No. 886,755. PATENTED MAY 5, 1908.

B. F. BELLOWS & A. BEHNER.

TELEGRAPH INSTRUMENT.

APPLICATION FILED SEPT. 27, 1904.

2 SHEETS—SHEET 1.

Fig. 1.

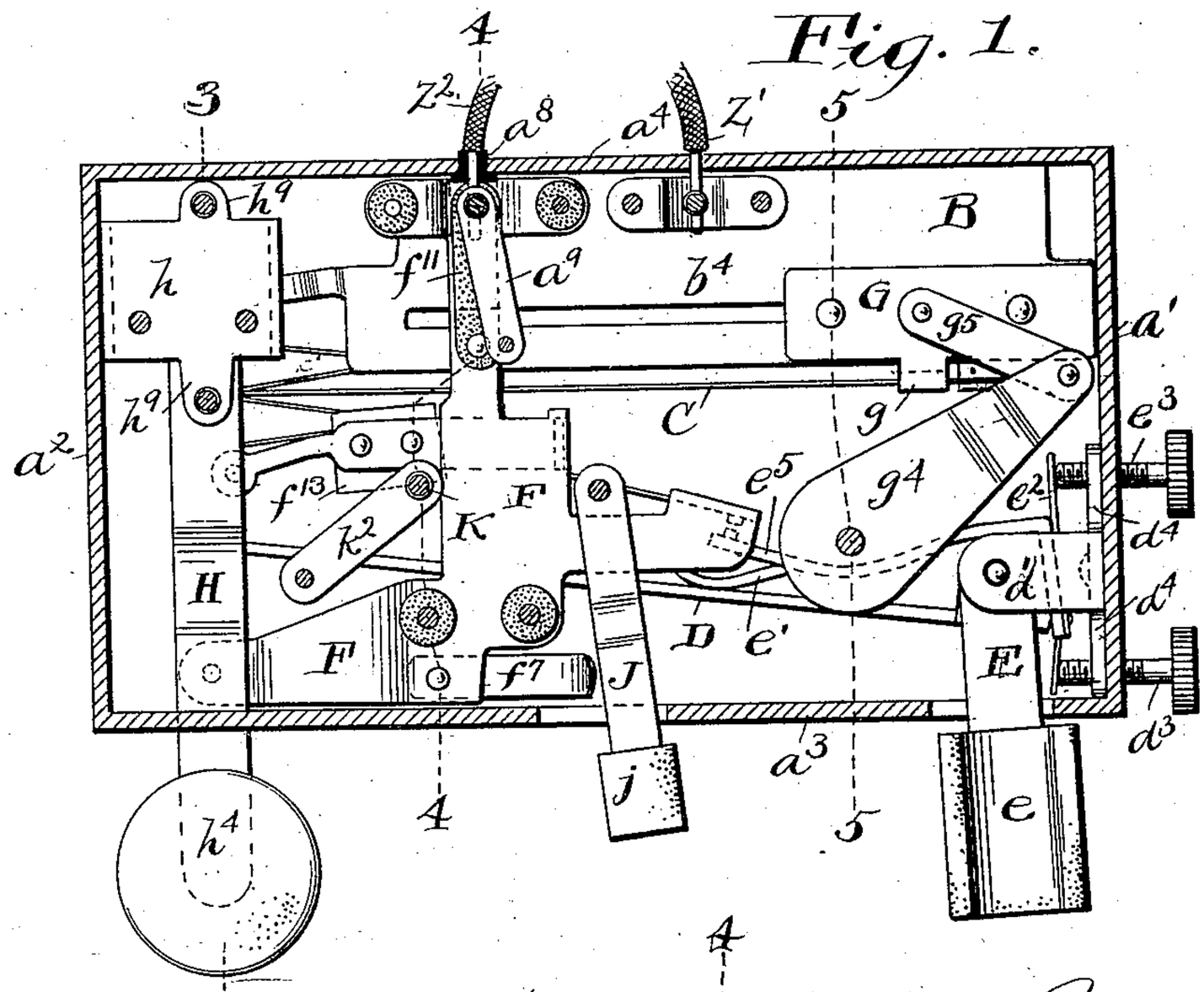
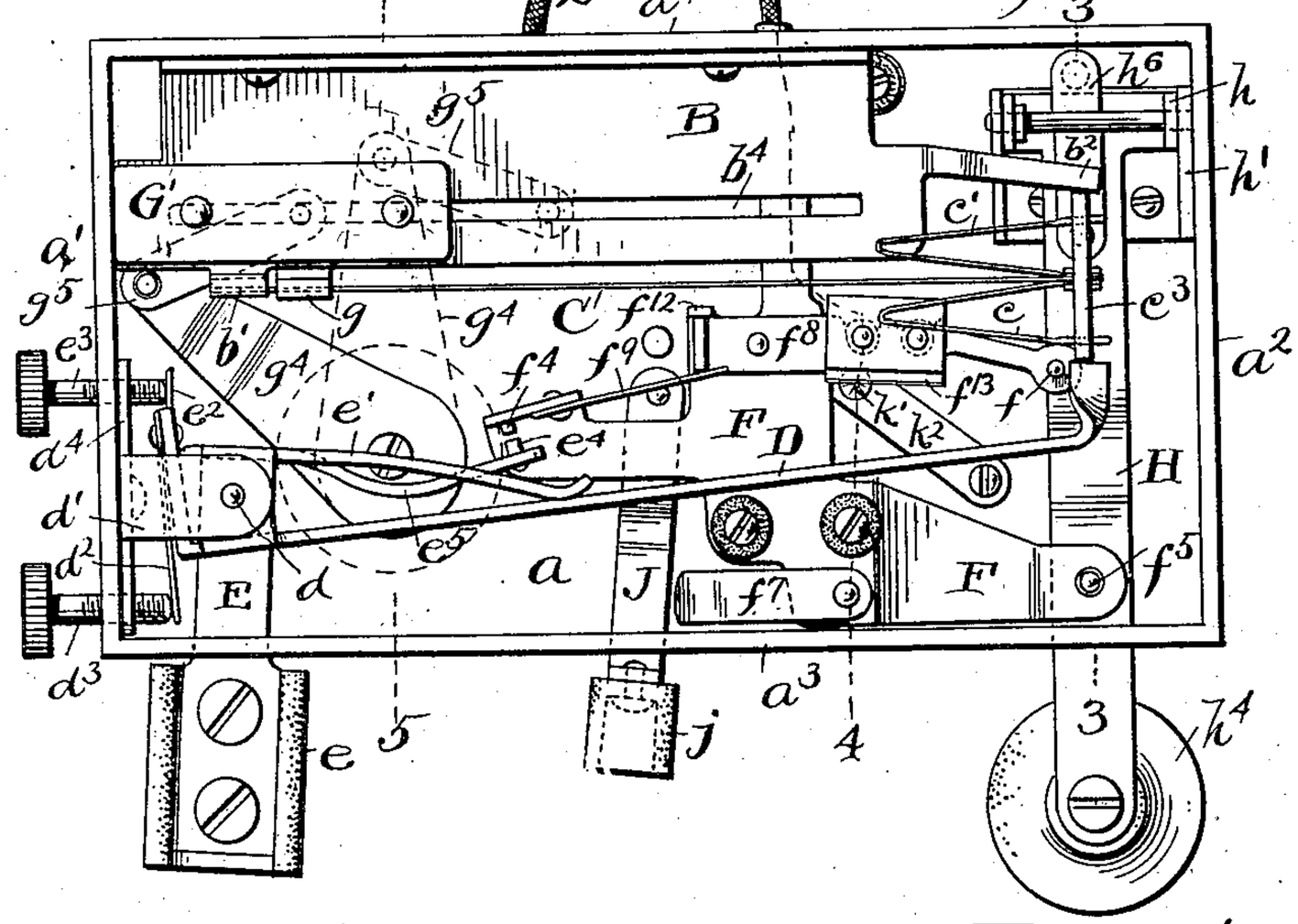



