

No. 835,750.

J. GELL.

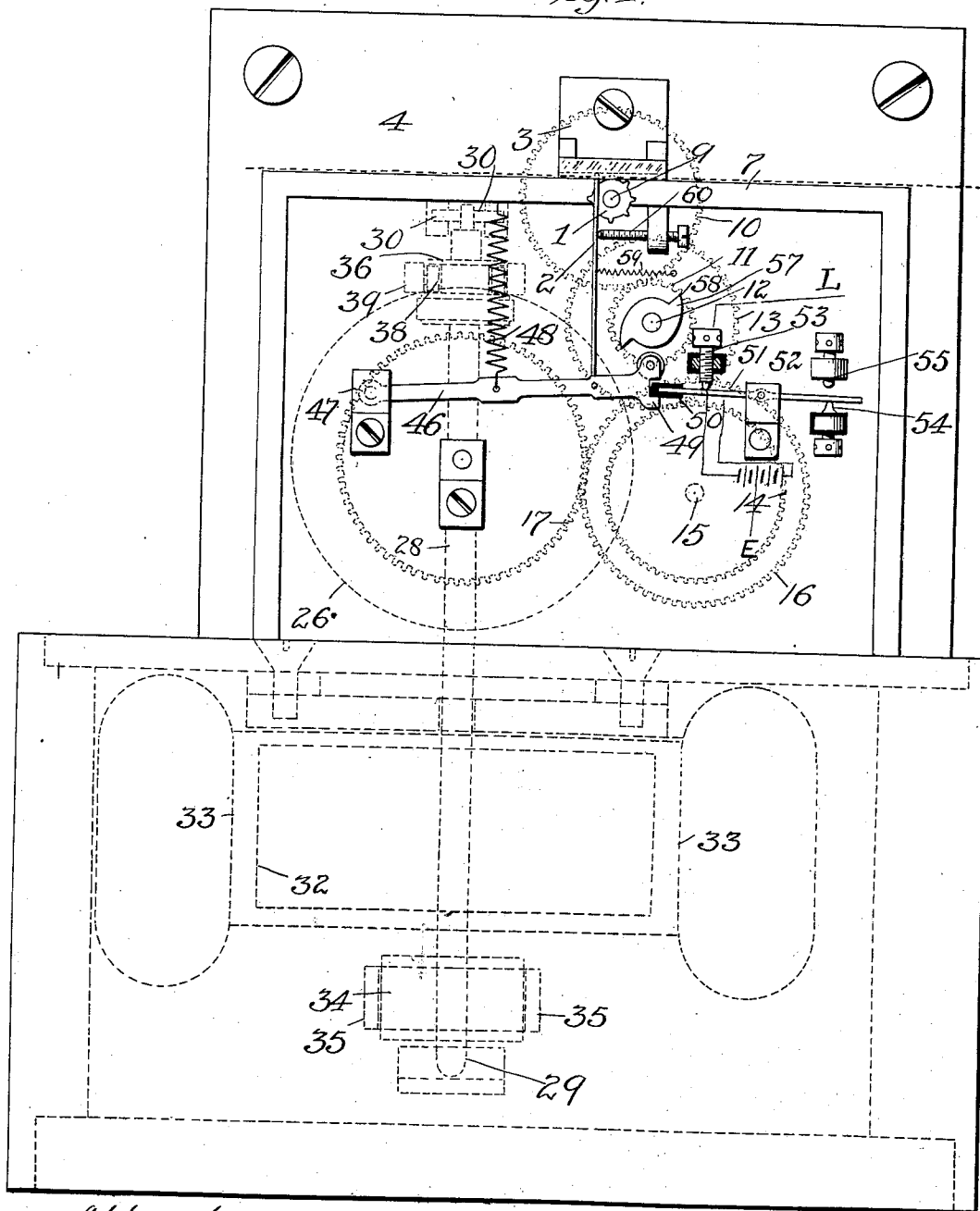
PATENTED NOV. 13, 1906.

AUTOMATIC TRANSMITTER FOR TELEGRAPHIC SYSTEMS.

