) of the pressure sound A (Fig. 3) is firmly held between the thumb and index finger of the left hand. The tip of the little finger is made to rest gently on the head of the patient immediately behind the auricle, and the sound is introduced parallel to the anterior superior wall of the auditory canal, until the cylindrical extremity of the spiral end D (Fig. 3) rests upon the base of the short process of the malleus. The short process of the malleus is selected

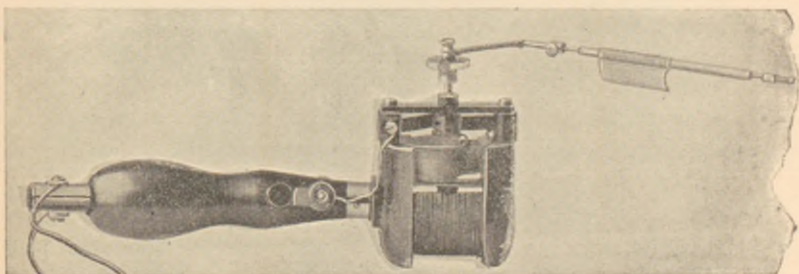


FIG. 2.—Motor with pressure sound attached.

as the point of contact, as it has been demonstrated by Lucae* that “if the malleus is still movable, more or less free movements are seen at once to take place in the whole drum membrane, which in the majority of cases correspond to the movements of the short process—*i. e.*, occurring inward on pressure upon the latter, and outward on removal of pressure.” Dr. E. B. Dench,† in his recent work on the ear, referring to the same subject says: “It has been demonstrated that pressure exerted at the short process of the malleus is communicated directly through the incus to the foot plate of the stapes, and from this to the labyrinth.”

* *Archiv für Ohrenheilkunde*, vol. xxi, p. 84.

† Dench. *Diseases of the Ear*, p. 382.

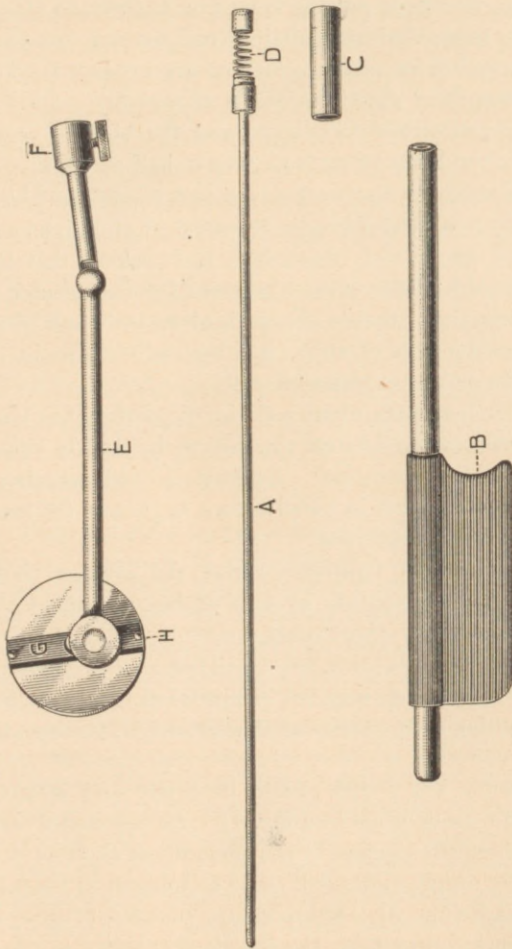


FIG. 3.—G, eccentric throw ; H, stud and sleeve with binding screw ; E, adjustable connecting rod or shaft ; F, receiving socket with binding screw for pressure sound ; A, pressure sound and spiral spring (D) ; C, protecting cap for spiral spring when not in use ; B, corrugated handle and tube.

When contact is made with the pressure button before referred to, vibrations ranging from five hundred to fifteen hundred or more a minute, judging from the note obtained from the revolutions of the armature, are produced. The extent or length of the vibrations is thoroughly controlled by the eccentric throw G (Fig. 3) and the binding screw H (Fig. 3), the range being from zero to half an inch.

In the cases so far treated the best results have been obtained by a minimum length or extent of vibrations and a maximum number of vibrations. It is seldom that the binding screw has been further removed from the center of the eccentric throw than a sixteenth of an inch, and when this minimum length of stroke has been adhered to, in no case has the patient experienced pain.

In a few instances, where a slight discomfort has been noticed, examination has shown this to be due to undue pressure on the speculum. Eczematous and excoriated canals, of course, must be cured before beginning the massage of the drum membrane.

The duration of treatment varies, the average being from three to ten seconds at each sitting, and should be repeated from two to three times a week.

A few mechanical hints, developed from several months' use of this instrument, may not be unwise at this point before presenting a few histories illustrating its therapeutic value.

The motor and sound should be firmly and steadily held in the same plane (see Fig. 1). As the motor and sound are carefully adjusted to run smoothly at right angles, any twisting of the motor will cause an immediate binding of the shaft E (Fig. 3). The pressure sound A (Fig. 3) is made an inch longer than the handle B (Fig. 3), to allow for the length of vibration, and the handle *must* be held in the center of the sound.

The cylindrical end of the sound A (Fig. 3) enlarges toward its distal extremity and in shape resembles more nearly a truncated cone. It is hollowed out, as will be seen by the dotted lines in the cut, not only to better adapt itself to the short process of the malleus, but also to receive a pledget of absorbent cotton or other soft material in order to prevent any possibility of mechanical injury. Sounds with spirals of different strengths have been found necessary, and in every case the writer has found it wiser to begin with the one of least resistance, and to continue its use until the patient's confidence has been secured and a certain degree of tolerance obtained. The motor is adapted to a two-volt current. Any good storage cell will suffice.

