

Specification of Marc Antoine François Mannons : apparatus for ascertaining the presence and degree or cessation of vitality in the human body, &c.;

Contributors

Mennons, Marc Antoine François.

Publication/Creation

London : Great Seal Patent Office, 1862 (London : George E. Eyre and William Spottiswoode)

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A.D. 1861, 26th OCTOBER. N° 2683.

S P E C I F I C A T I O N

OF

MARC ANTOINE FRANCOIS MENNONS.

5

APPARATUS FOR ASCERTAINING THE
PRESENCE AND DEGREE OR CESSATION
OF VITALITY IN THE HUMAN BODY, &c.

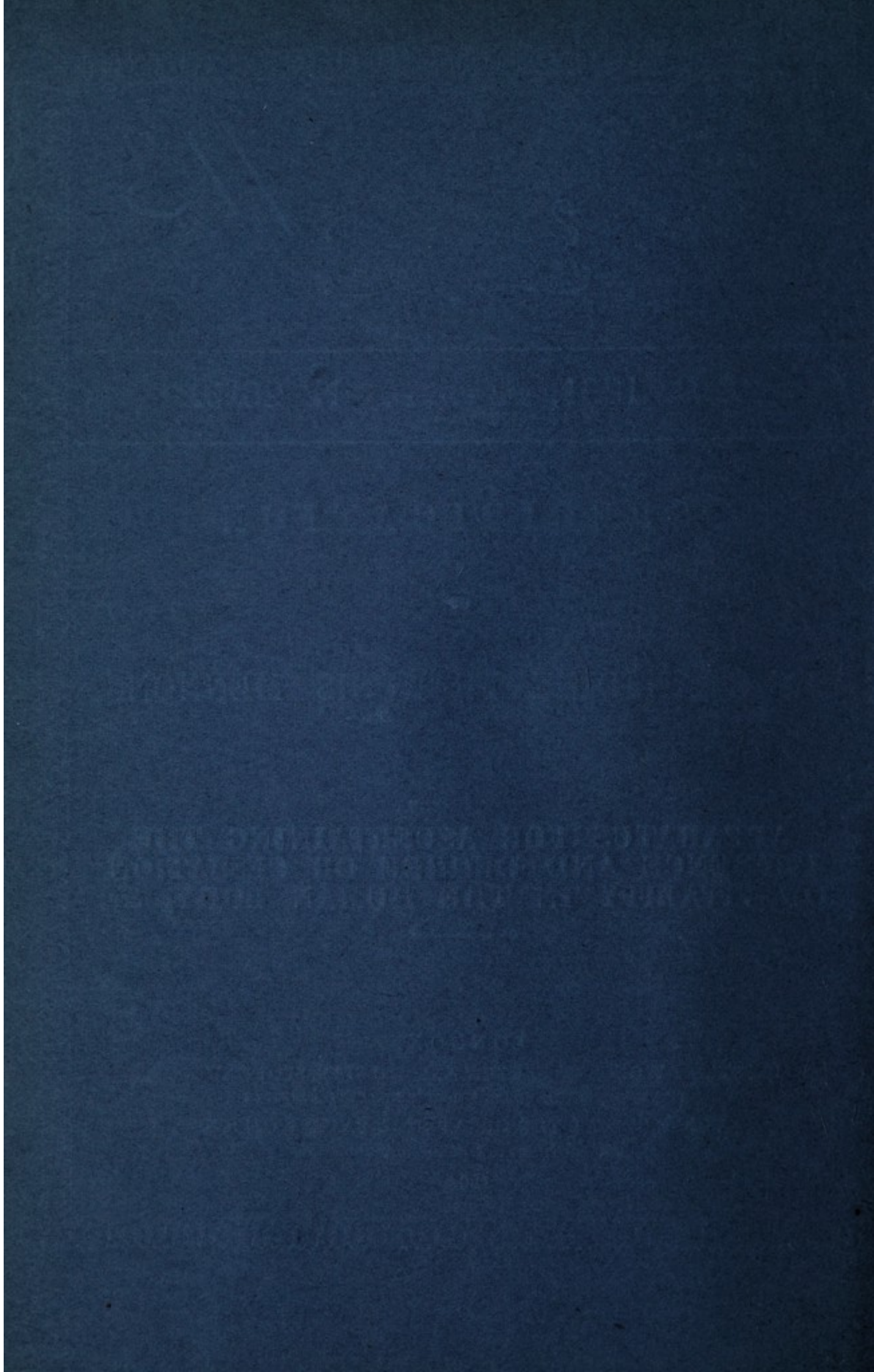
LONDON:

