N° 2404 A.D. 1915

Date of Application, 13th Aug., 1915—Accepted, 11th May, 1916

COMPLETE SPECIFICATION.

Improvements in Electromagnetic Driving Mechanism.

We, THOMAS RUSHTON, Electric Clock Maker, formerly of 51, but now of 58, Birnam Road, Tollington Park, in the County of London, and THE COVENTRY ELECTRIC CLOCK COMPANY LIMITED, Manufacturers, of 43, Gray's Inn Road, in the County of London, 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:—

The present invention relates to electromagnetic driving mechanisms of the kind in which a wheel is rotated by means of a pawl consisting of a member carried on an arm of flexible material attached to the oscillating armature of the driving electromagnet. The object of the present invention is to provide a construction of such a mechanism particularly useful for driving electric "sub-dials" although of application also in other cases. This object entails the requirements that the driving mechanism must prevent unintentional rotation of the driven wheel and must, in addition, have its parts as simple and light as possible, in contradistinction to mechanisms hitherto employed which have often been exceedingly complicated. With these objects in view, according to the present invention, at the end of the driving stroke the arm of flexible material carrying the pawl contacts with a rigid banking member serving to prevent excess bending of the flexible arm in addition to locking the device. It is easy to mount two such mechanisms in relation to a driven wheel so that one of them acts as the normal driving mechanism and the other as an emergency driving mechanism, but preferably arranged to drive the wheel in the opposite direction. An application of this device to "sub-dials" would consist in the provision of means for setting back the hands. It must be pointed out, however, that in such a case it is essential for both pawls to be retracted from the wheel when they are in their normal position or position of rest.

Some examples of the present invention are illustrated in the accompanying drawings, in which

Fig. 1 illustrates a mechanism in accordance with the invention applied to driving an electric "sub-dial".

Fig. 2 shows the mechanism in the attracted position of the armature, *viz.* just as the driving stroke is beginning.

Fig. 3 shows an alternative arrangement in which the distance between the pivot of the armature and the point of contact of the pawl decreases during the driving movement instead of increases.

Fig. 4 shows a duplicate arrangement in which a driving pawl is employed and also a pawl for setting the clock back.

Referring now especially to Figs. 1 and 2, the pawl consists of a member carried on a light spring 1. As illustrated, the spring 1 is simply inserted between the member 2 and a banking piece 6. The spring 1 carries the pawl member 7 proper at its end. In Fig. 1 the armature is shown in its unattracted position, being held there by a tension spring 8 anchored at a point 9 fixed to the base-plate 10 and to a hook 11 upon the armature 3. The whole of the clockwork and mechanism is carried upon the base 10, the clockwork and the

[*Price* 6*d.*]

pivot of the armature of the electromagnet being carried by a crossbar 12 which is screwed to the base 10 at the points 13 and 14. Terminal screws 15 and 16 are secured to the base but insulated therefrom. These form terminals of the winding of the electromagnet 4.

In Fig. 2 the armature 3 is shown in the attracted position. During the moment of attraction of the armature, the armature itself and the member 2 are drawn substantially in a direction away from the centre of the driven wheel 5. If the spring 1 were stiff, or if a pawl substituted for it were secured to the member 2 instead of being hinged to it, the end 7 of the pawl would also be lifted away from the wheel 5, but this member 7 is more or less free owing to the flexibility of the spring 1 and remains in contact with the wheel, but the inclination of the spring 1 to the wheel increases as shown in Fig. 2, and the result is that owing to the adjustment of the apparatus the member 7 is drawn over one tooth of the wheel 5.

During the next phase of the movement, the spring 8 retracts the armature 3 and the member 2 is pulled towards the wheel 5 once more. The result of this is that the driving movement takes place, the spring 1 returning to the position shown in Fig. 1, and during this movement in addition to the impulse in the direction of drive the spring 1 presses the pawl 7 against the wheel 5. In the extremity of the driving position as shown in Fig. 1, the member 7 comes against the banking member 6 which thus limits the amount of the driving movement of the pawl.

In the arrangement shown in Fig. 3, however, while most other details remain the same, the pawl spring 1 is shown turned back towards the pivoting point 17 of the armature 3. An extension of the arm 2 forms the banking member 6, and there is a spring check pawl 18 similar to the pawl 18 which is shown in Fig. 1. Here again the action is very similar, except that during the driving movement the member 7 approaches the pivot 17 instead of moving further away from it.

