Dec. 2, 1930. M. J. GOUDSMIT 1,783,537

MUSICAL TIME INDICATOR

Filed Aug. 2, 1928 3 Sheets-Sheet 1

Fig: 1.

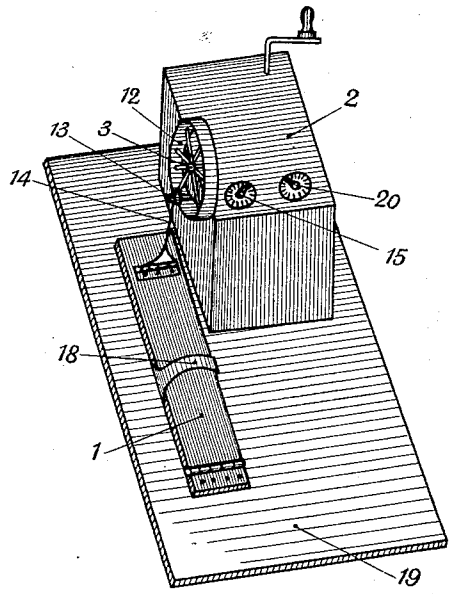
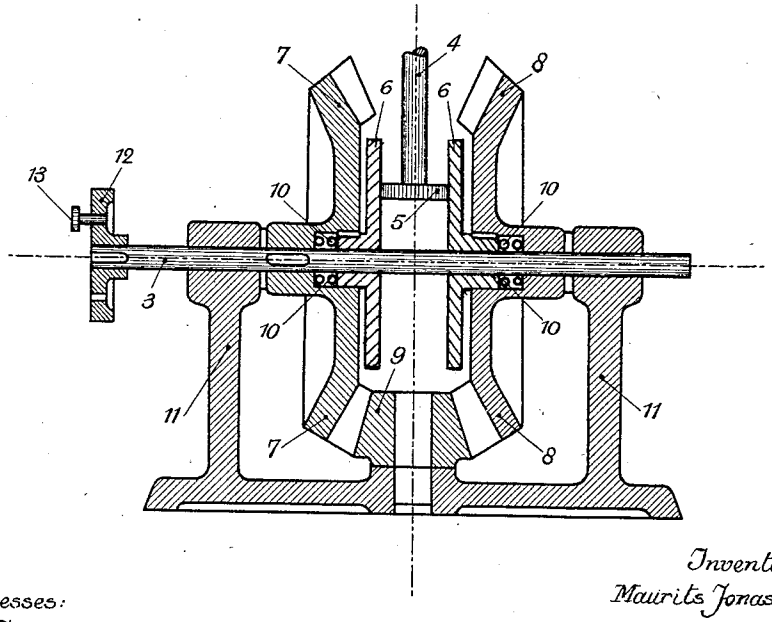


Fig: 2.



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Fig:3.

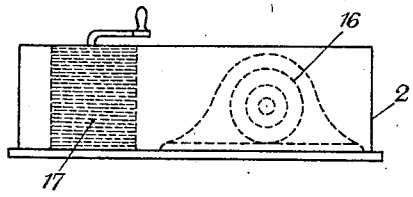
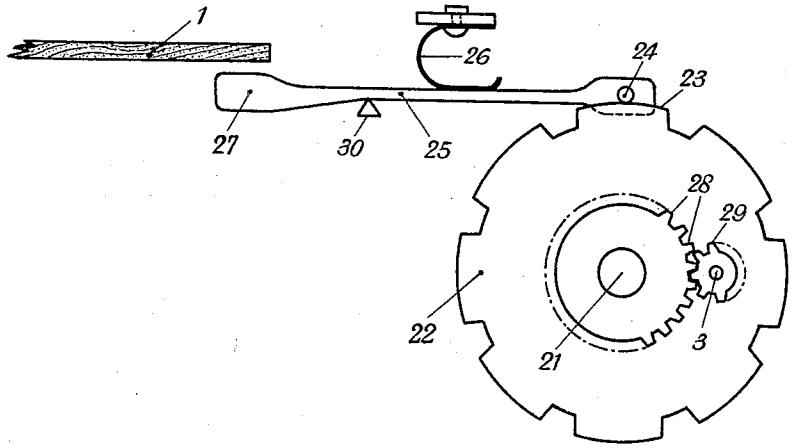


Fig:4.



