B. HURD.

INK WRITING TELEGRAPH REGISTER.

APPLICATION FILED DEC. 16, 1907.

1,000,601.

Patented Aug. 15, 1911.

3 SHEETS—SHEET 1.

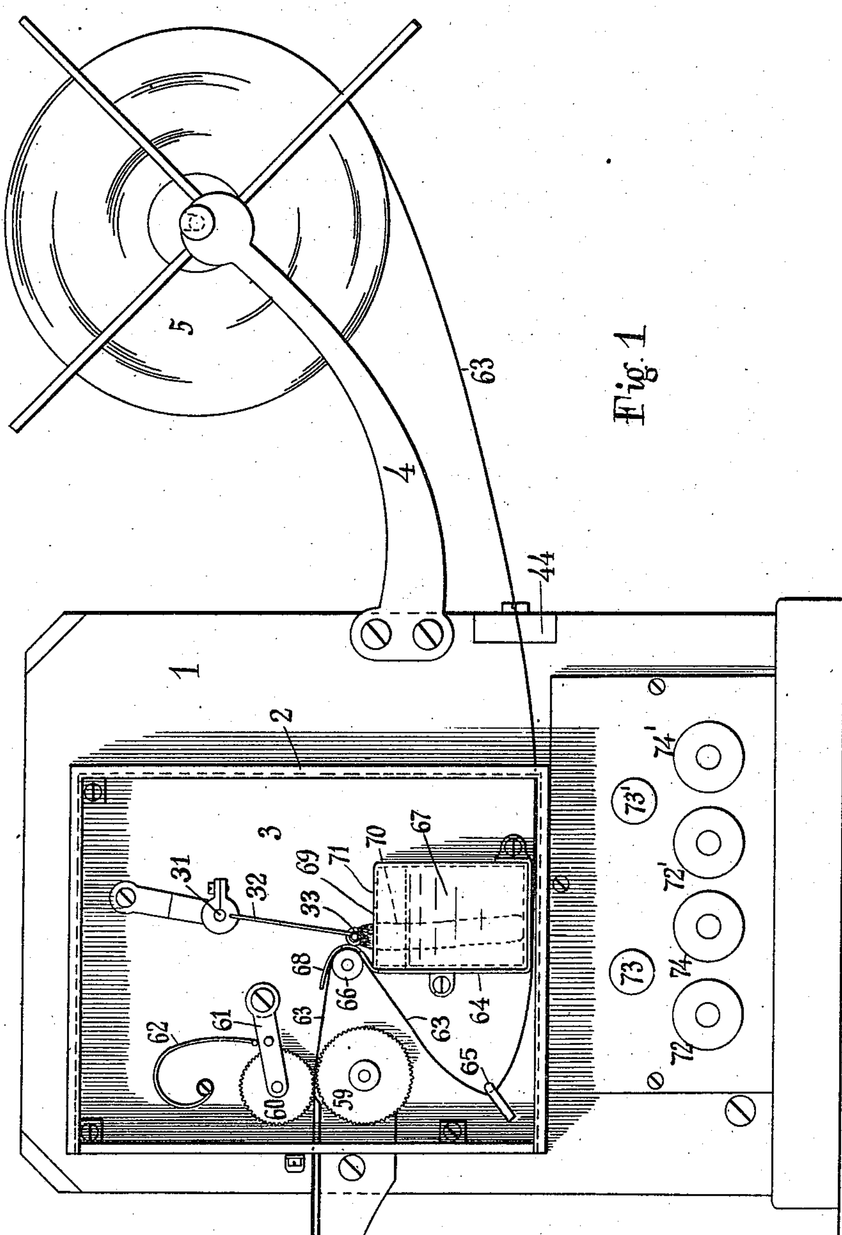

Fig. 1

Witnesses

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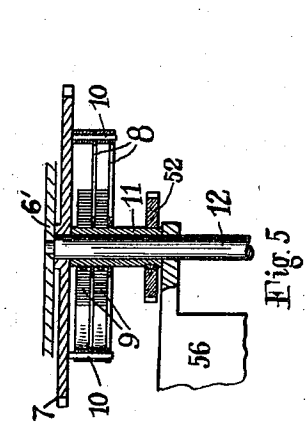

