W. F. KENDALL.

COMPENSATING DRIVING MECHANISM.

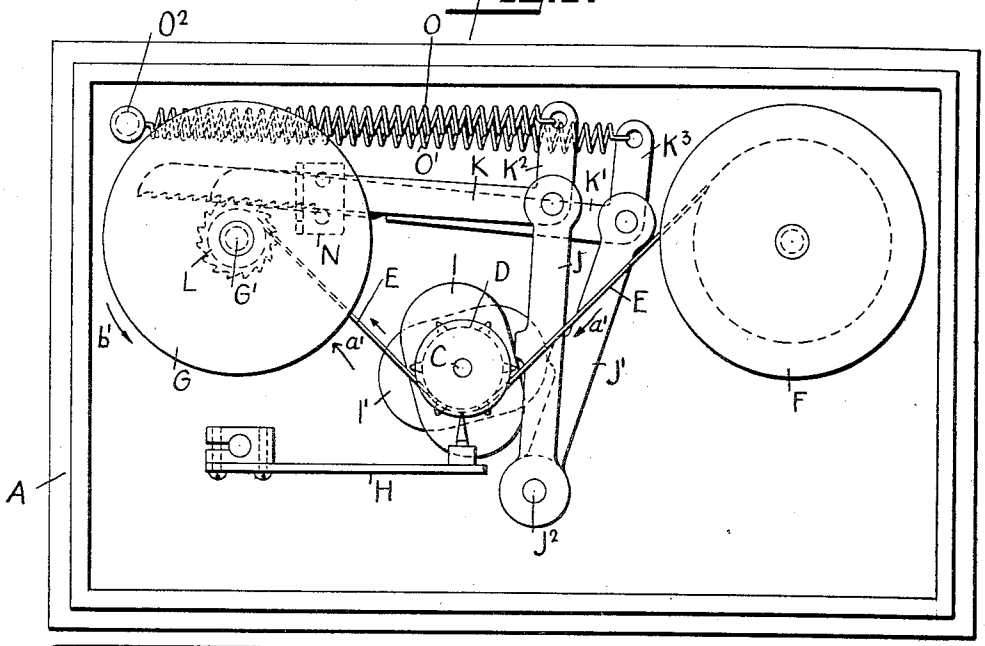
APPLICATION FILED FEB. 20, 1913.

1,103,778.

Patented July 14, 1914.

3 SHEETS—SHEET 1.

Fig. 1.



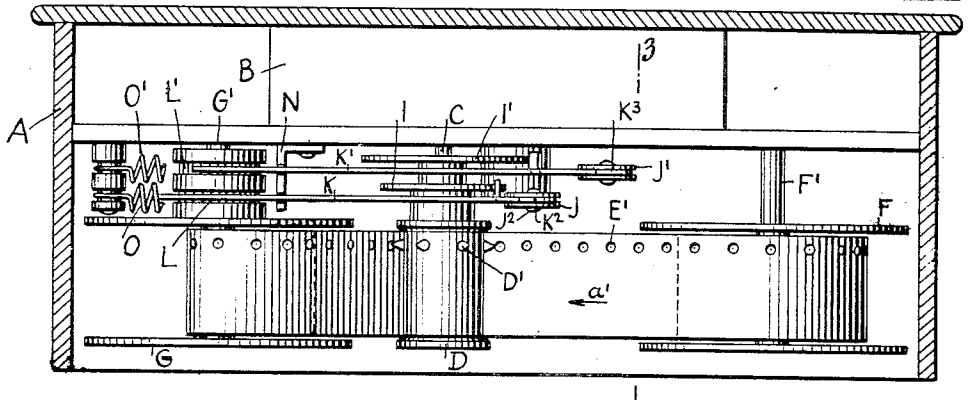
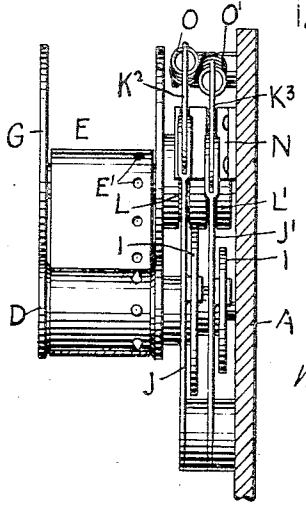


Fig. 2.

