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ELECTRIC TEMPO DEVICE

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FIG. 1

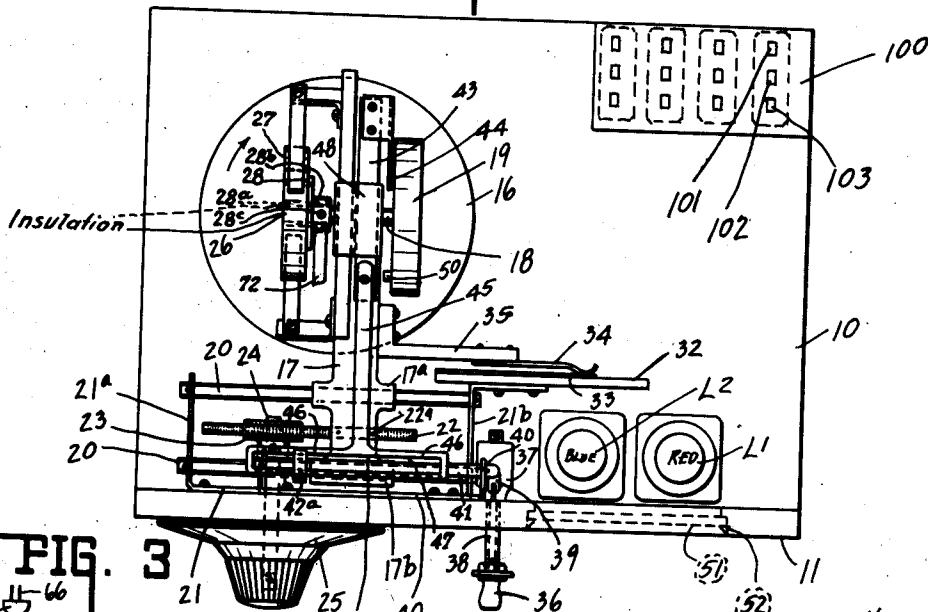


FIG. 3

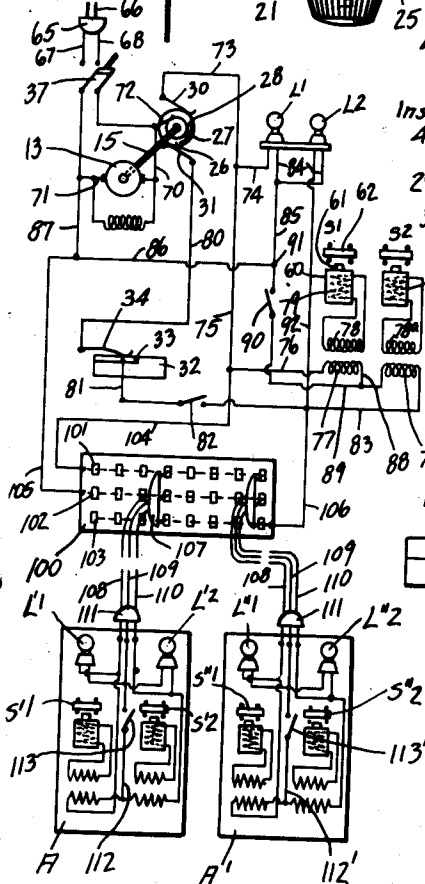
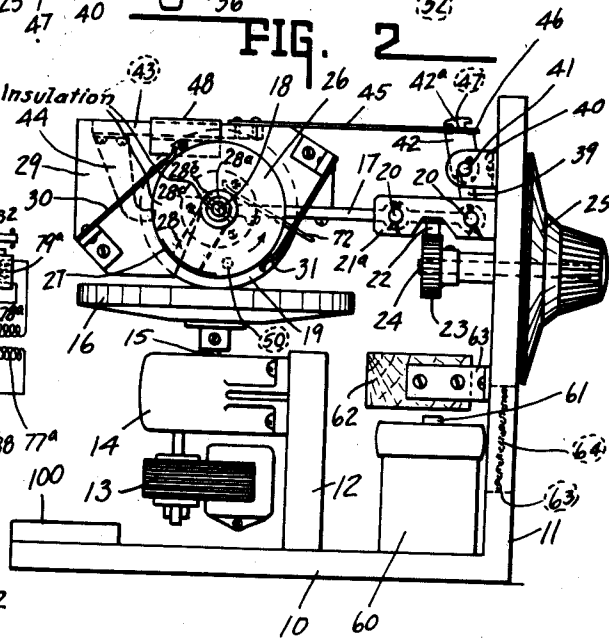


FIG. 2



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ELECTRIC TEMPO DEVICE

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5 Claims. (Cl. 58—130)

This invention relates to an electric tempo device.