APPLICATION FILED NOV. 28, 1904. RENEWED OCT. 19, 1906.

3 SHEETS—SHEET 1.

Fig. 1.



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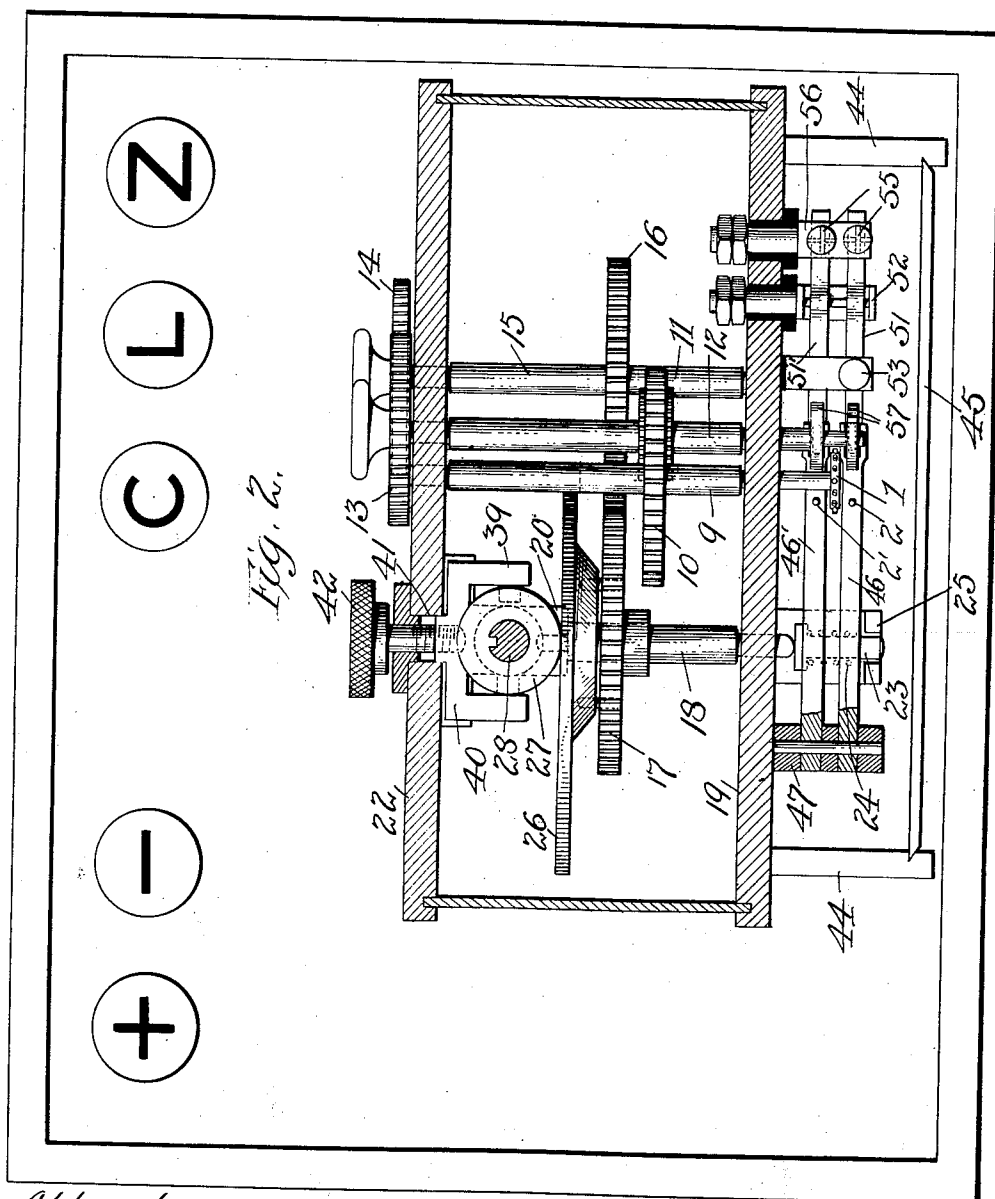
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3 SHEETS—SHEET 2.



