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⑤④ **Metronomic signalling device and method of tempo signalling.**

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Description

This invention relates to silent metronomic signal pulsing devices.

Metronomic devices make it possible to train or guide players of musical or similar activities a more accurate timing by a regularly repeated beat signals emitted from the devices at a rate ranging from 40 to 208 per minute.

Audible (acoustic) and visual (optical) are two types of metronome widely known, while the former produces ticking sound and the latter produces oscillating light or pendulum. Another is a combination of the audible type with a skin felt addition and is known from US-A-2,535,809, of the first six lines of claim 8 specifying "a case including a back wall comprising a flexible diaphragm, a timing mechanism within the case, means responsible to operation of the timing mechanism for creating uniformly periodic impacts in the diaphragm", and column 1, lines 25 to 28 specifying: "my timing device may be considered as being *in the nature* of a silent metronome in that it supplies sensible but *substantially inaudible* periodic beats". The device powered by a main spring is regulated by a clockwork mechanism including an escape wheel, 8 striking members and pallet fingers.

These types of metronomic devices they all emit signals that disturb music making. For example, the audible metronomic signals may interfere with concentration upon tone and pitch. Visual metronomic signals may additionally interfere with note reading. The prior art cited above which the inventor carefully qualifies the "silent metronome" obviously is an audible type with added skin felt feature. Unless soundproof material such as soft rubber is used, a diaphragm by definition is a sound amplifying element such as one finds in a telephone receiver or the cone of a loudspeaker. In the device the impact actions by the striker members of the escape wheel against the pallet fingers cause the casing to resonate and the shaft transmits the impact to the diaphragm thereby causing it to amplify the striking sound further to a distinct tick similarly as a regular audible metronome. The ticking sound or noise will render the device useless in an actual performance such as studio recording session where the microphones are sensitive enough to pick up even a slightest sound or noise emitted by the device. The lack of synchronising or inter-connecting means of the device in the reference further hinders the application of a method whereby the tempo signals may be effected to a plurality of users tacitly from a central location remote from the users.

According to one aspect of the present invention there is provided a silent metronomic signal pulsing device comprising: a housing having an opening; a transmitter fixed across said opening and having a face projecting from said housing for tempo-signal-imparting engagement with a user; transducer means comprising a disk-like member movable with said transmitter;

dynamoelectric means having a part fixed to said member and a part fixed to said housing and operable for pulsing said member and thereby actuating said transmitter for tempo signal guidance of the user without acoustical interferences; and electrical means for controlling the pulsing tempo of the dynamo-electric means, characterised in that said face is texture accentuated by an array of projections which in operation thrust toward and tacitly impart a silent motion impulse to the skin of the user contacted by the pad face of the transmitter so that the transmitter is soundproof and clap-proof, and in that the member is fixed to said transmitter.

The advantages offered by the invention are that, firstly, the signal impulse generating means in US-A-2,535,809 which consists of striker members, pallet fingers, diaphragm as well as the mechanical clockwork is replaced by a dynamoelectrical translating means, including an elastic soundproof signal transmitting pad of soft rubber or similar material that allows imparting of silent motion impulses to the skin of the user contacted by the device without acoustic interference and, secondly, the electrical pulsing means in the device can also be inter-connected in multiple circuit to separate units in a synchronised manner and a master signaller or alternately a conductor's baton equipped with a tapping key switch can thereby effect respectively a steady or flexible tempo signals to the units. This method of signalling (Figures 3 and 5) allows a conductor or director to direct musicians contacted by the separate devices to be situated unconventionally beyond his field of vision during rehearsal or actual performance. For example, they may be behind him, above him, behind the curtain or moving from place to place to enhance the phonic effect of a performance. In the latter situation, the moving musicians may carry devices that are radio wave activated, a wireless system which can be easily achieved in accordance with the present state of electronic arts.

According to another aspect of the present invention, there is provided a method of use of the metronomic signal pulsing device mentioned above for metronomic tempo signalling comprising: generating silent tempo signals from a metronomic signal generating circuit through driving by a conductor; controlling said tempo signals so as to vary their tempo; and translating said signals dynamo-electrically into mechanical silent motion impulses by plural soundproof transmission means and thereby transmitting the impulses to plural users so that the plural users simultaneously receive tempo guidance by feeling said impulses silently.

