N° 14,646 A.D. 1911

Date of Application, 21st June, 1911

Complete Specification Left, 19th Jan., 1912—Accepted, 6th June, 1912

PROVISIONAL SPECIFICATION.

An Improvement in Electrically Driven Clocks or Watchworks of the Primary or Self-controlling Type.

I, THOMAS RUSHTON, of 27, Salisbury Road, Upper Holloway, London, N., Watch and Clock Repairer, do hereby declare the nature of this invention to be as follows:—

This invention relates to an improved form of electrically driven clock or watchwork of the primary or self-controlling type, and its construction is carried out as follows:—

Mounted upon the arbor of the centre or minute hand wheel (but free to rotate thereon) is a ratchet toothed wheel which has secured to it a drum or barrel which contains a coiled spring. The outer end of this spring is secured to the rim of the barrel and the inner end of the spring is secured to the arbor of the centre wheel, and these connections are in such a manner, that when the ratchet wheel is turned, the spring gives a corresponding turning stress to the arbor upon which the ratchet is mounted. Mounted also upon this centre arbor is a soft iron armature which is attracted at the right moment to an electro-magnet which is mounted in such a position in the frame of the clock that the attraction of the armature may take place with the best advantage.

Secured in a suitable manner to this armature is a pawl which engages with the ratchet wheel so that when the armature is moved from the electro magnet the pawl gathers in the ratchet teeth and when the armature is attracted to the magnet the ratchet wheel is caused to rotate which results in the spring contained in the barrel receiving a part wind.

Secured also to the frame of the clock is another pawl also engaging with the ratchet wheel which acts as its check after the ratchet wheel has been carried round by the motion of the armature. The spring which bears against this checking pawl is electrically insulated from the pawl and also from the frame of the clock. This spring is tipped with platinum or other suitable metal and constitutes one of the contact points. An arbor to which is secured two arms, is mounted in such a position in the clock frame that when these arms are allowed to drop, one of them (the end of which constitutes the other contact point and is also suitably tipped) comes in contact with the previously mentioned contact point on the check-pawl spring; and in this manner the electrical circuit is closed. The other arm on the arbor which is made with a lateral springiness, is in engagement with a piece of mechanism which takes the form of a circular slotted rim, and is mounted upon the arbor of the next wheel in the train, that is, the wheel which is directly driven by the centre or minute hand wheel. This piece of mechanim in the form of a slotted rim has its periphery so shaped, that, as it rotates the before mentioned arm in engagement with it is guided to the slots whereby the arm is allowed to fall, and in consequence of this the before-mentioned contact arm falls and, as has been explained, closes the circuit.

Since the fall of these arms results in the closing of the electrical circuit the armature will be attracted to the electro-magnets and by virtue of the pawl mounted upon the armature the ratchet wheel will be caused to rotate to the extent of one tooth. As a result of this movement the check pawl with its

[*Price 8d.*]

insulated contact spring will be raised up out of engagement with its present tooth, and fall into the next. As a result of the rise of this pawl the arm will be lifted through the slot and on to the rim again but owing to the particular construction of this rim, and also to the lateral springiness of the arm itself, the arm will not follow the descent of the pawl into the next tooth. The moment the pawl drops the circuit is broken and the armature, by means of a spring, is carried from the electro-magnets and the pawl which is upon the armature gathers in another ratchet tooth; and so the cycle of operations is repeated as the clock continues on in its movement.

Dated the 14th day of June, 1911.

THOMAS RUSHTON.

COMPLETE SPECIFICATION.

An Improvement in Electrically Driven Clocks or Watchworks of the Primary or Self-controlling Type.

I, THOMAS RUSHTON, late of 27, now of 24, Salisbury Road, Upper Holloway, London, N., Watch and Clock Repairer, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to electrically driven clockwork in which the driving device is wound at intervals by the action of an electromagnet. According to the invention the contact making arm is normally supported by a part driven with the clock train, and is allowed to fall at intervals upon a pawl engaging the winding wheel; its fall closes a contact completing the circuit of an electro-magnet the excitation of which results in the required winding movement. During this movement the pawl will be raised by the teeth of the wheel it engages, and through it the contact making arm is lifted back on to its support.

