N° 919 A.D. 1907

Date of Application, 14th Jan., 1907

Complete Specification Left, 15th July, 1907—Accepted, 14th Jan., 1908

PROVISIONAL SPECIFICATION.

Improvements in Electric Clocks.

We, ISAAC HARDY PARSONS, of Kibworth Harcourt, Leicestershire, Electrical Engineer, and ALFRED ERNEST JOSEPH BALL, of 38 St. Saviours' Road East, Leicester, Clockmaker, do hereby declare the nature of this invention to be as follows:—

This invention relates to electric clocks of the class known as electric master clocks, and has for object certain improved features which are developments of Patent No. 24620 of 1904.

According to our previous patent the pendulum is at certain predetermined intervals arranged to trip a gravity impulse lever during one swing of the said pendulum, and to receive an impulse from the said gravity lever during the next swing of the pendulum; the gravity lever resting during the interval on an inactive face of an impulse pallet, which is connected to and which vibrates with the pendulum, the impulse to the pendulum being imparted by the gravity lever bearing on an angular face of the pallet with a sliding or rolling action. After imparting an impulse to maintain the vibration of the pendulum the gravity lever is reset electromagnetically.

According to this our present invention, the pendulum in swinging or vibrating both trips and receives an impulse from the gravity lever during the same swing of the pendulum, the tripping lever or levers being arranged to release the gravity impulse lever just as the angular impulse face of the impulse pallet passes under a roller or equivalent of the gravity lever. In a simple form of this our present invention, the pendulum receives an impulse at each complete vibration. When it is desired that the gravity lever shall give the pendulum an impulse at half-minute or other pre-arranged intervals, the trip lever is brought earlier into engagement with the holding catch of the said gravity lever, than is provided for in our previous patent, so that the impulse takes place at or before the centre of the pendulum's swing, as will be hereinafter described.

In carrying this our present invention into effect, we attach to the pendulum or a part in connection and vibrating therewith, an impulse pallet which we provide with an angular impulse face, but we need not of necessity provide the impulse pallet with a dead face or platform. As with our previous patent we arrange that the impulse pallet swings close to the roller or equivalent of the gravity lever.

In order to obtain the half minute or other desired duration between the impulses, we, in some instances, rotate a ratchet shaped 'scape wheel by means of a pushing pawl, and extension of which forms a trip lever which is brought into action at each half minute or other interval by the pawl dropping into a deeper cut tooth. This type of 'scape wheel provides only for a two-seconds movement of the seconds hand, when a seconds pendulum is used.

When it is desired that the seconds hand shall indicate each second, we employ a 'scape wheel and pallets of the type shown in Fig. 1 of our previous patent, and in order to bring the horizontal trip lever into action earlier, we

[*Price 8d.*]

modify the action of the small vertical lever which we employ to control it (which is described in our previous patent) in the following manner:—

We pivot the vertical lever and the horizontal trip lever on independent studs on to the pendulum or a part vibrating therewith. We arrange that a weighted member of the vertical lever keeps the trip lever tilted above the horizontal position. In vibrating with the pendulum the lower end of the vertical lever passes to and from before the 'scape wheel, and being provided with an unturned lug, it is arrested in its swing at each half minute by engaging one of two pins in the 'scape wheel, thus allowing the trip lever to fall into its horizontal and active position. On the return swing of the pendulum, the trip lever disengages the catch from a stud or equivalent which supports the gravity lever, thus effecting the release of the said lever just as the highest point of the angular face of the impulse pallet passes under the roller or equivalent of the gravity lever. After imparting an impulse to the pendulum to maintain its vibrations, the gravity lever is re-set electro-magnetically either by the method described in our previous patent hereinbefore referred to, or by any other suitable means, or by the employment of any other suitable form of contact device.

In some instances, we find it convenient to trip the gravity lever by pulling its catch instead of pushing it and further in some instances, we construct the impulse pallet with a short inactive or dead face on which the roller or equivalent of the gravity lever first drops prior to rolling down during the same swing of the pendulum on to the impulse face, thus avoiding the slight shock or jar which would result from dropping the gravity lever direct on to the impulse face.

Dated this 12th. day of January, 1907.

ISAAC HARDY PARSONS.
ALFRED E. J. BALL.

COMPLETE SPECIFICATION.

Improvements in Electric Clocks.

We, ISAAC HARDY PARSONS of Kibworth Harcourt, Leicestershire, Electrical Engineer, and ALFRED ERNEST JOSEPH BALL of 38 St. Saviour's Rd. East, Leicester, Clockmaker, 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 electric clocks of the class known as electric master clocks, and has for object certain improved features which are developments of our Patent No. 24620 of 1904.

According to our previous patent the pendulum is at certain predetermined intervals arranged to trip a gravity impulse lever during one swing of the said pendulum and to receive an impulse from the said gravity lever during the next swing of the pendulum; the gravity lever resting during the interval on an inactive face of an impulse pallet, which is connected to and which vibrates with the pendulum, the impulse to the pendulum being imparted by the gravity lever bearing on an angular face of the pallet with a sliding or rolling action. After imparting an impulse to maintain the vibrations of the pendulum the gravity lever is reset electromagnetically.

According to this our present invention, the pendulum in swinging or vibrating both trips and receives an impulse from the gravity lever during the same swing of the pendulum, the tripping lever or levers being arranged to release the gravity impulse lever just as the angular impulse face of the impulse pallet passes under a roller or equivalent of the gravity lever. In a simple form of this our present invention, the pendulum receives an impulse at each complete vibration. When, however, it is desired that the gravity lever shall give the pendulum an impulse at half-minute or other pre-arranged intervals, the trip lever is brought earlier into engagement with the holding catch of the said gravity lever than is provided for in our previous patent, so that the impulse takes place at or before the centre of the pendulum's swing, as will be hereinafter described.

In carrying this our present invention into effect, we attach to the pendulum or a part in connection and vibrating therewith an impulse pallet which we provide with an angular impulse face, but we need not of necessity provide the impulse pallet with a dead face or platform, as with our previous patent. We arrange also that the impulse pallet swings close to the roller or equivalent of the gravity lever.

In some instances we rotate a ratchet shaped 'scape wheel by means of a pushing (or pulling) pawl in any well-known manner, and in order to obtain the half minute or other desired duration between the impulses, we effect the tripping of the gravity lever by means of an extension of such pawl, which is brought into action at each half minute or other interval, by the pawl dropping into a deeper cut tooth. This type of 'scape wheel provides only for a two seconds movement of the seconds hand when a seconds pendulum is used.

When it is desired that the seconds hand shall indicate each second, we employ a 'scape wheel and pallets of the type shown in Fig. 1 of our previous patent, and in order to bring the horizontal trip lever into action earlier, we modify the action of the small vertical lever which we employ to control it (which is described in our previous patent) in the following manner:—

We pivot the vertical lever and the horizontal trip lever on independent studs on to the pendulum or a part vibrating therewith. We arrange that a weighted member of the vertical lever keeps the trip lever tilted above the horizontal position. In vibrating with the pendulum the lower end of the vertical lever passes to and from before the escape wheel, and being provided with an inturned lug, it is arrested in its swing at each half minute by engaging one of two pins in the 'scape wheel, thus allowing the trip lever to fall into its horizontal and active position. On the return swing of the pendulum, the trip lever disengages the catch from a stud or equivalent which supports the gravity lever, thus effecting the release of the said lever just as the highest point of the angular face of the impulse pallet passes under the roller or equivalent of the gravity lever. After imparting an impulse to the pendulum to maintain its vibrations, the gravity lever is re-set electro-magnetically either by the method described in our previous patent hereinbefore referred to, or by any other suitable means, or by the employment of any other suitable form of contact device.

In some instances, we find it convenient to trip the gravity lever by pulling its catch instead of pushing it and further in some instances, we construct the impulse pallet with a short inactive or dead face on which the roller or equivalent of the gravity lever first drops prior to rolling down during the same swing of the pendulum on to the impulse face, thus avoiding the slight shock or jar which would result from dropping the gravity lever direct on to the impulse face.

