N° 9527 A.D. 1915

Date of Application, 30th June, 1915

Complete Specification Left, 30th Dec., 1915—Accepted, 29th June, 1916

PROVISIONAL SPECIFICATION.

Improvements in Electric Clocks.

I, WILLIAM HAMILTON SHORTT, of "Bramcote," Bramcote Road, Putney, S.W., Civil Engineer, do hereby declare the nature of this invention to be as follows:—

This invention relates to improvements in electric clocks of the type in which impulses are imparted to a pendulum by a lever bearing with a sliding or rolling action against the face of a pallet or the periphery of a wheel attached to or vibrating with the pendulum.

In particular it refers to the special form of mechanism described in Patent No. 12,328 of 1911.

As a result of endeavours to determine the best possible proportions of the various parts mentioned in the mechanism referred to, it has been found that in order to make use of the most efficient and precise form of release, it was necessary that the impulse lever should be reset slowly and that the over throw when resetting should be both small and constant, also that the size of the releasing and the impelling parts should be kept down.

These requirements are diametrically opposed to those of a sound and reliable switching action, which requires a large and heavy impulse lever having considerable movement and a vigorous replacement. Simplicity, accuracy and constancy of adjustments also demand the use of a crutch, which in its turn requires to be of small dimensions on account of frictional considerations combined with the necessity of robust construction.

The introduction of a short crutch necessitates the delivery of the impulse to the pendulum relatively close to its point of suspension, which again requires reduction in the dimensions of the impelling mechanism.

In the improved type which is the subject of this patent, the whole of the above apparently irreconcilable requirements have been met.

According to one form of this invention the moving parts of the mechanism are mounted between skeleton clock plates in the manner customary in the horological profession, and the form of an upright triangle is found most suitable in order that all the arbors may be pivotted close to the pillars which separate and rigidly connect the plates. The crutch, which is consequently pivotted at the top of the triangle, carries at its lower end the small impulse roller; the whole being between the clock plates.

The impulse lever is also mounted between the clock plates, being pivotted towards one side near the base of the triangle, and it carries the impulse pin, which is normally held immediately above and just clear of the impulse roller at the bottom of the crutch. The extremity of this pin rests alternately upon one or other of the two extremities of a V-shaped rocking anchor, and the release is accomplished each time the crutch swings through its central position by the action of a pin or other projection upon the crutch which engages with the anchor, and throws it over first to one side and then to the other.

The lever on being released communicates energy to the pendulum as it falls

[*Price 6d.*]

in the manner described in the patent above referred to, but instead of meeting with the armature of the resetting magnet, it is stopped by, and operates, a catch which holds up a comparatively massive lever, pivotted towards the opposite side of the triangle. The sole duties of this lever are, first to reset the impulse lever by means of a roller and cam action which lifts it gently into its original position, and secondly to make a substantial contact with the armature of an electro-magnet, resulting in the usual powerful switching action terminating with a momentum break and the resetting of the lever itself on the catch, the shock of the action being preferably absorbed by a dash pot.

In another form in which contact and impulse is not required to take place every semivibration but every complete vibration, one side of the V-shaped anchor is removed and a chronometer detent escapement spring or similar device substituted for the pin or projection on the crutch.

When the contact and impulse is required to take place at intervals, the period being some even number of semivibrations, then it is necessary to introduce the usual count wheel, which also may be conveniently pivotted between the plates of the triangle, as an intermediary between the chronometer spring detent and the half anchor.

In any form of this invention embodying the introduction of the count wheel, inasmuch as the energy to be communicated to the pendulum requires to be increased in proportion to the length of the interval between impulses as measured by the number of teeth in the wheel, the size of the lever has to be increased proportionately and the necessity for the disassociation of the impulse lever from the contact lever is so greatly reduced, that it may be considered unnecessary, and the usual direct method of resetting may be adopted.

Dated the 29th day of June, 1915.

W. H. SHORTT.

COMPLETE SPECIFICATION.

Improvements in Electric Clocks.

I, WILLIAM HAMILTON SHORTT, of "Bramcote," Bramcote Road, Putney, S.W., Civil Engineer, 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 improvements in electric clocks of the type in which impulses are imparted to a pendulum by a lever bearing with a sliding or rolling action against the face of a pallet or the periphery of a wheel attached to or vibrating with the pendulum.