Fig. 5

Fig. 2

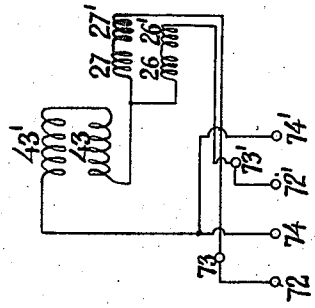

Fig. 6

Witnesses

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3 SHEETS—SHEET 3.

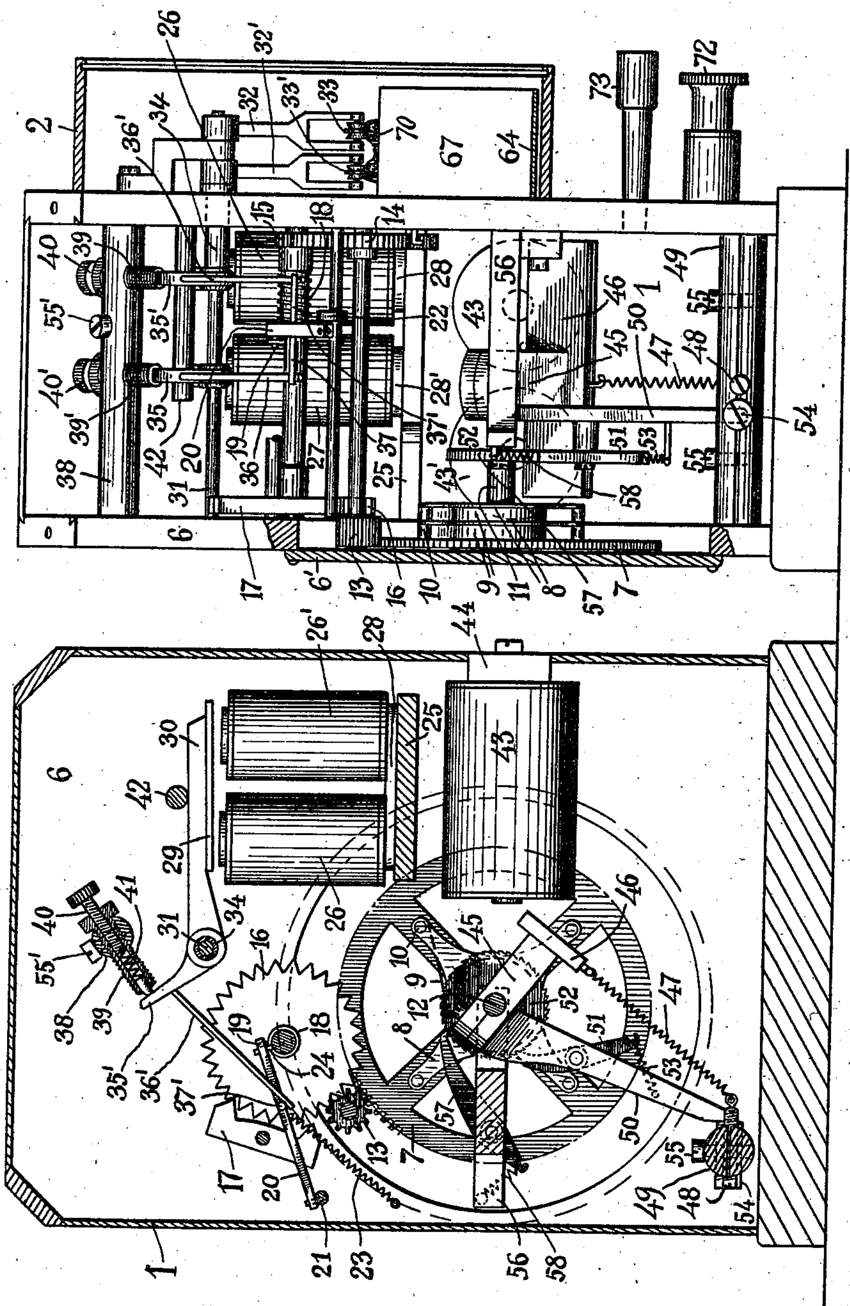

Fig. 4

Fig. 3

Witnesses
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UNITED STATES PATENT OFFICE.