The lower part of Fig. 4 shows an arrangement almost identical with the lower part of Fig. 1. In this case the only difference is that the mechanism is so designed that normally in the position of rest the end of the pawl 7 is out of contact with the wheel 5. The object of this will be seen immediately. A similar driving mechanism 1^a, 2^a, 6^a, 7^a is shown at the top part of the wheel. This is connected up to an electromagnet in exactly the same way as the mechanism at the bottom, and in its normal position of rest also remains out of contact with the wheel. As shown it is in the driving position, and in ordinary dials it would probably be used in connection with a push switch or other suitable device which can be operated to drive the ratchet mechanism, and it can readily be seen that this mechanism drives the wheel 5 in an anti-clockwise direction and so tends to put back the hands. In this case the spring check pawl 25 has to be shaped to allow of motion in both directions. Such an arrangement is very useful to meet the demand where dials are set to local time daily as on board ship.

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

1. An electromagnetic pawl driving mechanism especially applicable to the driving of "sub-dials", of the kind employing a pawl consisting of a member carried upon an arm of flexible material inclined to the radius of the driven wheel passing through the driving point of the pawl, in which at the end of the driving stroke the pawl contacts with a rigid banking member serving to prevent excess bending of the flexible arm.

2. A driving mechanism of the kind set forth in Claim 1, in which in addition to the normal driving mechanism there is an emergency driving mechanism of similar construction but preferably designed to drive the driven train in the

opposite direction, for example for setting back the hands, both driving mechanisms being so designed that when in the position of rest both pawls are retracted from the wheel.

3. An electro-magnetic step-by-step mechanism especially applicable to electromagnet driven "sub-dials", constructed substantially as described and illustrated in the accompanying drawings.

Dated this 13th day of August, 1915.

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Liverpool and Bradford,
Patent Agents for the Applicant.

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RUSHTON & *another's* COMPLETE SPECIFICATION.

(2 SHEETS)

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

SHEET 1.

Fig: 1.

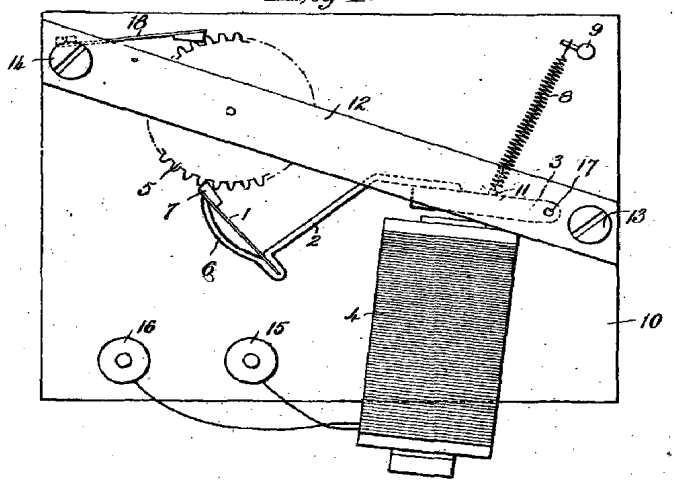
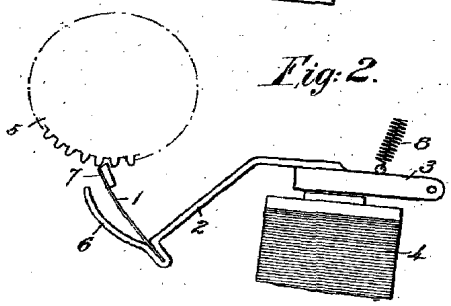


Fig: 2.



SHEET 2.

Fig: 3.

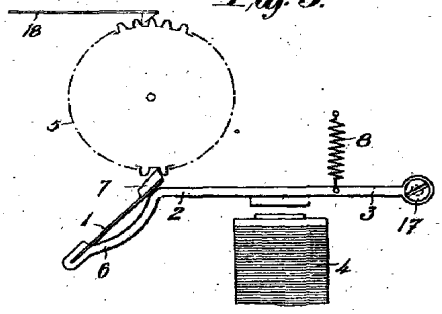


Fig: 4.

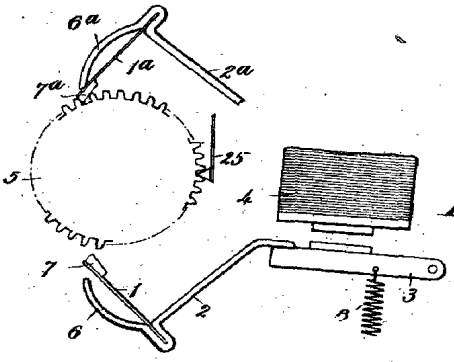


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Fig: 1.

