

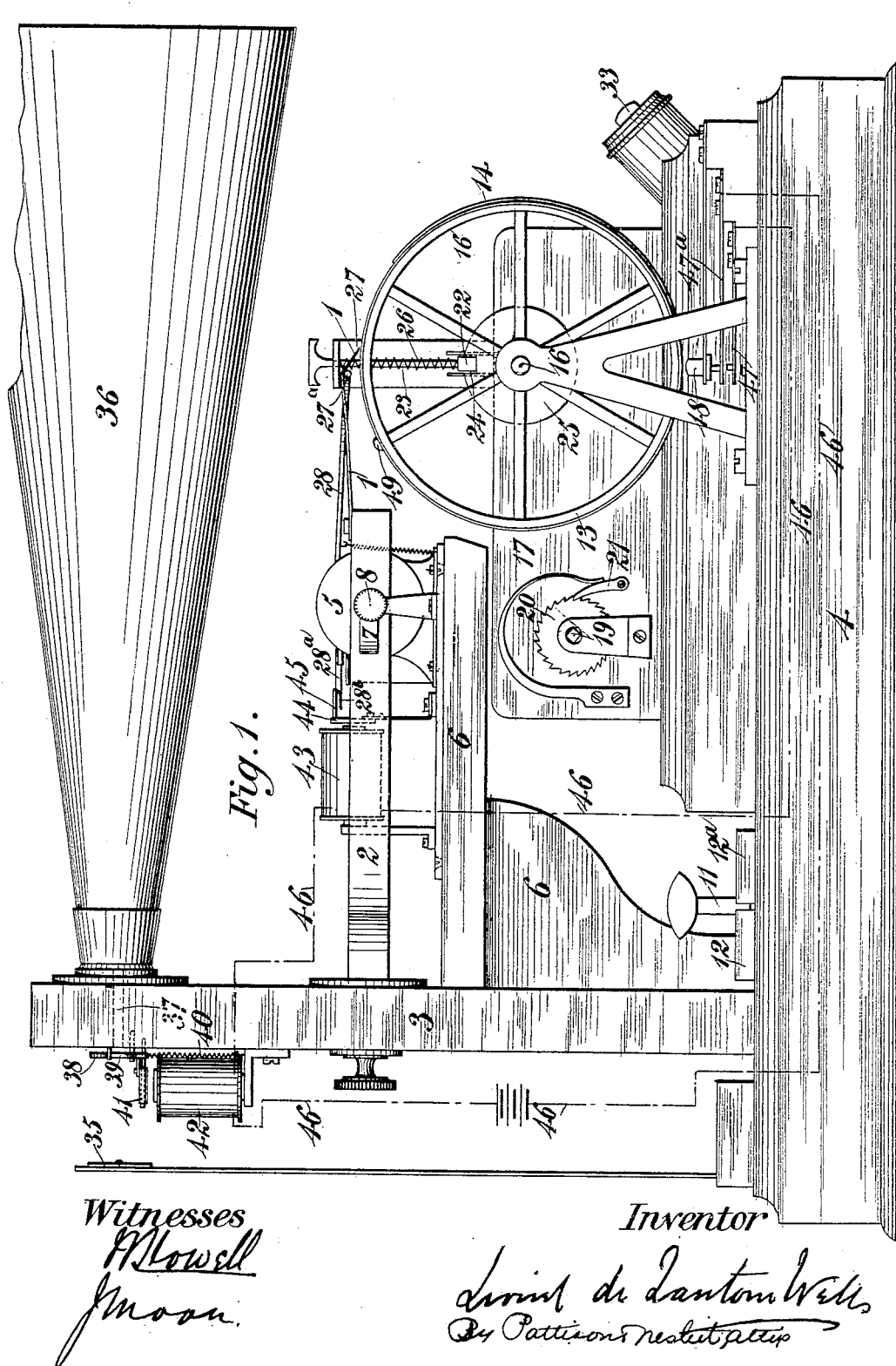
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3 Sheets—Sheet 1.

L. DE L. WELLS.
PERSONAL EQUATION CHRONOGRAPH.

No. 493,346.

Patented Mar. 14, 1893.