BENJAMIN HURD, OF NUTLEY, NEW JERSEY.

INK-WRITING TELEGRAPH-REGISTER.

1,000,601. Specification of Letters Patent. Patented Aug. 15, 1911.

Application filed December 16, 1907. Serial No. 406,601.

To all whom it may concern:

Be it known that I, BENJAMIN HURD, a citizen of the United States, residing at Nutley, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Ink-Writing Telegraph-Registers, of which the following is a full, clear, and exact specification.

My invention relates to telegraph instruments, particularly the type using the Morse code and adapted for recording impulses transmitted.

Among the various special features of my invention may be mentioned particularly the great compactness of the instrument secured by the novel arrangement and relation of parts, and the inclosure and protection of all parts, including particularly all means of adjustment, so as to avoid any improper changes in adjustments by inexperienced and unauthorized persons. For example, in telegraph offices when this type of instrument is used, it is desirable that it be left for considerable periods in the absence of the person in charge of the office, but a great source of trouble consequently arises due to change of exposed adjustments during these periods by unauthorized or unskilled persons. However, if all adjustable parts be inclosed, the protection will be sufficient to avoid trouble from this source.

Another important feature of my invention relates to the inking mechanism whereby the necessity of constant attention by a skilled operator is avoided, the construction and mode of operation being such as to secure an accurate record in clear and distinct lines or dots and without requiring any renewal of the ink supply except at very long intervals. Moreover, with my improved instrument, the construction is such that no particular skill or expertness is required in renewing the ink supply, as has been necessary heretofore. I also secure the advantage of a self-winding mechanism, thus overcoming the necessity of attention by the operator to the instrument in this respect.

The fulfilment of other objects and advantages secured by my invention will be understood by those skilled in the art from the following description and accompanying drawings.

Figure 1 is a front elevation of an instrument embodying my invention; Fig. 2 is a plan view with the upper part of the casing removed; Fig. 3 is a cross section on the line 3—3 of Fig. 2; Fig. 4 is an end elevation with parts of the casing removed; Fig. 5 is a detail view; and Fig. 6 is a diagram showing the electrical connections.

The instrument is inclosed in a main casing 1, and upon the face thereof is a similar casing 2 inclosing parts of the feeding and inking mechanism, the face of which casing is closed by a glass plate 3. From the main casing extends an arm 4 for supporting the paper reel 5.

In a circular opening formed in the back plate 6 of the casing and closed by a cover 6′ is located a main gear 7 which supports from its arms suitable disks 8 for inclosing and separating coiled springs 9. I prefer to use duplicate main springs on account of the more uniform pressure and action obtained. The outer ends of the springs 9 are secured to one of the pins 10 fixed to the gear 7 and which also serve to support the disks 8. The inner ends of the springs 9 are fixed to a sleeve 11, which is movable about the main supporting shaft 12. The gear 7 drives a pinion 13, which in turn drives through its shaft a gear 14 fixed to the same shaft. The latter gear drives a pinion 15 fixed to a parallel shaft upon which is also fixed a ratchet wheel 16. The wheel 16 is engaged by an oscillating escapement or regulator 17, which limits the speed of the feeding mechanism. Upon the shaft driven by pinion 15 is formed a spiral groove by means of a wire 18. The inner end of this wire extends a slight distance in a radial direction from the shaft and forms a stop for the feeding mechanism when engaging the cross pin 19 carried by a lever 20, one end of which is supported on a shaft 21 and retained in any desired position thereon by the adjustable collar 22. A spring 23 is secured at one end to the lever 20 and extends downwardly therefrom and to one side thereof, being secured at its lower end to the front portion of the casing. The lever 20 at its inner end carries a downwardly extending pin 24 which engages the spiral groove formed by the wire 18. Thus when the lever 20 is raised and its pin disengaged from its groove, the spring 23 will snap the lever toward the front of the casing and draw the pin downwardly into engagement with the groove at a point nearer the front of the casing. The pin 19 being thrown out of engagement from the stop engaged thereby, will release the feeding mechanism and as