The chief object of this invention is to provide a device in its simplest form such that it will positively indicate to the conductor of a band, orchestra, symphony, or the like, the exact beat or time.

Another object of the invention is to provide a device which may be so arranged that it will individually indicate to each musician, when desired, the same beat or time.

The device has particular utility when employed for the purpose of synchronizing the orchestration with a performance, such as various dancing acts, floor-shows, and the like, which particularly emphasize eccentric, aesthetic and acrobatic dancing.

It has been the experience of orchestra, band and like leaders when playing for performances that a slight difference in time of the orchestration with reference to the dancing act frequently mars the performance. The present invention, therefore, permits the orchestra leader, for example at rehearsal, to employ the device and record the timing which is satisfactory to the performer, or performers, and at the performance, or performances, and on the same and/or successive days have this selected timing automatically imposed on the orchestration. Thus, the sole responsibility for synchronization between orchestra and performance rests solely upon the performer, or performers, following agreement at rehearsal.

The device is capable through manual adjustment, of securing this same synchronization for a plurality of different numbers in the same or subsequent performance. The conductor in this instance serves, as it were, a central control station operator.

Upon receipt of the score and at rehearsal, the conductor, when the timing has been agreed upon between the performer and the conductor, notes the dial reading of the manual adjuster on that score. It is contemplated also that ultimately various scores will be initially indicated when written so that any conductor having a standard tempo device of the character described, need not go through the rehearsal, scale reading, determination just specified but will merely set the dial to the designated scale reading and proceed with the initial rehearsal in order to become familiar with the orchestra music, thus saving considerable time.

The chief feature of the device is that it is capable of indicating 4—4; 3—4 (waltz); 2—4

and 1—4 tempo. All other tempos, such as 12—8; 6—8, et cetera, may be worked out by the operator.

Other objects and features of the invention will be set forth more fully hereinafter in the detailed description of the device and associated system.

The full nature of the invention will be understood from the accompanying drawing and the following description and claims.

In the drawing,

Fig. 1 is a top plan view of the portion of the device, parts being omitted for clearness.

Fig. 2 is an end elevation of the device, parts being omitted for clearness.

Fig. 3 is a diagrammatic wiring diagram of parts of the device and the electrical system including the same.

In the drawing there is illustrated the operative portion of an electric tempo device and Figs. 1 and 2 more especially represent portions of the master control station. The device is illustrated without a complete container but this is merely for purposes of clearness.

In Figs 1 and 2, 10 indicates a base and 11 a face plate. Mounted on the base is a support 12 which suitably supports in turn an electric motor 13 which through a speed reducing device 14 drives a shaft 15 in turn rotating at a predetermined speed a friction disc 16. As cantilever support 17 is moved—see Fig. 1—from slightly off center radially to the right, the speed of rotation of the shaft 18 increases.

The cantilever support 17 includes two bearings 17a and 17b and the same slidably receive the bars or rods 20 carried by the bracket members 21, 21a and 21b. The cantilever member 17 has suitably secured to it as at 22a, the rack 22 which meshes with the pinion 23 carried by a shaft 24 that extends through the face plate 11 and mounts on its exposed end the dial member 25. Thus, as the dial member is rotated clockwise, the friction wheel 19 is caused to move toward and away from the center of the disc 16, thereby determining the speed of rotation of the shaft 18 which is associated with a cyclically operable switch arrangement, hereinafter to be set forth.

The shaft 18 mounts an insulation disc 26 having on its periphery a metallic segment 27 and this segment is in electrical contact with an arm 28 preferably insulated at 28a from the shaft 18. Said arm 28 includes a hub portion 28b which may be engaged by a spring contact finger 72, so that electrical energy may be continuously

supplied to the segment 27 during the rotation of shaft 18. Hub 28b is pinned by an insulation pin 28c.