PRINTED BY GEORGE E. EYRE AND WILLIAM SPOTTISWOODE,
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY:

PUBLISHED AT THE GREAT SEAL PATENT OFFICE,
25, SOUTHAMPTON BUILDINGS, HOLBORN.

Price 8s.

1862.





A.D. 1861, 26th OCTOBER. N° 2683.

**Apparatus for Ascertaining the Presence and Degree
or Cessation of Vitality in the Human Body, &c.**

LETTERS PATENT to Marc Antoine François Mennons, of the British and Foreign Patent Offices, 39, Rue de l'Echiquier, Paris, in the Empire of France, for the Invention of "IMPROVED APPARATUS FOR ASCERTAINING THE PRESENCE AND DEGREE OR CESSATION OF VITALITY IN THE HUMAN BODY, AND IN ANIMALS OF THE HIGHER CLASS, APPLICABLE TO THE SEMEIOSIS OF HEALTH, DISEASE, AND DEATH."—A communication from Léon Victor Collongues (M. D.), residing at No. 72, Grande Rue, Passy-les-Paris, in the Empire of France.

Sealed the 16th April 1862, and dated the 26th October 1861.

COMPLETE SPECIFICATION filed by the said Marc Antoine François Mennons at the Office of the Commissioners of Patents, with his Petition and Declaration, on the 26th October 1861, pursuant to the 9th Section of the Patent Law Amendment Act, 1852.

5 **TO ALL TO WHOM THESE PRESENTS SHALL COME, I, MARC ANTOINE FRANÇOIS MENNONS**, of the British and Foreign Patent Offices, 39, Rue de l'Echiquier, Paris, in the Empire of France, send greeting.

8 **WHEREAS** I am in possession of an Invention for "IMPROVED APPARATUS FOR ASCERTAINING THE PRESENCE AND DEGREE OR CESSATION OF VITALITY IN THE
10 **HUMAN BODY, AND IN ANIMALS OF THE HIGHER CLASS, APPLICABLE TO THE SEMEIOSIS OF HEALTH, DISEASE, AND DEATH,**" communicated to me by Léon Victor Collongues (M. D.), a person resident at Passy-les-Paris, in France, and have

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petitioned Her Majesty to grant unto me, my executors administrators, and assigns, Her Royal Letters Patent for the same, and have made solemn declaration that it is a communication.

NOW KNOW YE, that I, the said Marc Antoine François Mennons, do hereby declare that the following Complete Specification under my hand and seal, fully describes and ascertains the nature of the Invention, and the manner in which the same is to be performed, reference being had to the Figures of the accompanying Drawing, and to the letters marked thereon, that is to say:—

The Invention communicated to me consists in a novel combination of acoustic instruments, by aid of which the variable degrees of animal vitality in health or disease may be translated into signs of known value, and by which the transition from life to death may be verified with absolute certainty. This application of acoustics, to which the Inventor has given the name of "dynamoscopy," reposes on the theory that the degree of vital energy in animated beings is in direct ratio to the rapidity, intensity, and number of the vibrations of the nervous system. In following out this theory, a continued series of observations led to the discovery of the fact that the murmuring sounds perceived in auscultating the extremities and other parts of the animal frame are in reality due to the vibration of the nerves, contrarily to the opinions of Wollaston, Ermann, Laennec, and other physiologists, by whom they have been diversely attributed to muscular action, or to spasmodic contractions of the heart and arteries. A further course of experiments practised on a large variety of human subjects, and on animals of the higher order resulted in proving, 1stly, that the murmuring sounds produced by these nervous vibrations possess all the characters of musical notes; 2dly, that the variations in the degree of vital energy in the different phases of health or disease, give rise to corresponding changes in the notes emitted, which ascend and descend in perfect unison with those of the musical scale; 3dly, that at the approach of dissolution, these notes after passing through the successive gradations of the scale, become imperceptible at the extremities of the body, from whence they retreat towards the centre, where they may in most cases still be perceived for several hours after the suppression of the respiration, and of the pulsations of the heart; 4thly, that in syncope, catalepsy, and other forms of apparent death, these notes not only remain perceptible so long as a trace of vitality exists, but differ essentially in character from those of the real post-mortem murmur. These general indications obtained, it became necessary to discover a practical means of applying them with certainty to the study of the animal economy. To this end advantage was taken