One way of carrying out the invention is described in detail below, with reference to drawings which illustrate only one specific embodiment, in which:-

Figure 1 is a plan view of a metronomic signalling device embodying the invention and partly broken away and in section to reveal details;

Figure 2 is a side elevational view of the device

of Figure 1 with parts broken away and in section for revealing details;

Figure 3 is a schematic view showing how a plurality of metronomic devices according to the present invention may be activated through a central unit;

Figure 4 is a schematic electrical diagram relevant to the operation of the device; and

Figure 5 is a schematic electrical diagram especially relevant to the arrangement of Figure 3.

Figures 1 and 2 show the portable device comprises a body base portion 11 of which is moulded from a suitable plastic material. Removably carried by the base 11 is a snap-on detachable cover 12 so that the rim flange 13 with a lower edge inwardly projecting retaining bead 14 is retainingly engageable with a complementary latching shoulder 15 at the inner side of a rabbet groove 17 which provides an upwardly facing shoulder on which the edge of the flange 13 seats.

In accordance with the invention, dynamo-electric means are provided inside 18 the device for generating tacit metronomic signal impulses, comprising in a preferred arrangement a balanced, co-operative pair of agitator electro-magnets 19 mounted in respective diametrically opposite spaced bosses 20 located at the rim of a cavity 21 defined within an integral thickened area 22 within the housing on the base member 11 and defining an opening from the housing. The electro-magnets 19, when they are energised, will attract co-operatively related, normally gapped, arms 23 of a metronomic impulse transducer of soft iron material and from which the arms 23 integrally project divergently and tangentially from diametrically opposite marginal location on the transducer 24 and in complementary positions for actuation by the respective electro-magnets 19. The transducer 24 is carried by a soundproof relatively soft, yieldably movable transmission pad 25 having a surface area facing inwardly and to which area is secured fixedly the outwardly facing surface of the member 24, while the arms 23 project from the inwardly margin of the facing surface of the member. On its outer face, the pad 25 of rubber or rubber-like elastic material desirably has an array of interspersed mode projections 27 providing a texture accentuated, an air cushioned or clap-proof face. About its perimeter, the pad 25 has means for securing it to the base member 11, comprising a preferably continuous peripheral attachment flange 28 which is adapted to be firmly clamped against an annular frusto-conical shoulder 29 provided in annular outwardly opening groove cavity 30 concentric with the outwardly opening cavity 21 in the thickened base area 22. A clamping ring nut 31 is adapted to be threadedly engaged by means of threads 32 with base 11 within the annular cavity 30 and driven with its complementary frusto-conical clamping surface 33 against the pad flange 28 of the pad 25 to clamp it securely against the clamping shoulder 29.

In accordance with a preferred embodiment of

the invention, pulsing operation of the electro-magnets 19 is adapted to be effected by electrical means (Figures 1, 2 and 4) comprising an electrical circuit 34, components of which may be carried on a circuit board 35 mounted as by means of a thin mounting panel 37 on the inside roof surface provided by the top of the cap 12. Means such as a pulse cycling transistor 38 and capacitor 38a (a digital circuitry may be alternately employed) are connected electrically to the electromagnets 19 and to a power source such as a battery 39. An on/off electrical switch 40 for the electrical circuit has suitable actuating means mounted conveniently on the cover 12. A pulse frequency or tempo control 41 in the circuit 34 is adapted to be adjusted as by means of a knob 42 located on the cover 12 and desirably provided with an indicator 43 for visualising adjustment relative to a tempo or pulse rate scale 44. Through this arrangement, when the circuit is closed, the electro-magnets 19 are energised and de-energised with a frequency determined by the adjustment of the tempo control 41. At each energisation of the electro-magnets 19 in each cycle, the impulse signalling device arms 23 are drawn toward, but the sufficiently resilient pad 25 prevents contacting, the electromagnets and then released on de-energising of the electro-magnets. This causes the impulse transducer 24 to push outwardly on the pad 25 and at the same time torque slightly in a counter-clockwise direction as viewed in Figure 1 and then returned by virtue of the return spring action of the pad 25. This causes the projection 27 to thrust toward and tacitly impart a silent motion impulse to the skin S (Figure 2) of a user contacted by the pad face. In Figure 1, the double headed arrow 45 indicates the oscillating cycle of the transducer 24 as it is alternately actuated in a pulse and release cycle by the electro-magnets 19. A double headed arrow 47 indicates reciprocatory axial motion cycle of the member 24. As a result, the user receives a definite and dual combined twisting and thrust for each impulse. This is especially effective where an article of clothing intervenes between the device 10 and the skin of the user. The device 10 may be carried in a garment pocket with the impulse transmitting pad 25 contiguous to the user's body. An attachment means 48, 49 is provided alternatively for attaching the device to the user's body.