In particular it refers to the special form of mechanism described in Patent No. 12,328 of 1911.

As a result of endeavours to determine the best possible proportions of the various parts mentioned in the mechanism referred to, it has been found that in order to make use of the most efficient and precise form of release, it was necessary that the impulse lever should be reset slowly and that the overthrow when resetting should be both small and constant, also that the size of the releasing and the impelling parts should be kept down.

These requirements are diametrically opposed to those of a sound and reliable switching action, which requires a large and heavy impulse lever having considerable movement and a vigorous replacement. Simplicity, accuracy and constancy of adjustments also demand the use of a crutch, which

in its turn requires to be of small dimensions on account of frictional considerations combined with robust construction.

The introduction of a short crutch necessitates the delivery of the impulse to the pendulum relatively close to its point of suspension, and this again requires reduction in the dimensions of the impelling mechanism.

This invention has for its object the provision of an improved mechanism wherein the above mentioned apparently irreconcilable requirements will be met.

According to one practical form of this invention, illustrated by Fig. 1 of the accompanying 2 sheets of drawings the moving parts are mounted between skeleton clock plates in the manner customary in the horological profession, and the form of an upright isosceles triangle is used as it enables the various arbors to be pivotted close to the pillars which separate and rigidly connect the plates. The crutch "Y" which is pivotted at the top of the triangle, and swings between the plates, carries at its lower end the small impulse roller "A". The impulse lever "B" is mounted on an arbor pivotted towards the right hand side of the base of the triangle and carries the impulse pin "B^1". This impulse lever is normally held up by means of the rocking anchor "D" pivotted below its centre of gravity, the impulse pin being extended so as to engage and rest upon one or other of the catch points according to the position of the anchor.

The release is accomplished, each time the clutch swings through its central position, by the action of the pin "K" which engages with the tails and throws over the anchor from one side to the other.

The lever, whose inertia is increased by the vertical bar "E" mounted on the arbor, on being released communicates energy to the pendulum as it falls in the manner described in Patent No. 12,328 of 1911, but instead of meeting with the armature of the resetting magnet after completing the delivery of the impulse, it is stopped by and operates the catch "F" which holds up the massive contact lever "G" which is pivotted towards the left hand side of the base of the triangle. On being released this lever falls and the small roller "H", which engages with the lower half of the loading bar "E", gently lifts by cam action the impulse lever into its original position, where it is retained by the catch point of the anchor "D" which has been rocked over and is waiting to receive it.

The loading bar "E", the back of which forms the cam face is so shaped that the overthrow of the lever above the catch point is both small and constant, it being independent of the speed and exact extent of movement of the resetting lever. Having accomplished the resetting of the impulse lever the contact lever is itself replaced upon its catch as a result of the action of the electro-magnet "O" which is energised on the lever projection "L" coming into contact with the contact spring "M" attached to the armature "N". The dash pot "Q" serves to relieve the catch from shock and to prevent vibration.

In order to obviate the necessity for mounting the movement so that the axis of motion of the pendulum coincides with that of the crutch, a single driving pin "P" is provided on the latter and a link pivotted in a block mounted on the pendulum rod serves to connect the two.

Fig. 2 shews the modifications necessary in the design illustrated in Fig. 1 when contact and impulse are required to take place once every complete vibration instead of once every semi-vibration. The left-hand point of the catch "D" has been removed and the top left-hand tail altered in shape so as to be operated by the D-shaped gathering jewel "K", mounted on the end of the flexible spring (K_1) attached to the crutch "Y" just below the driving pin "P", in a manner similar to the action of a chronometer detent spring. Obviously the impulse lever "B" will now only be released each time the crutch passes through its central position when moving to the left.

On the swing to the right the jewel "K" simply rides over the upright tail of the catch "D".

