Feb. 9, 1932. H. BROADWELL 1,843,910

TUNING FORK

Filed July 13, 1929

FIG. 1

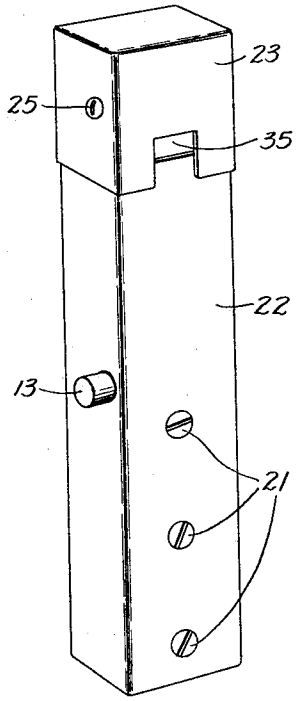


FIG. 2

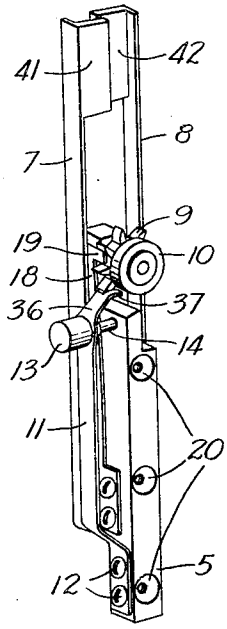


FIG. 3

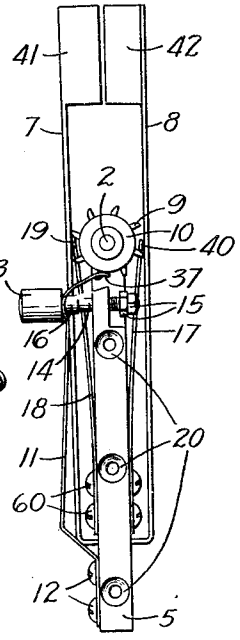


FIG. 4

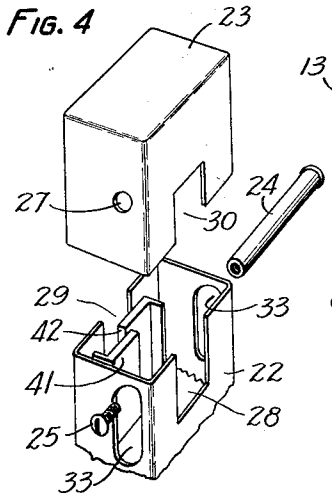
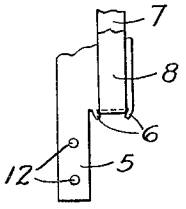


FIG. 5



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Patented Feb. 9, 1932

1,843,910

UNITED STATES PATENT OFFICE

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TUNING FORK

Application filed July 13, 1929. Serial No. 378,157.

This invention relates in general to stroboscopic systems in which a tuning fork is employed as a means for intermittently viewing a rotating object, and more particularly to means for actuating the tuning fork tines.

The stroboscope, as commonly understood, comprises an arrangement for rendering a moving body visible at certain points in its path of travel, as by throwing a light upon it at intervals or by observing it through intermittently recurring apertures.

In Patent No. 1,160,356, A. H. Adams, November 16, 1915, there is disclosed a stroboscopic system employed in determining variations in the speed of a rotating telephone dial within certain fixed maximum and minimum limits. In this patent, a stroboscope target is employed upon which is impressed a plurality of regularly disposed indications, the relative movements of which when viewed through a vibrating tuning fork, indicate whether or not the dial is functioning at a speed desirable for the proper operation of automatic telephone switches. In the system disclosed by the patentee, a tuning fork is employed as a medium for intermittently or successively viewing the rotating body, it being necessary to strike the fork tines against some stationary object or performing an equivalent operation, in order to excite them and cause them to vibrate. It is apparent that to first excite the fork and then focus it on the target introduces an objection which is more pronounced when the time consumed by the fork in vibrating and the duration of the motion to be studied are relatively brief.

It is an object of this invention to permit the actuation of the tuning fork tines in a convenient manner, and while focused upon the object to be stroboscopically studied.

