The invention relates to a metronome comprising a pendulum mounted fixed in rotation on a pendulum spindle, an escapement wheel driven by a spring which can be wound up, an escapement wheel, mounted fixed in rotation on the escapement wheel spindle, which moves the pendulum by means of a pallet mounted fixed in rotation on the pendulum spindle, a bell which is struck by a bell hammer, and a bell-operating cylinder, for actuating the bell hammer, which is mounted fixed in rotation on the escapement wheel spindle and usually is fixed in rotation to the escapement wheel.

In the case of a metronome of this kind, the pendulum delivers periodic audible timed beats. The bell, however, depending on the rhythm selected (e.g 3/4 or 4/4 time), is rung by the bell hammer only on the first beat of the appropriate rhythm selected for the bar (e.g. on every third or fourth beat), so that the user of the metronome can clearly distinguish the appropriate first beat of the rhythm selected. For such a use it is important to synchronize the ringing of the bell exactly with the beat in question.

In the case of a known metronome (DE-PS 18 10 596, Figures 1 and 2) of the general type described in the introductory part, the escapement wheel and a bell-operating cylinder consisting of four separate toothed wheels are pressed together by means of a threaded nut so that they are fixed in rotation. When, for synchronization of the beat with the striking of the bell, the escapement wheel and bell-operating cylinder must be adjusted relative to one another, the threaded nut must first be untightened, and after the adjustment has been made it must be tightened again. The adjustment of the escapement wheel and bell-operating cylinder relative to one another is thereby performed by infinitely variable adjustment by trained personnel.

In the case of the known metronome, manufacture, mounting, and adjustment of the escapement wheel and bell-operating cylinder are expensive, time consuming and difficult. The infinitely variable adjustment of the bell-operating cylinder relative to the escapement

wheel can lead to inaccuracies and provides no possibility of performing the above mentioned synchronization of the striking of the bell and the rhythm beat in a simple manner.

The aim of the invention is to provide, in the case of a metronome of this general type, a simple arrangement for synchronization of the bell-operating cylinder and escapement wheel providing the possibility of improved control.

This objective is achieved according to the invention by arranging that the metronome has the following features :

a. the escapement wheel and the bell-operating cylinder each comprise an opposing set of teeth by means of which the escapement wheel and the bell-operating cylinder are positively engaged with one another in defined angular settings;

b. the escapement wheel and the bell-operating cylinder are, in order to provide their reciprocal positive engagement and for altering their angular setting, axially displaceable relative to one another on the escapement wheel spindle;

c. the escapement wheel and the bell-operating cylinder are held in reciprocal positive engagement by means of releasable fixing means.

The following description of preferred embodiments of the invention, together with the accompanying drawings, provides a more detailed explanation.

Figure 1 schematically shows, in cross-section, a metronome comprising a pendulum, bell, escapement wheel and bell-operating cylinder;

Figure 2 is a partially cut away representation of the bell-operating cylinder and escapement wheel;

Figure 3 is a view in the direction of the arrow A in Figure 2 and

Figure 4 is a partially cut away representation of an alternative embodiment.

The metronome shown in Figure 1 comprises in a conventional way a pyramidal housing 1, made of wood for example. A frame 2 which serves for the mounting of the individual elements of the working parts of the metronome is fixed inside the housing 1.

An escapement wheel 4, which drives a pendulum 8, consisting of a pendulum bar 6 and a pendulum weight 7, in a known way by means of a pallet 5, is mounted fixed in rotation to an escapement wheel spindle 3 which is rotatably mounted in the frame 2. The pendulum bar 6 and pallet 5 are mounted fixed in rotation to a pendulum spindle 9 which is likewise rotatably mounted in the frame 2. The escapement wheel spindle 3 is driven by a clock or spring mechanism 11, the spindle of which is given the reference number 12 in Figure 1, in a way which also is known in itself.

A bell-operating cylinder 13, fixed in rotation to the escapement wheel 4, is also mounted on the escapement wheel spindle 3, from which cylinder cogs 14 project at predetermined angular spacings. The cogs cooperate in a known way with a bell hammer 15, pivotably mounted on the frame 2, in such a way that whenever a cog 14 moves past the free end of the bell hammer, the hammer head provided at the other end strikes a bell 16 mounted in the frame 2. The bell hammer 15 and bell 16 are (in a way which is known and therefore not shown) displaceable in the axial direction of the escapement wheel spindle 3, so that the bell hammer 15 is actuated by a predetermined ring of cogs on the bell-operating cylinder 13, depending on the rhythm selected.