The cantilever support 17 in turn supports an insulated block or plate 29 and suitably secured thereto in diametrical relation with respect to shaft 18 are the spring fingers 30 and 31. Thus, in each rotation of the disc 26 current will be supplied for a limited period to any device electrically connected to the spring finger 30 and similarly to any device electrically connected to the spring finger 31, except as hereinafter set forth.

The member 21b supports an insulation plate 32 which mounts a metallic strip 33 and the same is adapted to be engaged by a spring finger 34 carried by an arm 35 in turn carried by the cantilever support member. Thus, as member 17 is moved to the left or right for switch speed adjustment, switch 34 may or may not be in electrical contact with plate 33. At relatively high speeds of rotation of shaft 18, there will be an open circuit between finger 34 and the metallic conductor or strip 33, and the purpose of this automatic cutout arrangement will be set forth hereinafter.

There is mounted on the face plate 11 a switch member 36 which controls a switch structure indicated generally in Fig. 1 by the numeral 37, and indicated specifically in Fig. 3 by the numeral 37. This is the master switch. It, as hereinafter to be set forth, supplies energy to the motor and to the electric signals. This switch is mentioned at this point for the purpose of describing the immediate following control, to-wit; movable with the switch member 36 is a member 38 which is connected to a lever arm 39 pivotally supported in bracket 40—see Figs. 1 and 2—and the lever arm 39 rocks a shaft 41 carrying an arm 42.

Slidably supported by the member 17 is the element 43 which has secured to it in depending relation a hook 44—see more especially Fig. 2. A bar or strip 45 is secured to the opposite end of member 43 and its opposite end is elongated in opposite directions, as indicated at 45. In effect, therefore, members 45 and 43 constitute a T-shaped structure and the head of the T is slotted as at 47. This is an elongated slot and the headed portion 42a of the member 42 is seated therein. Member 43 is slidably supported, as stated, in the member 43 shown in Figs. 1 and 2, carried by arm 17 and member 29.

The purpose of the aforesaid mechanism is as follows: When the switch member 36 is pushed in to open the motor circuit, the shaft 41 is rocked clockwise—see Fig. 2—and member 45 together with member 43 is moved to the right—see Fig. 2—or toward the face 11—see Fig. 2. This moves the hook 44 into position immediately adjacent the side of the wheel 19 and the wheel 19 on that face carries a pin 50 which in the rotation counterclockwise of wheel 19 seats in the hook portion and thus further rotation of the wheel 19 is prevented, even though the momentum of the rotating parts be such that the armature of the motor and the various other associated parts, including the disc 16, continues or attempts to continue to rotate. The driving connection between the friction wheel 19 and the friction wheel 16 is such should there be additional rotational movement after the energy to the motor 13 is cut off, the friction wheel 19 will always remain in this position until the circuit is again closed.

When the circuit is closed by pulling out on

switch 35 to secure motor operation, the hook 44 is withdrawn and the cyclic switch device always starts the signal indications in predetermined relation so that upon successive initiation of operation, the signals will always be started at the same relative time with reference to the period of rotation.

The device includes a pair of visual signals in the form of lamps. Herein the lamp L1 is indicated as of red color and the other lamp L2 is indicated as of blue color. They are secured either on the base or by a bracket carried by the face plate, as desired, and are visible through the transparent or translucent closure 51 in the opening 52 in the face plate.

There is also supported by the base 10 an audible signal 60 which has a plunger 61 therein, and the same is actuated by a solenoid 79 which causes the plunger to elevate and strike a sounding block 52 suitably supported as at 63—see Fig. 2. Two of these sounding block signals are provided—see Fig. 3—although only one is shown in Fig. 2. For clearness, as stated, certain parts have been omitted in certain of the figures, to-wit, the visual signals shown in Fig. 1 are not shown in Fig. 2 and the audible signal devices shown in Fig. 2 are not illustrated in Fig. 1. The face plate 11 is apertured as at 63 adjacent the audible signals S1 and S2 and the opening is closed by an ornamental screen 64 through which the tone is heard.