Fig. 2.




Witnesses.
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2 SHEETS—SHEET 2.

Fig. 3.

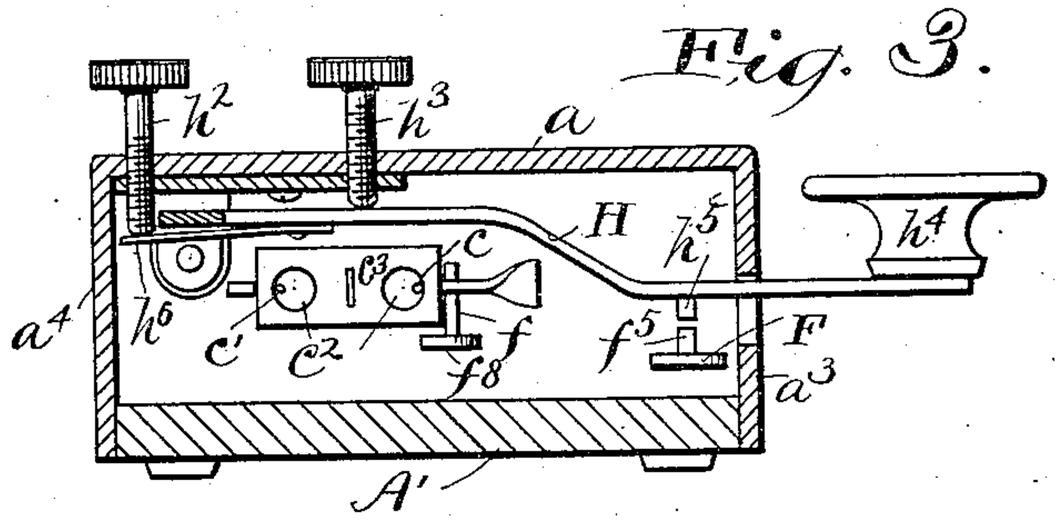
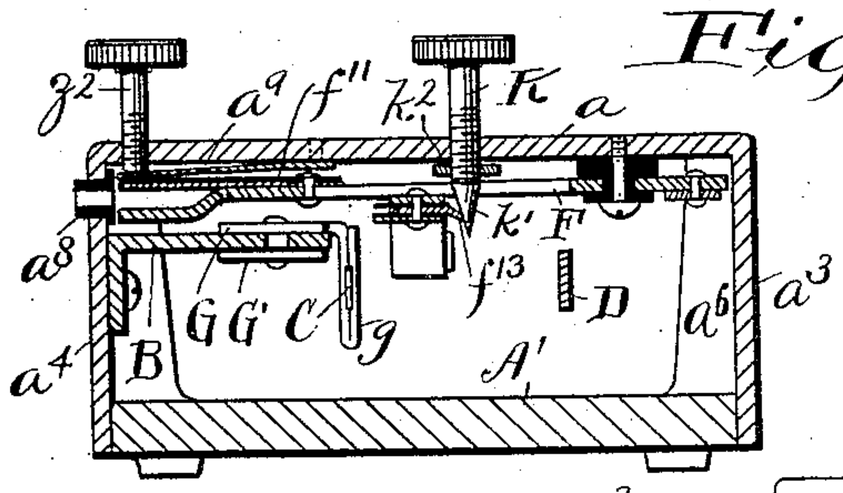



Fig. 4.