A preferred form of this support consists of a notched or slotted rim rotated by the clock, and supporting the contact arm not directly but through a springy member which is deflected before it falls so that when restored to the support it springs beyond the notch through which it fell.

In the accompanying drawings—

Figures 1 and 2 show front and side elevations respectively of a spring driven clock work mechanism according to the invention, one of the frame plates being removed in Figure 1.

Figure 3 shows in three positions an alternative structure of a detail.

Figure 4 shows diagrammatically the application of the invention to a weight driven clock.

In Figures 1 and 2 the driving spring is contained in a drum indicated at 1 and is wound in the ordinary way by coiling; obviously a spring could be tensioned longitudinally to drive the clock. This drum has secured to it a wheel 2, which is preferably a ratchet wheel though not so shown, and which with it rotates loosely on the arbor 3 to which the first wheel 4 of the driven train is secured. The spring within the drum is attached at one end to the drum and at the other end to the arbor in the usual way. Pinion 5, arbor 6 and wheel 7 are the next members of the driven train which terminates in the arbor 8 of a suitable escapement, not shown, which may be controlled by a pendulum or balance wheel or other known device.

The winding wheel 2 is adapted to be turned in the direction for winding by a pawl 9 secured upon a lever 10 which is pivoted to the arbor 3 and of which one end forms the armature of electromagnet 11 while the other end

forms a counterbalance to return the armature from the attracted position. There may be a spring to restore the armature if desired. The winding wheel is prevented from turning backward by the check pawl 12 which is pivotally mounted on the back plate 13 of the clockwork frame. The frame is formed in usual manner by the two plates 13, 14, joined by rods 15, and the plates form bearings for the various arbors of the train. A spring 16 presses the check pawl against the winding wheel.

In the construction illustrated the spring 16 is used as one of the contacts controlling the circuit of electromagnet 11, and is therefore separated from pawl 12 by a layer of insulation 17; it is also insulated from the clock frame at 18. The spring is preferably tipped with platinum at the contact point. Obviously the pawl itself or a third idle pawl could be used for the purpose.

The second contact consists of an arm 19 fastened to a spindle 20 which is rotatably mounted in the frame. The spindle also carries a second arm 21, consisting of a flat spring set in a vertical plane so as to be flexible laterally. The inturned end 22 of this arm is pressed by spring 28 upon a slotted rim 23 which is secured to and rotates with the wheel 7. The outer surface of this rim is formed with a number of long ratchet teeth 24 which terminate at the slots.

In the construction shown the spindle 20 forms a stop for the armature 10 and is covered with cushioning material to deaden sound.

The electrical circuit of the magnet when completed, extends from a battery or other source of E.M.F. not shown, through conductor 25, the winding of the magnet to the clock frame at 26, thence through spindle 20, arm 19, spring 16 to conductor 27 which leads to the other pole of the source.

The action of the apparatus is as follows:—As rim 23 rotates one of its teeth 24 gradually presses the end 22 of arm 21 outwards until a slot is beneath the arm. When this happens the arm 21 falls under the action of spring 28, its end 22 passing through the slot. Thus spindle 20 is turned and arm 19 brought into contact with spring 16. This completes the circuit of the electromagnet 9 which accordingly is excited and attracts its armature 10. The consequent movement of pawl 9 with the armature turns the winding wheel 2 forward one tooth. As the wheel turns the check pawl 12 is raised against the action of spring 16 and lifts the arm 19, so also lifting arm 21. The end 22 of this arm passes upward through the slot in rim 23 through which it fell, the bevelled upper edge of the end 22 enabling it to be pressed laterally in passing the slot. When the slot is passed the arm springs laterally (to the left in Figure 2) so that its end rests on the upper surface of the adjacent tooth 24. Thus when the pawl 12 at the end of the movement of wheel 2 falls between the next pair of teeth, the arm 19 does not follow it, but is held up by the engagement of arm 21 upon the toothed rim 23. In this way the spring in drum 1 is wound a little and the motion of the clock continues. The end 22 of arm 21 soon falls off the tooth 24 on to which it has been lifted, and is then gradually pressed outward by the next tooth as first above described.