Reference will now be had to Fig. 3 which is the wiring diagram, and which shows the several electrical connections. In said figure, 65 indicates a terminal plug with the prongs 66 adapted for connection to any conventional outlet socket. The cord or cable includes the two lines 67 and 68. These are controlled by the switch 37 previously referred to and illustrated in Fig. 1 in elevation. The line 68 controlled by the switch 37 has one branch 70 connected to the electric motor 13. The other line 67 is similarly connected to the motor as at 71. The line 68 is connected to the contact finger 72 before mentioned, which rides on the hub of the member 28 and insulated from the shaft 18. The segment 27 is shown in this figure on the disc 26; likewise, the member 28. The two fingers 30 and 31 are similarly illustrated. A line 73 connects by one branch 74 to the red master light signal L1 and another branch thereon 75 connects by line 76 to one terminal of the primary 77 of a transformer the secondary 78 of which is connected to the winding 79 of the audible signal 60 having the striker 61 for engaging the sounding block 52, the unit being designated in Fig. 3 not only by these numerals but also by the designation S1.

The other switch finger 31 is connected by line 80 to the spring finger 35 and the terminal bar 33 (on the insulated plate 32) is connected by line 81 to one terminal of the switch 82 and the other terminal of switch 82 is connected by line 83 to one terminal of the primary winding 77a, of a transformer, the secondary 78a of which is connected to a solenoid 79a of the second audible signal S2 having the striker and sounding block as shown, said second audible signal unit being designated in Fig. 3 by the symbol S2.

The two lines 84, constituting the return from the two visual signals L1 and L2, are connected to line 85, in turn connected by line 86 to line 87, in turn connected to line 87. The other two terminals of the two primary windings of the transformers 77 and 77a are connected by lines 88 to line 89 which includes a switch 90 and

line 89 therefrom is connected at 91 to the line 85.

The operation of the master tempo device is as follows:

When the switch member 36 is actuated to energize the device, including the electric motor, after the dial has been properly adjusted to the desired position corresponding to the tempo desired, the initial positioning device (hook 44) is retracted and maintained in the retracted position as long as the master switch 37 is closed. In the rotation of the disc switch, current is alternately supplied to switch contact fingers 30 and 31. Current supplied to switch contact finger 30 energizes the visual signal L1 and at the same time energizes the primary winding 77 of the audible signal S1 to secure an audible tone from the block 62. This latter signal indication is obtained provided the switch 90 is in closed relation. If in open circuit relation, as illustrated in Fig. 3, the audible signal S1 will not be sounded. In certain types of programs the audible signal would be of very interfering character and consequently there is provided this manual cut-out. This switch is not shown in Figs. 1 and 2 for clearness.

Current supplied to switch contact 31 is supplied through the switch 35—33 and the switch 82 to the signal L2 by line 92. This line 81 also supplies energy by line 83 to the primary of the second audible signal S2 unless the switch 90 is in open circuit relation as shown in Fig. 3. It will thus be noted that switch 90 is adapted to simultaneously cut out both audible signals.

It has been previously set forth that if the speed of rotation of the disc 26 is sufficiently great, the movable parts shown in Fig. 1 will be shifted sufficiently to the right so as to have the switch member 34 engage the insulated portion 32 and not the metallic terminal switch 33. In this event the switch 35—33 would be in open circuit relation and in that even no current would be supplied either to the audible signal S2, even if switch 90 were closed, and the visual signal L2 as well.

If the device is arranged for 4—4 time, the signal L1, for example, and then signal L2 will be energized in succession, giving the desired tempo or beat as set forth initially herein, and repeating same. In the event the tempo increases, then automatically the beat is but a single beat or indication such as L1 only for each revolution of the cyclic switch disc 26. For waltz time, the switch 82 is utilized. This cuts out signals L2 and S2 so that only signal L1 is energized. Possibly signal S1 (if switch 90 is closed) is energized, but to secure waltz time, the single light L1 is energized at the desired interval by adjusting the dial to secure the equivalent of three signal indications per unit of time equal to the four signal indications theretofore obtained from two signals for the same unit of time.