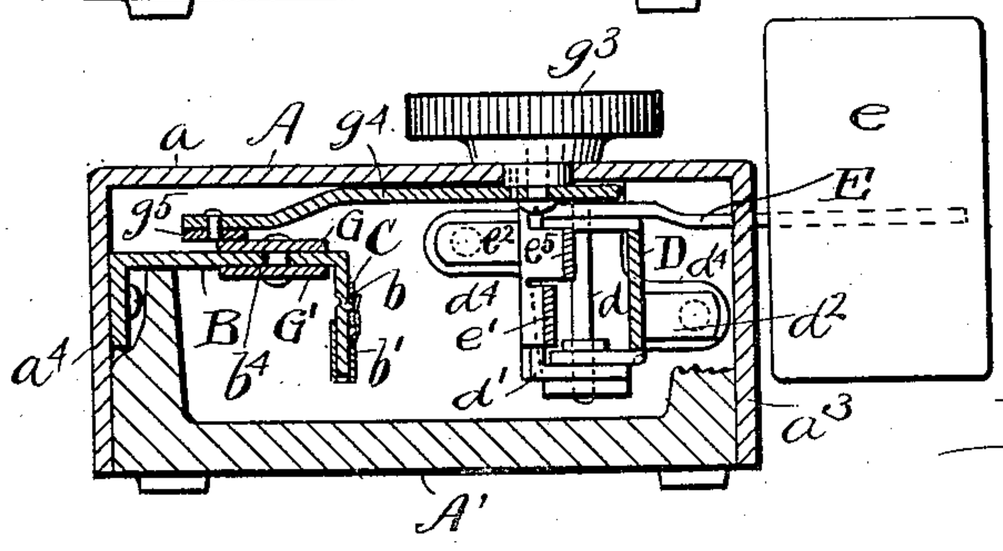
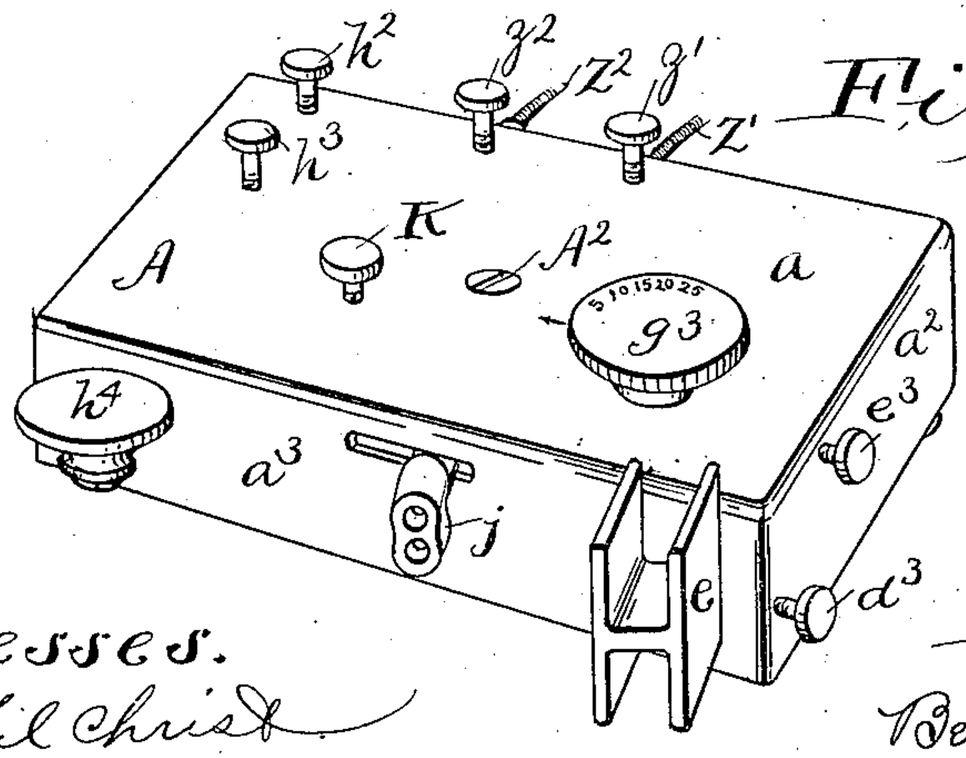




Fig. 5.

Fig. 6.

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# UNITED STATES PATENT OFFICE.

BENJAMIN F. BELLOWS AND AMBROSE BEHNER, OF CLEVELAND, OHIO; SAID BEHNER ASSIGNOR TO SAID BELLOWS.

## TELEGRAPH INSTRUMENT.

No. 886,755. Specification of Letters Patent. Patented May 5 1908.

Application filed September 27, 1904. Serial No. 226,145.

*To all whom it may concern:*

Be it known that we, BENJAMIN F. BELLOWS and AMBROSE BEHNER, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Telegraph Instruments, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to a telegraph transmission device or key.

The ordinary Morse key requires a movement of the operator's hand for each dot or dash: as the Morse alphabet is made up largely of dots, the continuous movement of the operator's hand in making successive dots becomes very tiresome. To obviate this, a system has been devised which allows one movement to the operator's hand to make the dashes and a different movement to release automatic mechanism which makes continuous dots until stopped by the operator.

The present invention provides a very efficient self-contained transmission instrument, which comprises, in addition to the ordinary Morse key, a key which by one movement will make dashes, and by another movement will release automatic mechanism to make dots until the return of the key to normal position cuts off the dots.

With this apparatus there is no more work in making a succession of dots than there is in making a single dash.

Our invention comprises an efficient mechanical apparatus without the employment of magnets or batteries for effecting the above result.

The invention may be most conveniently summarized as consisting in the combinations of parts hereinafter described and definitely set out in the claims.

In the drawings, Figure 1 is a sectional plan of our invention, the top plate being removed. Fig. 2 is a bottom plan of the same. Figs. 3, 4 and 5 are cross sections substantially on the correspondingly numbered lines of Fig. 1, all looking toward the right of that figure. Fig. 6 is a perspective view of our device.

Referring to the parts by letters, A represents the frame of the apparatus, comprising a top plate $a$ and four edge plates, $a'$, $a^2$, $a^3$, $a^4$, thus presenting the form of a rectangular inverted box.

A′ is the base fitting within the walls of the box, shown as having upwardly extending standards $a^5$ on which the top rests.

As we have arranged the instrument, the parts are all carried by the box-like frame, wherefore the simple removal of the screw $A^2$ which secures the instrument to the table allows the separation of the box and the base, and provides for inspecting the interior of the instrument.