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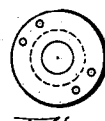
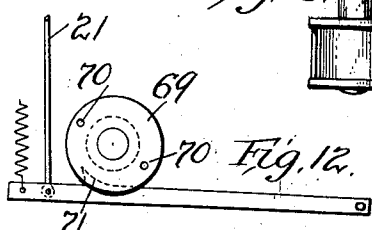
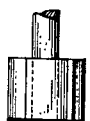
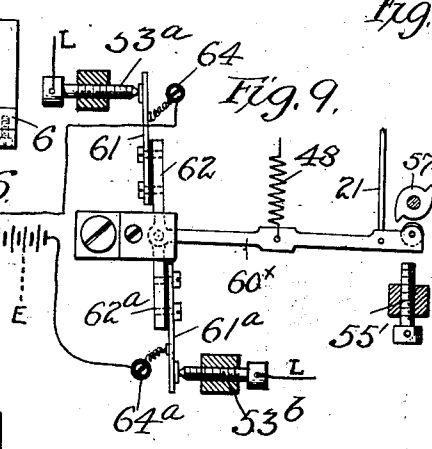
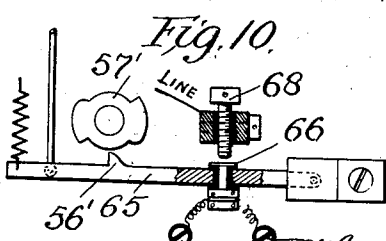
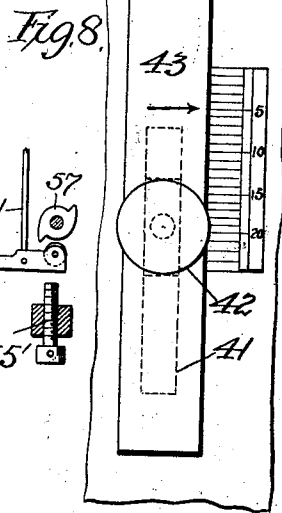
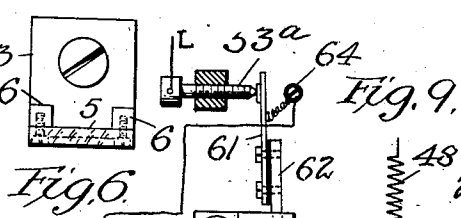
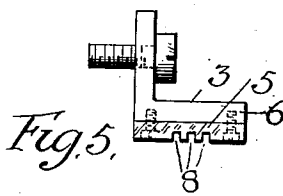
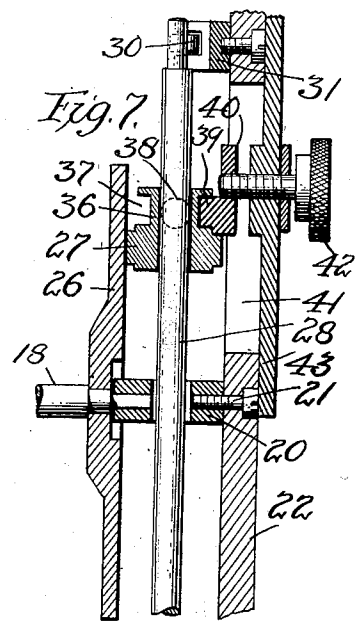
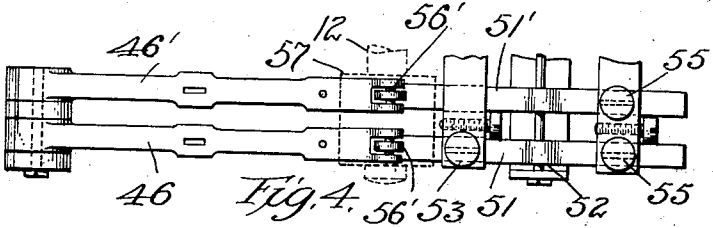
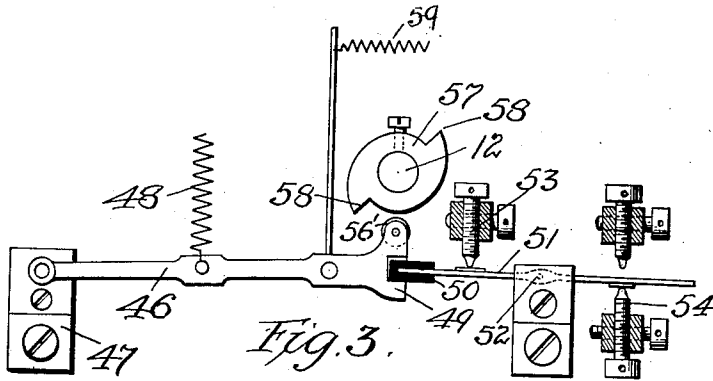
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3 SHEETS—SHEET 3.