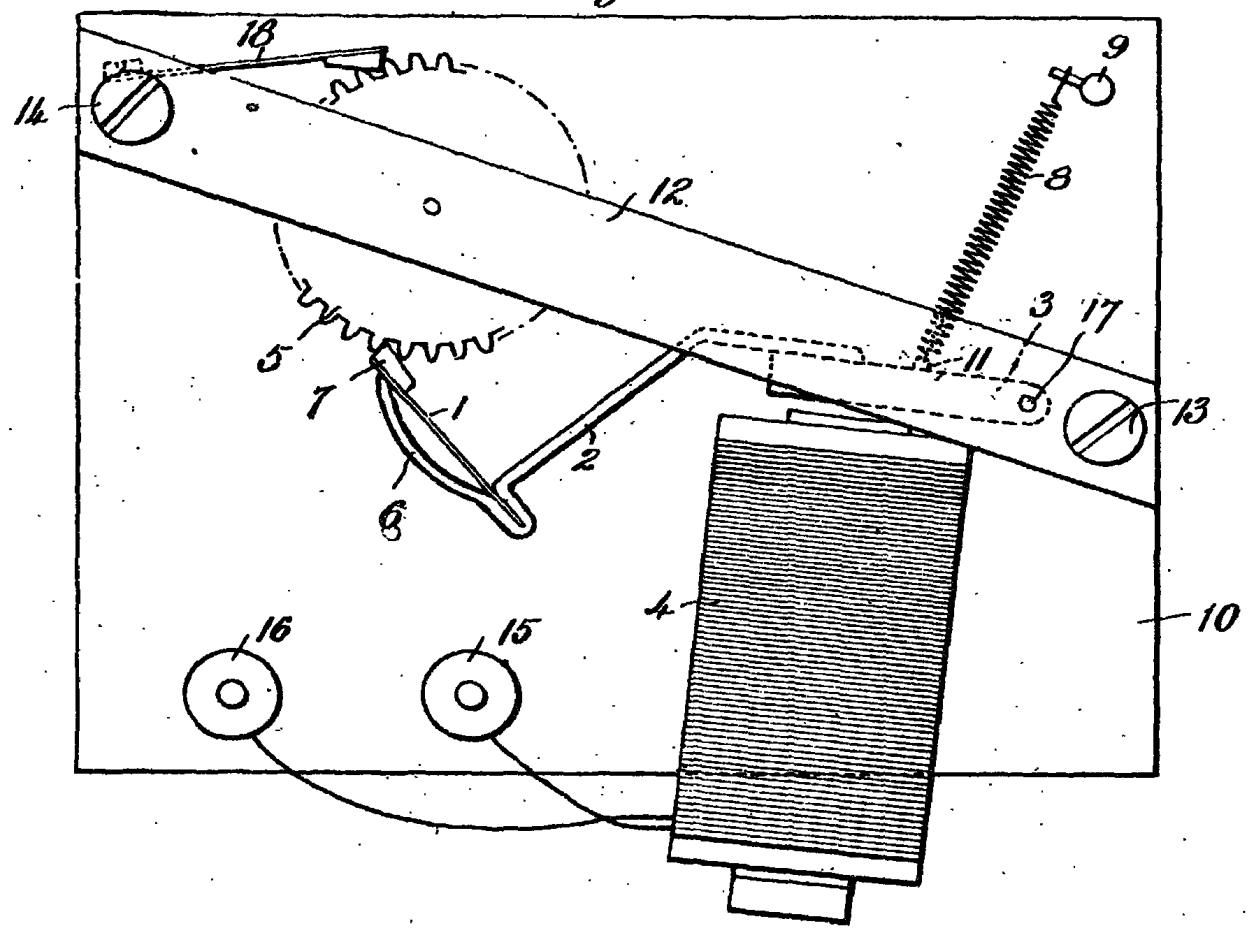
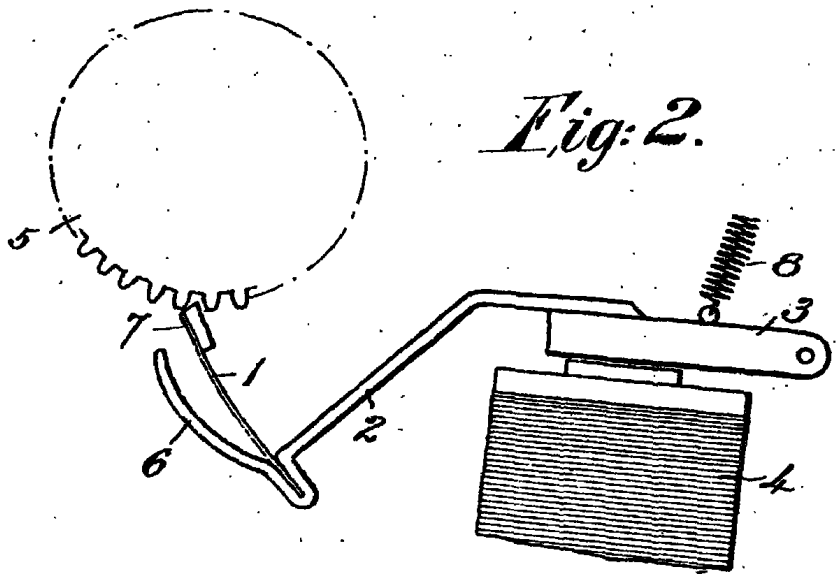
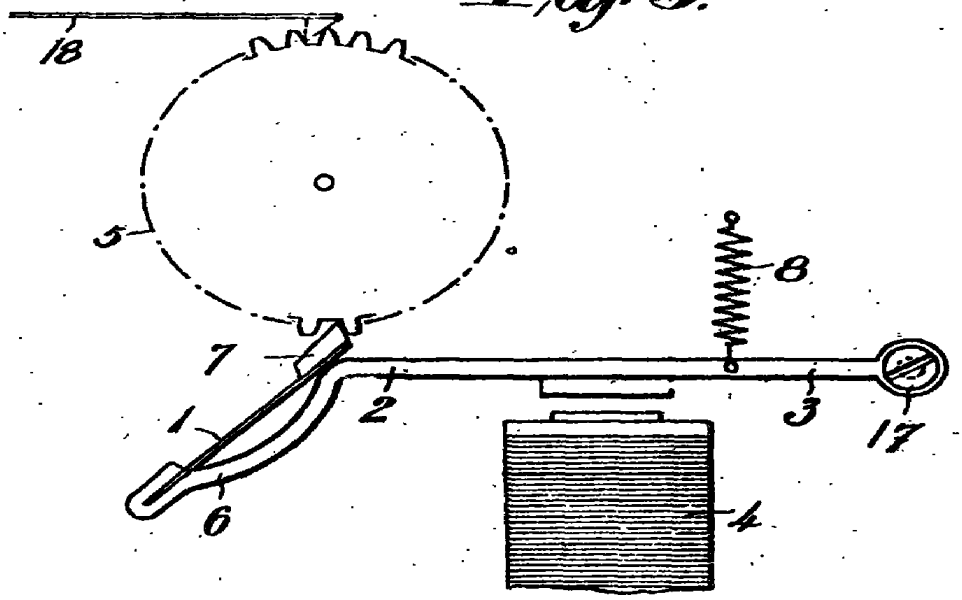