For plural tacit metronomic signalling, as enabled by the said preferred embodiment of the invention, the device 10 may provide with multiple circuit jack outlet 50 to which a lead connection 55 to slave unit 53 may be plugged in. The slave unit 53 is a stripped down version of device 10 that contains electro-magnets 19 and transmitter means 23, 24, 25 and it is powered by the signal pulsing component of a device 10 or an equivalent master signaller 54.

Figure 3 depicts a multiple signalling where the equivalent signaller 54 is of increased capacity to accommodate the power demand from a large number of units 53. Connected to the master

signaller 54 are a DC adaptor 57 to supply extra power when needed and an adaptor cord 63 leading to a conductor's baton 60 for effecting manual tempo signalling. Located on the handle 61 of conductor's baton 60 is a digital key switch assembly 62 provided for manually generating flexible tempo signals to the remote signalling units 53 or 53' as shown in Figure 5. By tapping the switch key 62 as flexibly in tempo as desired a correspondingly flexible tempo signal can be generated to the unit 53'. On each tap of the normally open biased key switch 62 it closes briefly the pulsing circuit 65 across the power source 39' (or 57) and the solenoids 19' of the slave units 53' energised synchronously, thereby a multiple signalling of tempo is manually effected. By setting the dial 59 at a desired rate and the control switch 58 closed, the electrical pulsing circuit 34' is energised for steady tempo pulsing action at a rate indicated on the control 59. Each pulse closes a synchronising relay switch 64, preferably of a silent kind that having a similar function as switch 62 in closing the pulsing circuit 65, which correspondingly actuate the solenoids 19' of the slave units synchronously, thereby a multiple signalling of a steady tempo is effected.

Claims

1. A silent metronomic signal pulsing device (10) comprising: a housing (11, 12) having an opening (21); a transmitter (25) fixed across said opening (21) and having a face (27) projecting from said housing (11, 12) for tempo-signal-imparting engagement with a user; transducer means comprising a disk-like member (24) movable with said transmitter (25); dynamo-electric means (19, 23) having a part (23) fixed to said member (24) and a part (19) fixed to said housing (11) and operable for pulsing said member (24) and thereby actuating said transmitter (25) for tempo signal guidance of the user without acoustical interferences; and electrical means (41, 42, 43, 44, 59, 62, 64) for controlling the pulsing tempo of the dynamo-electric means (19, 23), characterised in that said face (27) is texture accentuated by an array of projections which in operation thrust toward and tacitly impart a silent motion impulse to the skin of the user contacted by the pad face (27) of the transmitter (25) so that the transmitter (25) is soundproof and clap-proof, and in that the member (24) is fixed to said transmitter (25).

2. A device as claimed in claim 1, characterised in that said part (23) fixed to said member (24) comprises at least one rigid arm (23) located along a margin of said member (24) and adjacent to a margin of said transmitter (25), and said part (19) fixed to said housing (11) comprises an electro-magnet (19) adjacent to the margin of the member (24).

3. A device as claimed in claim 2, characterised in that said parts of the dynamo-electric means (19, 23) are in a narrow gap relation so that in the operation of said dynamo-electric means (19, 23)

said part (23) will be alternately drawn toward, but not colliding with, said housing carried part (19) on the housing (11) and released for thereby effecting the pulsing of said member (24) and the actuation of said transmitter (25).

4. A device as claimed in any preceding claim characterised in that said dynamo-electric means (19, 23) is adapted to effect oscillatory, reciprocatory pulsing movement (45, 47) of said transmitter (25).

5. A device as claimed in any preceding claim characterised in that said electrical means (41, 62) for controlling the pulsing tempo of said dynamo-electric means (19, 23) includes a conductor's baton (60) electrically connected with said electrical means (57, 39', 65) and having a digital tapping switch (62) mounted on the baton (60).

6. A device as claimed in any preceding claim characterised by a plurality of separate units (53, 53') for transmitting said tempo signal to separate users.