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AUTOMATIC TRANSMITTER FOR TELEGRAPHIC SYSTEMS.

No. 835,750.

Specification of Letters Patent.

Patented Nov. 13, 1906.

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To all whom it may concern:

Be it known that I, JOHN GELL, a subject of the King of England, residing at Highgate, London, England, have invented certain new and useful Improvements in Automatic Transmitters for Telegraphic Systems, of which the following is a specification.

My invention is an improvement in transmitters for automatic telegraph systems and the like; and my invention consists in the features and combination and arrangement of parts hereinafter described, and particularly pointed out in the claims.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of the invention, a part of the casing being omitted for convenience of illustration. Fig. 2 is a plan view with parts in section and parts removed and omitted. Fig. 3 is a detail side view of the lever action and electrical contacts. Fig. 4 is a plan view of parts shown in Fig. 3. Fig. 5 is an end view of the check-shoe or guide. Fig. 6 is a side view of said guide. Fig. 7 is a sectional view, with parts in side elevation, of the differential speed-gearing. Fig. 8 is a front view of the registering scale of the differential speed-gearing with the parts associated therewith. Fig. 9 is a side elevation of a modified form of lever action with the electric contacts controlled thereby. Fig. 10 is a further modification of the lever arrangement in which a segmental wheel controls the impulses. Fig. 11 is a plan view of the said segmental wheel. Fig. 12 is a side view of another modified arrangement of lever action in which a lantern-wheel is employed. Fig. 13 is a detail view of a modified lantern-wheel action. Fig. 14 is a side view of the modified form of lantern-wheel.

The invention is designed to control the electrical impulses in automatic telegraphy, and it operates in connection with a previously-perforated tape, so that as the tape passes over transmitting-pins the perforations therein will be presented to the transmitting-pins, which by rising through the perforations will allow certain electrical contacts to be made, whereas when imperforate portions of the tape are presented to the transmitting-pins the same will be prevented from rising and the contacts will not be made.

The perforated tape, as is usual in such instruments, has a central row of feed-holes, and on each side of this there is a row of

marking-holes which are irregularly placed according to the different arrangements of holes making up the different characters.

In the drawings, 1 indicates the star feed-wheel, which engages the central row of perforations for feeding the tape, (indicated at 4 in dotted lines, Fig. 1,) and 2 2' represent the positively-operating pins, which are moved vertically and control the making of the electrical contacts.

The star feed-wheel and the transmitting-pins operate in connection with a guide or check shoe 3, consisting of a right-angular piece screwed to the frame 4 and having a transparent foot or check portion 5 secured to the horizontal portions 6 of the check-shoe by screws, as shown in Figs. 5 and 6. The tape passes over the table portion 7 of the frame and under the check shoe or foot, and the under surface of this shoe is provided with three grooves 8, arranged parallel with each other, the middle groove being for the star feed-wheel and the outer grooves for the transmitting-pins.