Fig: 2.



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

Fig: 3.



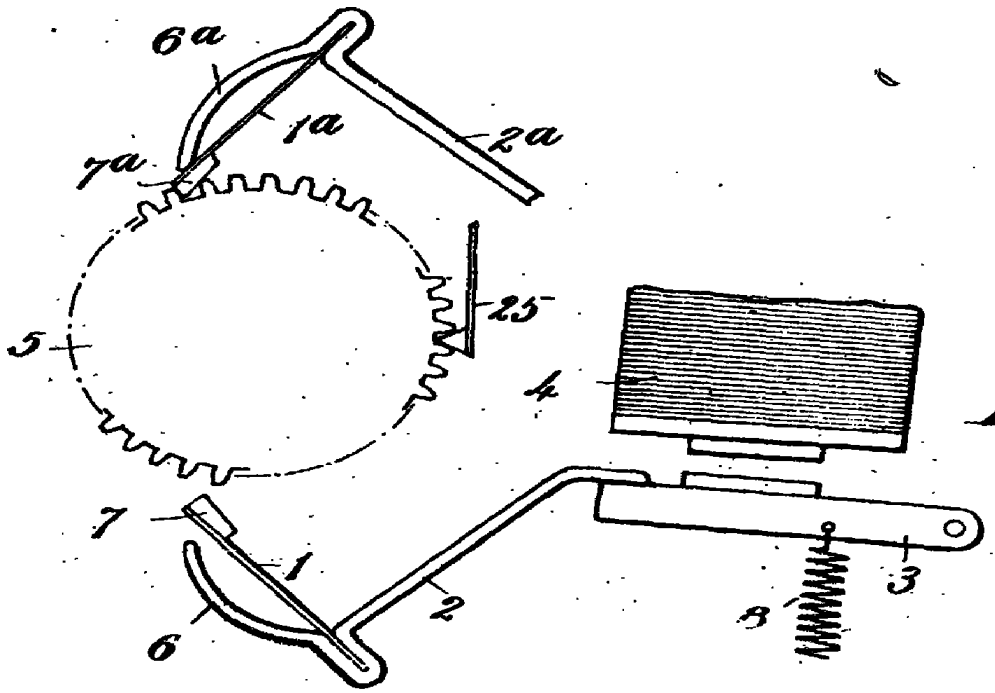


Fig: 4.

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