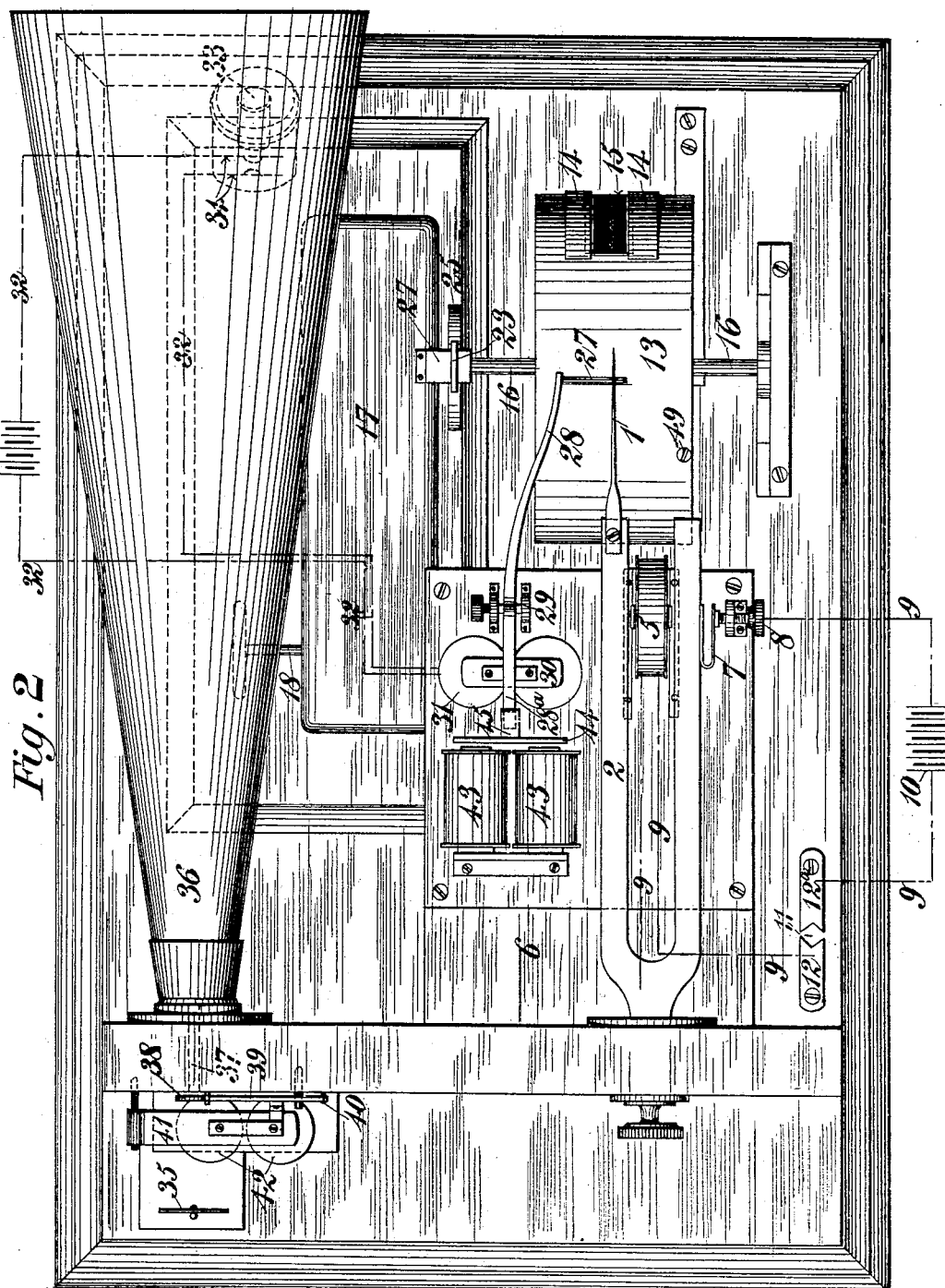
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Witnesses
Howell
Mason.

Inventor
Louis de la Wells
By *Paterson & Nestle, Attys.*

(No Model.)