Secured to the rear side $a^4$ of the frame is a forwardly projecting horizontal plate B, which has, near one of its ends, a downturned lip $b$. Secured to this lip by a suitable clip $b'$ is a long thin flat spring C. This spring extends on edge horizontally nearly the length of the instrument, and it is the device, which, when released, automatically makes the dots by vibrating back and forth under its own elasticity, as hereinafter explained.

Carried at the free end of the spring C are a pair of V-shaped springs $c$ and $c'$, each having one leg clamped to the end of the spring C, and the other end freely projecting through openings $c^2$ in a block $c^3$ carried by the end of spring C. The end $b^2$ of the plate B projects in the rear of the block $c^3$ and forms a stop for it. This block is normally held in its position by the arms D which bears against the forward end of the block. This arm is pivoted at $d$ to ears $d'$, carried by the frame end $a'$. This arm carries a spring $d^2$ against which a set screw $d^3$ bears, the spring giving the arm a tendency to bear against the end of the block $c^3$.

Pivoted on the same stud $d$, which carries the arm D, is an arm E which has at its outer end the finger piece $e$. The inner end of this arm E is rigidly secured to an arm $e'$ which bears against the arm D, being pressed towards the same by a set screw $e^3$ which acts against a spring $e^2$ carried by the arm $d'$. If the finger piece $e$ be moved to the right in Fig. 1 the arm $e'$ presses forward the arm D releasing the block $c^3$, wherefore the spring C is free to vibrate.

One electric terminal $Z'$ is connected with the frame of the instrument by the binding post $z'$; the other terminal $Z^2$ is connected by the binding post $z^2$ to a plate F, which is carried by, but insulated from, the top plate $a$ of the frame. This plate F adjustably carries a pin $f$, which extends in front of the V-shaped spring $c$. This V-shaped spring con-

stituting one terminal of the line and the pin $f$ the other terminal, it follows that if they are allowed to contact the circuit will be closed thereat. Now the spring C is under such tension that when the arm D releases the block $c^3$ the latter swings forward until the spring $c$ contacts with the pin $f$ and closes the circuit. The momentum of this forward swing bends the spring $c$ on itself and its reaction assists the spring C in swinging backward. Thus when released the spring C will make a number of vibrations back and forth, making and breaking the circuit at the pin $f$. The number of contacts, which the spring in its vibrations would make, if let free, is perhaps a dozen or more, the only requirement being that it be something in excess of six, as six dots are the most required in the Morse alphabet. The spring $c$ is made of very light material so that it may be easily bent. The spring $c'$ is supplied to balance the spring $c$, and also as an extra spring, to take the place of the spring $c$ should the latter become broken. In such emergency, the spring C, with the attachments at its free end, is simply taken out and turned over, bringing the spring $c'$ into the position formerly occupied by the spring $c$. The plate F carries also a contact point $f^4$, which is adapted to be engaged by a contact point $e^4$ on an arm $e^5$, rigidly carried by the arm E. These contacts $f^4$ and $e^4$ are normally separated; a movement of the key piece $e$ to the right to release the spring C simply separates these contacts further. A movement of the key piece to the left closes these contacts, and thus provides means for making the dashes. Thus, in sending, the operator grasps the key piece $e$ between the thumb and finger and moves it from its intermediate position to the left for each dash, and to the right to initiate the dots, holding it at the extreme right hand position until the proper number of dots have been made, when he allows it to come back to the intermediate position, cutting off the dots.

To regulate the rate of variations of the spring C, and hence the speed with which the dots will follow one another, we provide plates G, G′ slidably connected with the plate B by pins extending through a slot $b^4$ of the latter plate parallel with its front edge. This plate G has a downwardly extending lip $g$, which yokes snugly around the spring C. The left hand edge of this yoke $g$ thus defines the center of oscillation of spring C, and by shifting the yoke the effective length of the spring is varied. The shorter the effective spring the more rapidly it oscillates, wherefore the speed of the dots is increased by moving the yoke $g$ to the left and decreased by moving it to the right.

The shifting of the yoke $g$ is effected by turning a knob $g^3$ on the top plate $a$ which beneath that top plate carries an arm $g^4$ connected by a link $g^5$ with the plates G G′. Thus, if the knob be turned to bring the arm $g^4$ to the extreme right hand position, as shown in Fig. 1, the spring C will be of the greatest length and the vibration be the slowest, perhaps five times per second; while if the knob be turned to shift the plate G to the other extreme position the vibration would be most rapid, perhaps twenty-five per second. Suitable numbering on the knob may indicate this, as shown in Fig. 6.