A few brief histories are presented to show the results obtained. In each case reported other methods of treatment had been persistently tried without lasting, and I might say with no, benefit.

CASE I.—Essie L., aged nineteen years; occupation, dress-maker. Came to St. Bartholomew's clinic for treatment on December 4, 1894. Complained of deafness and constant ringing in both ears. The following history was obtained: Deafness and tinnitus in both ears for three years; unable to state in which ear symptoms began first; has had treatment for nine months, with the result of a slight improvement in hearing, but no relief from the tinnitus; never had pain or discharge from either ear; no assignable cause; no heredity.

Examination.—Auricles and canal normal; both membranæ tympani uniformly cloudy and moderately retracted, but not funnel-shaped; light reflex lost; short process not unduly prominent; little or no fibrous tissue; membrane moved throughout by Siegle's otoscope; handle of malleus slightly foreshortened; Eustachian tubes patulous; watch heard on contact only; bone conduction markedly increased; lower tone limit elevated; chronic catarrhal inflammation of the nasopharynx.

This case will be readily recognized as one of chronic catarrhal otitis media.

Treatment consisted of ordinary cleansing and care of nasopharynx and direct massage of the ossicular chain three times a week, each treatment lasting from five to thirty seconds, or until there was marked congestion of the vessels about the long process of the malleus. The ready congestion of the tissues immediately around the handle of the malleus, the writer believes, has much to do with the prognosis in a given case. After the third massage, the tinnitus, which had been greatly diminished in intensity by the previous treatments, ceased, and the hearing distance increased to an inch.

January 14, 1895, date of last visit, hearing distance had increased to four inches ($\frac{4}{5}$) and tinnitus had not returned.

CASE II.—Allied to Case I, but of longer duration, is that of O. F. M., aged forty years; occupation, physician. Right ear chiefly involved; tinnitus and impaired hearing for five or more years; no pain; no discharge; no hereditary tendency. Auricle was found to be normal; slight squamous eczema of canal; drum membrane dull; no light reflex; scar tissue marked; movement of drum and malleus limited; short process prominent and long process foreshortened; ossicles firmly bound together and mucous membrane apparently thickened; Eustachian tube open, but not freely so; slight mucous rhonchi; watch heard on close contact; chronic hypertrophic nasopharyngitis and pharyngeal tonsils filled with leptothrix masses.

Treatment began March, 1894. Politzerization; use of Delstanche masseur; applications to the nasopharynx and squeezing out of the masses from the tonsils resulted in a decided improvement of the general condition, but no corresponding improvement in the symptoms most complained of.

Treatment was discontinued during the summer to be resumed early in December; conditions the same as before treatment, with the exception of the nasopharynx. Direct massage was immediately begun on patient's return, and treatment of nasopharynx continued. The lessening of the tinnitus began with the first massage, and at present writing, March, 1895, hearing distance for affected ear is two inches ($\frac{2}{5}$) and tinnitus

can only be heard occasionally at night with the head resting on a pillow.

CASE III.—A. M., aged twenty-nine years, began treatment February 4, 1895.

Complained of loss of hearing and tinnitus in both ears, more pronounced in right ear; duration, four years; has had an occasional furunculosis of both canals. Examination revealed a case of chronic catarrh of the middle ear. Watch heard on contact, A. D., and at an inch ($\frac{1}{2}$), A. S.

Patient has had massage of drum membrane twice a week regularly.

On March 14th, date of last record, watch was heard by A. S. at seven inches ($\frac{7}{8}$), A. D. two inches ($\frac{2}{8}$). Entirely free from tinnitus.

From the cases herewith reported, and from a large number now under treatment, both in private practice and at the clinic, the writer feels justified in the following conclusions:

That in the mechanical mobilization of the ossicles by vibratory massage we have an agent of undoubted value in chronic and subacute affections of the middle ear. That the therapeutic value of this method depends largely on the rapidity and amplitude of the vibrations.

That it is a safe method of treatment in all cases of impaired function due to some defect in the conducting apparatus. That it is of especial value in sclerosis and in atrophic conditions by virtue of its action in increasing the vascularity and hence the nutrition of the part.

That in hypertrophic otitis media this method is safer and to be preferred to the pneumatic method of Delstanche, which is unsafe and in many cases positively harmful.

That it is a method easy of application, causes little or no reaction, and is unattended with pain or discomfort to the patient.

Since writing the above, we have been especially fortu-

nate in having obtained and read an article by so eminent an authority as Dr. P. Garnault,* who has devised and used an electric pressure sound similar in construction to the one described above.

In addition to massage through the external auditory canal, Dr. Garnault has employed rapid (six hundred to seven hundred per minute) vibrations through the Eustachian tube to the drum membrane, which he believes to be especially useful in certain labyrinthine diseases.

Garnault's results have been corroborative of those published by Lucae.

The value of rapid and mechanically accurate vibrations particularly emphasized by this writer.

179 SCHERMERHORN STREET.

* *La Massage vibratoire et électrique dans les affections de la gorge, des oreilles et du nez. Société d'éditeurs scientifiques, Paris, 1894.*

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A WEEKLY REVIEW OF MEDICINE.

EDITED BY

FRANK P. FOSTER, M.D.

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