The star feed-wheel is fixed to a shaft 9, journaled in the sides of the frame, as shown in Fig. 2, the said shaft being driven through a gear-wheel 10 thereon, meshing with a pinion 11 on the shaft 12. This shaft in turn is driven through a gear 13, meshing with a gear 14 on a shaft 15, which also is journaled in the sides of the frame. The shaft 15 also carries a gear-wheel 16, meshing with a gear-wheel 17 on a shaft 18, which latter is journaled at one end in the front side 19 of the frame, and at its rear end the said shaft is journaled in a block 20, screwed, as at 21, to the rear side 22 of the frame. This shaft 18 is spring-pressed longitudinally, for which purpose a pin 23 is employed, the head of which bears upon the end of the shaft 18, and a spring 24, surrounding the said pin 23 and located between its head and the up-turned part of a bracket 25, serves to exert a yielding force to the said shaft 18 to press it longitudinally. The shaft 18 has fixed thereto a friction drive-disk 26, adapted to be borne upon by a friction drive-roller 27, carried by an upright shaft 28. This shaft is supported at its lower end in a step-bearing 29, while its upper end finds a bearing against antifriction-rollers 30, arranged on each side of the same and journaled in a block 31, screwed to the rear side 22 of the frame. The upper end of the shaft 28 is reduced to

bear on the said rollers. The vertical shaft 28 at its lower end has connected thereto the motor, which I have shown as consisting of an armature 32, secured to the shaft and rotating between fields 33. The shaft also carries the commutator 34, brushes for which are indicated at 35. This electric motor may be of any known construction, and I have therefore shown it in a diagrammatic manner without going into details. The friction drive-roller 27 has a splined connection with the vertical shaft 28 and is adapted to be adjusted vertically in order to impart more or less speed to the friction drive-disk 26, and consequently to the train of gearing which imparts motion to the star feed-wheel and the tape, and for the purpose of securing a differential drive the friction drive-roller is provided with an extension or hub 36, having an annular groove 37, receiving anti-friction-rollers 38, carried on the inner sides of the arms 39 by a bracket or fork 40, which has a portion entering slightly a vertical slot 41 in the rear wall 22 of the frame, wherein it is held adjustably by means of a clamp-screw 42. This clamp-screw passes through a washer or slide 43, fitting against the rear side of the casing and covering the slot 41 in all positions to which the said washer may be adjusted.

In order to change the speed of rotation of the star-wheel, it is simply necessary to adjust the friction drive-roller 27 up or down along the shaft 28, thus bringing it further from or nearer to the center of rotation of the friction drive-disk 26. In this adjustment the bracket 40 slides in the slot 41, as does also the washer 43, which, as shown in Fig. 2, has a portion entering the said slot, and when the desired position of the drive-roller is attained it may be held in said position by simply turning the thumb-nut 42 to clamp the parts in place. The vertical shaft 28 passes through an opening in the bracket 26. The spring-pin 23 by pressing on the shaft 18 secures proper contact between the drive-roller and the friction drive-disk and provides for taking up any wear which may occur.

As will be seen from Fig. 2, the star feed-wheel is arranged upon an extension of the shaft 9 beyond the side 19 of the main box or frame, and this extension is inclosed in a supplemental casing or box composed of the sides 44 and the front 45. The transmitting-pins 22' also extend down into this supplemental casing and are connected at their lower ends pivotally to levers 46 46', which are arranged side by side and are pivoted to a bracket 47, secured to the wall of the casing. These levers are normally pressed upwardly by springs 48, and they are provided with forked free ends 49, adapted to engage the insulating-blocks 50 of levers 51 51', which are pivoted intermediate of their length at

52 to a suitable bracket supported on and insulated from the side wall 19, as indicated in Fig. 2. These levers carry contact-points adapted to engage contact screws or points 53 54, the contact 53 being insulated and coacting with the lever 51, while the contact 54, which is also insulated, coacts with the lever 51'. The two contact-levers 51 51' are arrested by stop-screws 55, extending through a bracket 56, supported on the side of the frame. These contact-levers and contacts control the electrical impulses when they are brought into engagement under the control of the transmitting-pins, as will now be described.