the shaft revolves, the pin 24 will be caused to travel in the spiral groove until the end of the lever 20 is carried to such position that the pin 19 will check the operation by engaging the projection from the shaft. The lever 20 will be raised or tripped by each dot or dash impulse sent over the line, and in the present case is arranged for operation by either of two different circuits.

At the right of the mechanism thus far described, and fixed to a support 25 extending between the two sides of the casing, are located two pair of electro-magnets 26, 26′, 27, 27′. The cores of these magnets extend vertically and the cores of magnets 26, 26′ are connected at their base by a strip of soft iron 28, and the cores of magnets 27, 27′ are similarly connected by another iron strip 28′. The movable armatures 29, 29′ of the two pair of magnets are respectively carried by extensions 30, 30′ and are adapted to be separately or simultaneously operated. The extension 30′ is fixed to a shaft 31, which latter extends through the front part of the casing and has fixed thereto at its front end a yieldable strip 32 carrying an ink wheel 33 at its lower end. The extension 30 is fixed to a sleeve 34 mounted to turn freely on shaft 31. The sleeve 34 extends through the front portion of the casing and carries a yieldable strip 32′ at its front end, which in turn carries a second ink wheel 33′ at its lower end. Thus when the armature 29′ is drawn downwardly by the excitation of magnets 27, 27′, the shaft 31 will be turned slightly and cause the ink wheel 33 to be pressed against the tape; similarly when armature 29 is drawn downwardly by the excitation of magnets 26, 26′, the sleeve 34 will be turned slightly and cause the ink wheel 33′ to be pressed against the tape; at one side of the record made by the wheel 33. The extension 30′ which, as before stated, is fixed to shaft 31, carries an upwardly extending part 35, which in turn carries a rod or pin 36, the outer end of which extends below a cross pin 37 carried by the lever 20. The extension 30 carries a part 35′ similar to the part 35 and also carries a rod 36′, the lower end of which extends under the cross pin 37′ attached to the lever 20. Thus when either armature 29′ or 29 is attracted, the lever 20 will be raised or tripped by reason of engagement of the parts just described. The cross bar 38 carries the adjusting means and stops for each of the parts 35, 35′. The extension 35′ is limited and controlled by a hollow screw 39 which has a screw-thread engagement with the bar 38 and extending toward the part 35′ as shown. This screw serves as a stop for the movement of the armature 29 and prevents actual contact with the cores of its magnets and so avoids the possibility of the armature being held by residual magnetism. A second screw 40 has a threaded engagement with the hollow screw 39, as shown, and the position of this screw controls the tension of a spring 41 located in the lower end of the screw 39 and pressing against the outer end of the extension 35′. It will thus be seen that by turning screw 39 the limiting position of armature 29′ is controlled and by turning screw 40 the pressure against the extension 35′ is controlled and consequently the force tending to raise armature 29 from its magnets against the cross bar or stop 42. The part 35 is similarly controlled and limited by similar parts 39′, 40′ and 41.