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of the known principle in acoustics, that each note of the diapason executes a given number of vibrations per second, from whence the induction that the notes emanating from the animal body should represent a number of nervous vibrations coinciding exactly with their position in the musical
5 scale; that thus, in obtaining the accord between the sound emitted by the body and that of a diapason, the vibrations of the note chimed by the latter should precisely correspond in number with those of the nervous system. The accuracy of this induction being verified by actual experiment, the discovery has been completed by the combination of apparatus hereafter described, by
10 aid of which the nervous vibrations corresponding with the different degrees of vitality, may be rendered distinctly perceptible to the ear, and numerically estimated by comparison with notes of known value.

Figures 1, 2, represent two steel diapasons, the first sounding from si—₂: =60 vibrations per second to fa—₁: =85 vibrations, and the second from
15 do—₂: =32 vibrations, to sol—₂: =48 vibrations. These diapasons are each composed of a fork with double branches A, A, fitted with metallic slides B, B, which are adjusted to the required note by means of the pressure screws C, C; D is a threaded rod forming the lower extremity of each instrument, and which, after having traversed the two caoutchouc discs E, G, and
20 the cork conductor F, screws into the wooden or metallic support H. The branches of the diapasons thus arranged are graduated by any of the known acoustic processes, to the points at which the slides should be adjusted for the production of the different notes of the scale. The notes sounded by the two instruments above described, are,—

25	No. 1.—With slides.		No. 2.—With slides.
	si — ₂ : =60 vibrations per second.		do — ₂ : =32 vibrations per second.
	do — ₁ : =64 do. „ do.		re — ₂ : =36 do. „ do.
	re — ₁ : =72 do. „ do.		mi — ₂ : =40 do. „ do.
	mi — ₁ : =80 do. „ do.		fa — ₂ : =42 do. „ do.
30	fa — ₁ : =85 do. „ do.		sol — ₂ : =48 do. „ do.
	Without slides.		Without slides.
	fa [#] — ₁ : =88 vibrations per second.		la — ₂ : =53 vibrations per second.

Figures 3, 4, represent two other diapasons producing a series of lower tones than those emitted by Nos. 1, 2. In order to add to the clearness of
35 the sound, these instruments are mounted horizontally on massive supports, and when in use should be insulated as completely as possible, so as to avoid the intervention of vibrations from surrounding objects. The notes sounded by these diapasons are,—

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No. 3.—With slides.				No. 4.—With slides.			
do	— ₃ .	=16	vibrations per second.	do	— ₄ .	= 8	vibrations per second.
re	— ₃ .	=18	do. „ do.	re	— ₄ .	= 9	do. „ do.
mi	— ₃ .	=20	do. „ do.	mi	— ₄ .	=10	do. „ do.
fa	— ₃ .	=21	do. „ do.	fa	— ₄ .	=10	do. „ do. 5
sol	— ₃ .	=24	do. „ do.	sol	— ₄ .	=12	do. „ do.
la	— ₃ .	=26	do. „ do.				
Without slides.				Without slides.			
si	— ₃ .	=30	vibrations per second.	la	— ₄ .	=12	vibrations per second.