Fig. 3.



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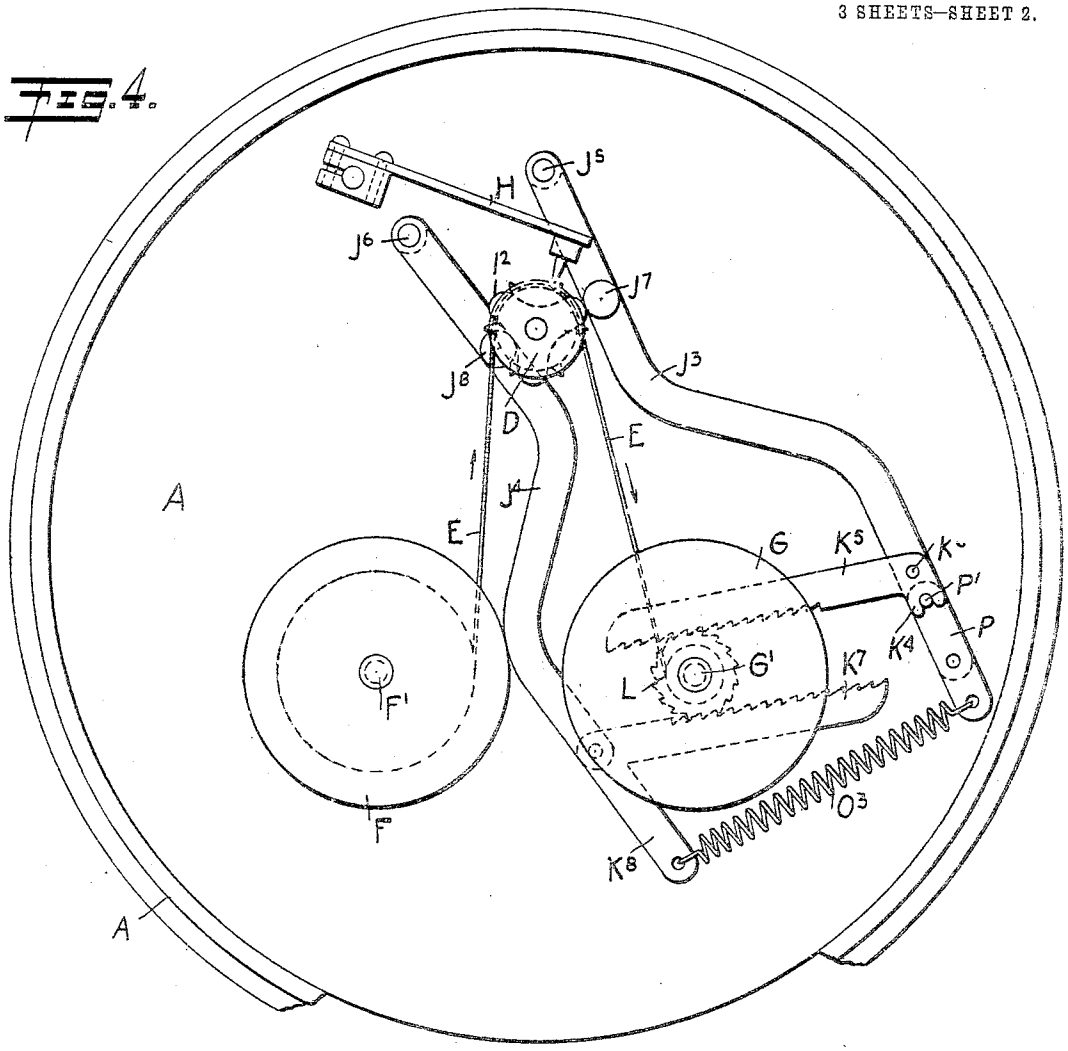
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3 SHEETS—SHEET 2.

Fig. 4.