The winding mechanism comprises a pair of magnets 43, 43′ located below the two pair of magnets already referred to. The coils of the magnets 43, 43′ are connected at their outer ends by a soft iron piece 44 which extends beyond the magnet cores and forms a support for the magnets by connection at the ends of the iron part 44 to the casing, as indicated in Fig. 1. Fixed to the shaft 12 already referred to as carrying the main gear 7, is a clamping member 45 carrying at its outer end an armature 46 for the magnets 43, 43′. The armature 46 normally rests below the face of the magnets and when the latter are excited, the armature 46 will be attracted upwardly, giving corresponding rotation to the shaft 12. The armature 46 is connected by a spring 47 to the end of an adjustable screw 48 passing through a cross bar 49 and the armature is therefore normally held in its lower position. Fixed to the part 45 is an extension 50 which carries a pivoted pawl 51, one end of which engages a ratchet wheel 52 fixed to the sleeve 11 already referred to as having the inner ends of the springs 9 connected thereto. The opposite end of the pawl is engaged by a spring 53 connected to the extension 50 and tending to hold the pawl 51 in engagement with its ratchet wheel 52. The movement of the part 45 and extension 50 in one direction caused by the spring 47 is limited by an adjustable screw 54, which engages the lower end of the extension 50 and is adjustable in the cross bar 49, as desired. The cross bar 49 is split longitudinally and the two parts are held together by screws 55 which also serve to clamp the adjustable screws 48 and 54 firmly in any desired position of adjustment. The cross bar 38 is similarly split longitudinally, the screw 55′ serving to hold the two parts together to clamp the screws 39, 39′ in any desired position of adjustment. A supporting part 56 fixed to the front portion of the casing and engaging the shaft 12 at one end carries a pawl 57 which is pivoted to the support 56. The pawl 57 engages the ratchet wheel 52 and is constantly held in engagement therewith by the spring 58 connected to one end of the pawl and to an

extension from the support 56. The pawl 57 serves as a stop for the ratchet wheel. It will be seen that when the magnets 43, 43′ are excited, the armature 46 will be attracted against the pressure of the spring 47 and rotate the extension 50 to some extent. The pawl 51 will therefore be drawn backwardly passing over a certain number of teeth on the ratchet wheel 52, and when the magnets are deënergized and the armature 46 released, the spring 47 will cause the extension 50 and pawl 51 to be drawn to their normal positions and cause the ratchet wheel 52 to be rotated corresponding with the number of teeth previously passed over by the pawl 51. The ratchet wheel 52 by its rotation will increase the tension of the springs 9 and the wheel will be held in its new position by the pawl 57. Thus every excitation of the magnets 43, 43′ will cause an attraction of the armature 46 and resultant rotation of the ratchet wheel 52 a certain amount and therefore wind the springs 9 a certain amount. This action is repeated each time the operator's key closes the circuit, thus tending to always maintain the springs 9 under considerable tension.

The feeding and inking mechanism will now be more particularly described. The shaft driven by the pinion 13 extends through the front portion of the main casing, and in addition to carrying the gear 14 also carries and drives the knurled wheel 59 fixed to the shaft in front of the main portion of the casing. Above this wheel is located another knurled wheel 60 carried by an arm 61 pivotally mounted upon a stud extending from the casing. A spring 62 fixed at one end to the casing and engaging the pivoted arm 61 at the other, serves to press the wheel 60 against the tape 63, which passes between the wheels 59 and 60. The wheel 59 serves as the driving means for the tape and the wheel 60 by its pressure serves to cause the feeding of the tape through the instrument. From the reel 5 the tape 63 passes through an opening in the auxiliary casing 2, under a sheet metal support 64 fixed to the casing, then engages a hook 65, and thence passes over an idler 66, from which it passes over the feed wheel 59. The support 64 serves to carry or fix in position the ink well 67 and also carries an extension 68 which embraces the roller 66 and serves as a guide for the tape. The ink supply device comprises the well 67 having a perforated cover 69 which supports a comparatively large, flat feeding wick 70 of felt or other suitable material, and an opening 71 is provided in the cover which serves as a convenient means for introducing ink to the well whenever required. The wick 70 is shown in Fig. 4 as having two extensions which are each engaged respectively by one of the ink wheels 33, 33′. The extension 68 which embraces the tape and the roller 66 is provided with two openings, one opposite each of the ink wheels 33, 33′. Thus when either of the ink wheels is shifted in position by the mechanism already described, each will be forced through an opening in the shield 68 and make pressure against the tape and roller 66. At the same time the ink wheel is maintained in contact with the ink feeding wick 70, the movement of the tape causing the ink wheel or wheels to revolve, thus keeping the periphery of each wheel well coated. Also, by reason of the tape being carried by the roller 66 at the point or points where the ink wheels are applied thereto, the tape is rigidly supported, which, together with the action of the ink wheels results in a clear and well-defined record of the impulses sent over the line being obtained. Also, by reason of the capillary attraction of the ink in the well 67 through the wick 70, the ink wheels will always be well supplied. I prefer to provide the upper portion of the wick 70 with two extending portions, one in engagement with each of the ink wheels, as shown in Fig. 4. It will be seen that the ink well is readily removable from its support for the purpose of refilling when necessary or for adjustment of the wick.