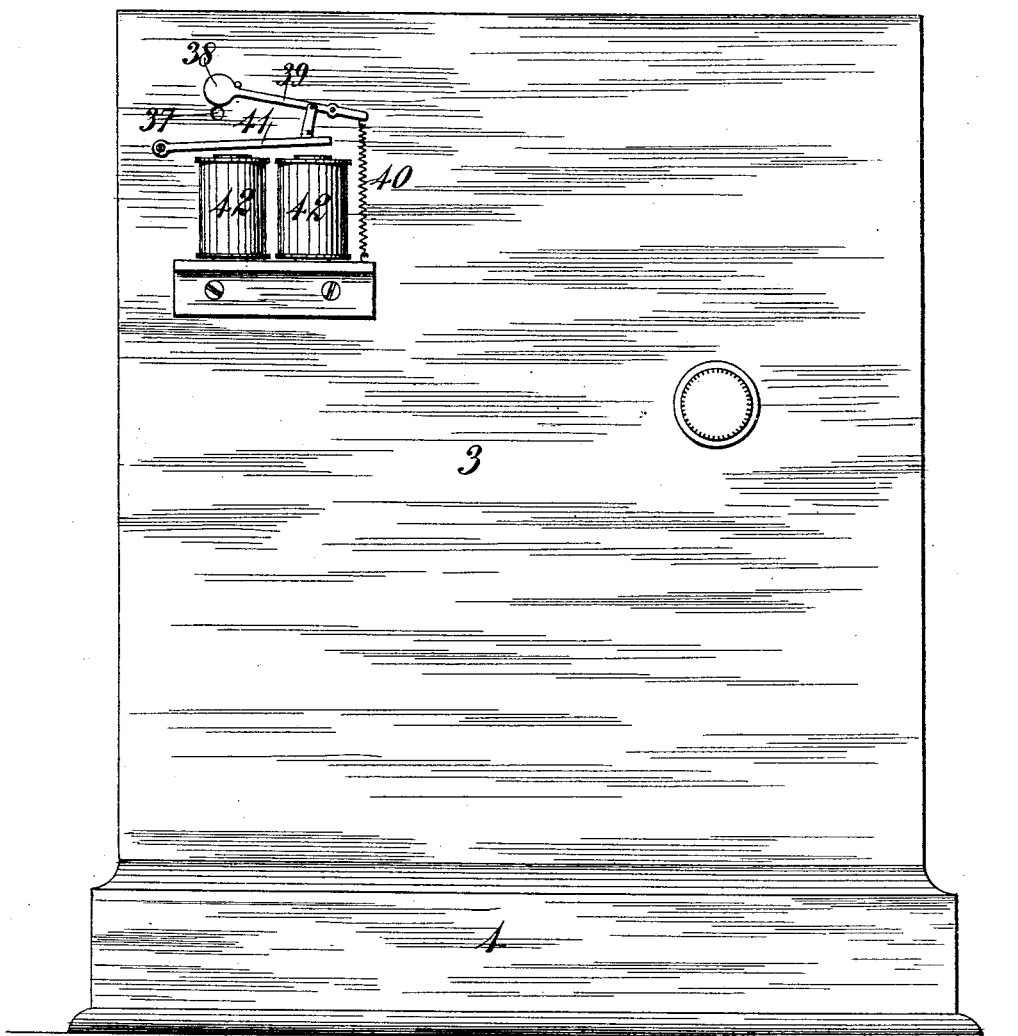
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Fig. 3.



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UNITED STATES PATENT OFFICE.

LIONEL DE LAUTOUR WELLS, OF LONDON, ENGLAND.

PERSONAL-EQUATION CHRONOGRAPH.

SPECIFICATION forming part of Letters Patent No. 493,346, dated March 14, 1893.

Application filed June 17, 1892. Serial No. 437,064. (No model.)

To all whom it may concern:

Be it known that I, LIONEL DE LAUTOUR WELLS, a subject of the Queen of Great Britain and Ireland, residing at Piccadilly, London, in the county of Middlesex, England, have invented Improvements in Electrical Chronographs, of which the following is a specification.

This invention has reference to a construction of electrical chronograph specially suitable for recording the very small interval of time that usually elapses between the reception of an impression on the retina of the eye of an observer and the ultimate effect conveyed by the action of the brain to any desired part of the body, as for example the hand, to indicate the reception of such impression. In an electric chronograph for this purpose according to this invention there are used in connection with an electrically operated tuning fork carrying a stylus, and a movable carrier or support for material whereon a record of the vibrations of the tuning fork and stylus can be made, an electro magnetic device for simultaneously operating an indicator or object the movement of which will produce an impression upon the retina of the eye of an observer, and for allowing the stylus to come in contact with the said recording material, and an electro magnetic device under the control of the observer, for removing the stylus from the said material, the arrangement being such that the short interval of time that will elapse between the impression produced upon the retina of the eye of the observer by the movement of the indicator or object by the first mentioned electro-magnetic device, and the operation, by the observer, of the second of the said electro-magnetic devices, and which interval will vary with different observers, will be recorded on the said recording material and can be read off by a suitable scale.