Referring to the annexed drawings illustrative of our said invention and in which like letters indicate like or equivalent parts:—

Figs. 1, 2 and 3, show the invention in its simple form, and with the impulse

applied to the pendulum between the centre of oscillation and the point of suspension.

Figs. 4, 5 & 6 show the invention with the impulse applied to the pendulum at or about the centre of oscillation, the impulse pallet being shown in these figures, however, below the pendulum "bob".

Figs. 7 & 8 illustrate the type of trip levers which we employ when the invention is applied in conjunction with a centre seconds 'scape wheel, progressing with a seconds movement, when using a pendulum of seconds length.

Fig. 9 shows the invention applied in conjunction with a centre second 'scape wheel progressing with a two seconds movement, when using a pendulum of seconds length.

Fig. 10 shows the invention applied to a cheap construction of the master clock, in which a number of cast projections are used in lieu of pillars, cocks and brackets, the fixing feet and pendulum suspension being preferably also included in the casting.

Figs. 11, 12, 13, 14, 15 & 16, show various forms of angular impulse pallets, in accordance with this, our invention, together with rollers or equivalents thereto.

Referring to Fig. 1, the crutch or pendulum A, in swinging say to the right, disengages the hook M from the supporting stud or roller O by means of the trip lever G, the gravity lever N then falling with its roller P just as the face R^1 of the impulse pallet R swings under the said roller P. The impulse is then given to the pendulum by the weight of the gravity lever N bearing on and rolling down the impulse face R^1 of the pallet R, as shown in Fig. 2. This impulse continues until the contact screw S meets its fellow contact S^1, when the lever N is replaced electro-magnetically by an electro magnet not shown. On the gravity lever N being replaced to its potential position the hook M engages the stud or roller O without interference from the trip lever G, by reason of the latter being lifted clear of the former by the incline G^1 mounting the roller G^2, thus holding the point G^3 clear of the hook M, as shown in Fig. 2.

Referring to Fig. 3 which illustrates the application of the invention to a pendulum which receives an impulse at intervals of one minute, the weight of the gravity lever N and N^1, is in this instance twice the weight of that employed when it is desired that the pendulum should receive an impulse at each half minute.

In this figure, A shows a pendulum of seconds length and G a pawl pivottally connected therewith, while E shows a 'scape wheel having 30 teeth. On the stud C^2 of the pawl G falling into a deeper cut tooth of the escape wheel E, its hooked shaped end G^3, engages with the stud M^1 of the catch M, which latter then on turning on its fulcrum M, O., disengages the stud O and thus releases the gravity lever N.

In consequence of the greater weight of the gravity lever N, the impulse is in this instance, applied somewhat gradually to the pendulum, by the roller P bearing first on to the curve R^2, before giving its maximum impulse to the impulse face R^1. Other examples of such curves are shown in Figures 12 and 15.

On the completion of the impulse to the pendulum, contact is made by any suitable means, and the gravity lever N, is replaced by an electro magnet and armature not shown.

Referring to Figs. 4 to 6 the pendulum A in swinging say to the right by means of the pawl G engages the detent M^1, which by turning on its pivot M^2, feeds forward the escape wheel E, one tooth at each complete vibration, C and C^1 being the propelling and back stop clicks respectively. On the pawl G moving the detent M^1 sufficiently to trip the end of the pawl G^3 out of engagement with the detent M^1, the table M^3 raises the screw G^6, thus allowing the click C^2 to return to its normal position, ready to engage the next tooth, on

the return swing of the pendulum. On however, the click C^2 falling into a deeper cut tooth at each half minute or other pre-arranged interval, the catch C^3 of the click C^2 engages the hook M which by turning on its pivot M, O, releases the gravity lever N, by the action of the hook M^4 and the catch O, just as the inclined plane $R.^1$ swings with the pendulum under the roller P. On running down this incline an impulse is applied to the pendulum. This impulse ceases when the contact screw S meets its fellow S^1. The circuit being then completed, the current flows through the magnet U, U^1, and the armature V being attracted, it lifts the gravity lever until the contact breaking screw S^2 bears against the bolt S^3, which action breaks the circuit.

This breakage of the circuit, is due to the fact that the contact piece S^4 carrying the contact screw S^1 is insulated from the gravity lever N. The screws S^1 and S^2 are adjusted so that the gravity lever is lifted to its normal or potential position before the circuit is broken. On the circuit being broken the armature V returns again to its normal position. It is obvious that by omitting the 'scape wheel E shewn in Figs. 4, 5 and 6, an impulse may be given to the pendulum at each vibration if so desired.

Referring to Figs. 7 & 8, the pendulum in swinging to the left as shown in Fig. 7 enables the bell-crank lever F at each half minute to engage the pin J by means of the lug F^2. The lug K then no longer depresses the tail of the trip lever G which then falls to the position shown in Fig. 7. On the return swing of the pendulum, the trip lever G engages the catch M and in swinging to the right releases the hook M from the stud or roller O, thus permitting the gravity lever N, by means of the roller P to bear on to and roll down the angular face R^1, of the impulse pallet R, and so give the desired impulse of constant value to the pendulum.

On the completion of the impulse, the gravity lever is brought to a definite stop by the rigid stop T^2, and the contacts S, S^1 as illustrated in Figure 8. Contact being made the gravity lever is replaced electro-magnetically by an armature and magnet not shown.

The trip lever then occupies—relatively to the pendulum—the position shown in Fig. 8 until the lug F^2 again engages a pin or equivalent of the 'scape wheel.

Referring to Fig. 9. the pendulum in vibrating, rotates the 'scape wheel by means of the click C^2 causing the former to advance by 2-second steps. On the click C^2 engaging a deeper cut tooth at pre-arranged intervals, the extension G^3 of the click C^2 engages the hook M and releases the gravity lever N, just as the impulse face of the pallet R^1, is passing under the roller P. The roller P may or may not fall just on to the platform R^1, prior to rolling down the impulse face R^1.

The incline G^1 and roller or pin G^2, raises the extension G^3 clear of the hook M while the latter is being replaced. The bridge or cock Y permits the 'scape wheel to occupy a central position in the movement,—the crutch vibrating between the plates of the movement and the bridge or cock Y.

Referring to Fig. 10, X shows the cast base, which may be of iron or other suitable material, X^1 being the back-iron or yoke of the magnet U^1, U as well as its support X^2 & X^3 the bracket for supporting the pendulum, X^4 & X^5 the blocks or projections for carrying the bar or bridge of the arbor of the crutch A, X^6 the block or projection for carrying the bar for the 'scape wheel and back stop click, X^7 the cast block or projection for the bar of the gravity lever N, and X^8 the block or projection for carrying the armature V.

The stops X^8, X^9 and X^{10} for limiting the movements of the working parts, are also cast solid with the base, as also are the pillar X^{14} and feet X^{11}, X^{12}, & X^{13}.

The action of the movement shewn in Fig. 10 may be understood by general reference to the description of the action of Fig. 9.

Referring to Figs. 11 to 16 inclusive, Fig. 11 shows a roller of solid agate in lieu of metal while Figs. 12, 15 & 16 show equivalents to rollers which may

be either of agate or similar stone or of metal. Fig. 13 shows an equivalent which may be of steel, phosphor-bronze or when used with a light lever, may be of any suitable stone. Fig. 14 shows a pallet and roller reversed, the impulse being equally effective, whether the roller be on the pendulum and the impulse pallet on the gravity lever, or *vice versa*.

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

1. In an electric master clock, the obtainment of an impulse to maintain the vibrations of the pendulum, by a gravity lever which during one and the same swing of the pendulum, is tripped by the pendulum and imparts an impulse to the pendulum, by a suitable part of the gravity lever falling on to an angular impulse pallet connected to the pendulum, the gravity lever being afterwards replaced electro-magnetically, substantially as described.

2. In an electric master clock, the obtainment of an impulse to maintain the vibrations of the pendulum, by a gravity lever which during one and the same swing of the pendulum, is tripped by the pendulum and imparts an impulse to the pendulum, by a suitable part of the gravity lever falling on to an angular impulse pallet connected to the pendulum, the gravity lever being afterwards replaced electro-magnetically, such replacement being effected mechanically through the surfaces of a contact which also makes and breaks a circuit containing step-by-step secondary mechanisms, substantially as described.