It is frequently convenient to have with the automatic instrument the ordinary Morse key. This we provide by the key lever H, having, at its rear ears $h$, by which it is pivoted to a bracket $h'$, carried by the frame plate $a$. The contact point $h^5$ carried by this key lever forms one terminal of the circuit, and is adapted to make contact with a point $f^5$ carried by the plate F and forming the other terminal. The usual key knob $h^4$ is provided for operating this Morse key. The key has the usual upper stop in the form of a set screw $h^3$, while a set screw $h^2$ adjustably bears against the spring $h^6$ and serves to lift the key lever.

We provide a single circuit closer for the two keys, in the form of the arm J which is pivoted to the plate $a$ and forms one terminal of the circuit, and which is adapted to engage the spring lip $f^7$ carried by the plate F and forming the other terminal. A knob $j$ furnishes the means for shifting the arm J. When the arm is in contact with the lip $f^7$ the circuit is closed and both keys are idle. When it is moved out of contact (into the position shown in Figs. 1, 2 and 6) the circuit is opened at three various sets of contacts, namely, the spring $c$ and pin $f$, the points $f^4$ and $e^4$, and the points $h^5$ and $f^5$. The instrument is thus in condition to have the circuit closed at any of these places, by movement of the automatic key $e$ in one direction or the other or the Morse key as desired.

To adjust the time of contact, so that the instrument may send "light" or "heavy" as desired, we make pin $f$ adjustable in position. The less the distance between this pin and the spring $c$ the longer will that spring close the contact with the pin in the vibrations of the spring C and the "heavier" will be the sending; the greater the distance between the spring and pin, the "lighter" will be the sending. We provide for this adjustment by mounting this pin on a plate $f^8$, which is pivoted to the plate F, and is given a tendency to take its extreme position by a spring $f^9$ carried by that plate and bearing against a lug on the plate $f^8$. A suitable lug $f^{12}$ carried by the plate F forms a stop for this arm $f^8$. The arm $f^8$ has secured to it, but insulated from it, a plate $f^{13}$ with a bevel edge. With this edge is adapted to engage the bevel point $k'$ of a set screw K. The incline of this screw may thus force the free end of the arm

$f^8$ to the rear, causing the pin $f$ to approach the spring $c$, thus decreasing the amplitude of vibration.

It will be seen that all the parts constituting terminals of the main line $Z'$ are connected electrically with the frame of the instrument, while all the parts constituting terminals of the other line $Z^2$ are carried by and electrically connected with the plate F, which is insulated from the plate $a$.

We have devised a very simple form of jam nut for the various set screws, consisting of a spring plate secured adjacent to the frame member through which the set screw passes and having a threaded opening alining with the threaded opening through the frame member. Thus for the set screws $d^3$ and $e^3$ are provided projections $d^4$ of the bracket $d'$ which carries the automatic key. These projections have spring enough so that the screwing in of the set screws tends to bend them away from the frame plate, and, reacting, they bind the set screw. Similarly the bracket $h'$ which carries the Morse key is extended to form arms $h^9$, which serve to jam the set screws $h^2$ and $h^3$. The spring plate $k^2$ through which the screw K passes acts as a jam nut for the latter.

The binding screw $z^2$ screws into the frame plate $a$, but at its lower end it bears against a spring plate $a^9$ carried by the plate $a$ and this plate bears against an insulated surface $f'''$ surmounting a metallic piece secured to the upper side of the plate F. The plate F and the members it carries thus making a socket directly in front of the insulated bushing $a^8$ for reception of the terminal $z^2$.

The finger pieces of the two keys and the circuit closer are made of hard rubber or other insulating material, and they are all secured to their proper metallic levers by screws in such positions as to be out of the way of accidental contact by the operator's hand. The adjustment of the various springs, and amplitude of vibration of the key levers and the automatic spring, as well as the adjustment of the speed of the latter, are very easily made from outside of the apparatus, as clearly appears in Fig. 6.

We claim:

1. In a telegraph instrument, the combination of a vibrator comprising a long flat spring pivoted near one end and carrying one terminal of an electric circuit and vibrating comparatively slowly, a coöperating terminal, a finger piece, and lever mechanism operated thereby for holding the two terminals out of contact with the spring under constraint or releasing the same.

2. In a telegraph instrument, the combination of a spring secured at one end and adapted to vibrate at the other, a shorter spring doubled on itself carried by the main spring near its free end and forming one terminal of an electric circuit, and a coöperating terminal with which said double spring may contact.