It will be understood from the above that the instrument is adapted to give two different records independently of each other or simultaneously when either one or both of the line circuits are closed and opened by the operator. The electrical connections are indicated in Fig. 6. Current from one line is adapted to pass to terminal 72 through a cut-out plug 73, thence through the coils 27, 27′ of one pair of electro-magnets, and then through the coils 43, 43′ of the self-winding mechanism to terminal 74, and then to the line. It will be noted that the terminals and cut-out plugs are conveniently located on the face of the instrument below the inking device. Current from another line circuit is adapted to pass from terminal 72′ through cut-out plug 73′, thence through the coils 26, 26′ of the other pair of electro-magnets, and then through the coils 43, 43′ to the terminal 74′, and then to the line. It will thus be seen that when either of the line circuits is closed, the electro-magnets 43, 43′ will be excited in each case and cause the winding mechanism to be operated, as above described.

The operation will doubtless be understood from the above, but it may be stated in general that the closing of the circuit through the electro-magnets 27, 27′ causes the armature 29′ to be attracted, which results in the tripping and snapping back of the lever 20, which releases the feeding mechanism as above described and causes the

tape to be fed through the instrument. At the same time, as long as the magnets 27, 27′ are energized, the ink wheel 33′ will be pressed against the tape causing a dot or dash to be recorded thereon, depending upon the length of time the circuit is closed. At the same time this circuit is closed, the circuit of the electro-magnets 43, 43′ is closed causing the winding mechanism to be actuated. The feeding mechanism will continue to operate until the lever 20 has been returned to its original position, but of course each excitation of the magnets will cause the lever 20 to be snapped back to a new position by the action of spring 23 causing a continual feed of the tape while the message is being transmitted or recorded. Similarly, the closing of the circuit of the electro-magnets 26, 26′ will cause the attraction of armature 29 and the actuation of the feeding mechanism, the shifting of ink wheel 33′ against the tape, and the actuation of the winding mechanism, and the same action occurs when both pair of electro-magnets are operated simultaneously.

It will be seen that by my improved inking mechanism and relation of its parts, that the continual attention of the operator is avoided, and that a well-defined record is obtained.

It will also be evident that the structure and relation of the parts of the instrument are such as to secure compactness, reliability in operation, and that the parts are well protected.

It will also be seen that the winding mechanism relieves the operator from any attention in this regard.

Although I have described specifically one embodiment of my invention, it will be understood that various modifications in construction may be made without departing from the scope thereof.

Having thus described my invention, I declare that what I claim as new and desire to secure by Letters Patent, is:—

1. In a telegraph writing register, the combination of a tape feeding mechanism, a plurality of inking elements, and means whereby each of said inking elements is independently actuated and said feeding mechanism is wound up upon the actuation of one or more of said inking elements.

2. In a telegraph writing register, the combination of an electro-magnetic tape feeding mechanism, a plurality of inking elements, and electrical means whereby each of said inking elements is independently actuated and said feeding mechanism is wound up upon the actuation of one or more of said inking elements.

3. In an ink writing telegraph register, the combination of a tape feeding mechanism, an inking element, an ink well, a wick for carrying ink from said well to said element, and means for shifting said element against the tape upon closure of the circuit.

4. In a telegraph writing register, the combination of an electro-magnetic tape feeding mechanism, and a plurality of inking elements, electro-magnetic means for independently actuating said inking elements, said electro-magnetic actuating means being electrically connected in parallel to each other and said electro-magnetic feeding mechanism being electrically connected in series with each of said electro-magnetic actuating means.