3. In an electric master clock of the type claimed in the Claim 1, the obtainment of a gravity impulse to the pendulum, at intervals greater than a vibration of the said pendulum, by a trip mechanism comprising levers or equivalent such as F & G operating in conjunction with pins or equivalent in the escape wheel, substantially as described with reference to Figs. 7 & 8. of the accompanying drawings.

4. In an electric master clock of the type claimed in Claim 1, the obtainment of a gravity impulse to the pendulum, at intervals greater than a vibration of the said pendulum, by a trip mechanism comprising levers or equivalents such as G, M, N, G^2 and C^2 operating in conjunction with one or more deep cut teeth, or equivalents in the escape wheel or other cam, substantially as described with reference to Figs. 4, 5, 6, 9 & 10 of the accompanying drawings.

5. In an electric master clock of the type claimed in Claim 1., the obtainment of a gravity impulse to the pendulum, at intervals greater than a vibration of the pendulum, by trip mechanism comprising levers or equivalent such as G. M. N. G^3, and C^2, operating in conjunction with one or more deep cut teeth in the escape wheel, a cast metal base with cast projections for carrying bridges and bars, as herein described with reference to Fig. 10 of the accompanying drawings.

Dated this 12th day of July 1907.

ISAAC HARDY PARSONS.
ALFRED E. J. BALL.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1908.

A.D. 1907 JAN. 14. Nº 919.
PARSONS & *another's* COMPLETE SPECIFICATION.

(8 SHEETS)

SHEET 1

FIG 1

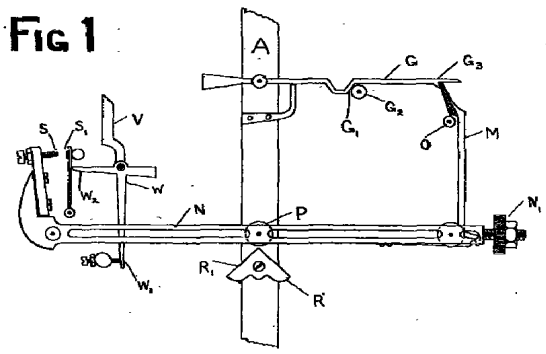
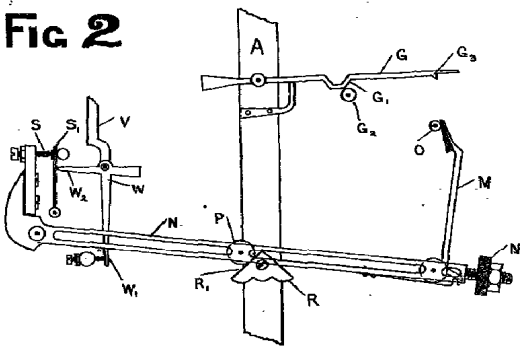


FIG 2



SHEET 2

FIG 4

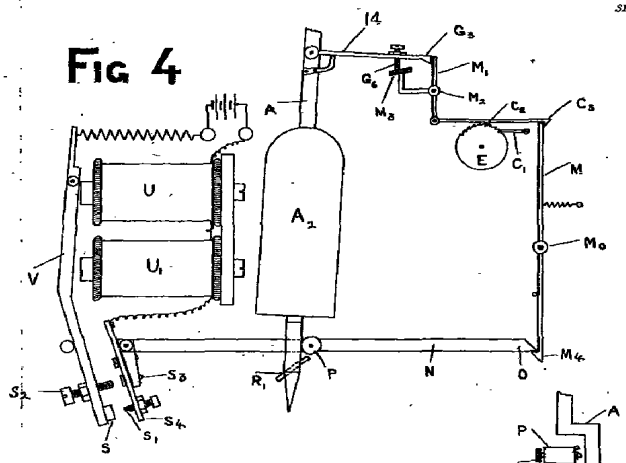
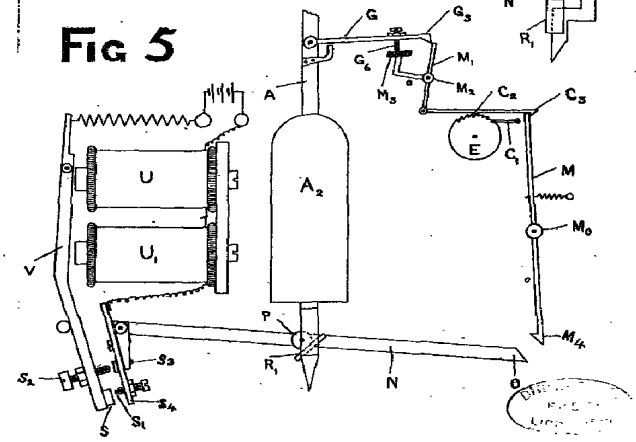


FIG 5



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A.D. 1907 JAN. 14. Nº. 919.

PARSONS & *another's* COMPLETE SPECIFICATION.