This object is attained in accordance with a feature of the invention by the provision of a finger actuated mechanism associated with the tuning fork tines which may be actuated by a slight pressure of the finger of the tester or observer, while the fork is being focused on the object.

The invention will be readily understood from the following detailed description made with reference to the accompanying drawings in which:

Fig. 1 is a perspective view of the box or casing in which the tuning fork is mounted;

Fig. 2 is a perspective view of the tuning fork and its associated operating mechanism;

Fig. 3 is an elevation of the fork and operating mechanism partially actuated;

Fig. 4 is an exploded perspective of a portion of the fork and casing showing the manner in which the cover is slidably mounted on the box; and,

Fig. 5 is a fragmentary view of the mounting block showing how the fork is secured thereto.

Referring to Figs. 2, 3 and 5, a mounting block 5 is provided with an extending portion having two bent-in flanges 6 forming a groove into which the base or bridge portion of the fork is staked, the fork comprising essentially the tines 7 and 8.

Rotatably mounted on the upper end of the mounting block 5, is a star-toothed wheel constituting a ratchet 9. A cylindrical bearing portion 10 is located in juxtaposition with the ratchet 9 and is mounted on the same shaft 2.

A spring pawl 11, secured to the lower end of the mounting block 5 by means of screws 12, is provided with a circular hole through which the shaft 14 of the finger button 13 is adapted to pass. The shaft 14 also passes through a hole in the upper end of mounting block 5 and is prevented from being withdrawn therethrough by the lock nuts 15 which are made up on the end of the shaft and abut against the mounting block when the button 13 is in its normal position. The shaft 14 is provided with a collar 16 which limits its inward travel.

The mounting block 5 also serves as a mounting for two spring members 17 and 18 which are secured thereto by means of screws 60, and are each provided with a projection 19 which normally rests between two successive teeth on either side of the ratchet wheel.

Three tapped holes 20 are located on the mounting block as shown in Figs. 2 and 3 which accommodate screws 21, by virtue of

which the tuning fork and its operating mechanism is secured within the box or casing 22. A hole in the side of the box permits the button 13 to protrude from the box as shown in Fig. 1.

The box 22 is provided with a cover 23 which is slidably secured to the box by means of an internally threaded cylindrical member 24 having a screw head secured at one end and adapted to receive the screw 25 at its other end. To position the cover, it is placed on the box-end and the member 24 passed through a circular hole in one side of the cover, then through two oppositely disposed oblong holes 33 in the upper end of the box, and the screw 25 inserted in the hole 27 to engage and be threaded into the member 24. The upper end of the box is provided with oppositely disposed rectangular apertures 28 and 29 which align themselves with corresponding apertures such as 30 in the cover 23.

By virtue of the arrangement just described the tuning fork may be employed without completely removing the box cover. When not in use, the cover 23 is pushed down until the cylindrical member 24 strikes the bottom of the oblong holes 33. In this position of the cover the apertures effected by the rectangular openings 28 and 30 are closed. When in service, the cover 23 is raised until the cylindrical member 24 engages the upper extremities of the oblong holes 33. In this position, rectangular apertures are effected through which the flanged ends of the tuning fork tines may be observed. This arrangement serves as a shield and enables the observer to obtain a clear view of the stroboscope target without interference from objects which would otherwise be in the line of vision.

The operation of the device is effected in the following manner:

The cover 23 is raised to the operating position and the box lifted so that the aperture 35, effected by the rectangular openings 28 and 30, is in a line with the eye of the observer. It is understood that a corresponding aperture 35 is effected at the back of the device. The button 13 is then slightly depressed to effect an opening between the tuning fork tine ends as shown in Fig. 3. The object to be studied may then be focused upon and viewed through the slit created by the slightly distended fork tines. When the proper focus is obtained and with the device held conveniently to the observer's eye, the button 13 is completely depressed. The inner end of button 13 engages the working end of spring pawl 11, forcing it inwardly. The pawl 11 is bent at an angle from the point at which it is engaged by the button 13 and terminates in an actuating tooth 36 and a projection 37. The depressing of button 13 causes the tooth 36 to engage a tooth in the star-wheel 9, and the projection 37 to abut against and make sliding contact with the cylindrical portion 10 of the star-wheel 9. By this arrangement, and the peculiar formation of spring pawl 11 in general, the pawl is given sufficient stiffness to permit the tooth 36 to rotate the star-wheel one tooth, upon the actuation of button 13, and equally sufficient resiliency or flexibility to permit it to slide off the back of the next tooth upon the release of the button 13.