Reference will now be had to the lower portion of Fig. 3. In it there is designated a terminal block 100 having successive groups of three stations, each designated by the numerals 101—102—103. All like stations are connected in multiple. Stations 101 are connected by line 104 to the line 75 and thus are in multiple with the L1 signal. Stations 102 or the common line is connected by line 105 to line 87. The stations 103 are connected by line 106 to line 83 as shown and are in multiple with the second signal L2. A suitable terminal plug having three prongs, the plug being indicated by numeral 107, connects the

three sub-master lines 108, 109 and 110 to the three master lines 104, 105 and 106, respectively, before mentioned. Through another plug 111, as shown, these sub-master lines being associated with a supplementary tempo unit designated by the letter A. Herein two such units A and A' are illustrated. Each includes the two visual signals and two audible signals. Visual signals L'1 and L'2 and the two audible signals S'1 and S'2 are included in unit A. The supplementary unit A' includes the two visual signals L''1 and L''2 and the two audible signals S''1 and S''2.

The electrical connections to the aforesaid are as illustrated and control and operation of the same is substantially the same as that set forth with respect to the master tempo unit, except there is provided in the audible signal return line 112 of unit A a manual switch 113 which is arranged to cut out the audible signals S'1 and S'2 whenever desired. This is because the energization of these signals is derived from the master unit visual signal supply and not independently thereof and not through the master unit audible signal supply. Similarly unit A includes switch 113' in return line 112' for control of the audible signals S''1 and S''2.

An auxiliary unit may be permanently mounted on the music stand of each musician. When each musician is to be provided with such a supplementary unit, the cable connection indicated by the plug 107, plug 111 and the lines 108, 109 and 110 are connected to the terminal plug 100 and the supplementary unit in the proper relationship, as shown in Fig. 3.

The utility of the device having been previously set forth, the operation of the master control mechanism having been previously set forth, and the individual operation of the signals under the respective conditions of control, it is believed no further description of any of the parts of the device as a whole is necessary.

While the invention has been described in great detail in the foregoing specification and similarly illustrated in the drawing, the same is to be considered illustrative and not restrictive in character. The various modifications herein disclosed, as well as others which will readily suggest themselves to persons skilled in this art, are all considered to be within the broad scope of the invention, reference being had to the appended claims.

The invention claimed is:

1. An electric tempo device or metronome including, in combination, a source of current, a constantly rotating shaft, a switch means cyclically operable thereby, an adjustable speed changing device therebetween for varying the periodicity of switch means operation, signal means of multiple character, circuit means connecting the signal means to the source of current, said signal means being successively energized by said switch means, another switch means interposed in the circuit means between one of said signal means and the first mentioned switch means, and means connecting the second mentioned switch means to the speed changing device for conditioning the second mentioned switch means for operation and non-operation for circuit control of current to the second mentioned signal means depending upon speed changing device adjustment.

2. A device or metronome of the character defined by claim 1, characterized by the speed changing device being of relatively movable wheel

and disc character, and the second mentioned switch means being of relatively slidable character, one member thereof being movable in proportion to the speed changing device relative movement through said connecting means.

3. An electric tempo device or metronome including, in combination, a source of current, a constantly rotating shaft, a switch cyclically operable thereby, a circuit connecting same to the source of current, an adjustable speed changing device between the shaft and switch, visual signal means of multiple character in said circuit and energized successively by said switch, a pair of signals jointly indicating four-four time, and manually operable switch means interposed between the switch and one of the signals for obtaining three-four time indication from the other signal.

4. In a universal metronome the combination with an electric motor, speed reducer, turnable rotatable thereby, and a power wheel adjustable relative thereto and rotatable thereby, of a single rotatable switch member rotatable by the power

wheel at different speeds, one revolution of said member constituting a cycle, a pair of switches, duplicate signal means each controlled by one of the switches, each signal means being successively actuable by the switch member and operable at half cycles, another switch structure connected in series circuit relation with one of the pair of switches, and means for adjusting the power wheel relative to the turntable for cycle rate variation by varying the speed of said wheel and for simultaneously controlling the second mentioned switch.

5. A device or metronome of the character defined by claim 1, characterized by the addition of a manually operable switch means in the circuit means interposed between the first mentioned switch means and the second mentioned switch means controlled signal for obtaining three-four time indication from the signal other than the last mentioned, second mentioned switch means controlled, signal, both signals when energized jointly indicating four-four time.

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