FIG 1

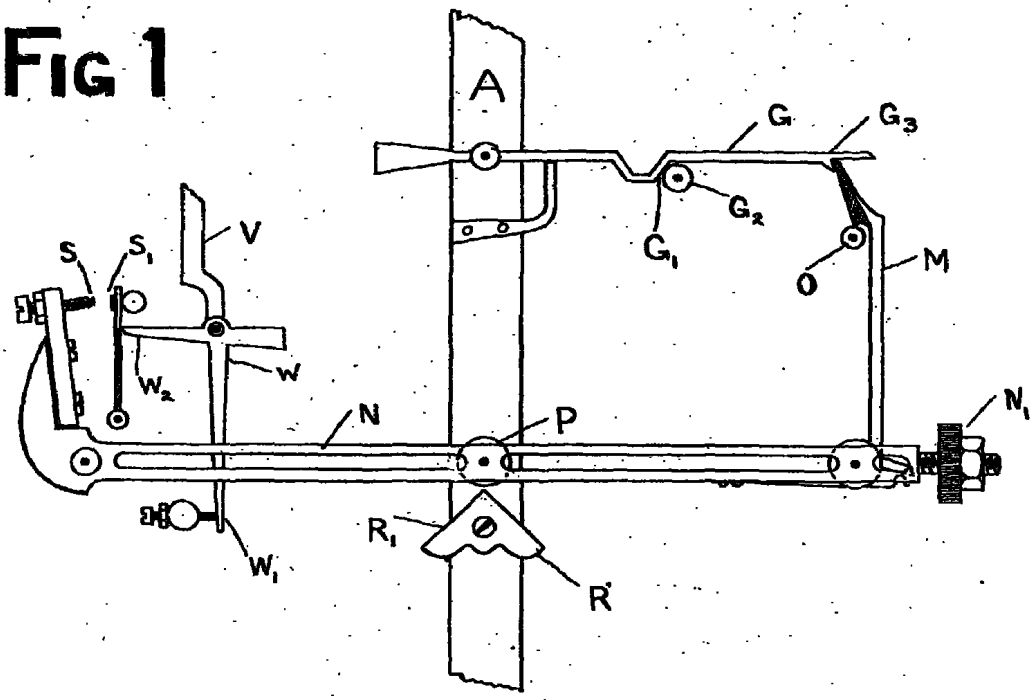


FIG 2

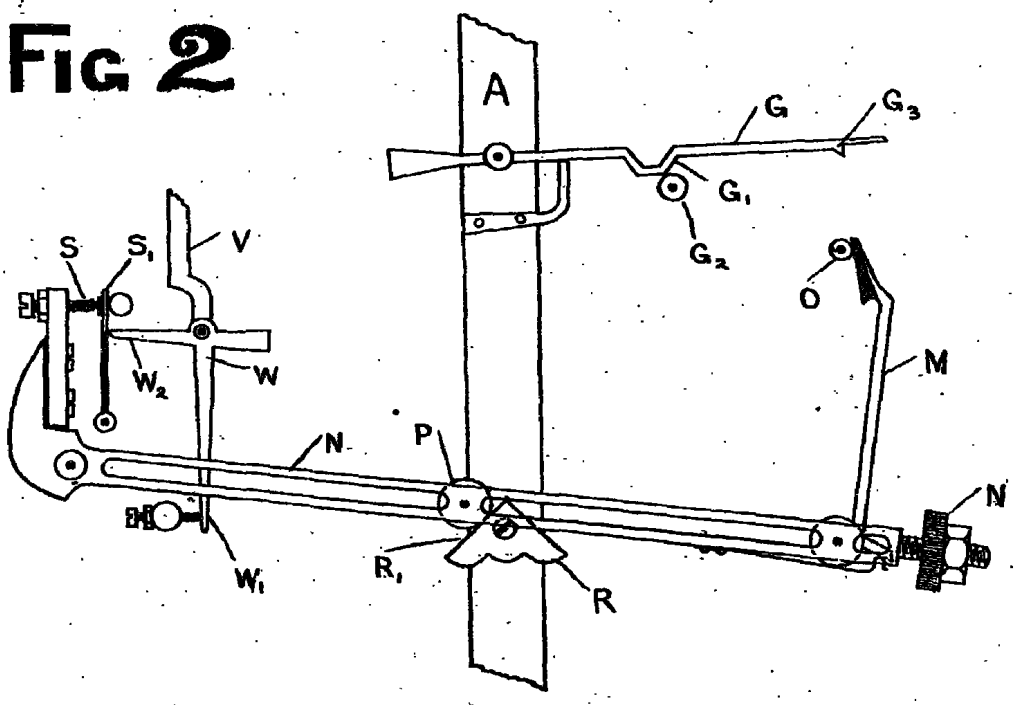
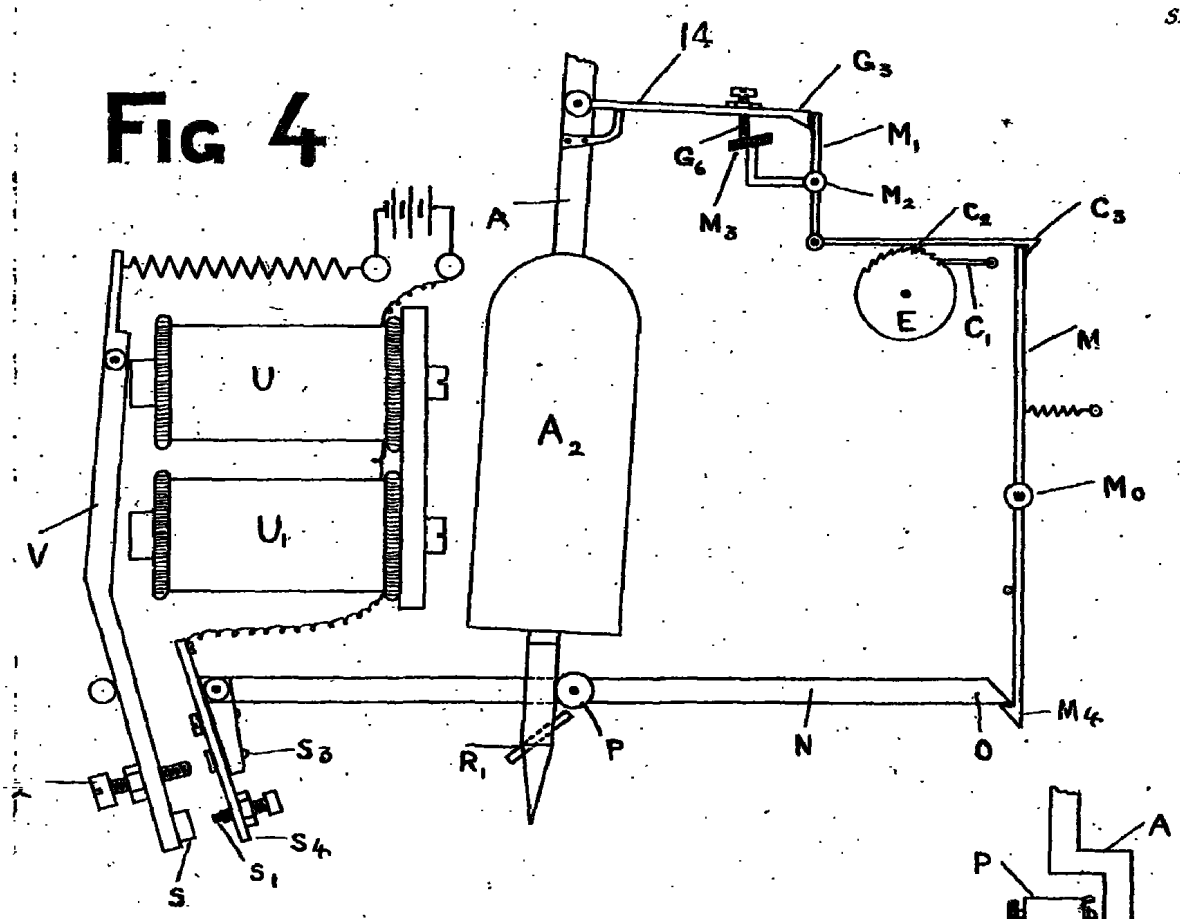


FIG 4



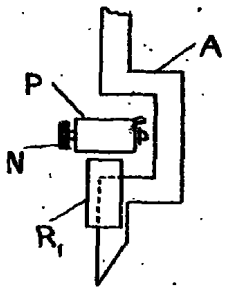
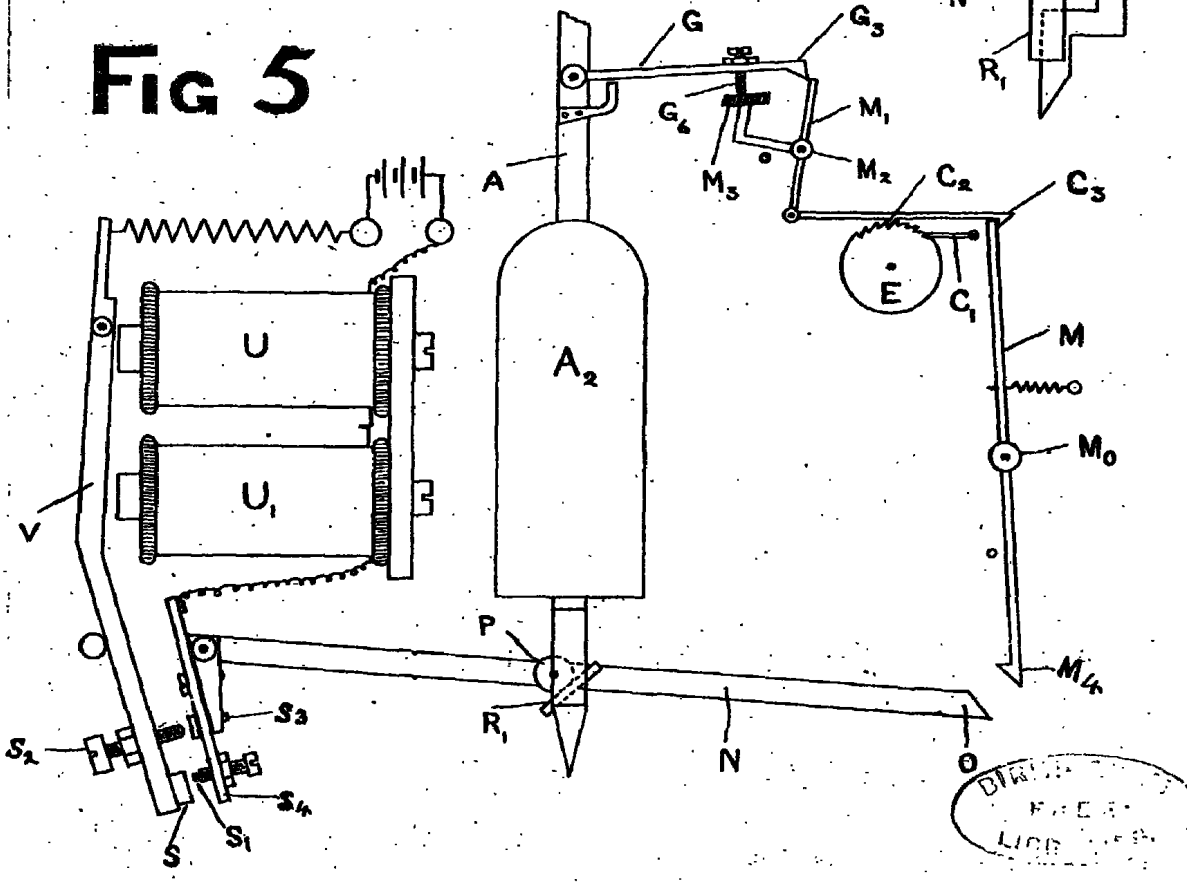


FIG 5



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(8 SHEETS)

SHEET 3.