Fig. 3 shews the modification in the design illustrated by Fig. 1 when contact and impulse are desired to take place at intervals, the period being some even number of semi-vibrations. The form of the catch "D" is the same as in Fig. 2 but the releasing pin "K" is now mounted on the count wheel "W" which is carried between extensions of the same plates as carry the catch "D". This wheel is operated by the D-shaped jewel (K_2) mounted on the flexible spring (K_1) attached to the left-hand end of the cross arm of the crutch "Y" which carries the driving pin "P". This wheel obviously advances one tooth each time the crutch swings to the right but the impulse lever "B" is only released once each revolution of the count wheel "W". The back stop "S" serves to prevent movement of the wheel when the crutch is moving to the left. As the interval between impulses now covers a considerable number of vibrations of the pendulum, the energy required to be communicated by each impulse is correspondingly increased. This is effected by the addition of the small weight (B_2) to the lever "B".

In any form of this invention embodying the introduction of a count wheel, inasmuch as the lever has to be loaded or its size increased in proportion to the number of teeth in the wheel, the necessity for the disassociation of the impelling and contacting functions is so greatly reduced that it may be thought sufficient to deliver the impulse to the impulse wheel "A" by an impulse pin mounted directly on the heavy contact bar "G".

Fig. 4 shows the modifications in the design of Fig. 3 which are consequently required. The impulse pin (B_1) is now mounted direct in the lever "G" which is normally held up on the inverted catch (F_1), this catch is operated and the lever released by means of the tail (F_2) which is raised by one end of the vane "V" mounted on the arbor of the count wheel "W", which is carried between the main plates of the movement to the right of the crutch "Y". This count wheel is operated in the usual manner by the D-shaped jewel "(K_2)" mounted on the flexible spring "(K_1)" attached to the crutch. The back stop "S" services to prevent any backward movement of the wheel as the crutch swings to the right.

Fig. 5 shews an alternative design for the modification illustrated by Fig. 4. In this case the crutch "Y" does not carry the impulse wheel which is now in the form of a roller, this impulse roller "A" is mounted on the lever "G" and delivers impulse to the crutch and pendulum in running down the pallet end "(B_1)" of the cross bar at the bottom of the crutch which carries the driving pin "P". The lever "G" is held up by the catch "F" mounted close to the left-hand bottom pillar of the clock plates, and this catch is operated once per revolution of the count wheel "W", also mounted adjacent to the left-hand pillar, by means of the vane "V" carried on the arbor. The back stop "S" carried on another arbor, pivotted between the main plates, serves to prevent backward motion of the wheel. The movement of the wheel is effected by means of the D-shaped jewel "(K_2)" mounted on the flexible spring "(K_1)" attached to the bottom of the crutch. The resetting of the lever "G" after delivery of the impulse is accomplished electrically in a manner similar to that illustrated by Fig. 1 but the electro-magnet is mounted as a separate unit.

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) An electrically operated pendulum impelling mechanism of the class hereinbefore described wherein the complete disassociation of the impelling function from the contact making function of the mechanism is accomplished by the introduction of an intermediary lever which in the first place operates

so as to mechanically reset the impulse lever and in the second to make the electrical contact which results in the restoration of the lever to its original position.

(2) A pendulum impelling mechanism of the class hereinbefore described wherein a slow resetting of the impulse lever together with a constant margin of safety or overthrow is achieved mechanically by means of the cam action of an intermediary lever.

(3) A pendulum impelling mechanism of the class hereinbefore described wherein a two legged rocking anchor pivotted below the centre of gravity is used to hold up the impulse lever which rests alternately on the extremity of one or other leg, the lever being released each time the crutch passes through its central position by the action of a pin projecting from it which engages with the catch and throws it over from one side to the other so that the latter is always in readiness to receive the lever when it is raised after having given an impulse.

(4) An electrically operated pendulum impelling mechanism of the class hereinbefore described wherein a dash pot is used to absorb shock and prevent vibration of the contact lever when thrown up on to its catch.

(5) A pendulum impelling mechanism of the class hereinbefore described wherein the crutch drives the pendulum by means of a link attached to the pendulum, which rides on a pin projecting from the crutch, in order to avoid the necessity of the axis of the crutch being mounted so as to coincide with the axis of vibration of the pendulum.

(6) A pendulum impelling mechanism of the class hereinbefore described wherein the several parts are mounted between skeleton clock plates of triangular form connected by 3 separating pillars substantially as described.