5. In an ink writing telegraph register, the combination of a tape feeding mechanism, an inking element normally out of contact with the tape, an ink well, a wick for carrying ink from said well to said inking element, and means for shifting said inking element from its normal position against the tape upon the closure of the circuit.

6. In an ink writing telegraph register, a plurality of electro-magnets provided with individual armatures, distinct concentric pivotal mounting means for said armatures, and an inking element carried by each of said pivotal means.

7. In an ink writing telegraph register, a plurality of electro-magnets provided with individual armatures, distinct concentric pivotal mounting means for said armatures, an inking element carried by each of said pivotal means, and a wick for continuously supplying ink to said inking elements.

8. In an ink writing telegraph register, a tape feeding mechanism, a plurality of inking elements, an electro-magnetic device for shifting each of said elements respectively against said tape, and an ink well and wick for continuously supplying ink to said elements.

9. In an ink writing telegraph register, an adjustable tape feeding mechanism comprising an actuating spring, an adjustable electro-magnetic device for winding said spring, an adjustable electro-magnetic actuating and stopping device located above said mechanism and first-named device, an inclosing casing, and inking means controlled by said actuating device and mounted upon the face of said casing.

10. In an ink writing telegraph register, the combination of means for feeding a tape, adjustable mechanism for driving said tape feeding means, inking means, an adjustable mechanism controlling the operation of said inking mechanism, and a casing inclosing said adjustable mechanism, said tape feeding means and said inking means being exterior of said casing.

11. In an ink writing telegraph register, the combination of a tape feeding mechanism, an inking element, an electro-magnet, a movable element for shifting said inking

element against the tape upon closure of the circuit of said electro-magnet, said movable element being actuated by said electro-magnet, means for controlling the movement of said movable element comprising an adjustable stop, yieldable means carried by said stop, and means for adjusting said yieldable means independently of the adjustment of said stop.

12. In an ink writing telegraph register, the combination of a gear wheel, a spring for actuating said wheel, electro-magnetic means for producing tension in said spring, a shaft, a pinion on said shaft driven by said wheel, a feed wheel fixed to said shaft for feeding the tape through the instrument, a gear fixed to said shaft, a second shaft, a gear on said second shaft driven by said first named gear, a ratchet wheel fixed to said second shaft, an escapement device engaging said ratchet wheel, a stop on said second shaft, and electro-magnetic means for releasing said stop, said electro-magnetic means including a plurality of electrically independent electro-magnets.

13. In an ink writing telegraph register, the combination of a gear wheel, a spring for actuating said wheel, a shaft, a pinion on said shaft driven by said wheel, a feed wheel fixed to the said shaft for feeding the tape through the instrument, a gear fixed to said shaft, a second shaft, a gear on said second shaft driven by said first named gear, a ratchet wheel fixed to said second shaft, an escapement device engaging said ratchet wheel, a stop on said second shaft, a plurality of electrically independent electro-magnets, and a single means operated by said electro-magnets for releasing said stop.

14. In an ink writing telegraph register, a feeding mechanism comprising an actuating spring, a gear wheel driven by said spring, a shaft supporting said gear wheel, a sleeve on said shaft to which one end of said spring is connected, an armature connected to said shaft, a magnet for actuating said armature, means controlled by the movement of said armature for rotating said sleeve and winding said spring, an arm fixed to said armature, an adjustable stop for said arm, resilient means for actuating said armature in one direction, and means for adjusting said resilient means independently of said stop.

15. In an ink writing telegraph register, a plurality of electrically and magnetically independent electro-magnets, inking mechanisms operated independently by said electro-magnets, a common tape feeding mechanism for said inking mechanisms, a stop for said tape feeding mechanism, and common means controlled by said electro-magnets for releasing said stop.

In testimony whereof I affix my signature, in presence of two witnesses.

BENJAMIN HURD.

Witnesses:
L. K. SAGER,
GEO. A. HOFFMAN.