7. A method of use of the metronomic signal pulsing device according to claim 1 for metronomic tempo signalling comprising: generating silent tempo signals from a metronomic signal generating circuit through driving by a conductor; controlling said tempo signals so as to vary their tempo; and translating said signals dynamo electrically into mechanical silent motion impulses by plural sound-proof transmission means (53, 53') and thereby transmitting the impulses to plural users so that the plural users simultaneously receive tempo guidance by feeling said impulses silently.

Patentansprüche

1. Ein "stilles" metronomisches Signal erzeugende Vorrichtung (10) mit einem eine Öffnung (21) aufweisenden Gehäuse (11, 12), einem Geber (25), der über der Öffnung (21) befestigt ist und eine Vorderseite (27) aufweist, die gegenüber dem Gehäuse (11, 12) zur Erzielung eines Temposignals beim Benutzer vorsteht,

mit Signalumformer mit einem scheibenartigen Bauteil (24), daß mit dem Geber (25) beweglich ist,

mit dynamo-elektrischen Mitteln (19, 23), die ein Teil (23) besitzen, das mit dem scheibenartigen Bauteil (24) verbunden ist und ein Teil (19), das an dem Gehäuse (11) befestigt ist und das scheibenartige Bauteil (24) in Schwingungen versetzt und damit den Geber (25) in Tätigkeit setzt, um ein Temposignal ohne akustische Interferenz auf den Benutzer zu übertragen,

und mit elektrischen Mitteln (41, 42, 43, 44, 59, 62, 64) zur Regelung des Impulstempes der elektro-dynamischen Mittel (19, 23), dadurch gekennzeichnet, daß die Vorderseite (27) durch eine Gruppierung von Vorsprüngen oberflächenakzentuiert ist und die Vorsprünge bei Betätigung auf die Haut des Benutzers, dem die Vorderseite (27) des Gebers (25) anliegt, zubewegt werden und im Takt einen "stillen" Bewegungsimpuls erzeugen, derart, daß der Geber (25) schalldicht und krach-

dicht ist, wobei das scheibenartige Bauteil (24) an dem Geber (25) befestigt ist.

2. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß das Teil (23), das an dem scheibenartigen Bauteil (24) befestigt ist, wenigstens einen starren Arm (23) aufweist, der längs einer Randkante des scheibenartigen Bauteiles (24) angeordnet ist und sich benachbart zur Randkante des Gebers (25) befindet, wobei das Teil (19), das am Gehäuse (11) befestigt ist, einen Elektromagneten (19) besitzt, der sich in Nähe der Randkante des scheibenartigen Bauteiles (24) befindet.

3. Vorrichtung nach Anspruch 2, dadurch gekennzeichnet, daß die Teile der dynamo-elektrischen Mittel (19, 23) einen schmalen Spalt definieren, so daß bei Betätigung der dynamo-elektrischen Mittel (19, 23) das Teil (23) abwechselnd auf das gehäusefeste Teil (19) im Gehäuse (11) zugezogen wird, ohne daß es damit kollidiert und wieder freigegeben wird, um derart das scheibenartige Teil (24) in Impulse zu versetzen und den Geber (25) zu betätigen.

4. Vorrichtung nach einem oder mehreren der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die dynamo-elektrischen Mittel (19, 23) in der Lage sind eine oszillatorische hin- und hergehende Bewegung (45, 47) des Gebers (25) zu erzeugen.

5. Vorrichtung nach einem oder mehreren der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die elektrischen Mittel (41, 62) für zur Kontrolle des Takttempos der dynamo-elektrischen Mittel (19, 23) einen Begleitertaktstock (60) aufweisen, der elektrisch mit den elektrischen Mitteln (57, 39', 65) verbunden ist und einen digitalen Anzapfschalter (62) aufweist, der auf dem Taktstock (60) angeordnet ist.

6. Vorrichtung nach einem oder mehreren der vorhergehenden Ansprüche, gekennzeichnet durch eine Vielzahl einzelner Einheiten (53, 53') zur Übertragung des Temposignals auf verschiedene Benutzer.