(7) In a pendulum impelling mechanism of the class hereinbefore described, the combination of an impulse lever normally resting on a catch, a count wheel to liberate it at intervals, a short crutch to which the impulse is imparted, a pin and link to connect the crutch and pendulum and a framework of skeleton clock plates of triangular form, to enclose the whole of the mechanism substantially as described.

(8) The electrically operated pendulum impelling mechanism mounted between skeleton clock plates of triangular form, embodying the use of a short crutch driving the pendulum by means of a pin and link, and the complete disassociation of the impelling and contact making functions with a mechanical cam-action resetting of the impulse lever, the release of which is effected each semi-vibration of the pendulum by means of a two legged rocking anchor, substantially as described and illustrated in Fig. 1 of the accompanying 2 sheets of drawings.

(9) The electrically operated pendulum impelling mechanism mounted between skeleton clock plates of triangular form, embodying the use of a short crutch driving the pendulum by means of a pin and link, and the complete disassociation of the impelling and contact making functions with a mechanical cam-action resetting of the impulse lever, the release of which is effected once each complete vibration of the pendulum substantially as described and illustrated by Fig. 2 of the accompanying 2 sheets of drawings.

(10) The electrically operated pendulum impelling mechanism mounted between skeleton clock plates of triangular form, embodying the use of a short crutch driving the pendulum by means of a pin and link, and the complete disassociation of the impelling and contact making functions with a mechanical cam-action resetting of the impulse lever, the release of which is effected once each revolution of the centrally mounted count wheel substantially as described and illustrated by Fig. 3 of the accompanying 2 sheets of drawings.

(11) The electrically operated pendulum impelling mechanism mounted between skeleton clock plates of triangular form embodying the use of a short

crutch driving the pendulum by means of a pin and link, a count wheel operating the releasing catch once each revolution, and a dash pot to absorb shock and vibration when the lever is reset, substantially as described and illustrated by Fig. 4 of the accompanying 2 sheets of drawings.

(12) The electrically operated pendulum impelling mechanism mounted between skeleton clock plates of triangular form embodying the use of a short crutch driving the pendulum by means of a pin and link, and a count wheel operating the releasing catch once each revolution, substantially as described and illustrated by Fig. 5 of the accompanying 2 sheets of drawings.

Dated this 30th. day of December, 1915.

W. H. SHORTT.

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A.D. 1915. June 30. No. 9527
SHORTT'S Complete Specification.

(2 SHEETS)

SHEET 1.

Fig. 1.

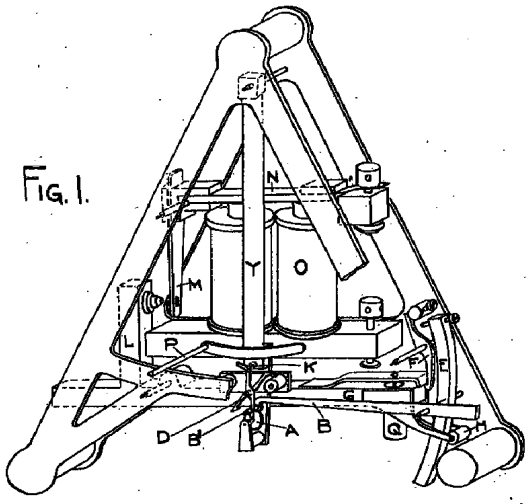
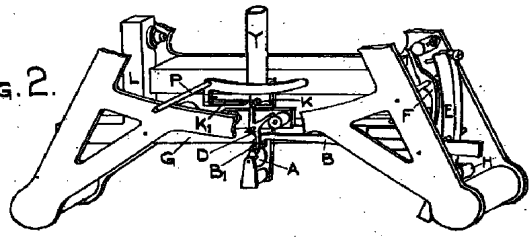


Fig. 2.



SHEET 2.

Fig. 3.

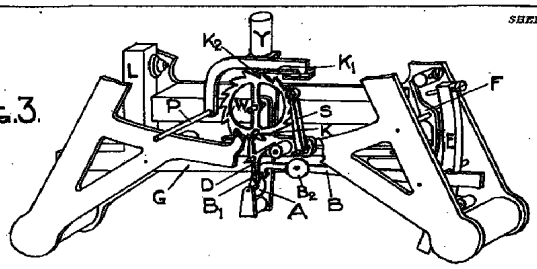


Fig. 4.