In order to be able to synchronize the audible beats produced by the pendulum 8 with the striking of the bell 16, it is necessary to set the cogs 14 of the bell-operating cylinder 13 appropriately relative to

the escapement wheel 4. An embodiment of the escapement wheel 4 and the bell-operating cylinder 13 which serves this purpose is shown in Figures 2 and 3. The escapement wheel 4, preferably made of plastic, is mounted fixed in rotation on the escapement wheel spindle 3 which is rotatably mounted in the frame 2. Projections 17, in the form of a set of teeth with equal angular spacings, project axially from the end face of the escapement wheel 4 facing the bell-operating cylinder 13. On the end face of the bell-operating cylinder 13 facing these projections, axially projecting projections 18, in the from of a set of teeth, are likewise provided at corresponding angular spacings, which, in the case of the operating state of the metronome shown in Figure 2, engage in the spaces between the projections 17 on the escapement wheel 4 to form a positive engagement and thus ensure that the escapement wheel and the bell-operating cylinder 13 are fixed in rotation to one another.

A circular locking disc 19 is also rotatably mounted on the spindle 3, at approximately the same distance as the axial length of the bell-operating cylinder 13, so that it can rotate but cannot be displaced axially and so that it faces the projections 17 on the escapement wheel 4, the outer diameter of which locking disc is so chosen that the outer periphery of this disc fits snugly inside the similarly circular recess formed by the bell-operating cylinder 13 and provides the cylinder 13 with a support and axial guide. The locking disc 19, for example likewise made of plastic, is fixed in the embodiment shown by means of claws 21, made in one piece with the disc 19, which engage resiliently in a corresponding groove in the escapement wheel spindle 3, and this provide a fastening of the locking disc 19 so that it cannot be displaced axially but at the same time it can be rotated relative to the spindle 3. The locking disc 19 is itself slightly elastic. It comprises, disposed inside the bell-operating cylinder 13 at angular spacings of 90°, a total of four axially extending locking recesses 22 which, for their part consist of two regions 23, 24 having different depths. The region 23 is - considered in the axial direction - less deep than the region 24. Axially extending locking tongues 25, directed radially inwards and formed on the inside of the bell-operating cylinder 13, similarly at an angular spacing

of 90°, cooperate with these locking recesses 22. In the operating state shown in Figure 2, the locking tongues 25 engage by means of their ends facing the locking disc 19 in the shallower regions 23 of the locking recesses 22. The bell-operating cylinder 13 is hereby fixed relative to the locking disc 19 and the escapement wheel 4 in such a way that the sets of teeth formed by the projections 17, 18 on the escapement wheel 4 and the bell-operating cylinder 13 are engaged with one another, and consequently the escapement wheel 4 and bell-operating cylinder 13 are positively fastened together.

If now, as a result of a rotation of the locking disc 19 relative to the bell-operating cylinder 13, the locking tongues 25 are moved from the shallow region 23 into the deeper region 24 of the locking recesses 22, there is a small amount of axial play of the locking tongue 25 in the deeper region 24, which enables an axial displacement of the bell-operating cylinder 13 relative to the escapement wheel 4 in such a way that the projections 18 move out of engagement with the projections 17, and the bell-operating cylinder 13 can be rotated relative to the escapement wheel 4. As Figure 2 shows, between the regions 23, 24 of the locking recesses 22, a protuberance 26 is provided over which the locking tongue 25 in question must pass during the relative rotation of the locking disc 19 and the bell-operating cylinder 13. This is possible since, during the sliding of the locking tongues 25 over the protuberances 26, the resilient locking disc 19 deforms slightly. The engagement of the locking tongues 25 in the region 23 of the locking recesses 22 therefore provides a kind of click-in or snap-in fastening of the locking disc 19 and bell-operating cylinder 13.

When the positive engagement between escapement wheel and bell-operating cylinder 13 (which likewise is made of plastic) is released in the above described way, in order to synchronize the beat with the striking of the bell, the bell-operating cylinder can be adjusted relative to the escapement wheel 4. Then, by rotation of the locking disc 19 relative to the bell-operating cylinder 13, the above mentioned snap-in fastening can again be performed, whereby the

escapement wheel 4 and the bell-operating cylinder 13 are again fixed in rotation to one another again but in a new relative position.

Because the engagement is provided by means of the sets of teeth formed by the projections 17, 18 on the escapement wheel 4 and the bell-operating cylinder 13, these two elements cannot be adjusted relative to one another in an infinitely variable manner but only stepwise depending on the relative spacings of the sets of teeth. This is advantageous for performing the synchronization under discussion exactly, since, for a predetermined phase change between rhythm beat and striking of the bell, it is easy to provide a fixed spacing ratio at which the bell-operating cylinder 13 must be set relative to the escapement wheel 4.