3. In a telegraph instrument, the combination of a spring, secured at one end and adapted to vibrate at the other, a doubled shorter spring carried by the main spring near its free end and forming one terminal of an electric circuit, and a coöperating terminal with which the doubled spring may contact, means for adjusting the position of said coöperating terminal, and means for normally holding said doubled spring out of contact therewith.

4. In a telegraph instrument, the combination of a spring a contact, said spring and contact forming terminals of an electric circuit, a suitably guided member slidable parallel with said spring, a yoke carried by said member and engaging said spring and defining its center of oscillation, a knob, an arm movable thereby and a link connecting the arm and yoke, whereby the turning of the knob shifts the yoke.

5. In a telegraph instrument, the combination of a contact, a controller adapted to vibrate and make and break a circuit with said contact, additional contacts independent of said controller, and a finger key having a neutral position and capable of movement in either direction therefrom, means whereby movement in one direction causes the controller to vibrate, and means whereby movement in the other direction closes said additional contacts without moving said controller.

6. In a telegraph instrument, in combination, a contact, an arm supported to vibrate and make and break a circuit therewith, restraining means normally holding the arm in idle position, additional contacts independent of said vibrating arm, a finger key having a neutral position and capable of movement in either direction therefrom, means whereby such movement in one direction moves said restraining means to release the vibrating arm, and means whereby movement in the other direction closes said additional contacts without moving said restraining means.

7. In a telegraph instrument, in combination, a controller capable of making and breaking a circuit at a uniform rate, a restraining arm adapted to hold the same in idle position, an arm movable independently of said restraining arm and carrying a contact, a coöperating contact therefor, a finger key connected with said last mentioned arm, and mechanism operated by said finger key and adapted to engage said restraining arm to release the same, but independent thereof for movement of the key in the reverse direction.

8. In a telegraph instrument, the combination of mechanism for causing a succession of contacts, a key for controlling the same, a

second key for making individual contacts, and a plate insulatingly mounted and carrying contacts for the two keys, an additional contact carried by said insulated member, and means whereby a reverse movement of the key which releases the vibration may cause connection between the last mentioned contact and a coöperating member.

9. In a telegraph instrument, in combination, a frame, a vibrating spring arm carried thereby, a plate insulated from the frame and carrying two contacts, one capable of closing a circuit through the said spring arm, and the other additional thereto, mechanism for holding the spring arm and its contact out of engagement, a member adapted to engage the additional contact carried by said plate, and a key arranged by movement in one direction to release said spring arm, and by movement in the other to cause connection with said additional contact.

10. In a telegraph instrument, the combination of a frame, a spring arm carried thereby, a plate insulatingly supported by the frame, three contact points carried by said plate, an individual key lever adapted to engage one of said contact points, and an automatic key adapted by movement in one direction to close a contact with another of said contact points, and by movement in the opposite direction to release the spring arm to close a contact with the third of said contact points.

11. In a telegraph instrument, in combination a spring arm adapted to carry one terminal, a pivoted arm carrying the other terminal, a spring tending to move said pivoted arm in one direction, and a screw having a pointed end and adapted to bear against said arm and force it in the other direction.

12. In a telegraph instrument, the combination with a lever, a bracket having ears to which the lever is pivoted, a frame to which said bracket is secured, a spring extension of said bracket which lies along the frame, and a screw which is threaded through the frame and through said spring extension and coöperates with said lever.

13. In a telegraphic transmitter, the combination of a controller comprising a vibratory leaf spring, said spring carrying one terminal of an electric circuit, a coöperating terminal, a finger piece, lever mechanism operated thereby and adapted to hold the terminals out of contact against the action of the spring and to permit said spring to vibrate to bring the terminals into contact, and a pair of contacts additional to said controller, one of said contacts being operatively connected with the finger piece.

14. In a telegraphic transmitter, the combination of a controller comprising a leaf spring held at one end and adapted to vibrate at the other and carrying one terminal of an electric circuit, a contact for said terminal, a stop for said controller, retaining means for holding said controller against said stop, a finger piece, and mechanism operated thereby for releasing said controller from the control of said retaining means.

15. In a telegraphic transmitter, the combination of a controller comprising a leaf spring held at one end and capable of vibrating at the other and carrying a spring terminal adjacent the vibrating end thereof, a contact for said spring terminal, a retaining spring normally holding said controller against operation, finger mechanism, means operated thereby and capable of releasing said controller from the effective retaining action of the said retaining spring, and a pair of contacts additional to said controller one of said contacts being operatively connected with the finger mechanism.