Each of the main levers 46 46' is provided with a jockey-roller 56' 56', adapted to be engaged by a cam 57, having abrupt shoulders 58, the said cam being fixed to the shaft 12. As this shaft rotates and the tape is fed by the star feed-wheel the cam 57 will engage the jockey-rollers and depress the levers 46 46', thus drawing down the transmitting-pins and holding them down until the abrupt shoulders arrive at the jockey-rollers, when the levers 46 46' will rise suddenly under the pull of the spring 48, and if at this time there is a perforation in the tape opposite the end of the transmitting-pin the said pin will rise therethrough, and the movement thus allowed to the main lever 46 or 46', as the case may be, will cause the said lever to operate the contact-lever 51 or 51' and make the same engage with the appropriate electrical contact, thus giving the electrical impulse; but if there is no perforation in the tape over the transmitting-pin when it rises the said pin in its upward movement will be arrested, and this will prevent the lever 46 or 46' from operating its corresponding contact, and no electrical impulse will result. The transmitting-pins are drawn normally toward the right by springs 59, and screws 60 are adapted to arrest the swinging movement of the transmitting-pins toward the right, these screws serving as adjustable stop means.

The top plate or table 7 is slotted for a short distance, so that the transmitting-pins 22' may be carried a little to the left when either of them enters a hole in the tape and until on the depression of the main lever by the cam 57 the pin is drawn down and is then drawn to the right against the stop-screw 60 by the spring 59.

The ratio between the pinion 11 and the spur-wheel 10 depends upon the number of points or teeth in the star feed-wheel 1 and the number of shoulders in the cam 57.

From the above it will be seen that the movement of the star feed-wheel and the vertical reciprocations of the transmitting-pins are derived through the same train of connections, and the movement of the tape is such that the perforations therein will register with the transmitting-pins exactly at the

moment the upward movement of the pin takes place, and the electrical impulses are sent forward by the movement of the circuit-closing lever or levers 51 51', according to the number and position of the marking-holes in the tape.

In transmitters for cable working and the like it is usual to arrange the cam 57 so that both levers 46 and 46' will be depressed at the same time; but for the Morse system and the like it is sometimes desired that the electrical impulses should be sent forward alternately, and for this purpose a divided cam or one specially formed is employed, Fig. 2, the shoulders on such cam being so placed as to give the alternate action. The cams may also be so formed that the duration of the marking-signals are definite and determined, and cams of various shapes may be used to suit different conditions and requirements, for which purpose the cams may be quickly removed and replaced by another adapted to give a different effect. This exchangeability is rendered possible in my present embodiment of the invention because the shaft 12 projects outside of the main inclosure and beyond its bearing in the wall 19, leaving a free end upon which the cam may be readily secured or from which it may be readily removed.

Reverting again to the driving mechanism, it will be observed that in changing or adjusting the differential speed-gear the washer 43 acts as a covering for the slot 41 and also as a vernier-slide, bearing for this purpose an index-finger or pointer thereon, as shown in Fig. 8, which, acting with a scale on the frame, indicates the speed at which the tape is being fed.

Referring to the modification of the lever and circuit-closing arrangement of Fig. 9, 60^x represents one of the levers, whose function, generally speaking, is similar to that of the lever 46 above described. It is depressed periodically by a cam 57, elevated by a spring 48, and has pivotally attached thereto the transmitting-pin 21. This lever, however, carries its contact directly, said contact 61 consisting of a plate insulated from and secured to the arm 62 of the lever 60^x, which arm extends at right angles to the main portion of the lever. This contact engages the contact-screw 53^a in closing the circuit.

There is a companion lever to that shown at 60 arranged alongside the same, but not necessary to illustrate, as the general arrangement and relation is the same as that shown in Fig. 4 in respect to the levers 46 46'. The contact-arm for the companion lever is, however, shown at 62^a carrying an insulated contact-plate 61^a. The current is conveyed to the contact-plates 61 61^a from the insulated pillars 64 64^a, which are connected to the line-terminal. The contact-screws 53^a 53^b, the latter belonging to the contact-plate 62^a,

are connected, respectively, to the copper and zinc terminals of a split battery. At 55' a stop-screw is shown for the lever 60^x.