It will be obvious that the space between two slots of the rim 23 must correspond with one tooth of the wheel 2. It is not necessary that the rim 23 should be on wheel 7; it could be on any member of the train so long as the gear ratio was such as to make the space between two slots of the rim correspond to the extent of drive given by each movement of pawl 9.

The mechanism shown in Figure 3 is an alternative to the rim 23 with its teeth and slots. It consists of a wheel 29 having slots 30 cut into but not through its periphery. The arm 31 which replaces the spring arm 21 carries at its end a pivoted finger 32 which is pressed by a spring 33 towards a stop 34. When the wheel 29 is in motion the frictional drag of its periphery upon the finger 32 moves this finger in the direction of motion against the action of spring 33 as is clearly seen in the lower part view in Figure 3. When a slot is reached the finger drops into it as shown in the full view in Figure 3. It

is almost immediately lifted out, as above explained by the lifting of the check pawl, and when so lifted the finger not being subject to any drag will spring to the left as indicated in the upper part view of Figure 3 and so will come to rest again upon the periphery of the wheel. The spring action thus prevents it falling again though the slot when the check pawl falls again into engagement with the teeth of the winding wheel.

In the mechanism shown in Figure 4, 35 is the driving weight which is secured to an arm loosely pivoted on the driving spindle 36. Ratchet wheel 37 which is fast on the driving spindle corresponds to the winding wheel on the spring driven construction, and is engaged by a pawl 38 pivoted on the arm and spring pressed towards the ratchet teeth. This pawl or a part of it is insulated as before, and is adapted to make contact with a bell crank lever 39, the further end of which engages with a support such as those already described by which it is normally kept out of contact with the pawl. When it falls a circuit is closed, and this results in the raising of the weight 35 by an electromagnet 40, of which the weight supporting arm may form the armature. In this movement the pawl is raised by the teeth over which it passes, and presses back the lever 39, the parts being so disposed that this movement lifts the end of the lever back upon its support.

This device is shown only in rudimentary form and it will be noted that there is no drive at the instant of winding. Means may be readily provided for maintaining the drive.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:—

1. A contact device for controlling an electric clock, comprising an arm normally supported by a part uniformly rotated by the clock, said arm being allowed to fall at intervals upon a pawl engaging the winding wheel, thereby closing a contact, and being restored to its support by the lifting of the pawl consequent on winding.

2. A construction according to Claim 1, wherein the arm or a part attached thereto is springy and is deflected before its release so as on being lifted to spring upon the supporting device beyond the gap through which it fell.

3. The improved constructions of electric clock substantially as described with reference to the accompanying drawings.

Dated this 18th. day of January, 1912.

W. P. THOMPSON & Co.,
285, High Holborn, London, W.C., and at
Liverpool and Bradford,
Patent Agents for the Applicant.

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A.D. 1911. JUNE 21. N° 14,646.
RUSHTON'S COMPLETE SPECIFICATION.

(1 SHEET)

[This Drawing is a reproduction of the Original on a reduced scale.]

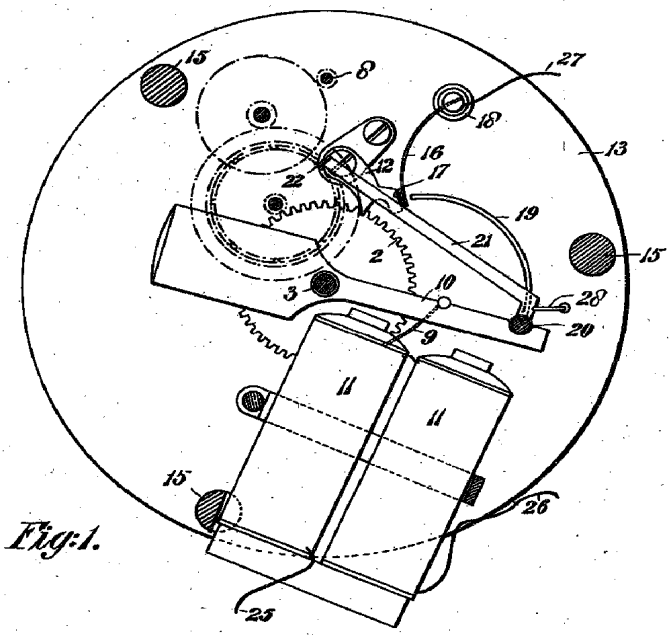

Fig: 1.