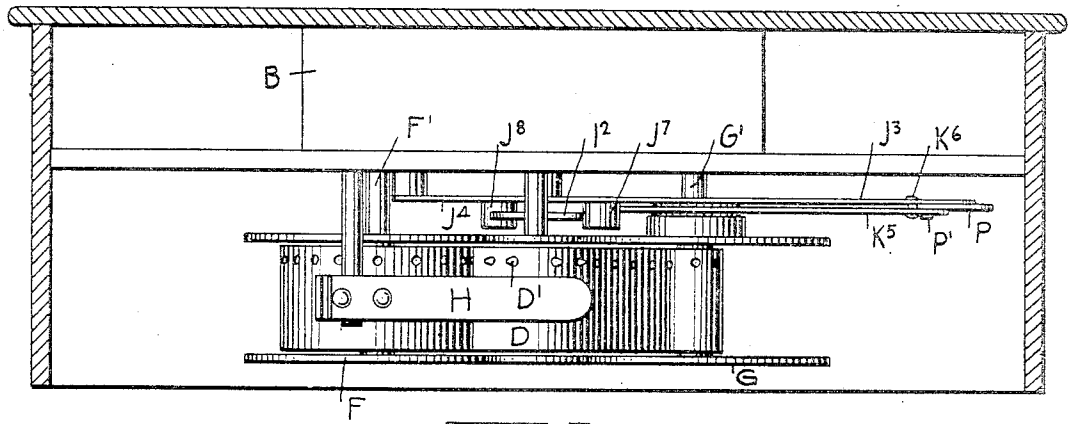


Fig. 5.

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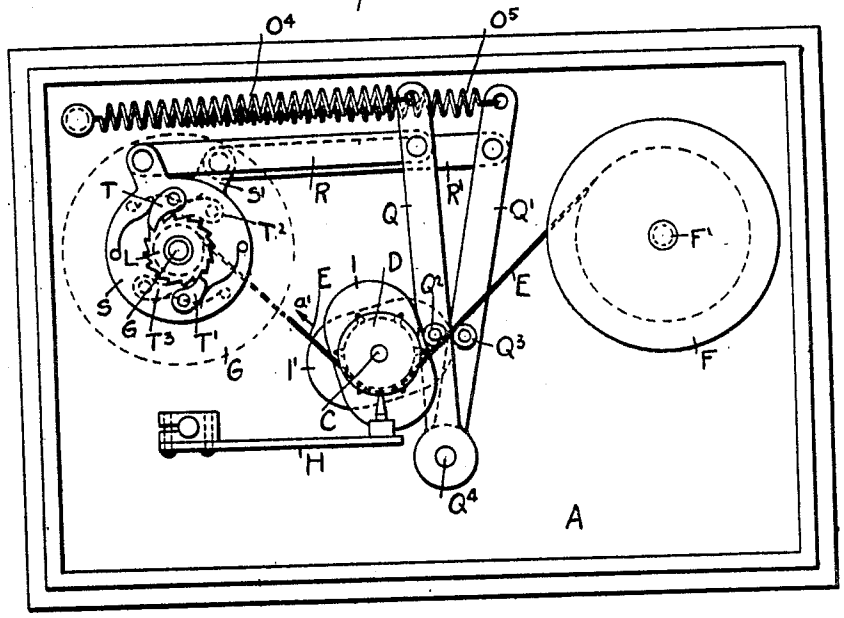
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3 SHEETS—SHEET 3.

FIG. 6.



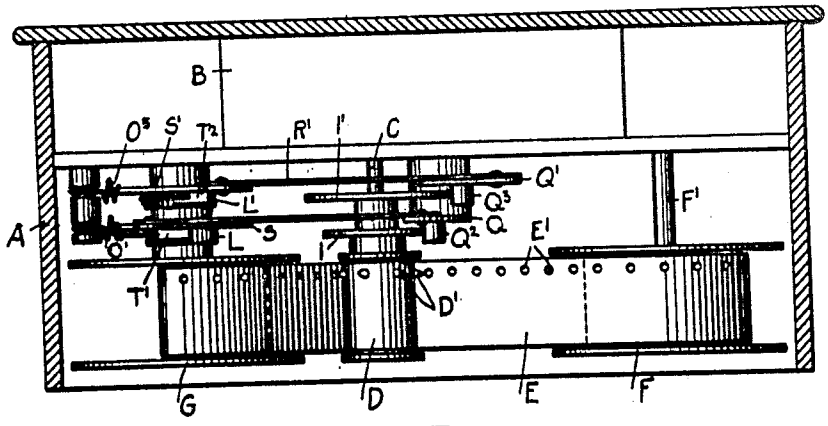


FIG. 7.