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Filed Aug. 2, 1928 3 Sheets-Sheet 3

Fig. 5

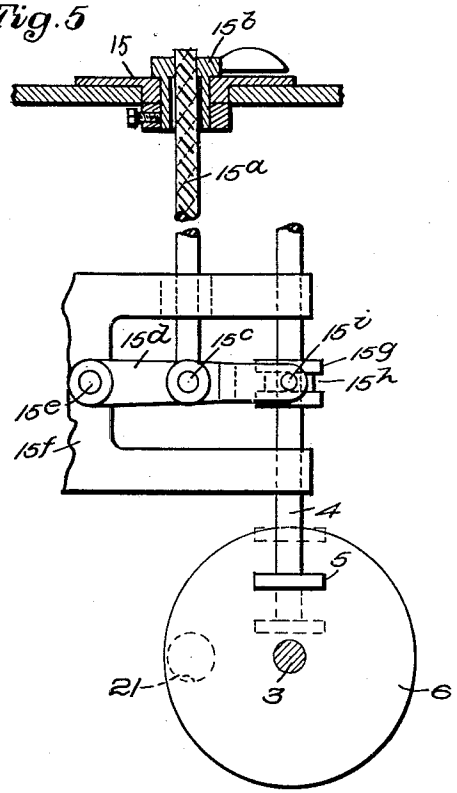
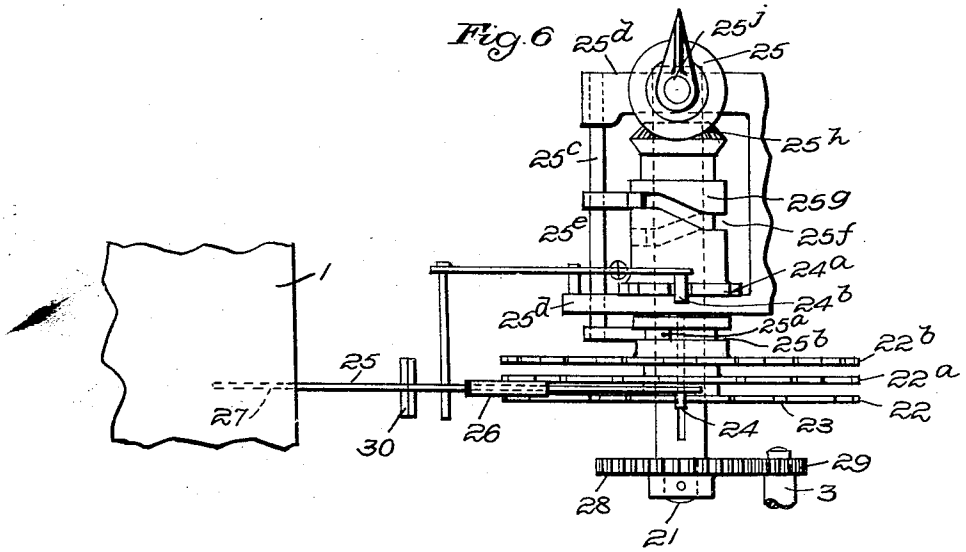


Fig. 6



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Patented Dec. 2, 1930

1,783,537

UNITED STATES PATENT OFFICE

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MUSIC TIME INDICATOR

Application filed August 2, 1923, Serial No. 296,972, and in Germany April 10, 1928.

Generally it is very difficult when teaching music to impart to the pupil the correct rhythm, the exact keeping of time and the exact regular rhythmic foot movement, in which exercises or compositions in general should be played or performed.

These difficulties are perceptible even to advanced pupils and practicing artists.

As the indications given in pieces of music, such as allegro andante and other indications, are too indefinite to indicate to the pupil or the practicing artist the exact time to keep when studying a piece of music, for this purpose use is made of the metronome, as is known.

The disadvantages connected with studying with the aid of the metronome are of many kinds. These, among others, are as follows:

When studying a piece of music two chief phenomena must be observed and followed besides the pedalling, these are the pitch and the rhythm or time. At present, both must be perceived by the ear by means of the metronome.

It is troublesome for the player to have to pay attention by ear to the rhythm by the ticking of the metronome, while he must at the same time accurately observe the pitch. The latter interferes with the former.

A further disadvantage consists in that when the metronome is in front of the player, the swing of the pendulum has a disturbing effect on the eye itself, as it must read the notes at the same time.

The present invention seeks to remove these disadvantages.

It arises on the one hand out of the conception that the player must be enabled to restrict his hearing exclusively to observing the pitch, and on the other hand from the consideration that the player tends naturally to suit the movement of his feet to the time or rhythm when playing.

The invention consists of an apparatus, which imparts the time of the music to be played mechanically to the foot of the player, but is adapted also to give the metric accent at the end of each metrical period or bar. With this device both the time and the metric accent are indicated by a movement perceptible to the sense of touch of the player. The rhythmic, swinging movement of this movable member is derived from a shaft rotating at uniform circumferential velocity. By changing this circumferential velocity, the time of the rhythmic swinging of the movable member is changed.