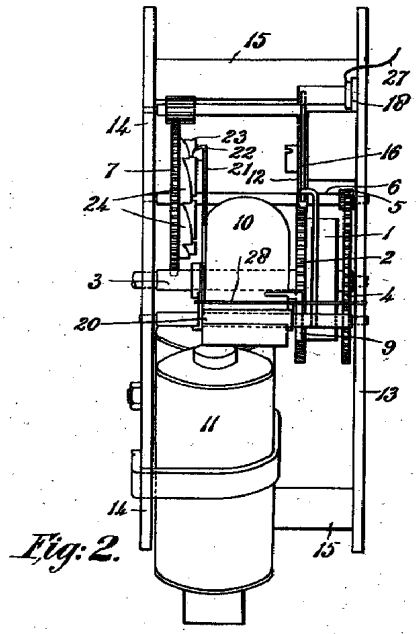

Fig: 2.

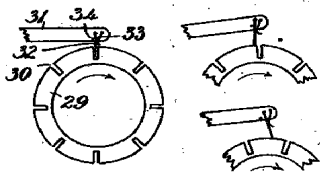

Fig: 3.

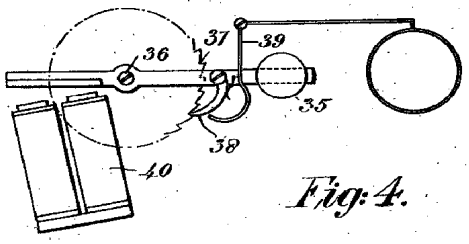

Fig: 4.

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[This Drawing is a reproduction of the Original on a reduced scale.]