Referring to another modification of a lever action (shown in Fig. 10) the main lever 65 is operated by a segmental wheel 57' instead of by a cam, said wheel acting on a tooth 56' on the lever. A stud 66, supported on and insulated from the lever, is connected electrically with the insulated pillar 67. 68 is a suitably-insulated contact-screw. This arrangement of lever-contacts and pillar is duplicated. The two levers are arranged side by side, as in the form above described, both levers, however, being operated from the same segmental wheel. The insulated pillar belonging to the lever which is a companion to the lever 65 is shown at 67^a, and this is connected with the contact-stud of the second lever. In connecting these parts into the circuit the pillars 67 67^a are connected, respectively, to the copper and zinc terminals of a split battery, while the contact-point 68 is connected to the line.

Fig. 12 shows a further modification of the lever action, in which a lantern-wheel 69 is employed. The number of pins and their position on the lantern-wheels determine the number of impulses it is possible to sent per revolution. In the form shown I have shown two pins 70 on the lantern-wheel, giving a two-contact action per revolution with a duration of the electrical impulses equal approximately to a quarter-revolution and a dwell or rest of a similar duration. In order to obtain this relation as to duration between the electrical impulse and the period of rest, the parts could be adapted and arranged so that the contact will begin when one of the pins of the lantern-wheel is to the right and in a line with the center of the shaft and the release to take place when the pin reached its lowest point. If this were done, the transmitting-pins 2 would be given too great a range of action, (unless the parts were made too small for accuracy and length of wear,) and I have therefore designed and employ the tooth 71. The radius of the bearing edge of this tooth on each of the levers is similar to the arc which the pins describe during the revolution of the lantern-wheel. As a result of this arrangement each of the pins 70 breaks the electrical contact at a point in the revolution of the lantern-wheel which is midway between the horizontal plane of the center of the shaft and the lowest point of movement of the pin, so that when the pin passes the lowest point of its revolution the levers do not yet commence to rise, and, in fact, they are held down until the pin has passed up the curved bearing edge and off from the point of the tooth, when the levers rise under the action of their springs and the circuit is closed for sending the electrical impulse.

The tooth 71 may be dispensed with and a

plain lever may be employed in place of a toothed lever. In this form of apparatus I employ the lantern-wheel shown in Fig. 14, in which two pins are used on each side of the wheel adjacent each other and adapted to act in common on the lever, so that a longer action of the lantern-wheel on the lever results than would be the case with a single pin on each side. The foremost pin of each pair breaks the contact, and when the key would otherwise rise, owing to the movement of the first pin, past the vertical center line or the lowest point of revolution the second pin of the pair comes into effective play and holds the lever depressed until in the revolution of the lantern-wheel the said second pin passes the vertical center line and begins to rise, when the lever, under the action of its spring, begins to rise also to close the electric circuit and send forward impulse.

Any number of pins may be employed in carrying out this part of the invention, and the lantern-wheels are provided with a series of holes, so that the pins can be inserted therein, as may be desired to obtain any modified action in respect to the duration of the contact and the interval of rest.

If desired, rollers may be used in the lantern-wheels in place of pins, the pins in these cases becoming the pivots of the rollers.

Various parts of the mechanism described above as illustrating the principle of my invention may be changed without departure from the fundamental features of my invention.

The check foot or shoe, having a transparent portion, as described, renders visible the action of the star feed-wheel and the transmitting-pins.

It will be understood, of course, that the cam, the segmental wheel, or the lantern-wheel may be used with any one of the arrangements of levers above described. The check or guide shoe may be in the form of a roller, if desired.

The action of the segmental wheel (shown in Fig. 10) differs from the cam in that it gives a definite and uniform length of contact and of dwell or rest. In other words, the contact is sharply broken, maintained for a uniform period, and sharply restored.

By my invention this instrument may be used for cable transmission or for the Morse double current, working by changing the form of the cam, segment-wheel, or lantern-wheel, thus avoiding the use of two distinct machines, which have heretofore been necessary.