7. Verfahren zur Benutzung der metronomische Signale erzeugenden Vorrichtung gemäß Anspruch 1 zur Erzeugung metronomischer Temposignale umfassend:

Erzeugen stiller Temposignale von einem metronomische Signale erzeugenden Kreis durch Antrieb eines Karduktors;

Kontrolle des Temposignals, so daß das Tempo variiert werden kann;

Umwandlung des dynamo-elektrischen Signals in einen mechanischen, stillen Bewegungsimpuls durch mehrere schalldichte Gebermittel (53, 53') und dadurch Übertragen der Impulse auf eine Vielzahl von Nutzer, so daß die Vielzahl der Nutzer gleichzeitig Tempoführung durch Fühlen des stillen Impulses erhalten.

Revendications

1. Dispositif d'émission de signaux pour un métronome silencieux (10) comprenant: un logement (11, 12) présentant une ouverture (21); un

émetteur (25) fixé transversalement à ladite ouverture (21) et présentant une face (27) formant saillie depuis ledit logement (11, 12) pour permettre la communication d'un signal de tempo à un utilisateur; des moyens transducteurs comportant un organe en forme de disque (24) pouvant être déplacé avec ledit émetteur (25); un moyen électro-dynamique (19, 23) présentant une partie (23) fixée audit organe (24) et une partie (19) fixée audit logement (11) et pouvant être actionnée pour imprimer des impulsions audit organe (24) et actionner ainsi ledit émetteur (25) pour guider le signal de tempo de l'utilisateur sans interférences acoustiques; et des moyens électriques (41, 42, 43, 44, 59, 62, 64) pour commander le tempo d'impulsion du moyen électro-dynamique (19, 23), caractérisé en ce que la texture de ladite face (27) est accentuée grâce à un ensemble de saillies qui, lors du fonctionnement, avancent et communiquent sans bruit une impulsion de mouvement silencieuse à la peau de l'utilisateur avec laquelle elles sont en contact grâce à la face du tampon (27) de l'émetteur (25) de sorte que l'émetteur (25) est insonorisé et insensible aux claquements, et en ce que l'organe (24) est fixé audit émetteur (25).

2. Dispositif selon la revendication 1, caractérisé en ce que ladite pièce (23) fixée audit organe (24) comporte au moins un bras rigide (23) situé le long d'un bord dudit organe (24) et adjacent à un bord dudit émetteur (25), et en ce que ladite pièce (19) fixée audit logement (11) comporte un électro-aimant (19) adjacent au bord de l'organe (24).

3. Dispositif selon la revendication 2, caractérisé en ce que lesdites pièces du moyen électro-dynamique (19, 23) sont en relation grâce à un écartement étroit de sorte que, durant le fonctionnement dudit moyen électro-dynamique (19, 23), ladite pièce (23) sera alternativement attirée en direction de ladite pièce (19) portée par le logement (11), mais sans entrer en contact avec elle, et relâchée pour réaliser ainsi l'impulsion dudit organe (24) et permettre l'actionnement dudit émetteur (25).

4. Dispositif selon l'une des revendications précédentes, caractérisé en ce que ledit moyen électro-dynamique (19, 23) est prévu pour permettre un mouvement d'impulsion oscillant en va-et-vient (45, 47) dudit émetteur (25).

5. Dispositif selon l'une des revendications précédentes, caractérisé en ce que ledit moyen électro-dynamique (41, 62) pour la commande du tempo d'impulsion dudit moyen électro-dynamique (19, 23) comporte une baguette de chef d'orchestre (60) connectée électriquement avec ledit moyen électrique (57, 39', 65) et pourvue d'un interrupteur de prise numérique (62) monté sur elle.

6. Dispositif selon l'une des revendications précédentes, caractérisé par une pluralité d'unités séparées (53, 53') pour transmettre ledit signal de tempo à des utilisateurs séparés.

7. Un procédé d'utilisation du dispositif d'impulsion de signaux de métronome selon la revendication 1 pour la signalisation silencieuse du

tempo de métronome comportant: la génération de signaux silencieux de tempo par un circuit de génération de signaux de métronome d'après la conduite d'un chef d'orchestre; la commande desdits signaux de tempo de manière à modifier leur tempo; et la traduction desdits signaux électro-dynamiques en impulsions silencieuses

mécaniques de mouvement par une pluralité de moyens de transmission insonorisés (53, 53') puis la transmission des impulsions à une pluralité d'utilisateurs de telle manière que la pluralité d'utilisateurs reçoivent simultanément le guidage du tempo par la sensation des impulsions silencieuses.

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