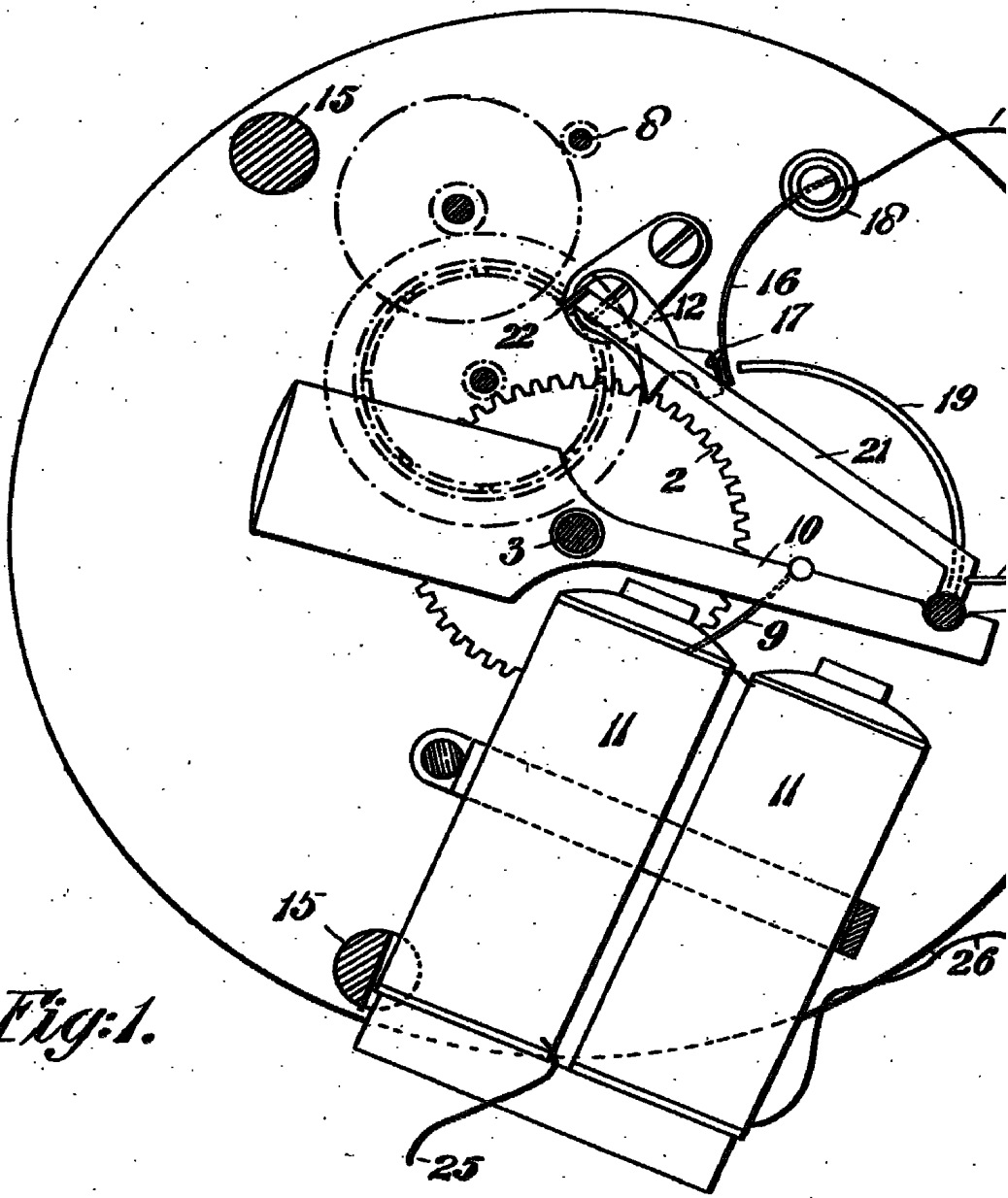

Fig: 1.

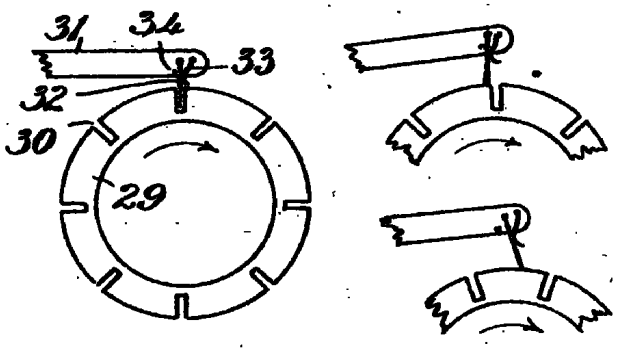

Fig: 3.