In order to move the locking tongue 25 from the region 23 into the region 24 of the locking recess 22, for which a certain amount of force is required because of the resilient snap-in fastening, the free end face of the locking disc 19 comprises holes 27 into which an appropriate tool, for instance a type of forked key, can be inserted, with the help of which the locking disc 19 can be rotated relative to the bell-operating cylinder 13, in order to move the locking tongues 25 from the shallow regions 23 into the deeper regions 24, which in turn then enables the necessary axial displacement of the bell-operating cylinder 13 relative to the escapement wheel 4.

In the embodiment shown, four locking recesses 22 and four locking tongues 25 are provided at corresponding angular spacings of 90°. Basically, an arrangement comprising a single locking recess 22 and an associated single locking tongue 25 is sufficient.

Moreover, in the embodiment shown the escapement wheel 4 is mounted on the escapement wheel spindle 3 so that it cannot be displaced axially, whereas the bell-operating cylinder 13 can be displaced axially relative to the escapement wheel 4. A converse embodiment in which the bell-operating cylinder 13 is rigidly fixed to the escapement wheel spindle 3 and the escapement wheel can be displaced axially can also be produced.

In order, during the final mounting of the metronome, to be able to place the escapement wheel 4 and the bell-operating cylinder 13 in a defined normal or initial position, one of the projections 17, which in Figure 2 is given the reference number 28, is specially shaped or marked. Similarly one of the projections 18 is specially shaped or marked. In Figure 2 this is indicated by the reference number 29. During the final assembling process the escapement wheel 4 and the bell-operating cylinder 13 are connected together in such a way that the two projections 28, 29 are adjacent to one another, and so a defined initial position is provided in this way for a possible, subsequent adjustment.

In the case of the alternative embodiment shown in Figure 4, the means for fixing or fastening the escapement wheel 4 and the bell-operating cylinder 13 together are constructed in a different way. A disc 31 is mounted on the escapement wheel spindle 3 so that it cannot be displaced axially, against which disc one end of a coiled pressure spring 32 located inside the bell-operating cylinder 13 bears. The other end of the spring 32 engages on an annular land 33 inside the cylinder 13. The coiled spring 32 therefore attempts to hold the projections 17, 18, on the escapement wheel 4 and bell-operating cylinder 13 respectively, in reciprocal positive engagement. In order to release this engagement the bell-operating cylinder 13 must be pushed, for example manually, axially away from the escapement wheel 4 against the action of the spring 32. When the required angular adjustment of the escapement wheel 4 relative to the bell-operating cylinder 13 has been made, the spring 32 again brings the two elements into reciprocal positive engagement.

CLAIMS

1. A metronome comprising a pendulum mounted fixed in rotation on a pendulum spindle, an escapement wheel driven by a spring which can be wound up, an escapement wheel, mounted fixed in rotation on the escapement wheel spindle, which moves the pendulum by means of a pallet mounted fixed in rotation on the pendulum spindle, a bell which is struck by a bell hammer, and a bell-operating cylinder, for actuating the bell hammer, which is mounted fixed in rotation on the escapement wheel spindle and usually is fixed in rotation to the escapement wheel, characterized by the following features :

a. the escapement wheel (4) and the bell-operating cylinder (13) each comprise an opposing set of teeth (17, 18) by means of which the escapement wheel and the bell-operating cylinder are positively engaged with one another in defined angular settings;

b. the escapement wheel (4) and the bell-operating cylinder (13) are, in order to provide their reciprocal positive engagement and for altering their angular setting, axially displaceable relative to one another on the escapement wheel spindle (3);

c. the escapement wheel (4) and the bell-operating cylinder (13) are held in reciprocal positive engagement by means of releasable fixing means (22, 25; 32).

2. A metronome according to claim 1, characterized in that the escapement wheel (4) is rigidly fixed to the escapement wheel spindle (3) and the bell-operating cylinder (13) is mounted axially displaceable on the escapement wheel spindle (3).

3. A metronome according to claim 1 or 2, characterized in that the fixing means comprise a spring (32) which presses the bell-operating cylinder (13) against the escapement wheel (4).

* C L M S *

4. A metronome according to claim 1 or 2, characterized in that projections (17) project axially at equal angular spacings from the end face of the escapement wheel (4) which faces the bell-operating cylinder (13), and at least one axially projecting projection (18) is provided on the opposing end face of the bell-operating cylinder (13) which engages in the spaces between the projections (17) of the escapement wheel (4) in a positive engagement.

5. A metronome according to claim 1, 2 or 4, characterized in that a resilient locking disc (19) comprising at least one axially directed locking recess (22) is rotatably mounted on the escapement wheel spindle (3) so that it cannot be displaced axially, and the bell-operating cylinder (13) comprises at least one axially extending locking tongue (25) which, when the locking disc (19) and the bell-operating cylinder (13) are rotated in opposite directions, can be locked in the locking recess (22) in such a way that the projections (17, 18) on the escapement wheel (4) and the bell-operating cylinder (13) are engaged with one another.

* C L M S *