This rhythmically moved member is connected in any manner to the foot of the player.

Structurally, the invention is characterized by a pedal and a mechanical driving device, which are connected together in such manner by suitable transmission members, for example, by a wheel and a pull rod, or by a cam, or other transmission means, that the rotating movement produced by the transmission device is converted by means of this transmission member into a swinging movement of the pedal.

The metrical accent is indicated by taps delivered on the underside of the pedal. For this purpose I may use a spring-loaded lever, actuated by a cam, which is driven from the crank shaft by means of toothed gear.

It is important for the operation of the apparatus, that the driving device operates with variable transmission, in order to derive the rhythmic movement of the pedal variable to correspond with the particular time, from the continuously rotating shaft.

The construction may obviously be so carried out that the movement of the pedal is parallel to itself.

The invention is illustrated in the following drawings in one constructional example.

Fig. 1 shows a constructional example of the apparatus in perspective.

Fig. 2 shows a transmission device in transverse section for driving the swinging member, which device has also a variable transmission ratio, and by means of which the rhythmically swinging member influencing the body of the player is driven, with the aid of a suitable transmission member.

Fig. 3 illustrates another constructional example of the driving mechanism for actuating the rhythmically moved member.

Fig. 4 is an elevation of the device for indicating the metric accent.

Fig. 5 is a vertical section on the line 5—5 of Fig. 2; and

Fig. 6 is a diagrammatic plan view of the mechanism shown in Fig. 4.

1 denotes the pedal, 2 the driving device, 3 the main shaft of the driving device, which latter is driven in any desired manner, for example by means of a spring mechanism, or by means of a motor, herein generally designated by the numeral 16 in Fig. 3, with the interposition of a transmission device.

4 is the shaft directly driven by the spring mechanism or the motor. 5 is a milled wheel connected to this shaft and movable in an axial direction thereof. 6, 6 is the pair of discs engaging this milled wheel and mutually rotating it. 7 and 8 are the bevel wheels connected to these engaging discs, and are coupled together by the bevel wheel 9. 10 are the springs pressing the discs 6 against the milled wheel 5. 11 is the standard in which the main shaft 3 is borne. 12 is a vibration wheel on the main shaft carrying the crank pin 13. 14 is the connecting rod connecting the pedal 1 to the crank pin 13.

15 illustrates a scale provided with a pointer. By displacing the pointer the transmission device can be adjusted to various speeds, in such manner that the brake discs brake to a greater or lesser degree, and permit the braking to be adjusted throughout the duration of one piece or a portion thereof.

In Fig. 5 I have shown one illustrative embodiment of means for adjusting the speeds of the discs 6 for greater or less speed of the shaft 3, said means comprising a screw-threaded rod 15^a operatively connected with the pointer 15^b arranged to rotate about the scale 15. By rotating the pointer 15^b the rod 15^a will be reciprocated by the threads thereon a predetermined amount. The rod 15^a is pivotally connected at 15^c to a lever 15^d which pivots at 15^e upon a stationary part 15^f of the apparatus. The free end of the lever 15^d is forked to straddle a collar 15^g secured to the shaft 4 to turn therewith. The collar 15^g is annularly grooved at 15^h and into this groove project rollers 15^i carried by the arms of the lever 15^d.

Obviously the turning of the pointer 15^b will, through the aforesaid mechanism, move the milled wheel 5 toward or away from the axis of the discs 6 and thereby increase or diminish the speed of the shaft 3, correspondingly varying the linear velocity of the pedal 1. It is however to be understood that the invention is not limited to this method of varying said speed.

In the constructional example illustrated in Fig. 3 an electric motor 16 is used for driving the device actuating the rhythmically moved member, for regulating the circumferential velocity of the shaft of the electric motor a rheostat 17 is used.

21 is a shaft coupled to the main shaft 3. 29 is a toothed wheel fixed to the main shaft 3 and meshing with a toothed wheel 28 on the shaft 21.

Cams 22 having elevated portions 23 are connected to the shaft 21.

A roller 24 resting on the cams is carried by a lever 25 pivoted at 30 and acted on by a spring 26.

One end of the lever 25 is below the pedal 1.

The elevated portions 23 on each of the cam discs 22 are preferably so shaped that each forms an arc subtending an angle through which the cam is rotated by a certain number of revolutions of the crank shaft 3.

20 is a second dial provided with a pointer. By adjusting this pointer the accent is regulated, for example, to 2/4, 3/4 or 4/4, the movement of this pointer serving to place one or other of the cams under the roller 24, for which purpose the pointer is connected to a rod.