I claim—

1. In combination, in an automatic telegraphic transmitter, a star feed-wheel, pins to enter the marking-holes in the tape, a train of gearing for driving the star feed-wheel, a lever for each of the transmitting-pins, a rotary element for depressing the two levers and allowing them to rise to pass through the

holes in the tape, and contacts controlled by the said levers for sending the electrical impulses, the said rotary element being removable and exchangeable with other rotary elements to vary the relative actions of the pins to suit the conditions of cable, Morse or other systems, substantially as described.

2. In combination, the star feed-wheel, the transmitting-pins, a pair of levers for the transmitting-pins, an exchangeable cam or like device for operating the levers, contacts controlled by the levers and a shaft upon which the cam is carried, said shaft having a free end extending beyond its bearings upon which the said cam is removably held to be exchangeable for varying the relative action of the pins, substantially as described.

3. In combination, the star feed-wheel, transmitting-pins, a pair of levers for the said pins, contacts controlled by the said levers and a rotary element to operate the lever, said lever and rotary element having a contact-surface between them which is concentric to the center of rotation of the rotary element whereby the levers will be held depressed for a definite and determined period, substantially as described.

4. In combination, the star feed-wheel, transmitting-pins, a pair of levers for the said pins, contacts controlled by the said levers and a rotary element to operate the lever, said lever and rotary element having a contact-surface between them which is concentric to the center of rotation of the rotary element whereby the levers will be held depressed for a definite and determined period, said rotary element consisting of a segmental wheel, substantially as described.

5. In combination in an instrument of the class described, a star feed-wheel, transmitting-pins to pass through openings in the tape as moved by said star feed-wheel and differential drive means for both the star feed-wheel and the transmitting-pin including a motor, a shaft, a friction-roller adjustable along the said shaft and a friction-disk driven by the said roller differentially according to its adjustment with connections from said friction-disk to both the star feed-wheel and the transmitting-pins.

6. In combination, in an instrument of the class described, a slotted casing a star feed-wheel, transmitting-pins, a motor, a friction driving-disk with connections from the same to the star-wheel and transmitting-pins, a friction drive-roller and means for adjusting the same along the motor-shaft comprising a slide or washer adapted to close the slot in the wall of the casing and serving as a vernier-slide to indicate the speed, and means for clamping the said slide in place in relation to a scale, substantially as described.

7. In combination in an instrument of the class described, a star feed-wheel, transmitting-pins, means for operating the same, and

a guide or check shoe formed of transparent material.

8. In an instrument of the class described, a star feed-wheel and a guide or check shoe having a groove for the feed-wheel to work in, said shoe being formed of transparent material, substantially as described.

9. In an instrument of the class described, a star feed-wheel and a guide or check shoe consisting of a grooved plate of transparent material and a supporting-bracket having arms holding the said plate with the main portion thereof exposed between the arms.

10. In combination in an automatic telegraphic transmitter, a star feed-wheel, pins to enter the marking-holes in the tape, a pair of levers for the transmitting-pins, means for adjusting the lateral movement of the pins or their movement in the longitudinal direction of the tape and interchangeable cam means for giving the pins different reciprocating movements in respect to each other, substantially as described.

11. In combination in an automatic telegraphic transmitter, a star feed-wheel, pins to enter the marking-holes in the tape, a pair of levers for the transmitting-pins, and cam means for the levers controlling the said levers definitely in two positions of contact off and contact on and of definite duration, substantially as described.

12. In combination in an automatic telegraphic transmitter, a star feed-wheel, pins to enter the marking-holes in the tape, a pair of levers for the transmitting-pins, and cam means for the levers controlling the said levers definitely in two positions of contact off and contact on and of definite duration, said cam means including a high part concentric with the axis and also a low part concentric with the axis, substantially as described.

13. In a system of the character described, the star feed-wheel, the two pins and interchangeable cam means for operating the pins comprising a cam element having its shoulders adapted to operate the pins simultaneously and a second cam element having its shoulders relatively arranged to operate the pins alternately, substantially as described.

14. In combination in an instrument of the class described, a star feed-wheel, a transmitting-pin, a lever connected thereto for operating the same, and means for operating the lever consisting of a lantern-wheel having adjustable pins.

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

JOHN GELL.

Witnesses:

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FRANCIS F. MCARDLE.