FIG 6

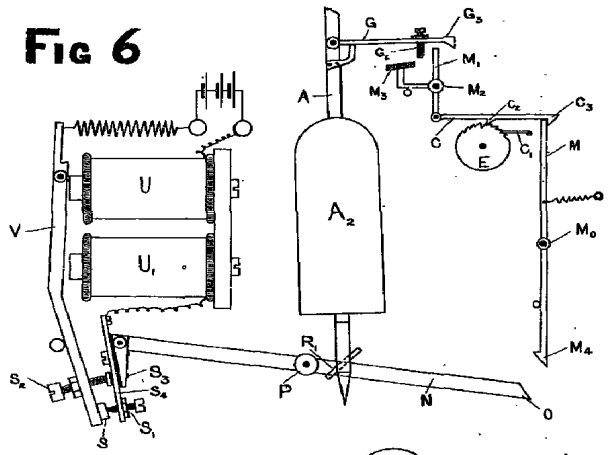
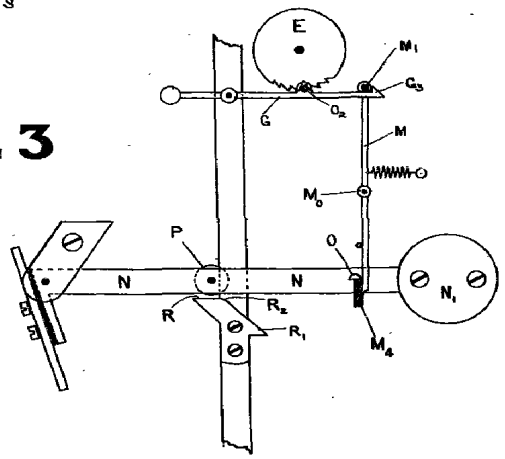


FIG 3



SHEET 4.

FIG 7

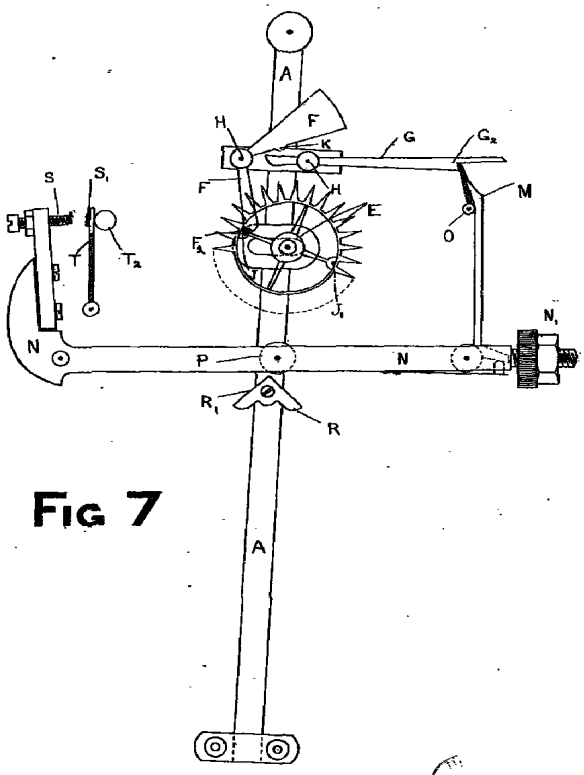


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FIG 6

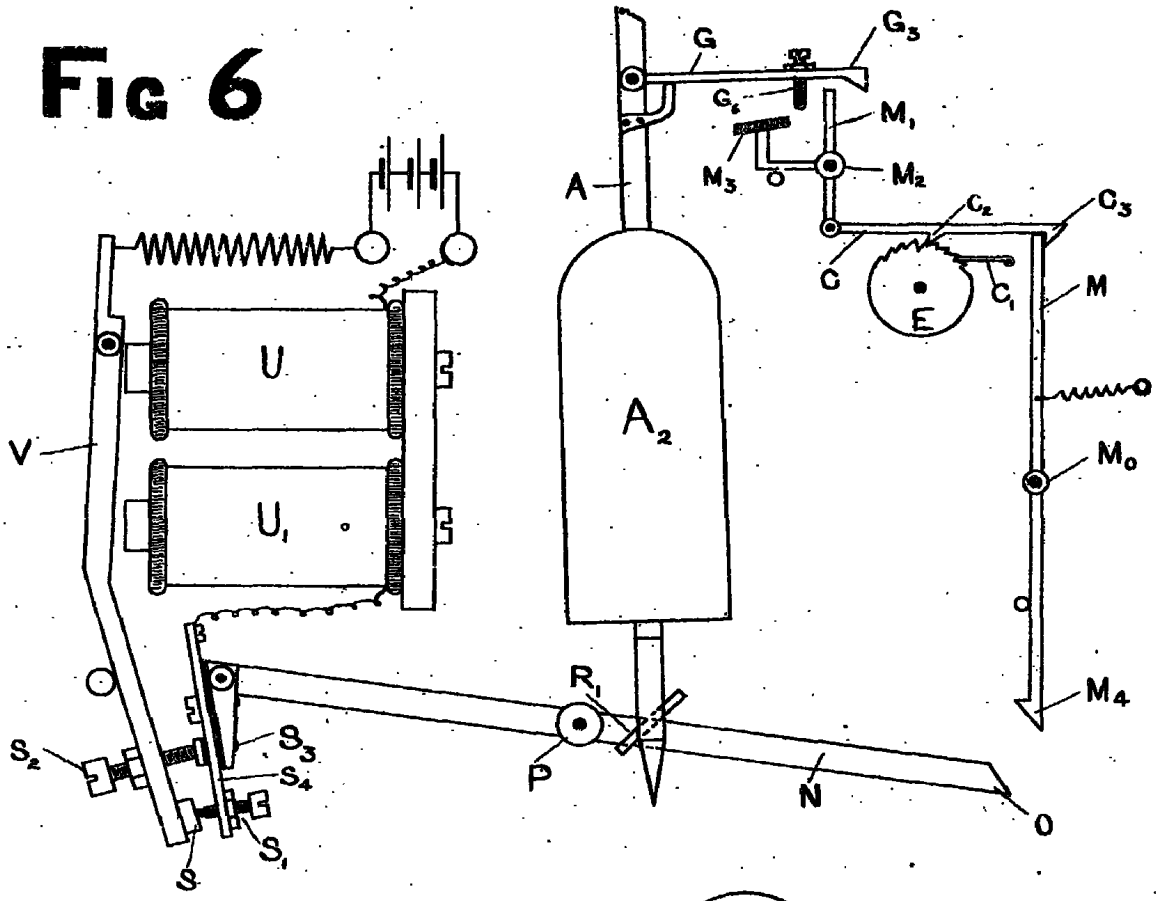
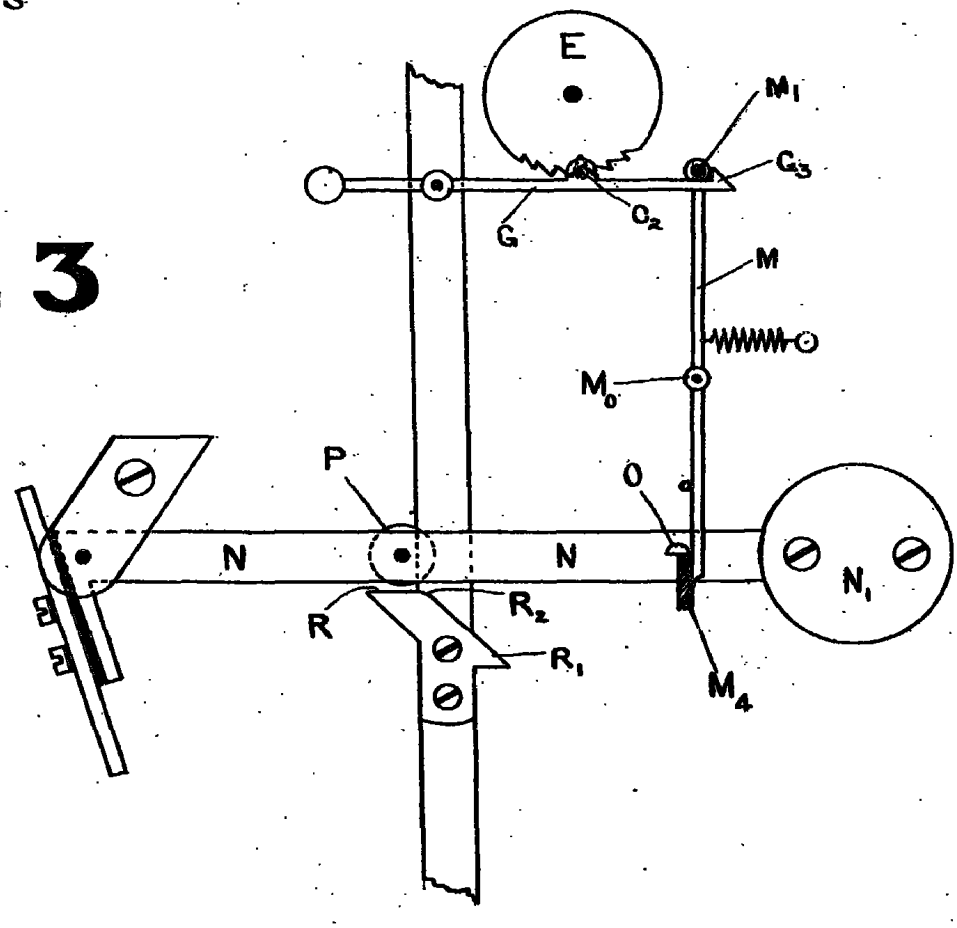