In the accompanying drawings, Figure 1 is a side elevation. Fig. 2 is a plan and Fig. 3 is a rear elevation of an electric chronograph according to this invention.

1 is a stylus carried by one of the prongs of a tuning fork 2 fixed to a standard 3 supported by a base 4. The tuning fork is caused to vibrate with a suitable number of vibrations a second, say for example two hun-

dred and fifty, by means of an electro magnet 5 carried by a bracket 6 and the circuit of which is arranged to be automatically completed and broken in rapid succession by a contact making and breaking device comprising a spring 7 fixed to one of the legs of the tuning fork and a fixed adjustable screw 8. The arrangement is such that when the circuit 9 indicated by dotted lines in Fig. 2, of an electric generator 10 is completed through the electro magnet 5, tuning fork 2 and contact making device 7—8 by the insertion of a plug 11 between two insulated contacts 12 12^a forming part of such circuit, the electro magnet will attract the prongs of the tuning fork and cause the spring 7 to leave the screw 8 thereby breaking the circuit of the electro magnet and allowing the prongs of the tuning fork to spring back and again complete the circuit, these operations being repeated in rapid succession so as to maintain the tuning fork in constant vibration. The vibration of the tuning fork may conveniently be started by gently striking it.

The record carrier in the example shown, is in the form of a rotary drum 13 provided with circumferential guides 14 for holding a strip of smoked paper 15 upon which the vibrations of the stylus 1 can be recorded in the form of a sinuous line as shown in Fig. 2. The record drum is fixed upon a suitably supported shaft 16 that forms the last motion shaft of a train of clockwork inclosed with a box 17 and driven by a spring. This spring is arranged to be wound up from time to time by a key or hand 18 that is applied to one end of an axle 19 the other end of which is provided with a ratchet wheel 20 with which a detent 21 engages to prevent rotation of the axle in one direction; or the shaft may be rotated by a falling weight, each in a manner well understood. The record drum and shaft are normally held stationary by a device comprising a stop 22 that is carried by a rod 23 and is normally held within a recess 24 formed in a disk or collar 25 that is fast on the shaft 16, by a spring 26 that encircles the rod 23 and bears at one end against the stop and at the other end against a bracket or guide 27 in which the rod 23 is arranged to slide. The stylus 1 is normally held out of contact with the drum and the strip of smoked

paper thereon by a pin 27^a carried by one arm 28 of a lever pivoted at 29 and the other arm 28^a of which carries the armature 30 of an electro magnet 31, the circuit 32 of which is adapted to be completed when necessary by a push button 33 and spring contacts 34 as indicated diagrammatically in chain lines in Fig. 2.

35 is an object, such for example as a sheet of white paper having thereon one or more black spots, that can be seen through a conical tube 36 and a hole 37 in the standard 3 by a person standing in front of the apparatus.

38 is a shutter or indicator carried by a lever 39 that is connected to a spring 40, and to the pivoted armature 41 of an electro-magnet 42, the arrangement being such that the shutter will be normally held in the raised position shown in Fig. 3, but when the electro-magnet 42 is excited the shutter will be depressed so as to hide the object 35 from the view of the observer looking through the tube 36 and hole 37.

43 is another electro magnet the spring armature 44 of which carries a tongue 45 which, when the said armature is in its normal position and unattracted by the electro-magnet 43, holds the arm 28^a of the lever 28—28^a in the depressed position shown so that the pin 27 carried by the other arm 28 of the lever will hold the stylus 1 clear of the record drum 13 and the strip 15 of smoked paper thereon. When however the armature 44 is attracted by the electro-magnet 43, the tongue 45 will be brought over the recessed or cut away end 28^b of the lever arm 28^a, so that the other arm 28 of the lever and the pin 27^a carried thereby, will descend sufficiently to enable the stylus 1 to come into contact by reason of its elasticity, with the smoked paper 15 when the same moves underneath it with the record drum. The circuit 46, shown diagrammatically in chain lines in Fig. 1, of the electro magnets 42 and 43 which are connected with each other, is adapted to be momentarily completed through insulated spring contacts 47 47^a by a spring push 48 which is depressed by the passage over it of a pin or projection 49 on the recording drum 13.