Figure 5 represents a sound conducting apparatus, termed by the Inventor the “dynamoscope,” by means of which the notes emanating from the nervous system are rendered sufficiently perceptible to the ear to be accurately compared with those emitted by the diapasons above described. This apparatus, the form of which may vary according to its intended application, is (for the human subject) generally composed of a solid rod I, in metal, ivory, cork, or other suitable conducting matter, provided at one extremity with an ear piece J, and at the other by a cylinder or finger piece K. These extremities J & K are screwed to the rod I, and may be replaced at will by pieces of different forms and dimensions, according to the size and conformation of the ear passage of the operator, or of the fingers of the subject to be examined.

Figures 6, 7, 8, represent in detail the separate parts of the apparatus, with different sized finger pieces for children and adults. In the auscultation of plane surfaces these finger pieces may in most cases be advantageously replaced by massive extremities of similar form.

MODUS OPERANDI.

(Human body.)

The “dynamoscope” just described being set by its finger piece K (as seen in the dotted lines Figs. 2, 3,) on the conductor F of one of the diapasons, the latter is sounded by striking the branches A, A. The operator then adjusts in his ear the extremity J of the dynamoscope, and having observed and retained either by voice or memory the note produced changes the instrument from the diapason to the finger of the subject to be examined. The ear being applied as before, the note proceeding from the nervous vibrations is compared with that just chimed by the diapason. Should the notes thus compared be found in unison, the numerical value of the nervous vibrations, and consequently the degree of vitality possessed by the subject, is at once ascertained by simple reference to the acoustic scale. Should it, on the other hand, be found that

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a discordance exists between the two notes, the slides of the diapason are raised or lowered, as the case may be, or again, one diapason is substituted to another until perfect unison is obtained. Thus, for instance, in supposing the digital note to accord with the re—1 : (diapason No. 1) the known value of 5 which is 72 vibrations per second, representing an equal number of vibrations of the nerves, it may be inferred that a high degree of vital energy is possessed by the individual, that number of vibrations having been found to correspond with the maximum of health. Or again, in the opposite extreme, in supposing the digital note to accord with the do—4 : (diapason No. 4), the known value 10 of which is 8 vibrations per second, it follows that the stamina of the patient are at the lowest ebb, that number of vibrations having been proved to correspond with the final stage of disease. These examples are only stated to aid the comprehension of the modus operandi, and will be completed further on by tables indicating the semeiotical value of the different notes. It should 15 here be remarked, that after a certain amount of study the practitioner may dispense with the diapasons, and trust entirely to the ear for the correct estimation of the sounds refracted by the dynamoscope. At the outset the direct comparison of the vital notes with those of the diapasons is absolutely indispensable, commencing with the instruments Nos. 1, 2, by which the 20 clearest sounds are produced, and gradually extending the experiments to the Nos. 3, 4, on reaching which the ear will be found to have acquired the power of ascertaining the presence and value of the most distant murmurs of the nervous system.

LAWS OF OBSERVATION.

25 In the practise of dynamoscopy on the human subject it is strictly necessary to commence by the examination and comparison of the sounds emanating from the extremities of each hand, the local auscultation, when required, being afterwards proceeded with.

In every case the patient should be placed in such a position as to allay, as 30 far as possible, the muscular contractions of the member or surface to be examined, and in short, care should be taken to avoid the intervention of all vibrations other than those of the auscultated parts, especially in extreme cases when the higher and more clearly defined notes are no longer perceptible.

As it would be impossible in the limits of the present Specification to 35 enumerate the dynamoscopical signs and gradations of tone peculiar to each class and stage of disease, I purpose confining myself to a detail of the primary indications, as obtained from the digital extremities, and which will serve as key to all the rest.

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As at first sight these tables might appear more complicated than they really are, I reproduce them in a condensed form, as shewn by the following Diagram, which may be assimilated to a reversed thermometrical scale:—