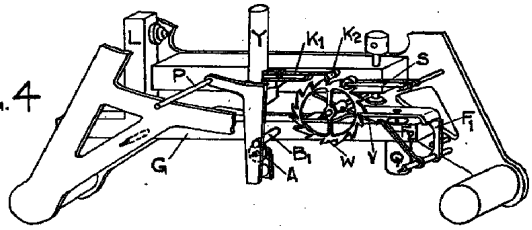


Fig. 5.

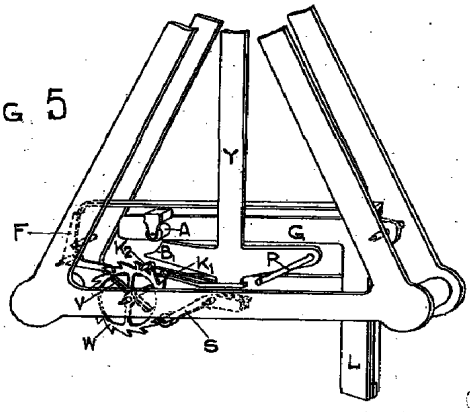


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FIG. 1.

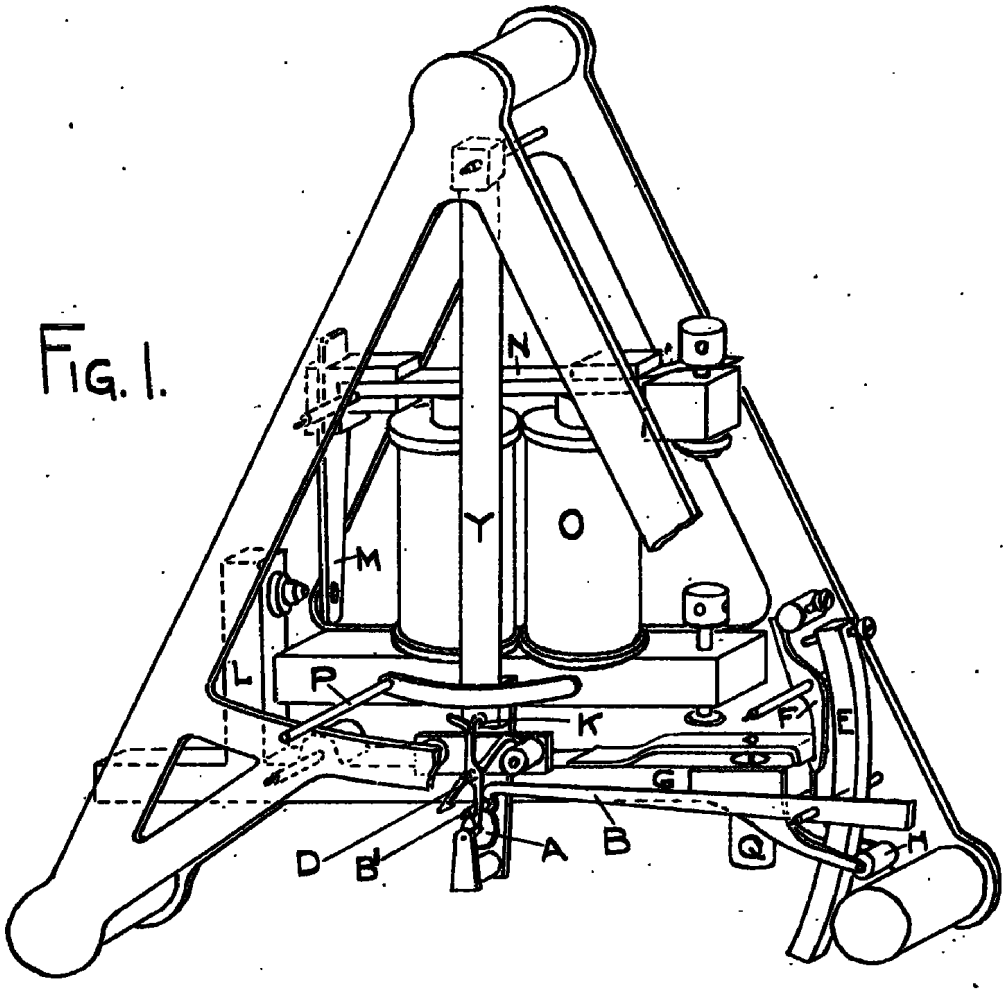


FIG. 2.