FIG 3



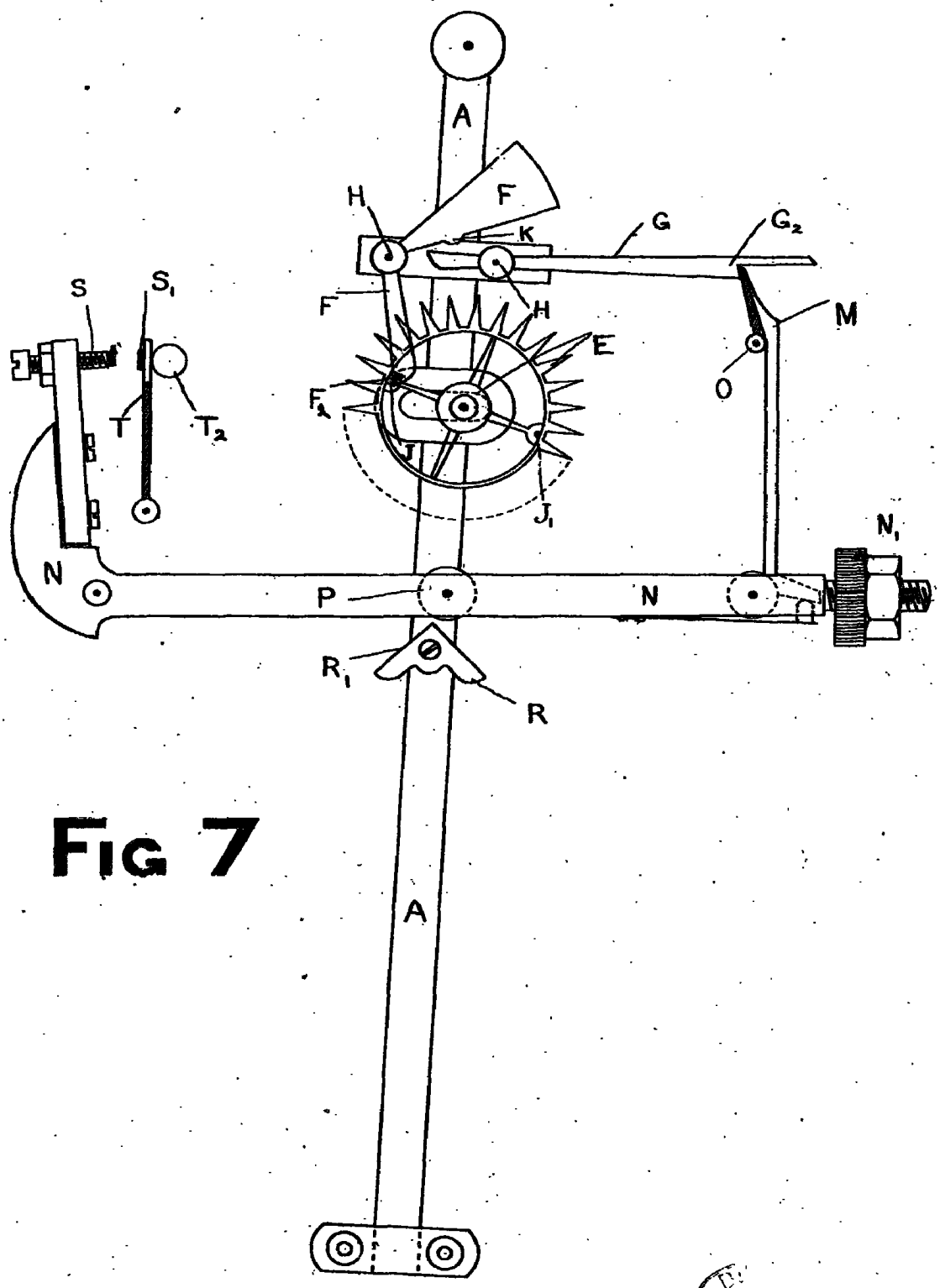


FIG 7

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SHEET 5

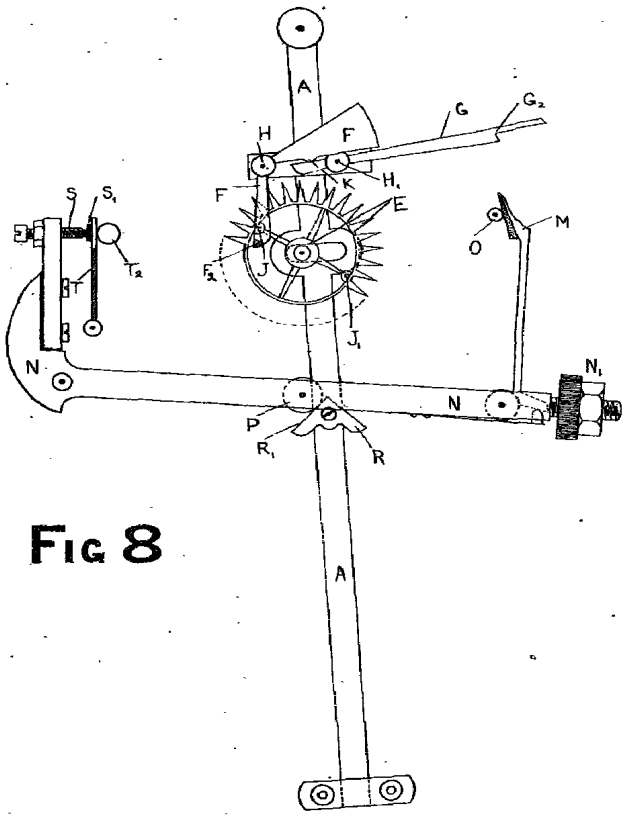

FIG 8

SHEET 6.