16. In a telegraphic transmitter, the combination of a controller capable of making and breaking a circuit at a uniform rate, a contact therefor, a finger key lever, a pivoted arm interposed between said lever and said controller, a spring engaging said arm and normally rendering the controller inactive, said lever being capable of a movement in two directions, by one of which it moves said arm against the resistance of the spring and renders the controller active and by the other of which it engages said contact.

17. In a telegraphic transmitter, the combination of a controller capable of making and breaking a circuit at a uniform rate, of a pivoted member adapted by its movement to permit the operation of said controller, means for normally preventing such movement of said member, a finger key lever, and a contact for said lever, said lever being capable of movement in two directions from its normal position, one of which movements actuates said pivoted member to permit the operation of said controller and the other of which movements brings said lever into engagement with its contact.

18. In a telegraphic transmitter, the combination of a controller capable of making and breaking a circuit at a uniform rate, a finger key lever, a contact therefor, a pivoted member interposed between said lever and said controller, and a spring engaging said member and normally rendering the said controller inactive, the lever being capable of movement in opposite directions by one of which movements it moves the said member against the action of the spring and renders the controller active and by the other of which it is brought into engagement with its contact.

19. In a telegraphic transmitter, the combination of a spring arm capable of making and breaking a circuit, a restraining member therefor, a spring acting on said member to cause it to prevent the spring arm from vibrating, a pair of contacts independent of

said spring arm, and a finger key having a movement in two directions, by one of which it closes said independent contacts and by the other of which it moves said member against the action of its spring to render the spring arm active.

20. The combination of a controller including a spring supported at one end and weighted at its other end, a stop adapted to limit the movement of the weighted end in one direction only, and key mechanism adapted to govern said controller, holding it idle against said stop, or rendering it active.

21. In a telegraphic transmitter, the combination of a controller adapted to make and break a circuit, a pivoted arm, a spring acting on said arm to hold the controller normally inactive, a pivoted finger member carrying finger pieces, a contact for said member, said member being capable of two movements, in opposite directions, one of which closes said contact and the other of which engages said arm to move it to release the controller.

22. In a telegraphic transmitter, the combination of a controller adapted to make and break a circuit, a pivoted arm, a spring acting on said arm to hold the controller normally inactive, a pivoted finger member carrying finger pieces, a contact for said member, said member being capable of two movements in opposite directions, one of which closes said contact and the other of which engages said arm to move it to release the controller, a spring tending to hold said finger member in engagement with said controller, and means for adjusting said two springs.

23. In a telegraphic transmitter, the combination of a controller adapted to make and break a circuit, a member adapted to render said controller active, a lever, a contact additional to the controller, another contact carried by said lever, said lever being mounted adjacent to said member and adapted to move independently thereof in the direction to close said additional contact, and adapted when moved in the opposite direction to move said member with it to render the controller active.

24. In a telegraphic transmitter, the combination of a controller adapted to vibrate and make and break a circuit, a pivoted member adapted to render said controller active, a spring tending to hold said controller inactive, a lever pivoted adjacent to the pivot of said member and adapted when moved in one direction to engage and move the member, and when moved in the other direction to move independently of the member, a double faced finger piece mounted on said lever, a contact carried by said lever and an additional contact with which it may coöperate when the lever is moved in the opposite direction to that which renders the controller active, and a spring tending to oppose the movement of the lever which closes such additional contacts.

25. In a telegraphic instrument, the combination of a controller adapted to vibrate and make and break a circuit, a member for governing said controller, a pair of contacts additional to the controller, finger mechanism adapted by movement in one direction to render the controller active and by movement in the other direction to close said additional contacts, an independent key including a contact, a lever, and a finger piece, and a manually operated circuit closer common to the controller, to the additional contacts and to the independent key.

26. In a telegraph instrument the combination of a vibrator constituting one terminal of an electric circuit, a stationary contact coöperating with said vibrator and constituting the other terminal of the circuit, said vibrator tending to make contact with the said contact when in its free condition, a spring-pressed lever normally pressing upon the said vibrator to hold the circuit terminals apart, and a key adapted to act upon the said lever to release the vibrator.

In testimony whereof, we hereunto affix our signatures in the presence of two witnesses.

BENJAMIN F. BELLOWS.
AMBROSE BEHNER.

Witnesses:
ALBERT H. BATES,
B. W. BROCKETT.