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COMPENSATING DRIVING MECHANISM.

1,103,778. Specification of Letters Patent. Patented July 14, 1914.

Application filed February 20, 1913. Serial No. 749,623.

To all whom it may concern:

Be it known that I, WILLIAM FLOYD KENDALL, a citizen of the United States, and a resident of Valley Cottage, in the county of Rockland and State of New York, have invented a new and improved Compensating Driving Mechanism, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved compensating driving mechanism, more especially designed for rotating the winding-up rolls for winding up a tape or ribbon and such as are used, for instance, in speed recorders and other machines and devices and arranged to rotate the winding-up drum at a gradually decreasing speed as the tape or ribbon winds up, thus insuring at all times a proper winding up of the tape or ribbon. In order to accomplish the desired result, use is made of a cam device rotating with the feed wheel, levers actuated by the said cam device to swing alternately in opposite directions, and motion transmitting mechanism connecting the said levers with the winding-up drum or other part to be driven.

A practical embodiment of the invention is represented in the accompanying drawings forming a part of this specification in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation of the compensating driving mechanism, as applied to a speed recorder; Fig. 2 is a plan view of the same with the casing shown in section; Fig. 3 is a transverse section of the same on the line 3—3 of Fig. 2; Fig. 4 is a side elevation of a modified form of the compensating driving mechanism as applied; Fig. 5 is a plan view of the same with the casing shown in section; Fig. 6 is a side elevation of another modified form of the compensating driving mechanism as applied, the winding-up drum being shown removed; and Fig. 7 is a plan view of the same with the casing shown in section.

The casing A of a speed recorder of any approved construction contains a clockwork B for continually driving a shaft C carrying a feed wheel D around which passes a tape or ribbon E unwinding from an unwinding drum F and winding up on a winding-up drum G, the drums F and G having their shafts F′ and G′ journaled in suitable bearings arranged on the casing A. A stylus H is adapted to mark the tape or ribbon E as the latter passes around the feed wheel D, the said stylus H being actuated by the mechanism of the speed recorder in the usual manner so that further description and showing of the speed recorder is not deemed necessary. The feed wheel D is preferably provided with sprockets D′ engaging spaced apertures E′ arranged along one margin of the tape or ribbon E to insure a positive feeding of the tape or ribbon.

In order to rotate the winding-up drum G with a decreasing speed as the windings of the tape or ribbon E accumulate on the said drum, use is made of a compensating driving mechanism, presently described in detail.

As shown in Figs. 1, 2 and 3, the clock-driven shaft C is provided with two cams I and I′ of elongated shape and having their major axis standing at a right angle one relative to the other, as plainly indicated in Fig. 1. The levers J and J′ are in peripheral contact with the cams I and I′, and the said levers are fulcrumed at J^2 in the casing A and are pivotally connected by ratchet pawls K and K′ with ratchet wheels L and L′ secured on the shaft G′ of the winding-up drum G. The ratchet pawls K and K′ are guided on guideways N attached to the casing A, and the pivotal ends of the said ratchet pawls K and K′ are provided with angular arms K^2, K^3 to which are secured springs O and O′ attached at O^2 to the casing A, so that the toothed ends of the ratchet pawls K and K′ are held in contact with the corresponding ratchet wheels L and L′, and the levers J, J′ are given a return swinging motion to cause the pawls K and K′ to turn the ratchet wheels L, L′ and consequently the winding-up drum G to wind up the tape or ribbon E. During the outward swinging motion given to the levers J, J′ by the cams I, I′ the springs O, O′ are placed under tension, and the pawls K, K′ glide over the ratchet wheels L, L′ and hence do not turn the same. It is understood that the tape or ribbon E is fed in the direction of the arrow a' by the action of the clock-driven feed wheel D, and the tape is wound up on the winding-up drum G by the ratchet pawls K and K′ turning the ratchet wheels L, L′ secured on the shaft G′ carrying the said winding-up drum G. It will be noticed that the cams I, I′ which rotate with the clock-