Right.		Degrees.	Left.	
Notes.	Vibrations per Second.		Vibrations per Second.	Notes.
re - ₁ .	72	Perfect + Health	72	re - ₁ .
do - ₁ .	64	1	64	do - ₁ .
si - ₂ .	60	2	60	si - ₂ .
la - ₂ .	53	3	53	la - ₂ .
sol - ₂ .	48	4	48	sol - ₂ .
fa - ₂ .	42	5	42	fa - ₂ .
mi - ₂ .	40	6	40	mi - ₂ .
re - ₂ .	36	7	36	re - ₂ .
do - ₂ .	32	8	32	do - ₂ .
si - ₃ .	30	9	30	si - ₃ .
la - ₃ .	26	10	26	la - ₃ .
sol - ₃ .	24	11	24	sol - ₃ .
fa - ₃ .	21	12	21	fa - ₃ .
mi - ₃ .	20	13	20	mi - ₃ .
re - ₃ .	18	14	18	re - ₃ .
do - ₃ .	16	15	16	do - ₃ .
re - ₁ .	72	16	36	re - ₂ .
re - ₁ .	72	17	16	re - ₃ .
re - ₁ .	72	18	8	re - ₄ .
re - ₁ .	72	Dis O ease	53	la - ₂ .
re - ₁ .	72	1	42	fa - ₂ .
re - ₁ .	72	2	26	la - ₃ .
re - ₁ .	72	3	21	fa - ₃ .
re - ₁ .	72	4	12	la - ₄ .
re - ₁ .	72	5	10	fa - ₄ .

ANNOTATIONS.

The notes, do -₁ : si -₂ : la -₂ : sol -₂ : fa -₂ : mi -₂ : re -₂ : do -₂ : si -₃ : la -₃ : sol -₃ : fa -₃ : mi -₃ : re -₃ : do -₃ : may represent a certain but very feeble amount of health when found on one side, the other side giving the same, the double or the triple octave below. When the head is unaffected the cause of disease should be sought for in the side of the body from which has been obtained the note of lowest value. When, on the other hand, an affection of the head exists, the disease will be found in the cerebral hemisphere of the side which corresponds with the note of highest value. Whenever one side of the body gives a fourth below the other the disease is easily curable; when a sixth, the disease is still curable;

when $\frac{1}{8}$ th, $\frac{1}{10}$ th, $\frac{1}{12}$ th, &c., down to $\frac{1}{2}$ d, the disease assumes a more and more serious aspect; with all other notes, descending the scale on one side, the malady presents all the symptoms of incurability.

In paralysis, the vital notes are generally imperceptible in the affected parts of the body, and when they do exist are reduced to "harmonic," or derivative sounds. When on one side the note re -₁ : = 72, is obtained, and on the other fa -₂ : = 42, re -₂ : = 36, sol -₃ : = 24, or si -₄ : = 15, it may be inferred that phthisis is present. In this case the lung will be found affected on the side corresponding with the lowest number of vibrations. When on one side the fa -₂ : = 42, exists, with la -₂ : = 53, on the other, the presence of quinsey may be inferred.

In diptheria, the direct notes are entirely absent, the "harmonic," or derivative sounds being alone perceived on either side of the body.

In typhus fever, the right side invariably gives one octave below the left.

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As will be seen, the preceding scale starting at the point marked \dagger , from the $re-1$: on both sides, (72 vibr^{ns} per second = "perfect health") descends progressively to 18° (1° above zero) corresponding with the $re-1 = 72$ vib. on one side, and $re-4 = 8$ vib. on the other, which in the large majority of cases indicate the lowest amount of vitality consistent with any 5 degree whatever of bodily health.

At \circ corresponding with $re-1 = 72$ vib. on one side, and $la-2 = 53$, vib. on the other commence the indications of positive disease, which assumes a more and more serious aspect in descending the scale towards $\circ - 5^\circ$ ($re-1 = 72$, vib. on one side, and $fa-4 = 10$ vib. or four octaves below, on the other. 10

Beyond this point the decreasing value of the notes progresses in direct ratio with the increase of the morbid symptoms. A little later they subdivide into $\frac{1}{4}$ th, $\frac{1}{6}$ th, $\frac{1}{8}$ th, &c., &c., and finally sink into an undefined murmur, denoting the immediate approach of dissolution.

The gradations of sound from the outset of disease to its close, will be more 15 clearly exemplified by the following memoranda of a few well characterised cases extracted from the author's note book.

A. TONSILAR ANGINA.

1st day $la-2$: 53, on right side, $fa-2$: 42, left

2d do. $fa-2$: 42, do. $re-2$: 36, do. 20

3d do. $la-2$: 53, do. $fa-2$: 42, do.