In Fig. 6 is shown an illustrative embodiment of mechanism capable of varying the metric accent in accordance with the above, this mechanism comprising three discs 22, 22^a and 22^b. The disc 22 may be assumed to be provided with a sufficient number of depressions to indicate 2/4 time or accent, the disc 22^a with depressions to indicate 3/4 time, and the disc 22^b to indicate 4/4 time, and by moving these discs successively into engagement with the roller 24 the corresponding accents will be transmitted to the pedal 1.

The cam discs 22, 22^a and 22^b are desirably splined so as to slide upon and rotate with the shaft 21 from which they receive their motion through the gears 28 and 29. The three discs 22, 22^a and 22^b are arranged to rotate as a unit and to move these discs axially of the shaft 21, I provide a yoke 25^a engaging an annular groove 25^b formed in a hub of the unit composed of said discs 22, 22^a, 22^b.

The yoke 25^a is secured to a slide 25^c, slidable in suitable guides 25^d. A cam roller 25^e carried by said slide is arranged to engage a cam groove 25^f formed in the face of a cylindrical cam member 25^g. The cam member 25^g is operatively connected through gears 25^h and 25^i with the rod 25^j at whose upper end is the pointer cooperating with the dial 20 so that when said pointer is rotated the discs 22, 22^a and 22^b will be successively brought into proper relation with the cam roller 24.

Cooperating with the cam groove 25^f is a cam disc 24^a having elevations 24^b properly arranged slightly to raise the lever 25 prior to the axial movements of the cam discs so that said lever will clear the said discs.

18 is a band or strap placed around the pedal, in order to give the foot the required hold during the tread of the pedal.

It is to be mentioned that the present invention can be used in combination with any

driving device which is suitable to rotate a shaft.

Furthermore it is to be mentioned, that in the constructional example shown in Fig. 1, the transmission device and pedal rest on one base plate 19. Obviously these members may be arranged otherwise than on a common base plate.

The apparatus operates in the following manner:

At the instant that the transmission device is set in operation by an external force, this device transmits its movement by means of any rod to the pedal, gives the same a swinging movement and the foot placed on the pedal follows this periodic or rhythmic movement.

At the same time the cam 22 is rotated by the crank shaft 3 and toothed wheel 28 and 29, the roller 24 travelling over the elevated portions 23. At the end of a certain number of revolutions the roller 24 is pressed by the spring 26 into one of the depressions between two elevated portions, so that the end 27 of the lever 25 strikes the pedal 1, the blow being felt by the foot of the player, and marking the metric accent of the piece.

The device can be used in connection with any musical instruments, but with pedal instruments some device other than a pedal must, of course, be used for indicating the time and accent.

Claims:

1. An apparatus of the character described comprising, in combination, means for transmitting rhythmic movement to a rest in contact with the person, and mechanism for imparting an actuating impulse at selected intervals to said rest.

2. A musical time-indicator comprising, in combination, means for transmitting rhythmic movements to a rest, means for imparting accenting impulses to said rest, including a plurality of laterally movable cams, a pulsating member, and means for moving a selected cam into operative engagement with said pulsating member.

3. A musical time-indicator according to claim 2, wherein the cams are respectively provided with elements for imparting variable pulsations to said pulsating member for each rotation of the driving member.

4. A musical time-indicator according to claim 2, wherein a spring actuated member is actuated by said cam to impart a predetermined number of impulses to said rest.

5. A musical time-indicator comprising, in combination, means for imparting accenting impulses to the person, including a plurality of members respectively provided with a selected number of accenting elements, a pulsating member cooperating with said accenting elements, and means for timing the accenting impulses, including a scale, and a pointer adjustable over said scale and operatively connected with said laterally movable members.

6. A musical time-indicator according to claim 5, wherein the timing of the accenting impulse is effected by means of a pointer adjustable over a scale and connected to a rod for moving the cams selectively into position for actuating a roller carried by the pulsating member.

7. An apparatus of the character described comprising a device for imparting rhythmic movement of the tempo to be played, and mechanical means for transmitting metrical accent by audible pulsations to the person of the player.

8. A musical time-indicator according to claim 7, characterized by means for imparting an accenting impulse to a pedal, a driving shaft 3, a shaft 21 driven by said driving shaft, a plurality of cams 22 adjustable lengthwise of said shaft, and a pulsating member arranged to be acted upon by selected cams for imparting pulsations to said pedal.

In testimony whereof I have affixed my signature.

MAURITS JONAS GOUDSMIT.

CERTIFICATE OF CORRECTION.

Patent No. 1,783,537. Granted December 2, 1930, to

MAURITS JONAS GOUDSMIT.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, line 10, after "allegro" insert a comma; page 3, line 79, claim 7, strike out the word "audible"; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 6th day of January, A. D. 1931.

M. J. Moore,
Acting Commissioner of Patents.

(Seal)

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