driven shaft C rock the levers J, J′ alternately in opposite directions, so that on the return movement of the lever J the ratchet pawl K turns the drum G in the direction of the arrow *b*′, and on the return movement of the lever J′ the other pawl K′ continues the rotation of the said drum and in the same direction. As the windings of the tape or ribbon E increase on the winding-up drum G, the throw of the ratchet pawls K, K′ gradually decreases as the ratchet wheels L, L′ can not be turned any farther than the taut portion of the tape or ribbon E extending between the wheel D and the winding-up drum G permits, and consequently the levers J and J′ are gradually moved farther away from the center of the cams I and I′ whereby the throw of the said levers J and J′ is decreased and likewise that of the ratchet pawls K and K′. It is understood that at the beginning of the winding up of the tape or ribbon E on the winding-up drum G, the levers J and J′ are in contact with the entire peripheral faces of the cams I, I′ at each rotation of the cams, that is, the latter impart a full throw to the levers J, J′, but as the winding up proceeds the said levers are gradually moved outward away from the centers of the said cams I and I′ and hence the latter gradually reduce the throw of the levers whereby the speed of the drum G is reduced. The relative proportion of the parts is such that the drum G is turned with a speed to keep the portion of the tape or ribbon E extending from the feed wheel D to the winding-up drum G taut, but as the windings on the drum G gradually increase in number the speed of the drum G is gradually checked by the taut tape or ribbon portion, and consequently the ratchet pawls K, K′ move gradually less distances and in doing so swing the levers J, J′ gradually outward away from the center of the cams I, I′, and the latter give less throw to the said levers. By the arrangement described, the windings on the drum G gradually control the position of the levers J, J′ relative to the cams I, I′,

In the modified form shown in Figs. 4 and 5, the levers J^3, J^4 are fulcrumed at J^5, J^6 on the casing A, and the said levers J^3, J^4 are provided with friction rollers J^7, J^8 in peripheral engagement with a cam I^2 secured on the clock-driven shaft C, which shaft carries the feed wheel D over which passes the tape or ribbon E unwinding from the drum F and winding up on the drum G. The free end of the lever J^3 is provided with a lever P having a pin P′ engaging the fork end of an angular arm K^4 formed at the pivotal end of a ratchet pawl K^5 fulcrumed at K^6 on the lever J^3 and engaging the ratchet wheel L on the shaft G′ of the winding-up drum G. On the free end of the other lever J^4 is pivoted a ratchet pawl K^7 in mesh with the other side of the ratchet wheel L and the pivotal end of this ratchet pawl K^7 is provided with an angular arm K^8 connected by a spring O^3 with the free end of the lever P. By the arrangement described but a single cam I^2 and a single ratchet wheel L is required as the friction rollers J^7, J^8 engage the cam I^2 at diametrically opposite sides, and the said cam I^2 is provided with three arms so that alternate swinging motions are given to the levers J^3 and J^4 in the opposite directions, and the movement of the levers J^3, J^4 is transmitted by the pawls K^5 and K^7 alternately to the ratchet wheel L so that the winding-up drum G is continually rotated. As the windings of the tape or ribbon E increase on the winding-up roll G the levers J^3, and J^4 are swung gradually farther apart, and the throw thereof is decreased to reduce the speed of the winding-up drum G correspondingly.

In the modified form shown in Figs. 6 and 7, the cams I and I′ are the same as the ones shown in Figs. 1, 2 and 3 and engage friction rollers Q^2, Q^3 held on levers Q and Q′ fulcrumed at Q^4 on the casing A. The free ends of the levers Q and Q′ are pressed on by springs O^4, O^5 to hold the friction rollers Q^2 and Q^3 in peripheral engagement with the cams I, I′. The levers Q and Q′ are connected by links R and R′ with arms S, S′ mounted to rotate loosely on the shaft G′, and on the said arms S and S′ are pivoted spring-pressed pawls T, T′ and T^2, T^3, of which the pawls T, T′ engage the ratchet wheel L secured on the shaft G′ of the winding-up drum G, and the pawls T^2, T^3 engage the ratchet wheel L′ secured on the said shaft G′. When the shaft G is running a rocking motion is given to the levers Q and Q′ by the cams I and I′ so that the levers swing alternately in opposite directions, and in doing so rock the arms S, S′ alternately in opposite directions to cause the pawls T, T′ and T^2, T^3 to impart a continuous rotary motion to the ratchet wheels L, L′ and the drum G to wind up the tape or ribbon E. Two pawls T, T′ and T^2, T^3 are preferably used on each arm S, S′ for the corresponding ratchet wheel L or L′, one of the pawls being in full engagement with a tooth of the ratchet wheel while the other is half way between adjacent teeth, as shown in Fig. 6. By this arrangement the ratchet wheel L or L′ is turned on a comparatively short throw of the corresponding arm. It will be noticed that as the windings of the tape or ribbon E increase on the winding-up roll G the throw given to the arms S, S′ is gradually diminished and consequently the winding-up drum G is gradually rotated slower to properly wind up the tape or ribbon E.