The spring pawl 11, due to its irregular formation, is provided with the necessary rigidity to effect the movement of star-wheel 9 during its period of actuation, and also with sufficient resiliency to permit it to slidably disengage itself from the wheel and return to normal under its own action. This is a very desirable characteristic in that it accomplishes an end which heretofore, in stepping mechanisms in general, was effected by a plurality of cooperating members. It is readily conceivable that this type of pawl is adaptable to any type of stepping mechanism, whether manually or electrically actuated, and is not specifically confined for its usefulness, to the tuning fork mechanism disclosed.

As the star-wheel 9 is advanced one tooth by the pawl tooth 36, the projections 19 and 40 of spring members 18 and 17 respectively, ride on the curved surfaces of oppositely disposed teeth in the star-wheel 9, and are forced outwardly and each into engagement with its associated tuning fork tine, the curved backs of the star-wheel teeth providing camming action. The upper end of spring 18 of which projection 19 is an integral part, engages the tine 7, whereas the upper end of spring 17 of which the projection 40 is an integral part, engages tine 8. As the projections 19 and 40 ride over the teeth in the star-wheel, due to the rotation of the wheel, the springs 17 and 18, as well as the tines 8 and 7, are forced outwardly or distended.

As the projections 19 and 40 ride off the back edges of the ratchet teeth, they snap back into a position between adjacent teeth in the wheel under their own restoring force. The fork tines 7 and 8 are thereby suddenly released and caused to vibrate.

The rotating object to be studied may then be observed through the vibrating shutters or flanges 41 and 42 in the same manner as is shown and described in the above mentioned patent. In order to obtain the complete shielding effect of the box, it has been found advisable to hold the fork-box close to the object to be studied. Interference from external objects is thereby reduced to a minimum. A second advantage in holding the fork close to the object to be observed, is that the accuracy of the stroboscope readings, when the object speed is substantially the speed for which the stroboscope target is computed, is aided thereby, the inner edges of the tines acting as a reference by virtue of

which very slow movement of the target divisions can be detected.

It is apparent from the foregoing description that applicant has devised a positive acting mechanism whereby the tines of a tuning fork may be set vibrating in a simple, convenient manner and while the fork is held focused on the object to be studied. This is particularly desirable in instances where it is necessary for the tester or observer to manually actuate the rotatable body, such as a telephone dial. To actuate the fork tines of applicant's invention requires but a slight pressure of the thumb and may be effected while the fork is being focused with one hand and the object, such as a telephone dial, actuated with the other hand.

What is claimed is:

1. In combination, a tuning fork, a ratchet wheel, a pair of spring members interposed between the tines of said tuning fork having projections normally positioned between oppositely disposed pairs of teeth in said ratchet wheel and adapted to ride on the teeth of said wheel upon its actuation to effect the distention and release of the tines of said tuning fork to cause them to vibrate, and a finger actuated pawl for actuating said ratchet wheel.

2. In combination, a tuning fork, a mechanism for effecting the vibration of the tines of said tuning fork, a casing in which said fork and said mechanism are enclosed, said casing having oppositely disposed apertures, and a cover for said casing having apertures adapted to be aligned with the apertures in said casing when raised from its normal position to permit the tines of said fork to be observed without removing the cover from the casing.

3. In combination, a tuning fork provided with a shutter on one end of each tine thereof, a mechanism for effecting the vibration of said tuning fork and a housing for said fork and said mechanism comprising a sheath-like casing and a cover slidably secured thereto, said casing and cover being provided with cooperating means for effecting a sight slot through which the shutters on said fork tines may be observed only when the cover is raised from its normal position on the casing.

4. In combination, a tuning fork, a mechanism for effecting the vibration of the tines of said tuning fork, a sheath-like casing entirely enclosing said tuning fork and said mechanism and a cover irremovably and slidably secured to said casing, said casing and said cover having cooperating apertures adapted to come into alignment to permit the tines of said fork to be observed when said cover is raised from its normal position.

In witness whereof, I hereunto subscribe my name this 12 day of July, 1929.

HOWARD BROADWELL.