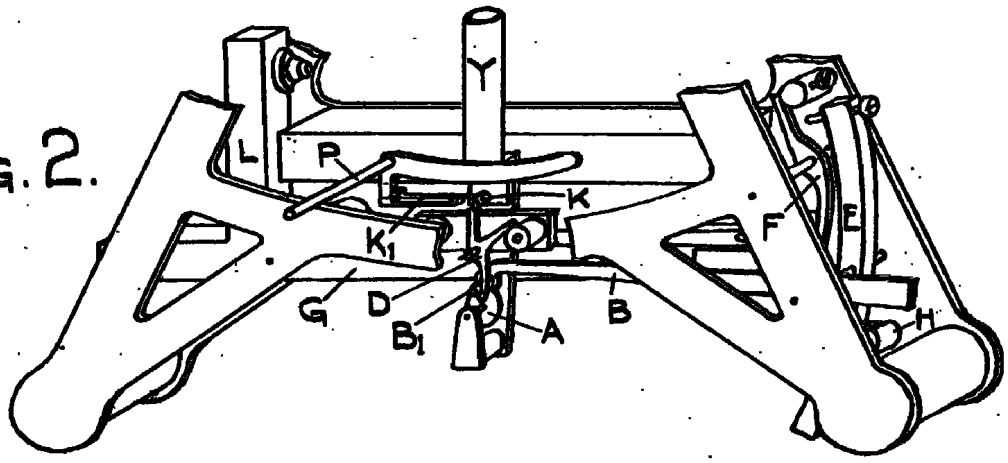


FIG. 3.