From the foregoing it will be seen that in each of the forms shown the throw of the levers and the ratchet mechanisms is gradu-

ally diminished and this action is controlled by the gradually increasing number of windings on the winding-up drum G, which latter can not wind up more tape or ribbon than is fed by the feed wheel D.

The compensating driving mechanism shown and described is composed of comparatively few parts, not easily liable to get out of order.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. In a compensating driving mechanism, the combination of a tape-feeding means for feeding a tape, driving means for driving the said tape-feeding means at a predetermined rate of speed, a winding-up drum for winding up the tape, ratchet wheels on the said winding-up drum, ratchet pawls engaging the said ratchet wheels, spring-pressed mechanisms connected with the said ratchet pawls for alternately imparting a forward movement to the said ratchet pawls to turn the said ratchet wheels and the winding-up drum for the latter to wind up the tape, and cam devices moving in unison with the said tape-feeding means and connected with the said spring-pressed mechanisms for imparting return movement to the said pawls.

2. In a compensating driving mechanism, the combination of a tape-feeding means for feeding a tape, driving means for driving the said tape-feeding means at a uniform rate of speed, a winding-up drum for winding up the tape, a cam device moving in unison with the said tape-feeding means, a pair of levers adapted to be swung alternately outward by the said cam device, ratchet pawls fulcrumed on the said levers, ratchet wheels on the said winding-up drum, and springs pressing the said ratchet pawls to alternately impart a forward movement to the said pawls, to turn the ratchet wheels forwardly whereby the drum is turned and the tape is wound up, the said springs alternately imparting a return movement to the said levers.

3. In a compensating driving mechanism, the combination of a tape-feeding means for feeding a tape, driving means for driving the said tape-feeding means at a predetermined rate of speed, a winding-up drum for winding up the tape, ratchet and pawl mechanisms connected with the said winding-up drum, a pair of levers connected with the said ratchet and pawl mechanisms, springs for alternately imparting a forward movement to the said pawl and lever mechanisms to rotate the winding-up drum for the latter to wind up the tape and to impart a return movement to the said levers, and cam devices moving in unison with the said tape-feeding means and connected with the said levers for alternately imparting an outward movement to the levers to alternately return the pawl and ratchet mechanisms.

4. In a compensating driving mechanism, the combination of a clock-driven shaft, a tape-feeding wheel on the said shaft for feeding a tape at a uniform rate of speed, a winding-up drum on which winds up the said tape, a cam device on the said shaft, levers in engagement with the said cam device to alternately swing the levers outward, ratchet pawls fulcrumed on the said levers and each provided with a series of teeth, ratchet wheels on the winding-up drum and engaged by the said teeth of the ratchet pawls, and springs for alternately imparting a forward movement to the said pawls to turn the ratchet wheels and the winding-up drum and to alternately impart a return movement to the said levers.

5. In a compensating driving mechanism, the combination of a clock-driven shaft, a tape-feeding wheel on the said shaft for feeding a tape at a uniform rate of speed, a winding-up drum on which winds up the said tape, a cam device on the said shaft, a pair of levers in engagement with and alternately swing outward the said cam device, ratchet pawls each having a series of teeth and an angular arm, ratchet wheels on the said winding-up drum and engaged by the said ratchet teeth, and springs connected with the angular arms of the said ratchet pawls for imparting a forward movement to the said ratchet pawls to turn the ratchet wheels and the winding-up drum to wind up the tape and to alternately impart a return movement to the said levers.

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

WILLIAM FLOYD KENDALL.

Witnesses:
E. S. GUEARY,
EDWIN SMITH.