4th do. $re-1$: 72, do. $la-2$: 53, do.

5th do. $re-1$: 72, do. $re-1$: 72, do.

Recovery.

B. APOPLEXY. 25

Attack at 9 o'clock A.M.

$re-3$: 16, on right side, $re-4$: 8, left,

2 o'clock, P.M.

do.— 3 : 16, on right side, do.— 4 : 8, left.

6 o'clock P.M. notes reduced to murmurs. 30

8 o'clock „ Death.

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C. CEREBRAL FEVER.

	1st day re— ₂ : 36, on right side, and re— ₂ : 36, on left.
	2d do. re— ₂ : 36, do. „ la— ₃ : 26, do.
	3d do. sol— ₂ : 48, do. „ re— ₂ : 36, do.
5	4th do. re— ₂ : 36, do. „ re— ₃ : 18, do.
	5th do. re— ₃ : 18, do. „ la— ₄ : 10, do.
	6th do. re— ₂ : 36, do. „ re— ₂ : 36, do.
	7th do. fa— ₃ : 21, do. „ la— ₃ : 26, do.
	8th do. la— ₃ : 26, do. „ fa— ₃ : 21, do.
10	9th do. re— ₄ : 8, do. „ fa— ₄ : 10, do.
	10th do. do— ₄ : 8, do. „ do— ₄ : 8, do.
	11th do. no perceptible notes do. „ undulating murmur
	Evening of same day = Death.

The foregoing details of the primary signs obtained from the digital auscultation, may as before stated be adopted as standard, by aid of which the practitioner may assign a definite value to the intermediate indications observed in the different species and stages of disease. From these elements he may, after a little experience, compose a series of auxiliary scales, divided to correspond with these intermediate signs, and forming dynamoscopical tables by reference to which any default of memory may be supplied. It should however be remarked that the general characters of the vital notes are to some extent modified by the age, sex, and idiosyncrasy of the individual, as also by certain abnormal influences. These varieties which leave unchanged the semeiotic value of the nervous vibrations may be briefly resumed as follows :—

Senile Notes.—Strong, hard, sonorous, and uniform.

Male Adult, do.—Strong, soft, full, and uniform.

Female Adult, do.—Soft, mellow, low, uniform, changing during pregnancy to hard, strong, and irregular.

Infantine Notes.—Thin, deep, filiform, soft, and regular.

During Sleep.—The vital notes are always softer and less perceptible than in the waking state.

During Anæsthesia.—The notes become irregular at the commencement, and tremulous in the more advanced stages.

During Surgical Operations.—They run through the different gradations of tone with extraordinary rapidity, and in extreme cases become intermittent, and almost imperceptible, assuming all the characters of the notes observed in the advanced stages of the most fatal diseases.

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Under the Influence of Electricity.—The perturbations of sound are still more distinctly marked. The full, soft, and uniform notes become strong, hard, and rolling, and continue so for a certain length of time after the termination of the experiment.

As a general rule these phenomena are confined to the portions of the body 5
comprised in the circuit of the current.

The general laws of observation above enumerated are found to apply with but few exceptions to the examination of all animals of the higher class, the only essential difference hitherto noted being that in certain cases the post mortem vibrations disappear much more rapidly than from the human 10
subject. The dynamoscope employed should be fitted with a massive extremity, and may be applied to any part of the body.

Having thus explained the rationale and practise of dynamoscopy as applied to the semeiosis of health and disease, I will now describe, in conclusion, its application to the distinction of real from apparent death. It is an 15
acknowledged fact that in the generality of cases conclusive proof of dissolution can only be obtained from the reunion of a variety of signs, including suspension of respiration, and pulsation of the heart; relaxation of the sphincters, depression of the eye, and opacity of the cornea; rigidity of the body, and, finally, decomposition. With the exception of the last, none of those signs 20
taken alone can be depended on as absolute proof of death, even when supported by the negative result of secondary tests, such as the application of electricity, actual cautery, &c., &c. In certain cases of syncope, for instance, the large majority of these indications may frequently be observed. In Asiatic cholera and other rapid disorders the depression and opalescence of the eye is 25
often found to accompany the final stages of the disease; and, lastly, examples of catalepsy have occurred in which the absence of decomposition constituted the only available proof of vitality in presence of the several counter-indications above enumerated. The existence and gradual suppression of the nervous vibrations in different parts of the body revealed by the dynamoscope 30
during the first few hours which follow decease, afford an infallible means of tracing the latent vitality to its extremest limits. As before stated, the digital notes of the patient "in articulo mortis" subside into an undulating murmur, which in most cases remains more or less perceptible until death supervenes.