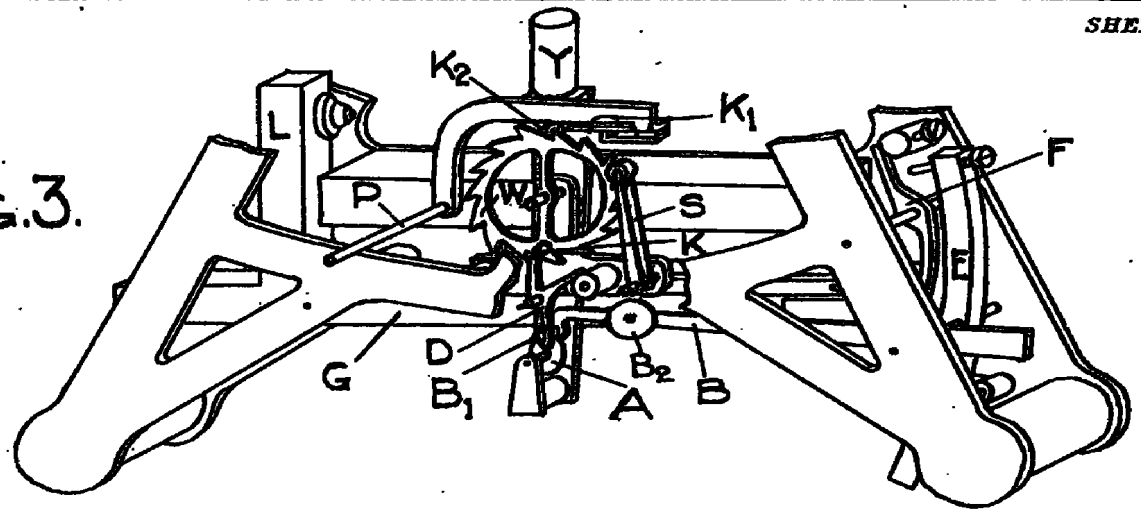


FIG. 4

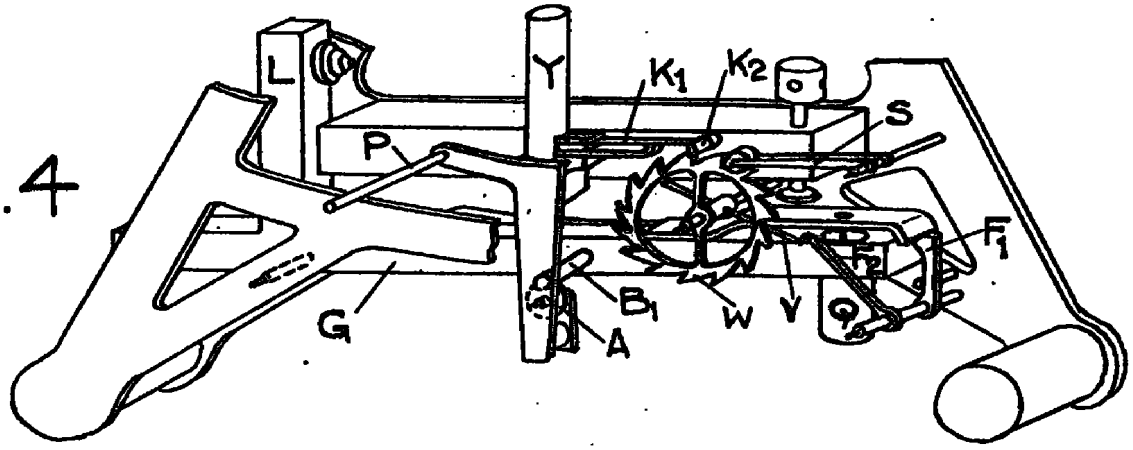
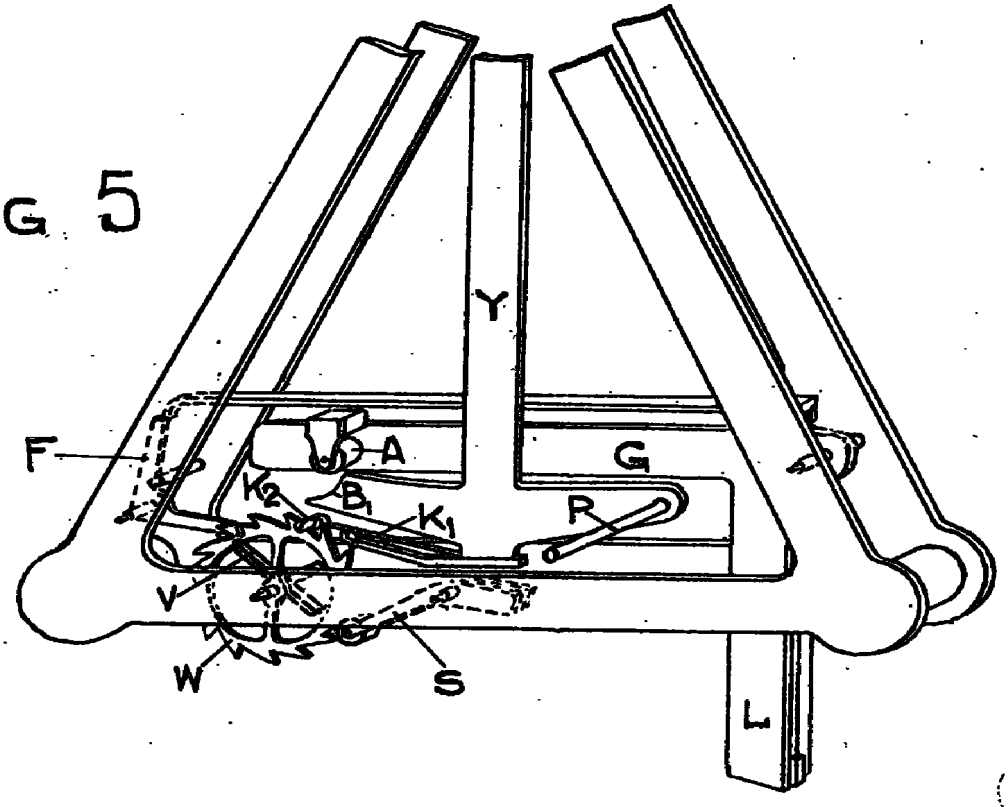


FIG. 5



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