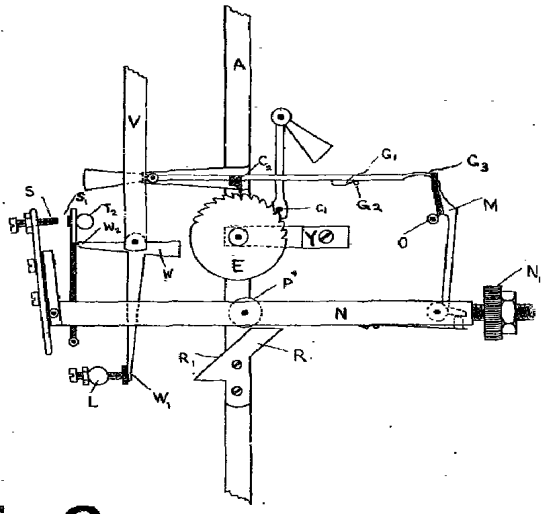

FIG 9

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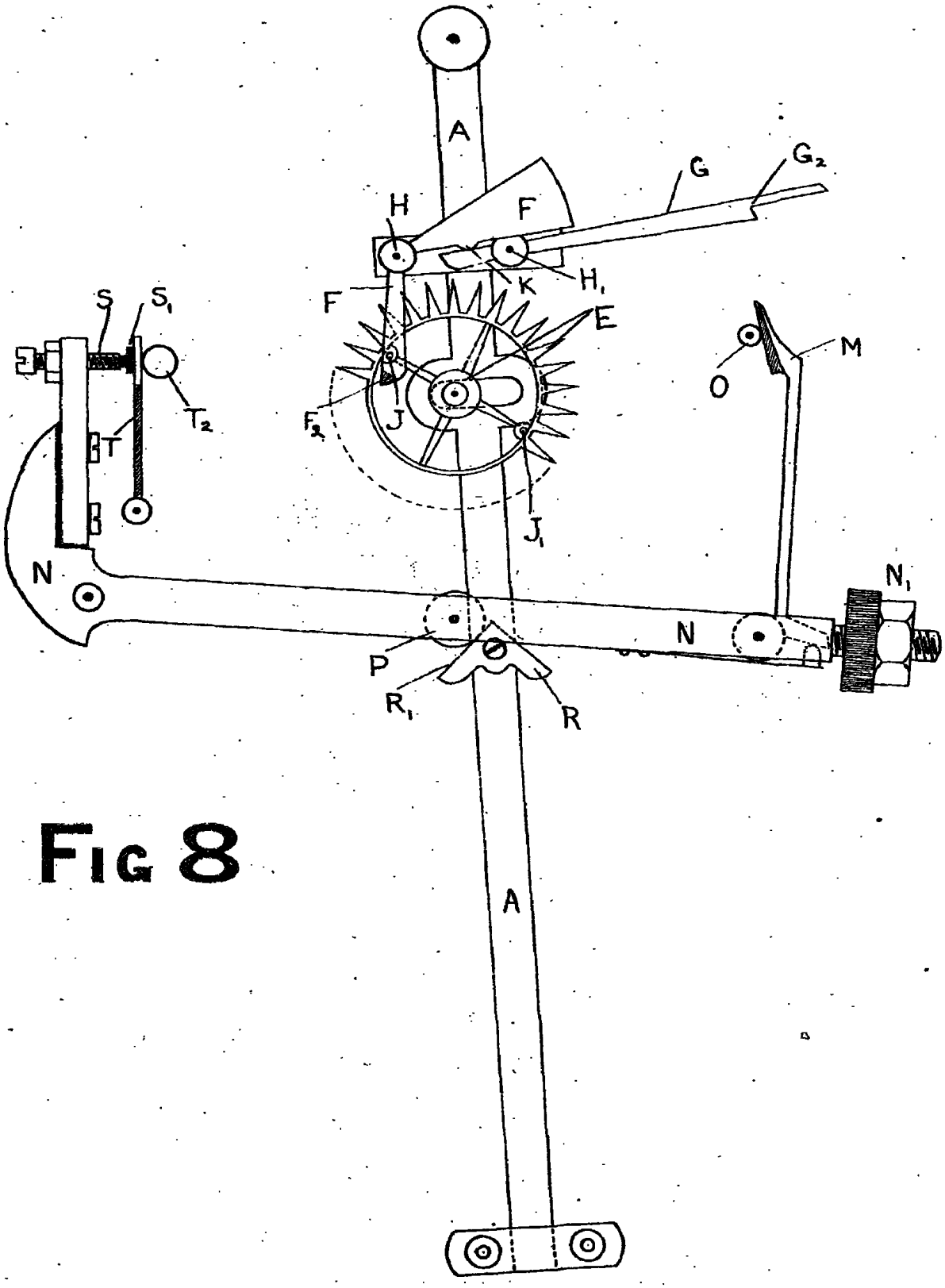


FIG 8

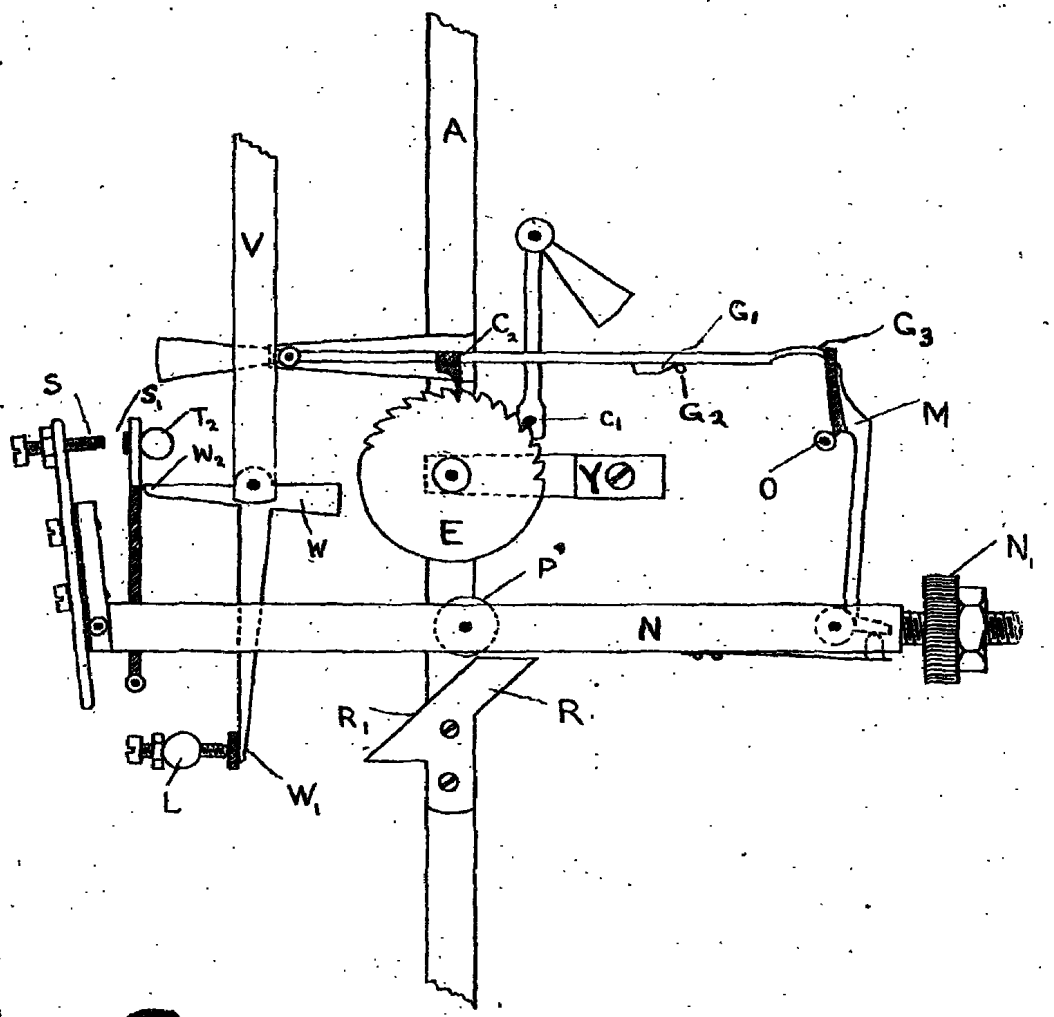


FIG 9

Malby&Sons, Photo-Litho.