The operation of the apparatus is as follows:—Assuming a person to be viewing the object 35 through the conical tube 36 and hole 37; that the tuning fork 2 and stylus 1 carried thereby are set in vibration by inserting the plug or key 11 between the contacts 12—12^a; and that the recording drum 13 be set in motion by raising the stop 22, then when the projection 49 on the drum passes over the spring push 48, the circuit of the electro-magnets 42 and 43 will be momentarily completed by the spring contacts 47 47^a being pressed against each other with the result that the armature 41 of the electro-magnet 42 will be attracted and depress the shutter 38 so as to hide the object 35 from view, and the armature 44 will be attracted so as to partly release the lever 28—28^a and allow the stylus 1 to

move into contact with the smoked paper 15 whereon its vibrations will be recorded in the form of a sinuous line. If now the observer depresses the push 33, the electro magnet 31 will be excited, and by attracting its armature 30, will cause the stylus 1 to be raised from the smoked paper 15 so that its vibrations will immediately cease to be recorded thereon. Thus the short interval of time that will elapse between the impression produced on the retina of the eye by the movement of the shutter 35 over the hole 37, and the operation by the observer of the push 33 to indicate the reception of such impression, will be recorded on the smoke paper in the form of a sinuous or wavy line corresponding to the vibrations of the stylus, and by reading off the number of vibrations on the smoked paper by a suitable scale the said interval of time can be determined. Thus if the tuning fork makes two hundred and fifty vibrations a second, and the number of vibrations recorded on the smoked paper be fifty, then the interval of time elapsing between the actions referred to will be one-fifth of a second.

What I claim is—

1. An electric chronograph comprising a tuning fork carrying a stylus, a movable record carrier, an indicator and an electro-magnetic device for controlling the same, an electro-magnetic device for moving said stylus from said carrier, an electro-magnetic device for enabling said stylus to move toward said carrier, and circuit making and breaking devices for controlling the circuits of said electro-magnetic devices substantially as hereinbefore described for the purposes specified.

2. In an electric chronograph, the combination with a tuning fork carrying a stylus and a movable record carrier, of an electro-magnetically operated device for enabling said stylus to move toward said carrier, an electro-magnetically operated indicator, a circuit closer arranged to be momentarily operated by said carrier and to operate both of said electro-magnetically operated devices simultaneously, an electro-magnetic device adapted to move said stylus from said record carrier, and a circuit making and breaking device under the control of an observer for controlling said last mentioned electro magnetic device substantially as herein described for the purpose specified.

3. In an electric chronograph, the combination of an electro-magnetically operated tuning fork, a stylus carried thereby, a record carrier, a lever adapted to move said stylus from said carrier, an electro magnet to operate said lever in one direction, a circuit closing device under the control of an observer, for closing the circuit of this electro-magnet, an indicator, an electro-magnet for operating the same, an electro-magnet adapted to allow said lever to move in the opposite direction and arranged in circuit with the electro magnet for operating said indicator, a circuit closer for said circuit, and a projection carried by

said record carrier and arranged to operate said circuit closer substantially as herein described for the purposes specified.

4. In an electric chronograph, the combination of an electro-magnetically operated tuning fork, a stylus carried thereby, a rotary record drum fixed upon a shaft and provided with guides 14 and a projection 19, means for rotating said drum, and a spring stop adapted to automatically arrest the motion of said drum substantially as herein described.

5. An electric chronograph comprising a tuning fork 2 with stylus 1, the electro magnet 5 with make and break device 7—8, the rotary record drum provided with guides 14, and projection 19, means for rotating said drum, the lever 28—28^a with pin 27^a, the electro magnet 31 with circuit closer 33—34, the conical tube 36 carried by a support formed with a sight hole 37 in line with said tube, a

shutter 38 adapted to move over said hole 37, an electro-magnet 42 for operating said shutter in one direction, a spring for operating said shutter in the opposite direction, an electro-magnet 43 having an armature provided with a tongue 45 to control the movement of said lever 28—28^a, a circuit 46 in which said electro-magnets 42 and 43 are placed, and a circuit closer for said circuit comprising spring contacts 47 47^a arranged to be operated by said projection 19 substantially as described for the purposes specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LIONEL DE LAUTOUR WELLS.

Witnesses:

W. HOWELL,

J. MOON,

Both of H. M. S. "Defiance," Devonport.