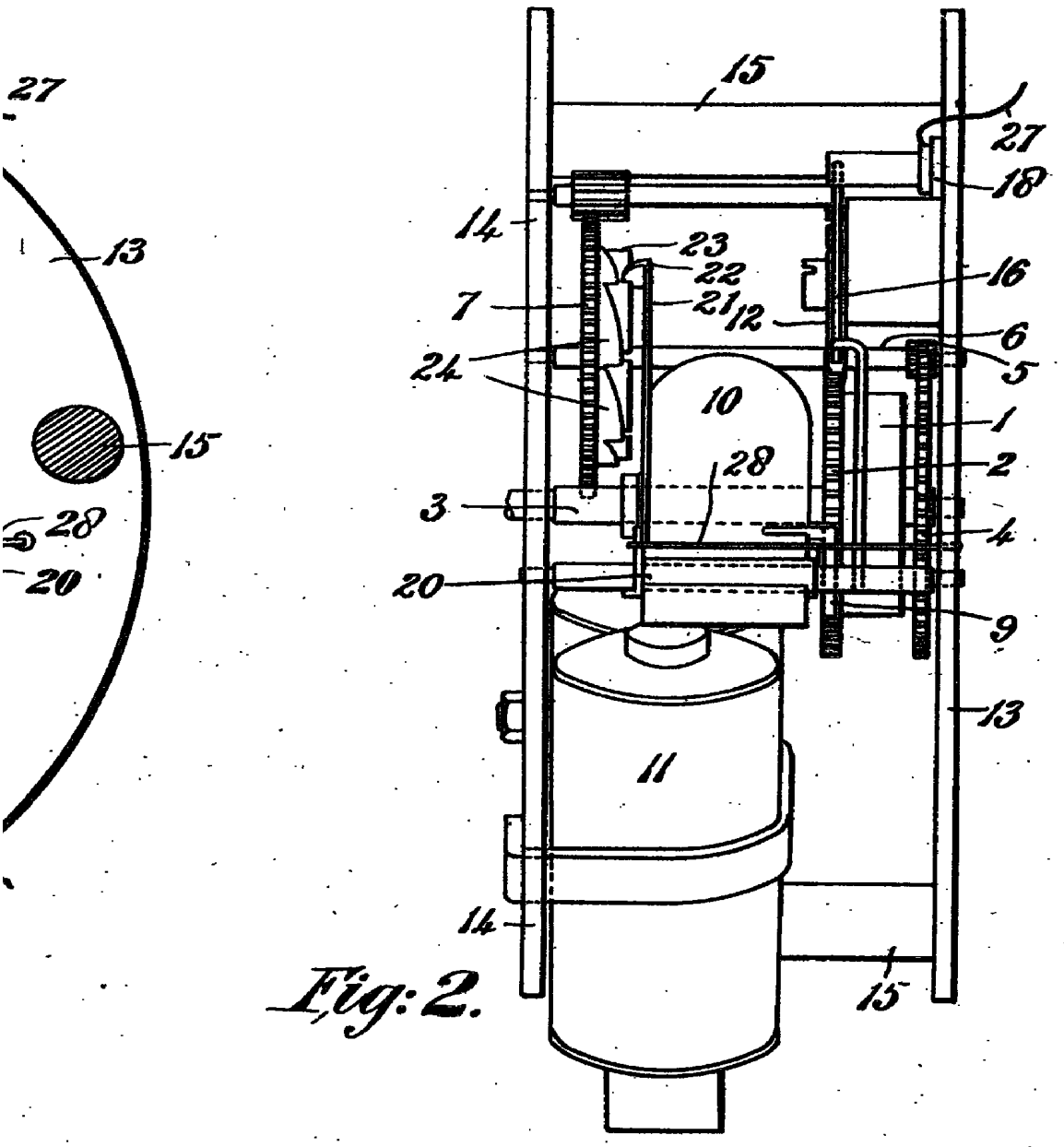

Fig: 2.

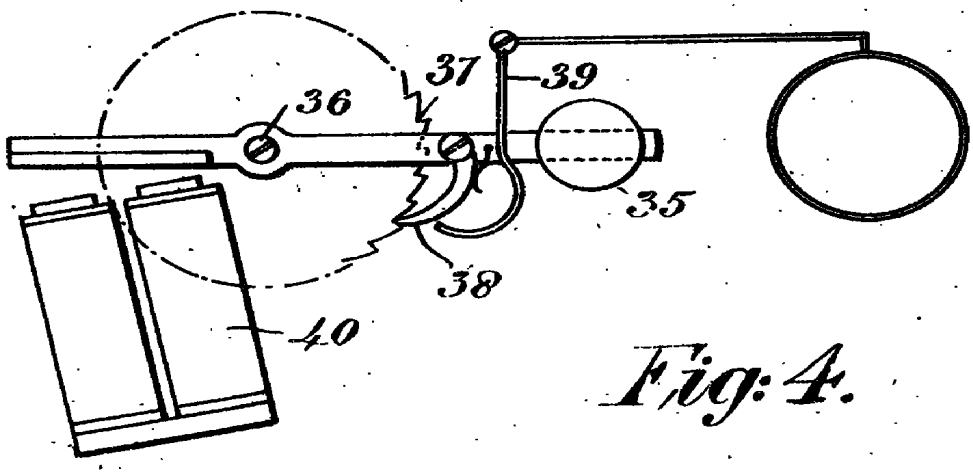

Fig: 4.

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