SHEET 7.

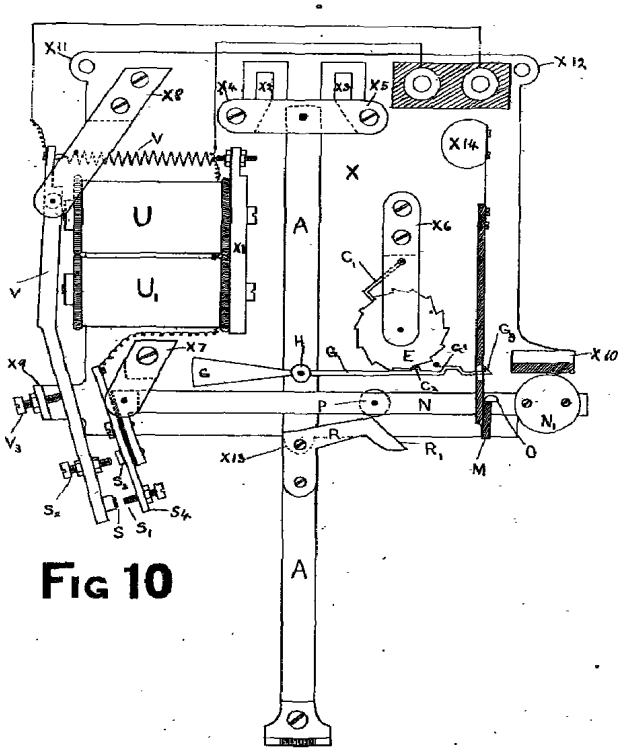


FIG 10

SHEET 8

FIG 11

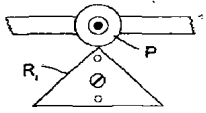


FIG 12

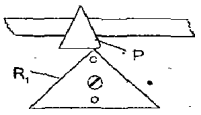


FIG 13

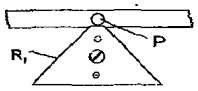


FIG 14

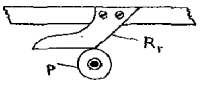


FIG 15

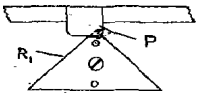
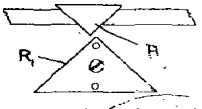


FIG 16



SHEET 7.

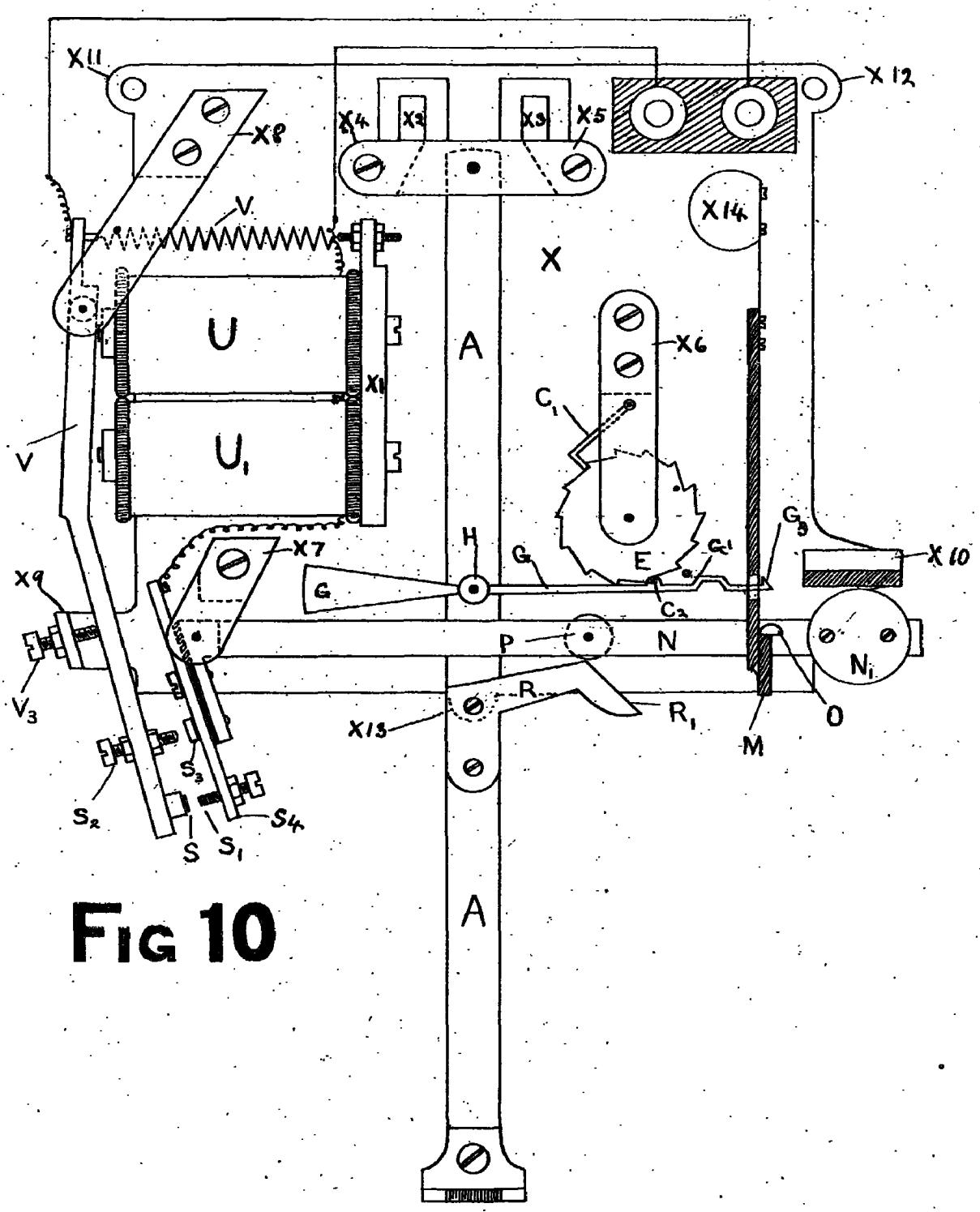


FIG 10

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

Fig 11

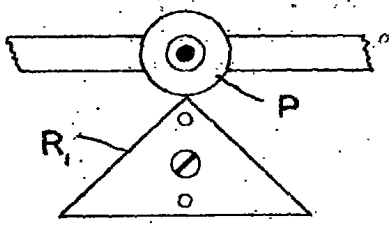


Fig 12

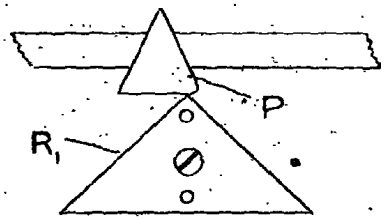


Fig 13

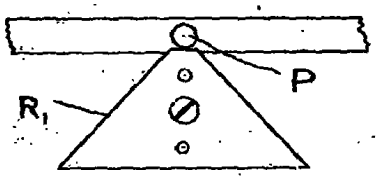


Fig 14

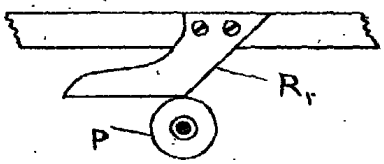


Fig 15

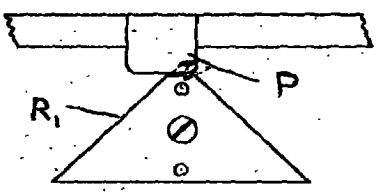
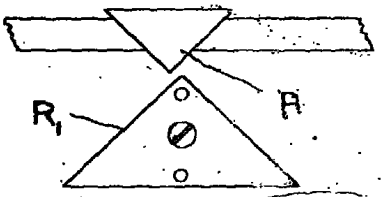


Fig 16



Malby&Sons, Photo-Litho.