Immediately after all sound disappears from the extremities of the body, 35
but on applying the dynamoscope to the neck, the wrists, and the upper part of the feet, it is found to exist in the form of a sharply-defined continuous murmur. From thence the sound gradually recedes towards the centre of the body till it reaches the precordial regions where it settles down, becomes inter-

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mittent and tremulous, and finally disappears. The time which elapses between the actual cessation of life and that of the nervous vibrations varies according to the locality and the nature of the disease or lesion by which death is caused. In several cases observed in the south of France, the pre-
5 cordial murmurs were distinctly perceptible up to the sixteenth hour after death; but in Paris ten hours has been the maximum period hitherto noted. In a recent case of apoplexy they were remarked to have ceased almost instantaneously throughout the whole body, the most careful auscultation having failed to detect even the precordial murmur within twenty minutes
10 after the attack.

In syncope, or in cases of apparent death resulting from asphyxia, catalepsy, hysteria, &c., &c., the digital murmur continues to be perceptible so long as a trace of life remains; while the notes observed in approaching the centre of the body present a certain character of organic vitality of which the real post
15 mortem vibrations are entirely divested. In one remarkable instance observed at the hospital of Montpellier, the patient after passing through the various stages of a scorbutic disease fell into a state of profound catalepsy, which was so far mistaken for absolute death that the body was laid aside for interment. Some hours later an accidental circumstance led to a dynamoscopical
20 examination, which resulted in proving the existence of the digital vibrations accompanied by a crepitating sound, which is only perceived in the living subject. The means of resuscitation usual in such cases were at once applied, but without apparent success, although the increasing intensity of the vibrations observed from hour to hour denoted a gradual return of vitality, till at last
25 after the thirty-sixth hour the patient suddenly awoke from the cataleptic state, and after a brief period of delirium came completely to himself. Fifteen days later he was discharged from the hospital in perfect health. The same results were obtained in four other cases of a similar character which have fallen under the author's notice, the difference between the vital and post
30 mortem vibrations being in each instance distinctly marked. Although the fact may be of little practical importance, it may here be observed that the retreat of vitality from amputated members is accompanied by the same phenomena as the general extinction of life. Immediately after the operation the well-defined notes previously perceived at the extremities of the member
35 subside into a murmur similar to that observed at the approach of general dissolution, and gradually recede from the periphery to the centre, where they die away within from ten to fifteen minutes. In all those experiments on inert bodies the auscultation should, when practicable, be performed with a dynamoscope of cork, or other matter less liable than metal to refract the

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vibrations of surrounding objects. In certain extreme cases the subcutaneous tissue may be laid open, and the instrument applied directly upon it, by which means the vital murmur may sometimes be detected after having become imperceptible at the surface.

Having now described and ascertained the nature of the said Invention, 5 and the manner of carrying it into effect, I would have it understood that I do not confine myself to the precise mechanical details of the dynamoscopical instruments so long as their principles and characteristic features be retained.

By what I claim and desire to secure by Letters Patent, is, the improved combination of acoustic apparatus, substantially as herein set forth and repre- 10 sented in the annexed Drawing, by means of which, applied as above described, the presence and degree or cessation of vitality in the human body, and in animals of the upper scale, may be ascertained and translated into signs of known value.

In witness whereof, I, the said Marc Antoine François Mennons, 15 have hereto set my hand and seal, this Twenty-fourth day of October, in the year of our Lord One thousand eight hundred and sixty-one.

M. F. MENNONS. (L.S.)

LONDON :

Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE,
Printers to the Queen's most Excellent Majesty. 1862.

